FROM WELFARE TO INNOVATION

STI – policies under the spotlight

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ARI TARKIAINEN

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ABSTRACT

Ari Tarkiainen

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Keywords: innovation, science and technology policies, welfare cluster

This thesis analyses the political construction of the current form of science and technology policies (STI policies). The empirical case analysis examines Finland's transition to STI policies since 1990. In implementing STI policies Finland is often seen as a model country: the Finnish case can be seen to illustrate two characteristics of its political culture – the strong position of bureaucracy in policy making and its tendency to consensual necessities. At the same time STI policies involve a great deal of obscurities often characterised as policy lessons. One of these lessons is the welfare cluster case.

Methodologically, the study utilizes the hermeneutical and rhetorical tradition. By introducing two rhetorical perspectives, the rhetoric-in-science (RIS) perspective and the rhetoric-in-politics (RIP) perspective, the study examines the political construction of STI policies. The aim is to explicate the ways in which scientific theories and the principles of new governance are embedded in those policies.

The study stresses that STI policies utilize a variety of rhetorical instruments such as the performativity of theoretical concepts and the ethos of new public management in order to be able to justify and legitimate those policies. The rhetoric skilfully exploits two classical dilemmas, the controversy between the natural and the social (culture vs. nature) and the controversy between the oikos and the polis (economy vs. politics). The conclusion of the study is that the interpretation of STI policies may have an ideological as well as rhetorical version. Both of them stress that STI policies do not refer to disputes on science, technology or innovation as such. Rather, they constitute one of the most important arenas where our accounts of society and politics are defined.

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The origins of this thesis are complex and manifold, and it has a long history. My personal version goes in the following manner. When I enrolled in my second academic studies at the University of Joensuu in 1988, my interest in research and scientific issues was aroused immediately. In the early 1990s I was involved in a couple of research and development projects associated with the dilemmas of career guidance and counselling in higher education, and many PhD plans were naturally linked with these issues.

My involvement with two EU projects at the North Karelia University of Applied Sciences in 1996- 2001, however, re-directed my interests totally. During these "social technology" projects, as they were called, I realized how difficult the problem of technological innovation is and how complex the practical development of innovative environments is in reality. Our endeavour to construct an arena for innovative home environments utilizing universal design principles in accordance with emerging new forms of social and health care services proved to be a difficult and time-consuming task. These confrontations made me start my postgraduate studies in social policy at the University of Joensuu in 2000.

I still remember a particular afternoon in 2000 when I met Professor Pirkkoliisa Ahponen for the first time. I immediately realized that I have found a person who appreciates my interest in innovation and understands my tentative PhD plans. Our discussions then, as well as many times since, went beyond traditional supervision boundaries, and often they have been very abstract and theoretical. However, these discussions have helped me a great deal. I appreciate, Pirkkoliisa, your support and I wish to thank you for your keen commitment with my PhD project. Professor emeritus Mikko Salo at the Department of Social Policy expressed a great interest on my PhD project as well. I remember how he used to knock my door and ask me for a cup of coffee at half past eight sharp. Thanks to both of you, Pirkkoliisa and Mikko.

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A scholar's work is often described as a flux between solitary introvert moments and extrovert social periods: both of them are necessary. During these PhD project years our unofficial lunch team has provided an arena for my extrovert social periods. Thank you Aino, Esko, Juha, Jukka, Maisa and Osmo. Your nice company and sense of humour have helped me a lot.

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March 25, 2009, in Joensuu

Ari Tarkiainen

CONTENTS

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ABBREVIATIONS

ANT	Actor-network-theory
ECSC	European Steel and Coal Community
EEC	European Economic Community
ETLA	Research Institute of the Finnish Economy
EURATOM	European Atomic Energy Community
GDP	Gross Domestic Product
GERD	Gross Expenditures on Research and Development
IMD	Institute for Management Development
KBE	Knowledge-based economy
MSAH	(STM) Ministry of Social Affairs and Health
MTI (KTM)	Ministry of Trade and Industry
NIS	National system of innovation
OECD	Organisation for Economic Co-operation and Development
OEEE	Organisation for European Economic Co-operation
OR	Operation research
RAY	Finland's Slot Machine Association
RIP	Rhetorical perspective on politics
RIS	Rhetorical perspective on science
SITRA	Finnish National Fund for Research and Development
SSK	Sociology of scientific knowledge
STE	Science and Technology Hybrid
STI	Science, technology and innovation policies
STP	Science and Technology Policy Council of Finland
STS	Science and technology studies
TEKES	National Agency of Finland
VTT	Technical Research Centre of Finland
WEF	World Economy Forum

1 INTRODUCTION

1.1. A passionate quest for innovations

The purpose of this study is to examine the political and rhetorical construction of STI policies.[1] They are interpreted as a dynamic complex in which the scientification of politics and the politicisation of science are intertwined.

The empirical case analysis focuses on the Finnish science and technology policies and, in particular, on the transition to the NIS (National System of Innovation) framework since 1990. This transition reflects the political and rhetorical shift from welfare policies to innovation policies in Finland in an interesting manner. The aim of this study is to show that STI policies provide a central platform in which the debates concerning the conditions of the cultural practices of western post-industrialized societies will be in the future.

The empirical material utilized in the study can be divided into three types. The first group is a collection of national and international STI policy material; it consists a variety of political documents and studies linked with those policies. The second group is composed of key persons' thematic interviews focusing on the welfare cluster; these key persons represent three instances - political administration, research institutes and enterprises. The third group consists of statistical studies linked with STI policies and produced by different institutes.

The key term of STI policies is innovation. New terms such as innovation are problematic because it is very difficult to give a strict definition for them, as is also the case with innovation. On the one hand, it is used as an umbrella type of term referring to inventiveness, creativity and novelty and, on the other hand, it has a more specific meaning as a complementary term to invention. This study attempts to clarify what makes innovations so special in current science and technology policies.

The speciality of innovations becomes evident if we examine the report *Finnsight 2015 - The Outlook for Science, Technology and Society* published by the Academy of Finland and TEKES, The Finnish Funding Agency for Technology and Innovation in 2006.[2] The report reveals the enchantment with the term innovation very clearly. This can be seen in the first chapter:

> "The development and strengthening of competences and innovations is the key to Finland's success in the future. Cutting edge basic and applied research coupled with broad-ranging expertise and competence will help to reach international excellence. Finland needs a national strategy, a vision and commitment to pursue these policies as well as an understanding of the challenges that lie ahead for business and industry and society as a whole and the means with which to promote our welfare." [3]

The overall point of *Finnsight 2015* is to identify the focus areas of the Finnish competence for the future in the fields of science, technology, society and business and industry, and to develop strategies for them. The project is explained to be instrumental in helping to define Finland's Strategic Centres of Excellence in Science, Technology

[1] The term STI policies refer to the current policy domain of science, technology and innovation policies.
[2] Finnsight 2015, The Outlook for Science and Technology and Society,
[3] Finnsight 2015.

and Innovation in line with the Government's decision-in-principle on the development of the public research system made 7th April 2005. The project is important because it deepens the collaboration between the Academy of Finland and TEKES and fosters the climate of multidisciplinary debate and discussion.

The *Finnsight 2015* report can easily be read as a report that, like many others, has no special value. But although it is fluently written and its structural design is excellent, the careful reader finds a variety of interesting issues and topics that the report advocates.

Undoubtedly, the report is an example of forecast studies in which the idea of forecasting is to specify the future by introducing a set of scenarios seeking to start political debates and discussions related to them. Such future research, as it is often called, is often justified by referring to four arguments: a) The future is shaped by human choice and action; it is not a matter of determinism; b) The future cannot be foreseen, but exploring the future can inform present decisions; it is rational and useful to discuss the problems of the future; c) There are many possible futures and scenarios map a "possibility space"; the task of the public discussion is to demarcate the line between the possible and the impossible and establish guidelines and milestones; d) Scenario development involves rational analysis and subjective judgement; the scenarios must be as plausible and justifiable as possible.[4] The real point of such forecasts is to enable strategic work related to possible futures and to discover new promising approaches and angles for the future.

However, this Finnish report illustrates the present discussion on innovation-driven society in Finland. Thus it mirrors the changes in science and technology policy since the 1990s and draws an interesting policy trajectory embedded in the innovation policy argumentation. All this becomes transparent if we examine the framework that the report advocates. We must also keep in mind that the ultimate aim of the Finnish forecast project is to support the Academy's strategic work and needs to strengthen the basic research and TEKES's strategic focus area planning.

The report does not advocate a single approach or view. Rather, it stresses the need to mix approaches, interfaces and perspectives in order to find synergy benefits. In other words, the report highlights the flux in economic, political and cultural environments, and all countries share the same interest to develop competencies in order to increase wealth. The conclusion of the report is that the development of research and technology creates new innovations for greater wealth and welfare, and this is possible if it is facilitated by those competencies that together with other competencies create new practices.

The report opens and ends with the challenge of globalisation. It attempts to describe the ever-changing environment by introducing eight prominent driving forces in today's global operating environment.[5] The first of them is globalization which has two different elements. The first element is the trend of increasing mobility; the flow of goods, money, capital, people, ideas, cultures and values across national boundaries is continuously expanding. The second trend is the growing interdependence of the different parts of the world, their increasing interaction and cooperation in economy, production, social development, communications and human exchange. With the breakdown of economic and communications boundaries around the world, nation states and regions must rethink their roles.

[4] See de Jouvenel 1967.
[5] Finnsight 2015, p. 6.

Finland is one of those advanced economies that are losing their status because of strong economic growth in the Far East. Also, the focus of economic growth is shifting to regions beyond Europe and the United States. These changes have a major impact on employment in Finland and its technological and economic competitiveness. Market success, stresses the Finnish report, cannot be achieved in the future simply by means of technological innovations, but it will require more in-depth knowledge of consumers' wishes and choices and an ability to differentiate them from other products and services.

> "As far as the individual citizen is concerned, globalisation means an increased freedom of choice both in education, in the labour market and in consumption. At the same time, the daily life of individuals is increasingly permeated by growing complexity, the increasing vulnerability of business and the economy, instability in the work environment and growing cultural tensions between people." [6]

The second driving force is the changing population structure. In countries such as Finland the ageing of population means that there is a clear need for more staff in the service sector as well as in professions requiring a high level of education. In Finland, working people take greater responsibility than before for the welfare of children, older people and others who are not in active employment. Also, countries' dependency ratio is rising more sharply than in most European countries. The ageing population is also changing the structure of consumption, which also increases the demand for health and care services.

The third driving force is the development of science and technology. They open up new opportunities for innovation in working practices, business processes, systemic structures and social behaviour. Technological development enables new ways in which people can participate in networks in a technological, professional and social sense. While the frequency of interaction will increase at the same time it is becoming more superficial. The need for human interaction will increase as will also the need for human relations supporting human maturation and adding to a sense of security.

The fourth driving force, argues the report, is the requirement of sustainable development. Our decisions and solutions must be ecologically sustainable but also economically viable, socially just and culturally valuable. The dramatic environmental changes such as the climate change and the loss of biodiversity have also impacts on health, well-being and the quality of life. The prices of depleting natural resources such as oil, natural gas and uranium will increase, and the scarcity of energy places increased pressure on production and transportation systems. It follows that governments must find ways to increase the environmental efficiency of industrial processes and reduce their emission levels.

The fifth driving force is the competition for location. It is a key factor in global competition and the cost level and availability of a competent workforce are its essential elements. Small countries such as Finland must carefully select the fields in which they want to reach international excellence in research, technology and innovation. In other words, those countries must network globally and develop new ways of exploiting global knowledge and competence. They must also realize that cultural and regulatory competencies are important.

[6] Finnsight 2015, p. 7.

> "In the future, growing need will be investment in developing competencies that creatively integrate basic scientific and technological know-how with business, cultural, legal and societal competencies." [7]

The market for competent workforce is becoming increasingly globalised. Therefore, every country must make their working and living environment more attractive to people coming from the outside. At the same time, people move out in search of the best education, science and technology in their own field, wherever it is. The patterns of alteration between work, study and leisure during the individual's life have become more and more important for individuals.

The sixth driving force is open source or open innovation ideology. It means that work is becoming increasingly independent of time and location. Organisations may work toward the same goals but they may be scattered around the globe, managed and administrated via ICT networks[8].

> "The role of motivation and incentives is set to increase even further, as is the importance of a motivating and inspiring climate at work. More partnerships and cooperation means more communication. This open innovation concept will continue to grow and expand with the rapid changes in earning models. The constant changes in needs are increasing job insecurity and short-term job contracts."[9]

The seventh driving force concerns the cultural aspects of globalisation. The advancement of globalisation means that different sets of values come in contact with one another in an increasing manner. The reactions of individuals and societies include the denial and suppression of diversity, approval and respect, and active efforts to promote multi-cultural interaction.

> "As the need for competent people continues to increase with population ageing, positive multiculturalism combined with the welfare state is definitely a competitive asset." [10]

In terms of Finland's international attractiveness and competitiveness there must be a sufficient range of cultural services and we must keep in mind that the promotion of Finnish culture has intrinsic value.

The eight driving force is the management of change. If global dependence was earlier understood in ecological and military security terms, nowadays it is understood from the point of view of capital, investment markets, production networks and information flows.

> "Many of the new challenges and means of governance are related to the deepening of cooperation between governments and businesses and industries in which the goal is to strengthen national competitiveness. (…) More and more often now, the globalization of innovation and production requires joint solutions to issue and technology-specific governance issues. These may be in the form of agreements and standards, regulation and common rules." [11]

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[7] Finnsight 2015, p. 9.
[8] ICT= Information and Communication Technology.
[9] Finnsight 2015, 10.
[10] Finnsight 2015, p. 11.
[11] Finnsight 2015, p. 11.

States, argues the report, remain important actors but they have to work more closely with other domestic, and more international actors when they seek to safeguard national interests. The competencies related to governance and the assessment of systemic risks will become more and more important.

In order to link the driving forces in globalisation with the Finnish economic, political and cultural contexts the report puts its analytic focus on a variety of Finnish competences and evaluates critically their appropriateness in regard with the future. This part of the foresight is the key of the report and it results from the work of panels where leading research and industry experts contributed their multidisciplinary knowledge and insights on the subjects concerned. [12]

Having analyzed the Finnish situation with the challenges in the future the report suggests three strategies for Finland. The first of them is that the new policies must be presented on human terms. Interestingly, the report highlights the importance of human values and issues: the role of learning in innovation processes; the importance of health promotion – the utilization of the extensive patent and statistical databases in the Finnish public health care, the use of the opportunities of human technology; the long tradition of basic education; the heritage of Finnish cultural competence in connection with the challenges of the multicultural world and the danger of marginalisation.

The second strategy highlights the development of core competencies together with new practices. The focus of development must be, argues the report, on the following issues:

- the service expertise - customers and users must come first, the development of the Finnish infrastructure and its functionality;
- the development of the Finnish social and health care system - to increase its efficiency by increasing the productivity of the system by the sensible use of new technology
- the further-development of the Finnish ICT know-how, the utilization of materials development and biotechnology - the co-development of the strong basis of in-depth expertise and multidisciplinary cooperation;
- the generation of interfaces and possibilities for interdisciplinary research and expertise to present possible new business opportunities;
- the development of infrastructures for new industrial and commercial experiments with end-users.

The focus of the third strategy is on the global economy. The report stresses that Finland ought to find political solutions in the following issues:

- the challenges of the global economy – Finland must find as a small country its own niches by specializing in areas where it is possible to achieve an internationally strong position, first, the management of global knowledge and multiculturalism – multiculturalism and difference must be seen as a richness and an opportunity;

[12] Each ten panels had a sector of its own and they have specified the key areas of competence related to a particular sector: 1) Learning and Learning Society, 2) Services and Service Innovations, 3) Well-being and Health, 4) Environment and Energy, 5) Infrastructure and Security, 6) Bio-expertise and Bio-Society, 7) Information and Communication, 8) Understanding and Human Interaction, 9) Materials, 10) Global Economy.

- the assessment of global risks – global risk management in economy and in the energy and environmental sector is increasingly important, and Finland must participate actively in the development of global and EU-level regulation;
- the sustainable environmental management – the globalisation and the liberalisation of world trade are fundamentally changing the framework of environmental management and Finland has real potential to create significant innovations in this field;
- the challenge of energy production and use – Finland must utilize its competency and know-how and find new commercially innovative solutions and environmentally sound energy solutions;
- the management of innovation networks – all significant innovations are nowadays created in global networks and Finland must utilize its open environment, in which basic and applied research are in cooperation with innovative environments.

The key aspect of the management of innovation networks is to understand the innovation process as such but also to understand people's needs and demands as well as their behaviour change. This kind of test area is under-developed in Finland. From a national economy point of view it is important to optimise the impacts of public authorities' operations. As a summary, the report announces openly that it is only by developing new public- private partnerships that Finland is able to provide new solutions to many service concepts. The old tricks do not apply anymore.

As seen in the *Finnsight 2015* report the key challenge for Finland is the problem of rapidly changing economic, political and cultural contexts, the dilemmas of globalisation. The report can be read as an instruction manual for the development of the Finnish political governance so that it is prepared to meet the dilemma.

In reality, it is a very political document. Its political aspects become transparent if we compare the Finnish report with some other similar reports, for example the UK document *Foresight Futures 2020. Prima facie,* the Finnish report appears a neutral and factual description of the present world and nothing else. The Finnish report introduces its message as a set of facts or as an unavoidable and almost determined path that Finland must follow. Its major concern is understandably on the nation state level. The proper agent of the report is thus Finland as a nation and its concern is the fate of Finland in the world of turbulent globalisation. But the Finnish report is not an exception to the rule. In reality, our contemporary world is full of similar reports in which different countries introduce their own future strategies and scenarios related to innovation. The beginnings of the Finnish science and technology policy governance are often traced back to the 1980s. Since then, the Finnish policy-making structures and core institutional arrangements of RTDI (Research, Technology, Development and Innovation) have been remarkably constant, and no significant reforms in policy-making process and mechanisms have taken place. [13]

In terms of the Finnish policy-making a lot of changes have been made at implementation level to adapt institutions and agencies responsible for funding research, and technology development, or for company support services. The development of the structures of the Finnish innovation policy has been incremental so far, and there is stability and a wide spread consensus among the key actors. The key feature of the

[13] Lemola 2002.

Finnish governance seems to be trust and mutual understanding concerning the factors facilitating economic growth and competitiveness.[14]

In comparison with some other reports, for example, the UK report,[15] the Finnish report highlights the future totally differently. The UK report is written with a very political vocabulary and it has a clear political ethos. The framework of the UK report is based on the scenarios of four interactive sectors or spheres: World market, National enterprise, Global responsibility, Local stewardship. These scenarios are presented as storylines which set out some general trends and provide more detailed views dealing with a number of areas: economic and sectoral trends; employment and social trends; regional development; health, welfare and education; the environment.

One of the most interesting differences between the two documents is how the UK report and the Finnish report see the relation between the traditional nation state and economic globalisation. Although the UK report stresses that political power remains at the UK level and the relationship with the EU remains distant, keeping responsibilities for defence, foreign and economic policy with the UK government, it also openly says that the diplomatic and security relationship with the US is to be strengthened. The report furthermore admits that market values will dominate, and economic and political power will be more concentrated in the hands of a few politicians and in the business community.

The report also stresses that the trade-off between liberalised markets and the retention of national control over the economy makes this a medium growth scenario over the long period. In other words, public investment in infrastructure development is reduced but services grow, especially in the areas of health, tourism and retailing. Unstable economic development and a lack of job creation in new dynamic sectors do not compensate for increasing flexibility in labour markets. Working hours continue to increase, especially for lower paid workers who are to supplement their income through work in the informal sector. In conclusion, the UK report can very easily to be read as a political document contrary to the Finnish report. On the one hand it stresses that the scenarios it advocates are open and flexible and, on the other hand, its language and vocabulary are clearly political. The Finnish report is as I will show totally different.

One of the main differences is a stylistic one. The Finnish report is written as if it were a serious scientific report without any political connotations. In reality, the report is nothing but a political one. Its political aim is to legitimate a set of political strategies, open new guidelines and introduce a variety of ideas related to new political instruments and tools to be used in the Finnish political context. What makes the Finnish report curious is the fact that it advocates its message as if it were not a matter of politics. The Finnish report is very important for this study because it opens up the problematics I will concentrate on.

The differences between various countries can be explained by referring to the differences of political cultures and practices. The political processes linked with the reports have been very different. If the UK report is produced and written by a set of scholars specialized to science and technology policies and the report has been revised at least twice, the construction of the Finnish report is very different. The introduction of the Finnish report emphasises that the report is a result of creative, fascinating and keen panel work. It is thus an output of the Finnish consensual political culture in which an

[14] EU - The European Commission (2006a).
[15] Foresight Futures 2020.

aim of politics is to activate participants and find an objective and coherent argumentation basis for consensus.

1.2. Genealogies of STI policies

The common view among STS scholars is that the actual science and technology policy directed by the state started after the Second World War in the USA and spread over the world very quickly.[16] While this is true, it is not the whole truth if we follow Mirowski's and Sent's[17] historical analysis of science policy in the United States in the 20th century. They distinguish between three over-lapping periods in their analysis: The Proto-industrial regime 1900-1940; the Cold War regime 1940-1980; and the globalized privatization regime since 1980.

Their thesis is that the contemporary science and technology policy, the globalized privatisation regime, has close links with the developments in international politics after the fall of socialist countries ruled by the Soviet Union at the end of the 1980s.

The whole idea of science and technology policies must be linked with the international politics after the Second World War and the birth of the Cold War era, in particular. In the late 1940s one of the most important developments was the spreading of strong political and economic aid via a set of different political interventions organized by the US government including the Marshall Plan, the European recovery program. The Marshall Plan has produced a lot of debate; one line of those debates has been the problem of winners. Some historians have stressed the benefits of the Marshall Plan to U.S. industry. [18]

The radical changes in national science and technology policies in the US were also very obvious and are often related to Big Science argument. The term Big Science [19] describes a series of changes in science during and after World War II. While in World War I science played a major role in warfare and armaments, the increase in the military funding of science the Second World War was unpredictable. The Manhattan Project proved that a strong investment on scientific research was important to any country wishing to have a role in international politics.

After the Manhattan Project and during the Cold War international governments i.e. the United States and the Soviet Union became the chief patrons of science and the character of the scientific establishments changed remarkably. Big Science implied specific characteristics: big budgets, big staffs, big machines and big laboratories. One interpretation of Big Science has been that it started a new era for governments. It started a new form of research facility: the government-sponsored laboratory system employing thousands of technicians and scientists managed by universities became a model for science as such. The home of scientific knowledge and research was in those very expensive laboratories. "*When history looks at the 20th century, she will see science and technology as its theme; she will find in the monuments of Big Science -the huge rockets, the high-energy accelerators, the high-flux research reactors -symbols of our time just as surely as she finds in Notre Dame a symbol of the Middle Ages... We build our monuments in the name of scientific truth, they built theirs in the name of religious truth; we use our Big Science to add to our country's prestige, they used their churches for their cities' prestige; we*

[16] Whereas Timothy Lenoir emphasises the German development in the 19th century; Lenoir 1998.
[17] Mirowski and Sent 2002.
[18] Schain 2001.
[19] Galison and Hevly 1994.

build to placate what ex-President Eisenhower suggested could become a dominant scientific caste, they built to please the priests of Isis and Osiris."[20]

If the Manhattan Project coined physics and astronomy as big sciences, later also life sciences, after the invention of DNA and RNA in the 1950s and the human genome project in the recent decade have become new big sciences. This heavy investment of government and industrial interests into academic science has blurred the traditional line between public and private research. The dependence of research on central public funding bodies is often seen as a dangerous development in which the degree of independence in contemporary scientific knowledge is questioned.

After the Second World War science and technology played an important role in national policies, and for example German's and Japan fast economic revival can be explained with those policies[21]. In terms of Big Science the contemporary NIS[22] framework used in STI policies is a new phase in its development; it openly advocates a totally new perspective to science and technology as a political program as we have seen above. Big Science has been a kind of accelerator for those policies while there was initially only a rationale for science policies, there later emerged a rationale for science and technology policies, and now we have a rationale for science, technology and innovation policies. Why?

When Thomas Kuhn released his famous *The Structure of Scientific Revolutions* in 1962 many things changed. Kuhn's book evoked a lot of discussion among scientists and philosophers. At the time one very popular picture of science was as is also today the opinion that science develops by the addition of new truths to the stock of truths or increasing the approximation of theories to the truth. This progress is in the hands of particularly great scientists and it is guaranteed if scientists follow the scientific method. In the 1950s the historical study of science was a young discipline and Kuhn was the first to articulate that the standard view was too simple and false.

Kuhn argues that there are no rules for deciding on the significance of a puzzle and for weighing puzzles and their solutions against one another. The decision to opt for the revision of a disciplinary matrix is not one that is rationally compelled, nor is the particular choice of revision rationally compelled. For this reason the revolutionary phase is particularly open to competition among differing ideas and rational disagreement about their relative merits. This suggestion was interpreted by some sociologists and historians of science so that the outcome of a scientific revolution, indeed of any step in the development of science, is always determined by socio-political factors.

As Philip Miroswki[23] remarks, Kuhn has been an extremely important figure in the history of science but we must not focus on Kuhn's person: we should rather examine other facets of the problem. One of those paradoxes related to Kuhn is how it is possible that a person with a disdainful attitude towards the social sciences has become a celebrated figure among social scientists.

Mirowski's answer is that Kuhn was involved in many other developments in the United States; the rise of Big Science and the innovation of OR[24]. His point is that those two interventions were a starting shot for the whole idea of science policy and there were two different versions of how science operated: the British and American ones.

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[20] Weinberg 1961, pp. 161–164.
[21] Freeman 1988.
[22] NIS= National System of Innovation aka The National Innovation System
[23] Mirowski 2004, p. 85.
[24] OR= Operation research.

While the British version stressed Michael Polanyi's idea of "tacit knowledge",[25] the American version highlighted Kuhn's "normal science". Polanyi's point was to elevate science as the paradigm of human accomplishment with roots in individual cognition. His epistemological view was that knowledge was not to be reduced to the brain, and he believed that everyday modes of knowing were in principle no different from their scientific counterparts. A motto for Polanyi was "We know more than we can say"; human knowledge has a tacit dimension. This means that liberty was a necessary prerequisite for progress in science and in the economy.

Mirowski's claim is that Kuhn's success was not only an accident but it is related to his involvement in Big Science. One of the most important aspects of Big Science is according to Mirowski the birth of cyborg sciences. The term of cyborg sciences refers to an enterprise to solve the problem of the Natural and the Social by reducing the Social to the Natural. This tendency is embedded in neo-classical economics, Social Darwinism, Kohler's psychological field theory, technocracy, eugenics and many other research programmes. The common feature of all these programmes is that if the earlier versions of scientism left the boundary between the Natural and the Social intact, what happened after the Second World War II was totally different.

Mirowski's point is that the fundamental of cyborg sciences is to agglomerate a heterogeneous assemblage of humans and machines, the living and the dead, the active and the inert, meaning and symbol, intention and teleology in which Nature has taken on board many of the attributes conventionally attributed to Society. Another one of Mirowski's radical claims[26] is that the new cyborg sciences did not simply spontaneously arise but that they were consciously made. Cyborg science is Big Science *par excellence*; its militarily imposed rationale of command, control, communications and information (the C^3I paradigm) is the key to all questions.

If the birth of science policy is clearly linked with the Cold War the contemporary R&D policy[27] is totally different. The contemporary R&D policy, often referred to the term STI policy or STI policies, is closely linked as we saw earlier with globalisation and competitiveness. It is also apparent that the shift from a cold war R&D policy to a competitiveness R&D policy is under way and the shift will be lengthy, uneven and incomplete. The science and technology policy literature associated with a competitiveness R&D policy rationale stresses three issues. If science and technology are seen as contributing to economic competitiveness, then funding for academics and basic research will increase. Second, it assumes that the funding of science and technology with a commercial rationale will not change scientists and their work. Third, it assumes that academic science and technology are somehow separate from the universities in which they occur. This means that there is a clear need for institutional reforms and reorganisations. The question is whether these assumptions are coherent and real.[28]

The shift toward a competitive R&D policy has started in the 1980s and it has spread to all industrialised countries. The profit-making potential of intellectual property and, in particular, the opportunities of biotechnology have intensified privatisation and commercialisation in university-based medical education and research. The rationale shift is naturally a complex of issues but it is often associated with the Reagan and Bush administration and a variety of changes in legislation in the 1980s and 1990s.

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[25] Polanyi 1958.
[26] Mirowski 2002, pp. 16–17.
[27] R&D = Research and Development.
[28] Slaughter and Rhoades 2002.

The key elements of a competitiveness R&D policy can be reduced into two major issues. While the first issue can be reduced to the problem of the economy, the second issue is the problem of economics as an analytic cognitive toolbox. The difference between the earlier rationale of science and technology policy is not substantial because it was based on economic growth and welfare. Rather, it implies a totally different view to the realm of economy. This means that we have to develop a new conceptual, methodological, metaphysical, theoretical, and instrumental arsenal to study the problem of economy. The other issue is linked with the first so that the new rationale also advocates the view that science should be understood as if it were as economic process.[29]

Kenneth Arrow[30] who defined science as a form of mining aimed to draw a sharp distinction between science and technology. This has later been popularized as the linear model of the relationship between science and economy. According to Arrow, if we think that science is a commodity, a special case of a troublesome thing called "public good", it follows that basic knowledge will not likely be rewarded as such.

But the welfare economists in the 1950s thought that in order to achieve certain welfare goals certain judicious government interventions are justified. In effect, they faced a kind of paradox: on the one hand, science could be conceptualized as a market and, on the other hand, it was a special case. This paradox was dovetailed later with the idea of market failure in Keynesian macroeconomics that equates technological progress with spending on research and development.[31]

While the image of science as the production of public goods is still involved in science and technology policy, it is also obvious that the public good scenario reflecting the Walrasian equilibrium has transformed into the cognitive/contracts scenario reflecting game theory and Nash equilibria for non-cooperative games. [32] Science is no longer regarded as producing things but rather fostering the existence of a complex of cognitive states. This redirects the economics of science towards the questions of the optimal organization of the actual process of inquiry in the face of uncertainty. [33]

All this implies that if the earlier account of science understood it as knowledge, as a thing, this was completed by the metaphors created in computer science for cognitive processes in which the information satiated hybrid is fused to knowledge. This new approach adopts the language of the agent as an information processor and takes the divergence between individual and social goals as its major point of departure.

If the traditional version of science policy was closely linked to the philosophy of science and the neoclassical economics, the contemporary STI policies have very close links with partly evolutionary and institutional economics and also with cyborg sciences, measurement and quantification. Mirowski's third provocative claim is that in the contemporary science policy the major issue is the problem of science.

The crucial question linked with the current debates on science is how the universities in the future will be structured. One very embarrassing aspect in the recent

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[29] In terms of the earlier rationale there were two important contributions or attempts to promote the economics of science Richard Nelson's version, very much based on Paul Samuelson's welfare economics, and Kenneth Arrow's version based on the Cowles Commission Walrasian theory both consultants at RAND. Both of these approaches see science as producing a thing called knowledge and both promote the central question related to economics of science whether or not the thing produced by scientists qualifies as a public good and therefore deserves public subsidy.

[30] Arrow 1962a, reprinted in Mirowski and Sent 2002, pp. 165–182.

[31] Nelson 1959, reprinted in Mirowski and Sent2002, pp. 151–164.

[32] Rizvi 1994.

[33] Mirowski and Sent 2002, p. 44.

debates on science is that scientists and science as such have no special position or quality. Research programs and projects are stabilized through the processes of negotiation, recruitment, purchase and realignment. Their legitimacy including the university system is thus an ongoing construction project.

According to Mirowski this has started a totally new discussion on science and there are two major rival approaches to the problem today: the science studies tradition or SSK/STS tradition[34] and the economics of science.[35] One of the curiosities of STI policies is that they openly advocate the benefits of science and technology and link them with competitiveness, economic growth and welfare. But as this is not the whole truth it makes the problem of STI policies more complex and difficult to understand, not to speak of analyzing it. This is due to the fact that for most governmental activities of science and technology are not goals in themselves but linked with other usually societal goals. Science and technology are often seen as national goals as such. Most of the expenditure on science and technology is discussed in the context of other goals.

But how did the situation develop in Finland and why are the developments at the 1940s so important? As we will see later in this study Finland has been a late-comer in science and technology policies. The Finnish science policy as a particular policy sector governed and funded by the state started *de facto* in the 1960s.

The ethos of the Finnish science policy is linked on the one hand with the Nordic welfare state ideal and with the interests of the export industries on the other hand. Two different perspectives for the transformation of those policies can be discovered. First, the construction of those policies can be seen as a negotiation process in which these two interests are politically interlocked so that the contradictory elements are dissipated. Second, the construction of these policies can still be seen as an amalgamation of Big Science and OR but its ethos is totally different from the earlier policy rationale.

One curious aspect of the Finnish science and technology policy analyses is that the OR aspect of those polices is often neglected and the role of cyborg sciences has not been critically analyzed in Finland, although one of the key debates in the Finnish social sciences in the 1960s and 1970s concentrated on such issues. The debates related to cybernetics have been very influential after the Second World War in the era of the Cold War both in the West and the East.[36] In Finland, OR has been a kind of invisible or hidden agenda in many debates in social and political sciences. In Finland, one very interesting curiosity has been the birth of mass communication studies and its political construction as a discipline in Finland in the 1960s and 1970s.

Yrjö Ahmavaara implemented cybernetics in social theory[37]as connected to the Finnish Broadcasting Company program strategy development in the 1960s and 1970s. Another example i Osmo A Wiio and his communication theory. Those two theorists utilized the idea of OR and other possibilities of cyborg sciences in different ways. Although the key issue for both theorists was to see human beings as constructors of social institutions and information processors i.e. their theories were different applications of systemic theory. Whereas Ahmavaara stressed in his Marxian favoured

[34] SSK= Sociology of Scientific Knowledge; STS= Science and Technology Studies.
[35] The interest of the first community is on the sociality of science i.e. the social dimensions of science and scientific knowledge and consists of such scholars as Donald MacKenzie, Sheila Jasanoff, Steve Shapin, Trevor Pinch and Andrew Pickering. The second community has close links with the philosopher of science Philip Kitcher but also with those who advocate social epistemology of science such as Alvin Goldman, David Hull and Miriam Solomon.
[36] Susiluoto 2006; Berndtson, Susiluoto, Palonen 1979.
[37] Ahmavaara 1970; Ahmavaara 1974; Ahmavaara 1974.

theory the role of cybernetics as a new instrument for planning government and administration Wiio rather stressed the meaning of human communication and its complexity at the basis of Herbert A. Simon's information theory. An interesting point is that Ahmavaara revised later his ideology totally, but Wiio remained faithful to his theoretical backgrounds.

In terms of the development of communication sciences in Finland, these two theorists have been very influential and Wiio, in particular, was very active in SITRA's early years[38]. His original point was to advocate SITRA as a Finnish version of RAND and his contribution to the development of science and technology policies in Finland was significant.[39]

The very apparent aspect of science and technology policies is that they imply a sort of promise, a warranty for the future. Although the bottom line in STI policies is that they involve a lot of insecurity, hopes, conjectures, contingency and risk, the ethos of these policies is that this is not the case. The nitty-gritty of those policies is simply that no real choices and alternatives are available. This aspect is often called in science and technology studies "technology-determinism"; the whole idea of the representative democracy is often excluded from the agenda of science and technology policies. The decisions that governments make are so complex and difficult, being full of high expertise and know-how, that it is impossible to translate them into lay persons' language. Both Ahmavaara and Wiio have advocated strongly the idea of social scientists as "software engineers" who model and analyze the human communications systems and its rationale, and both of them stressed the political aspects of "software engineers" expertise.

In other words, in the final analysis STI policies are inherently parts of politics and the ultimate aim of these policies is societal. But as the Finnish *Finnsight 2015*- report analysis clearly shows, the scenarios of Finland are the outcome of complex intellectual labour. It is a serious analytic work based on highly qualified expertise and know-how. The report is a know-how manifest advocating the ethos of objectivity, neutrality and impartiality often linked with the notion of scientific knowledge. The report also illustrates the ethos of enlighted policy making, a new mentality in political governance in which two administrative philosophies new public management and late cameralism are interlinked with one another.[40]

1.3. Purpose and the structure of the study

Two theses

It is apparent that if innovations are the core of STI policies there are two difficult problems that policy makers has to live with. The first problem is to give an exact definition of innovation: what are innovations. The second problem is to clarify the right ends and effective means to be utilized successfully in policy making. In terms of STI policies the concept of innovation is a matter of life and death due to the following reasons. On the one hand, the concept of innovation is important because it is used as justifying the new framework for science and technology policies and, on the other

[38] SITRA= The Finnish National Fund for Research and Development Fund; nowadays SITRA uses the attribute, The Finnish Innovation Fund.
[39] Särkikoski 2007.
[40] Hood and Jackson 1991, pp. 177–195.

hand, the concept is vital because it is used as a legitimation basis for the new ethos of political government that STI policies imply.

In the traditional science and technology policy context the idea of innovation was understood through linearity. In other words, it was a linear and sequential model of innovation in which the actors of science "discover" truths, technologists find "applications" for those scientific inventions by working out its practical implications, and the resultant products "diffuse" unchanged to users. [41] The pull-push mechanism embedded in a linear model [Basic research->Applied research->Development-> (Production and) Diffusion] assumes that scientific inventions function as catalysts in the pursuit of becoming concrete and tangible through technology. Technological innovations are sort of embodiments of scientific knowledge and there is a linear bond between a scientific invention and a technological innovation. Technological innovations are the basis for all innovations.

In the traditional science and technology policies the idea of innovation was linked with a technological innovation. Today one of the key arguments of the contemporary science and technology policies (STI) is to advocate a broader definition of innovation as a key aspect of science and technology. For example, one of the key arguments embedded in the NIS framework is that the traditional account of innovation must be reconsidered thoroughly. The idea of NIS is, rather, to advocate the idea of non-linearity and make the hidden aspects of innovation transparent in pursuit of creating innovation responsive environments as soon as possible.

In other words, one of the key arguments of STI policies is that there are no simple linear mechanisms between science, technology and economy there may be some mechanisms but they are more complicated than we have As entities science and technology do not interact as disembodied knowledge, but as embodied expertise: science is a resource that engineers draw on creatively, rather than apply in a simple and straightforward manner.

But what does the framework on National Innovation System add to the earlier approach? As Benoit Godin[42] remarks, although the NIS framework has close links with the system approach, it is different. The earlier view deal with policy issues: the government was believed at that time to have a prime responsibility in the performance of the system. The role of government was to secure its capacity to make the system work. But the policies had to be adapted and coordinated. Within the National Innovation System, the role of government is different: the framework stresses that its role is to create preconditions and platforms for those policies. The message is directed towards the actors, or sectors, and the focus is on the need for greater "collaboration". Whereas the early system approach was focused on the research system and its links with other components or sub-systems, the NIS framework's focus is on the firm as its main component, around which other sectors gravitate. The two approaches, however, put strong emphasis on technological innovation and its economic dimension, and urge all sectors to contribute to this goal – under their respective roles.

Taking into account all this it is possible to introduce two rather abstract theses regarding the STI policies as a political complex. These theses attempt to capture the core of the new STI policies rationale. The theses are based on the assumption that the concept of policy is a form of coordinated and regulated teleological activity in which structures and rules have an important role.

[41] Sörensen and Williams 2002.
[42] Godin 2007a.

The first thesis that might be called an internal thesis of STI policies focuses on the policy sector per se: One of the key points in STI policies is to reject partly the traditional linear model of innovation and replace it by the new non-linear model of innovation. This interpretation highlights the idea that by situating innovation to the middle of science and technology policies we must re-define both the content and form of science and technology policies. It follows that we have to analyze the hybrid of science, technology and economy, and provide a rational analysis of dynamics of that hybrid. It also means that we have to focus primarily on the problem of innovation instead of invention. But, as we will see later, the shift to NIS and to the knowledge-based-economy (KBE) is far from easy to do. They both imply a variety of theoretical and statistical difficulties that are very complex.

The key point of the internal thesis is that the shift to STI policies changes also the ethos of science and technology policies. The conclusion is that the resources of these policies must be re-allocated. In other words, the political discussion concerning the relation between the internal vs. the external aspects of those policies must begin immediately. All this implies a series of rhetorical moves in which a variety of rhetorical resources are used and adopted to justify the new rationale of those policies.

The second thesis that might be called *an external thesis of STI policies is* a kind of derivation from the first thesis. It argues that the first thesis is not enough. *The whole idea of STI policies is to expand political debates beyond the traditional domain of those policies and overtake a hegemonic position over other policy sectors. It follows that the rationale of STI policies must be linked with a new mentality of political governance.*

If the first thesis emphasises the significance of theoretical labour in pursuit of a better understanding of the hybrid containing science, technology, economy, and seeking to a plausible justification for new strategies, the second thesis highlights the role of political governance as a precondition for changing existing policy practices. If these two theses are accepted as valid it means that STI policies must necessarily involve two dimensions: first, to highlight the significance of innovation and, second, to highlight the construction process of responsive societal environments for innovations in particular. The second thesis introduces a totally new approach to science and technology policies and can be understood as a reversal of the first thesis. This approach is often called the horizontal aspect of science and technology policies. These two aspects of STI policies can take different names depending on the context. We might call them "theory-based top down policies" and "practice-based bottom up policies" and argue that the real challenge for STI policies is how to make these two aspects work together.

The NIS framework stresses that innovations are dynamic processes. It is only by utilizing the ideas of systems, complexity and contingency that we are able to understand them. This implies that technological innovations are possible through negotiations and compromises i.e. they are inherently social and political by nature. It follows that the interventional focus of that policy must be adjusted, and the quest for new policy instruments must be started immediately.

In analysing the political aspects of STI policies the research must focus on those two aspects. Only by taking into account these two totally different approaches are we able to access to the political core of that policy. This means that if the aim of the study is to analyze the political aspects of STI policies it is not useful to examine them only as an internal reform of science and technology policy. Rather, they should be understood as broad political and administrative processes in which the nitty-gritty of the policy is linked with new political governance. The political focus of new political governance consists of a set of self-reflexive political interventions in seeking to solve the dilemma of

the public sector as such and, in particular, to find a legitimation basis for the new political government and the expertise it prevails.

If this kind of an interpretation is accepted, it follows that the traditional science and technology policy arrangements and its power chances are in flux. One of these changes, perhaps its most radical reform, is that the role of basic research must be re-defined while its relevance and significance remain to be stressed. This kind of re-definition does not mean that the traditional idea of pure science or scientific research i.e. the autonomy of research and scientific knowledge remain untouched. Neither does it change the role of pure science but may change the role of scientists and scholars as well as their institutions.

Universities and other research institutes and organisations must not only be theoretically innovative but they also have to link theories to practice and thus explicate the possible benefits of their research with regard to possible innovations.[43] In other words, they have to link the external interest and the scientific interest more carefully than earlier.

One of the key challenges for political governance is how to make this very radical change real so that the shift from the scientific and/or technological invention to the other aspects of innovation such as diffusion and commercialisation becomes possible and plausible. All this puts a lot of pressure on political government, and what is perhaps the most important and radical change in regard with the traditional science and technology policy it changes the ethos of those policies. This change implies that political governance must utilize new theoretical knowledge dealing with science, technology and innovation in order to justify and legitimate the new agenda, its guidelines and milestones. But how are theory and practice linked with each other? Is the distinction theory vs. practice useful at all?

One of the curiosities embedded in the NIS -framework is that it although it refers to the KBE (knowledge-based-economy) argument it competes with NIS. [44] The KBE framework claims that, on the one hand, knowledge and know-how are the most strategic resources of the current economy and, on the other hand, learning is its most important process. The KBE argument sounds very plausible and is easy to accept. As some scholars have argued, this aspect has apparently helped the implementation of STI policies very much.[45]

One of the cornerstones of the learning economy emphasizes the role of new emerging knowledge and new co-developments between the dichotomy market vs. hierarchy- industrial networks. Its explicit aim is to speed up the rate of change by imposing growing international competition, deregulation and new technological opportunities in order to provide an incentive for companies to hire personnel with a high learning capability. Another cornerstone of the learning economy is the information technology and the codification of new technology that reinforce the acceleration.

The process is characterized by cumulative causation excluding a large and growing proportion of the labour force from normal waged labour. As Bengt-Åke Lundvall, one of the leading advocators of the learning economy, puts it. *"This kind of approach to economy implies the need to develop a new perspective on policy-making- a new kind of social compromise or the need for a new deal. The need is to further speed the rate of learning the*

[43] In the OECD this means that biotechnology and other science-based industries such as nanotechnologies have a special position in science and technology policy context.
[44] Godin 2007a.
[45] Godin 2003.

sectors facing international competition in order to obtain a bigger share in the most rapidly growing markets."46

The KBE framework stresses the significance of national policies. It means that nation states with their responsibility to implement STI policies have two different tasks. On the one hand, they have to create an open and flexible system of governmental environment for companies and industries to advance in global competition and, on the other hand, they have to create a sheltered sector where learning takes place at a slower rate and take into account the need to redistribute the access of information networks and the capabilities to learn in favour of the potentially excluded. The various ways in which this bipolarity peculiar to the construction of STI policies has been taken into account is one thematic addressed in this study.

This study focuses on the case of Finland because of the following reasons. First, Finland was *the first country in the world* to apply the NIS- framework in its science and technology policies. Second, Finland is an especially interesting case because Finland's performance in implementing the NIS has in many international studies been evaluated as excellent. Finland is often seen as *a model country* that has successfully linked the demands of global market with the Nordic welfare state tradition. Third, Finland as an actor has been very *determined and serious* in its ambition to fulfil all the principles of the NIS very carefully. Naturally, there are a lot of explanations available why Finland chose the NIS framework and why Finland has been successful but those issues will be dealt later.

Although this narrative of Finland as a success story is evidently a true story it is not the whole truth. One will get a bit different picture if the focus is put on some political interventions and experiences that have engendered a lot of obscurity and bafflement. One of those very peculiarities is the welfare cluster case, a particularly idiosyncratic political intervention linked with the renewal of the Finnish industrial policies in the 1990s. There is a lot of disagreement about its outcomes and results, some views suggest that it was a failure while others express a different one.

What makes the welfare cluster case so fascinating is the fact that *prima facie* it has nothing to do with STI policies. It is often argued that the welfare cluster case was only an exception to the rule and nothing else. My interpretation is that the welfare cluster is an important aspect of STI policies in Finland. This view is based on the following arguments.

One very interesting aspect of the welfare cluster is that the term was a buzzword, a neologism and its translation into English has been difficult. On the one hand, it is translated as the well-being cluster and, on the other hand, it is translated as the welfare cluster. Although there are a lot of political documents that prefer the term well-being I will use here the concept of the welfare cluster because of the following reasons.

First, the noun well-being is defined in an English dictionary as "*the state of being happy, healthy, or prosperous".* In other words, it is used as an attribute of an individual or a community and often as a synonym for a quality of life. The noun welfare is defined as "*the state of doing well aid in the form of money or necessities for those in need especially in respect to good fortune, happiness, well-being, or prosperity*". The noun welfare also refers to aid in the form of money or necessities for those in need, or it may refer to an agency or program through which such aid is distributed. [47]

[46] Lundvall 2002; Freeman 1991.
[47] "Wellbeing"in Merriam-Webster Unabridged Online, 2008.

Second, the semantic difference between the terms "well-being" and "welfare" becomes apparent if we examine the concept of a social welfare program. Encyclopaedia Britannica says that [48]

> "The chief characteristics of a welfare or security program are the risks to be protected against, the population covered, eligibility criteria, levels of benefits, manner of financing, and administrative procedures. All these criteria are subject to wide variation in practice. In particular, eligibility criteria often include a "time-lock," which requires participation in or coverage by a program for a specified time. Financing is generally accomplished by exacting contributions from covered persons, employers, or both, by the government out of general revenues, or by a combination of the two."

The conclusion is that the term welfare cluster describes the Finnish case more appropriately as will be shown later. The term was used exactly in the sense in which the term welfare is defined above. Furthermore, it is important to note that welfare economics as a branch of economics seeks to evaluate economic policies in terms of their effects on the well-being of the community.

Eventually, what is more important is the intervention as such because it opens a totally different outlook onto STI policies in Finland. The welfare cluster case can be seen as a practical case or a kind of policy exercise that opens up the door for the hidden aspects of STI policies. My thesis is that the welfare cluster has been one of the most important interventions in the Finnish STI policies because it deals with some very fundamental issues embedded in the Finnish political culture and its practices. This means that there are a lot of reasons why the welfare cluster intervention is useful for this study. These include following ones.

First, the welfare cluster case can be seen a long and multi-faceted process between the early 1990s and the early 2000s. Many experts see the intervention as a policy exercise linked with many other developments in the early 1990s and interpret it as a sort of failure or lesson for political government because its outcomes were different from those estimated.

Second, the intervention also reveals a lot of problems embedded in the NIS. It highlights well the problem of horizontality in particular. Third, the intervention also illustrates how the political and national aspects are important in STI policies. The welfare cluster case is a very Finnish intervention that has no other comparable cases anywhere in the world. Fourthly, the welfare cluster case is important because through it we are able to analyze the political aspects of STI policies. In other words, it illustrates how STI policies are ultimately and inherently parts of politics. Finally, what makes the welfare cluster case extremely interesting is that it seems to have a variety of its unintended effects and impacts. Although the original intentions and scenarios embedded in it never fulfilled the significance of its catalytic powers is enormous because most of today's political struggles are linked in a way or another.

The structure of the study

This study is structured in the following manner. I will start by introducing four slightly different accounts of understanding rhetoric. I will present two rhetorical perspectives *the RIS* perspective (rhetoric in science) with a focus on STI policies as a dilemma of

[48] "Social welfare" in Ensyclopedia Britannica Online, 2008.

theory and *the RIP* perspective (rhetoric in politics)with a focus on STI policies as a dilemma of practice. Then I will explicate textual strategies used in analyzing STI policies. I will explicate the empirical research questions and discuss how textual material is used in the study.

The rhetorical analysis has been divided into two parts. The first part is composed of two cycles: **the cycle of contextualisation** and **the cycle of re-contextualisation.** The second part, **the rhetorical re-description of STI policies,** is the nucleus of the study and is composed of five thematic moves. The point of the analysis is to locate new re-interpretations needed for understanding STI policies as theoretical and practical political constructions.

The first part consists of two cycles. **The first cycle, the analysis of texts in pursuit of contextualisation,** concentrates on the history of the Finnish science and technology policies. It seeks to clarify the transition to STI policies in the 1990s. Special emphasis is put on cluster policies and on the welfare cluster case in particular. Another aspect of the historical context is to examine the international context of STI policies, the role of the OECD in science and technology policies and the role of the EU in today's European innovation policies.

The second cycle, the analysis of texts in pursuit of re-contextualisation, focuses on current Finnish STI policies. The first part of the analysis focuses on Finland in the international context. The second part of the analysis concentrates on the welfare cluster case and utilizes the key actors' interpretations on the case and its outcomes.

The second part is called **the rhetorical re-description of STI policies. I**t includes two cycles, **the cycle of de-contextualisation** and **the cycle of re-interpretation**. The first cycle is composed of five thematic moves which enable us to analyse STI policies from two RIS and RIP perspectives. The idea of rhetorical re-description is based on Quentin Skinner's idea on the innovative ideologist. Skinner's aim is to explain how the existing vocabularies utilized in politics can be manipulated so that new concepts, terms and slogans start to live a life of their own and the old meanings are replaced with new meanings.

The first thematic move explores the political anatomy of STI policies. It asks whether they are ideology, rhetoric or what. **The second thematic move** examines the role of scientific frameworks and models in STI policies. **The third thematic move** clarifies the problem of new governance in STI policies and focuses on the problem of horizontality and the welfare state. **The fourth thematic move** investigates the cultural and national aspects of STI policies and explores the Finnish consensus political culture in particular. **The fifth thematic move** studies the role of rules and performatives in STI policies and concentrates on the role of conceptual frameworks and institutional reforms.

The second cycle, the cycle of re-interpretation, concludes the analysis. Its aim is to discover new horizons to understand the theoretical and practical challenges that STI policies evidently imply.

The discussion part of the study critically evaluates the rhetorical method and its appropriateness for examining STI policies as a political construction.

2. THEORETICAL FRAMEWORK FOR ANALYZING STI POLICIES

2.1. Dilemma of language

When Ludwig Wittgenstein started his *Philosophical Investigations (PI)* with a quote from Augustine's *Confessions* "which gives us a particular picture of the essence of human language", he actually argued for the importance of the idea that "individual words in language name objects", and that "sentences are combinations of such names.

Despite its plausibility, this reduction of language to representation cannot catch the nature of human language. In reality, human language has also other functions than the representative function. This picture of language is the basis of the whole tradition of philosophy and Wittgenstein wanted to find a new way of looking at philosophy and language. "*For a large class of cases – though not for all - in which we employ the word "meaning" it can be defined thus: the meaning of a word is its use in the language." (PI43)*

In order to describe the multiplicity of uses, their un-fixedness, and their being "part of activity", Wittgenstein introduced the key concept of his later philosophy, "language-game. The properties of language-games could be characterized as follows. First, they are a part of broader context termed a form of life. Second, the concept of language-games points to the rule-governed character of language. It is linked with the conventional nature of human activity rather than with the strict and definite system of rules for each and every language-game. Third, by using the concept of language-game Wittgenstein wants to stress the analogy between language and game. In a similar way as we cannot find a final, essential definition of "game", we cannot find the final definition of language.

Wittgenstein rejects the idea of general explanations and definitions based on sufficient and necessary conditions. Instead of the philosopher's craving for generality, Wittgenstein wants to use the concept of "family resemblance". We ought to investigate the uses of a word as if they were "a complicated network of similarities, overlapping and criss-crossing" (PI 66). The notion of family resemblance also exhibits the lack of boundaries and the distance from exactness that characterize the different uses of the same concept.

His point is that we use the concept of knowledge in different situations as "closed", although those situations are "open". In those situations we must speak of certainty rather than knowledge. We have solved the problem of the external world before we are able to ask the question about its existence. As Wittgenstein puts it "*What I hold fast to is not one proposition but a nest of propositions.*"[49] The truth of those statements is fused into the foundation of our language-game. And those statements can be understood as moves in our language-game; the statement concerning the external world is not a contingent fact as the concept of unicorn is.

The concept of *Weltbild* refers to culture and community; we belong to a community which is bound together by science and education. "But I did not get my picture of the world by satisfying myself of its correctness; nor do I have it because I am satisfied of its correctness. No: it is the inherited background against which I distinguish

[49] Wittgenstein 1969, § 225.

between true and false."[50] Wittgenstein considers that these propositions might be part of a kind of mythology and their role is like of that of the rules of game. These rules can be learned purely practically, without learning any explicit rules. Some propositions having the form of empirical propositions are hardened and they function as if they were fluid channels for empirical propositions. This relation alters with time, fluid propositions harden and hard ones became fluid.

Wittgenstein uses the metaphor of the river bed to describe the problem. The river bed provides the support, the context, in which claims that one knows various things have meaning. The bed itself is not something that we can know or doubt. In normal circumstances no sane person doubts how many hands he or she has. But unusual circumstances may occur and what was part of the river bed can shift and become part of the river. I might, for instance, wake up dazed after a terrible accident and wonder whether my hands, which I cannot feel, are there or not. The foundation for language-games is a kind of precondition for actual practices.[51]

Jaakko Hintikka,[52] as also Martin Kusch,[53] has made an interesting distinction between two types of theories of language; views of language as the universal medium and views of language as calculus. This distinction is a generalization of a contrast between two ways of looking at logic suggested by Jean van Heijenoort[54]. While the first takes logic to be a universal language, the second conceives it as a calculus in the sense of being re-interpretable in a larger scale like a calculus. If the conception of language as the universal medium leads to the thesis of ineffability of semantics i.e. to the claim that the relation between language and the world cannot expressed, the opposite conception of language as calculus will conceive language as a tool as something that can be manipulated and re-interpreted, improved, changed and replaced.

A believer in language as the universal medium is tempted to reject meta-language and to distrust the idea of truth as correspondence. Since there is no way of stepping outside of one's home language, there cannot be a meta-language. According to the classical account of truth as correspondence, "truth" is a meta-linguistic term that expresses a certain correspondence between a sentence and a state of affairs in the world. According the view of language as the universal medium there is no vantage point from which this correspondence can be viewed or discussed.

In political sciences the universal account of language is sometimes called the constitutive view of language[55] and its premise is that a moral or political language plays a key role in politics. It is a medium of shared understanding and an arena of action because the concepts embedded in it inform the beliefs and practices of political agents. In other words, who and what we are, how we arrange, classify and think about our world- and how we act in it- are deeply limited by the argumentative and rhetorical resources of our language.

Words and terms, as well as frameworks, theories, models and concepts, have always histories and linguistic origins. This applies to the concepts and terms used in politics, too. It is very apparent that the terms and concepts used in politics can never be

[50] Wittgenstein 1969, § 94.
[51] Hintikka and Hintikka 1986.
[52] Hintikka has recently strongly defended the option of calculus as a philosophical resource. See Auxier and Hahn 2006.
[53] Kusch 1989.
[54] Heijenoort van 1986.
[55] Ball and Farr 1989.

timeless, and that the changes in the vocabularies can never be purely linguistic. This kind of approach is very common among political scientists.[56]

The curiosity of the frameworks and vocabularies used in science and technology policies is that many categories embedded in them are taken for granted as if those conceptual frameworks had no histories and backgrounds. One of those assumptions taken for granted in science and technology policies concerns the distinctions between basic research and applied research, and the distinction between development and diffusion.[57] Those distinctions are important in the sense that they serve as a kind of argumentative and rhetorical resource in debates and confrontations linked with science and technology. Yet those distinctions are not universal - they are man-made artefacts and these categories have histories of their own.

To accept these ideas on language means that we also accept the view that politics and language are interwoven with one another. Let us imagine a situation in which a person asks another person to imagine politics and the political world without language. It becomes evident that such a state is extremely difficult to imagine. We should imagine politics without the attributes such as criticism, promise, argumentation, bargain, negotiation, compromise, hope and so forth. The situation becomes more difficult if we think of revolutions, peace talks, demonstrations, courts or parliaments and other existing political practices and institutions. To imagine politics without language is, in practice, a pure impossibility.

2.2. Dilemma of politics

Chantal Mouffe has in her recent writings stressed that if we want to find new horizons to understand the political we have to return to Wittgenstein's insights in his later philosophy.[58] Her aim is to examine a series of issues which are currently central to political theory and show that Wittgenstein provides us with a new way of theorizing the political. Mouffe examines the following issues linked with Wittgenstein: dilemma of universalism versus contextualism, democracy as substance or as procedures, democratic consensus, agonistic pluralism, and responsibility.

Her analysis stresses that liberal democratic "principles" cannot be seen to provide an unique and definite answer to the question of what is the good regime. Rather they provide one possible "language game" among others. "*Democratic action in this Wittgensteinian perspective, does not require a theory of truth and notions like unconditionality and universal validity but a manifold of practices and pragmatic moves aim at persuading people to broaden the range of their commitments to other, to build a more inclusive community.*"[59]

While many scholars in political sciences have no interest to advocate or underwrite any particular account of the political realm it may be useful to give some examples of contrary views. My choice here is to introduce Hannah Arendt's philosophy and then to clarify the dilemma of the concept of politics in general. Arendt is often seen as an old-fashioned nostalgic scholar whose thinking has nothing to do with our contemporary times. My outlook is however just the opposite.

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[56] Koselleck 1985.
[57] Godin 2007c.
[58] Mouffe 2000.
[59] See URL=< http://them.polylog.org/2/amc-en.htm>"Wittgenstein, Political Theory and Democracy", 19.5.2008.

Arendt never represented any systematic political philosophy, a philosophy in which a single central argument would be expounded and expanded upon in a sequence of works. Her writings rather cover many and diverse topics, spanning issues such as totalitarianism, revolution, the nature of freedom, the faculties of 'thinking' and 'judging', the history of political thought, and so on.

The most original aspect in Arendt's philosophy is her theory of action where she utilizes the ancient notion of *praxis* and replaces it by the notion of action,. This term she distinguishes from another ancient notion, *poiesis,* and replaces it by the notion of fabrication. Her original theoretical contribution by linking action to freedom and plurality is to show its connection to speech and remembrance. By viewing action as a mode of human togetherness she develops a participatory democracy and contrasts that with the bureaucratized and elitist forms of politics in our contemporary world.

Arendt argues that it is a mistake to take freedom primarily as an inner, contemplative or private phenomenon, for it is in fact an active, worldly and public phenomenon. Our sense of an inner freedom is derivative upon first having experienced "a condition of being free as a tangible worldly reality". The importance of publicity and plurality for action implies that action would be meaningless unless there were others present who see it and give meaning to it. The meaning of the action and the identity of the actor can only be established in the context of human plurality, the presence of others who are sufficiently like ourselves so that they can understand us and recognize the uniqueness of ourselves and our acts.

This communicative aspect of action is extremely important for Arendt and her endeavours to connect action to *speech*. Her argument is that it is through action as speech that individuals come to disclose their distinctive identity: *'Action is the public disclosure of the agent in the speech deed'*. The action of this character requires a public space in which it can be realized, a context in which individuals can encounter one another as members of a community.

Arendt uses the Athenian *polis* as the model for such a space of communicative and disclosive speech deeds. *"The polis, properly speaking, is not the city-state in its physical location; it is the organization of people as it arises out of acting and speaking together, and its true space lies between people living together for this purpose, no matter where they happen to be.*[60]

Such action is synonymous with the political. Politics is the ongoing activity of citizens coming together in order to exercise their capacity for agency, to conduct their lives together by means of free speech and persuasion. Politics and the exercise of freedom-as-action are one and the same. For Arendt, the *polis* stands for the space of appearance and that space must be recreated by action. Its existence is secured whenever actors gather together and it ceases when they do not.

The way in which Kari Palonen has returned to Arendt's problem concerning how to define the realm of politics is interesting. His point is based on the idea that we have two separate but intertwined perspectives to define politics: politics-as-sphere and politics-as-activity.

Palonen[61] argues that these two perspectives refer to two different and partially competing modes: the first "scope" analysis leans toward the use of spatial metaphors, whereas agency deals with politics in temporal terms. Politics-as-sphere and politics-as-action are competing modes for the conceptualization of the new phenomena of politics.

[60] Arendt 1958, p. 198.
[61] Palonen 2006.

In political sciences we have the following alternatives: we may focus on polity, politics, policies, politicking and politicization. If our focus is upon politicking and politicization, we must give an account of what is political action and agency. Max Weber's account is that politicking is a search for new power shares within an existing polity, while politicization concerns the redistribution of such shares in a polity-complex in a manner that opens new *Spielräume* for politicking. [62]

If we accept that power-changes are linked with all political action, it follows that the rhetorical moves and strategies are a condition for understanding theoretical contributions, always related to a situation, constellation and an audience to be moved[63]. Here this Skinnerian perspective is very important.

Politicking is often seen as an agonistic struggle (action) between various political partners and actors e.g. in parliament election campaigns. In the case of politicization we are dealing with the issues related to political power. Therefore, we have to focus our scientific interest on the following issues: 1) how is the political context defined and by whom; 2) how is the political and the apolitical differentiated; 3) who are the players of that particular game; 4) what is the issue under consideration and why just it; 5) what are the explicit and implicit rules of that game - who decides point of time when the game has started and when it is over.

One usual strain in politics is that there is a huge disagreement on these issues. Politics is traditionally seen as a continuous flux; it is a contest of defining the game and its rules incessantly. Politicking and politicization must be understood as an action or a process where this dynamic and emergent character of politics is present.

If we are interested in polity and policy we are dealing with the more static issues. The concept of polity, usually understood as an organized geopolitical unit refers to steady political structures that make politics possible; in polity the boundaries for politics are established and articulated. It means that for example the constitutional issues are referring to polity; they define the boundaries of adequate political space. The concept of policy can be defined so that it is a distinctive style of politicking, an attempt to regulate and coordinate one's activity. It refers to a line, programme or project.[64] In other words, it refers to administrative and governmental issues and mechanisms; one definition might be that a policy is a plan to guide decisions and actions. The terms may apply to government, private sector organisations and groups and individuals.

To read politics in this way means that we can analyze political judgments in temporal terms having relation to present, past and future. Palonen suggests that this is possible if you accept his nominalistic[65] approach and divide a matrix of historical time into a field of nine types of temporal experience:

[62] Weber 1919.
[63] Skinner 1988b.
[64] Arendt 1958, p. 198.
[65] Palonen stresses strongly his nominalism; I think that his strategy is to follow Weber and his methodological insight. His nominalism is a critique of Platonian essentialism and resembles the Aristotelian argument: species do not die as individuals. Palonen 2003 a.

past/future	present/future	future/future
POLITY 1	POLITICIZATION 2	POLITICS FICTION}
past/present	present/present	future/present
POLICY 1	POLITICKING	POLICY 2
past/past	present/past	future/past
"PREHISTORY"	POLITICIZATION 1	POLITY 2
PAST	PRESENT	FUTURE

Figure 1. Typology of four nouns: polity, policy, politicking and politicization

His idea is to distinguish political time (limited) and historical time (unlimited) and to examine the dilemma of political judgment in that context. "Prehistory" and "politics fiction" are of course relevant in a wider sense but they are irrelevant for the present political situation and therefore they are excluded here. As we can see, "politicking" as a performing action is the center of the political timetable understood as a temporal conduct within the limits of an extended present. This extension of the present makes it possible to include the self-assessment of the performance by political actors as in political judgments.

This typology helps us to understand the most important aspect in judging politically. This concerns politicization, understood nominalistically as any move opening a specific dimension of contingency for the play of politicking. The present politicking takes place within a definite horizon of the possible, *Chancen*. While politicization refers to the opening moves of playing with contingency, polity is a limit figure which refers to the moves of standardizing some existing types of politicization. These moves both exclude and delimit the use of available forms of politicization. In so doing they create an obstacle for the possibility that new *Chancen* would become commonly acceptable. Politicking as performance is not related to those politicizations which are open in principle, but also to the commonly accepted and regimented forms of polity.

What makes this typology useful in this study is that it illustrates well the problems of politics in general.[66] It also helps us to understand why language is an essential aspect of politics and why politicking as agency is at the heart of politics and why policy formulations are so complex and difficult in practice. In other words, the traditional question "What is politics?" must be replaced with a new question "What are political agents doing when they are acting politically?"

The typology is of a great importance as it allows us to understand the special character of the concept of policy. Policy does not refer here to the totality of the sub-

[66] This kind of approach is very coherent in the sense that it refers to the problem of necessity and possibility, the problems of modality in philosophy. One of the key issues among philosophers has been the problem of fiction in the case of the possible worlds. See Lewis 1986.

sectors. This typology provides new horizons to understand the problem of politics in STI policies.

2.3. Rhetoric as a tool for studying STI policies

Rhetoric as a phenomenon has often been compared to a combination which opens a lock. The "lock" is a complex situation involving a particular issue, a particular person or group, a particular time and place. The combination is that form of discourse which will convince a particular audience as to act over an issue.[67] In this study rhetoric is understood as a tool helping us to find the combination with which we open the lock of STI policies.

The chapter introduces four different accounts of rhetoric. The first account is the tradition of the new rhetoric. Then the focus shifts onto the linguistic turn in political sciences: how the rhetorical perspective is understood in political sciences. The third account of rhetoric might be called the rhetoric of science perspective and its focus is on the rhetoric of economics. The fourth account of rhetoric is linked with the STS (Science and technology studies) and SSK (Sociology of scientific knowledge) traditions.

2.3.1. The new rhetoric tradition

In everyday life we all regularly engage in argumentative practices, when we advance arguments in defence of certain assertions or actions and when we react to arguments put forward by others. Argumentation is a verbal activity normally constructed in an ordinary language.[68] A speaker or writer, engaged in argumentation, uses certain words and sentences to state, question, or deny something, or to respond to statements, questions or denials. Argumentation is accompanied by non-verbal means of communication such as gestures and facial gestures, but the verbal expressions can never be totally replaced by nonverbal communication. Without the use of language there is no argumentation.

Argumentation is a social activity, which is in principle directed to other people. Thus, when people try to put forward their arguments, they attempt to meet the outspoken or tacit reactions of others. Argumentation is an activity of reason, which indicates that the arguer has given some thought to the subject. To put forward an argument implies that the arguer attempts to show that a rational account can be given to defend his or her position in the matter. This does not mean that argumentation has no emotional aspects; vice versa, argumentation has often very strong emotional dimensions.

In general, argumentation always relates to a particular opinion, standpoint, on a specific subject. The need for argumentation arises when opinions concerning this or that subject differ. Holding an opinion is not enough to initiate argumentation. Argumentation starts from the presumption, right or wrong, that the standpoint of the arguer is not immediately accepted, but is controversial.

Argumentation is intended to justify one's standpoint, or to refute someone else's. In an argumentative justification of a standpoint one is attempting to defend the

[67] Hood and Jackson have utilized a similar approach in their analysis on the birth of Herbert Simon's admininstrative science. Hood 1991, p. 11.
[68] van Eemeren, Grootendorst and Henkemans 1996.

standpoint by showing that it conveys an acceptable proposition. In argumentative refutation one attacks the standpoint by showing that the proposition is unacceptable because an opposite, or contradictory, proposition is acceptable. Justifying and refuting a standpoint by way of argumentation proceeds by putting forward propositions. Those constellations of propositions have a special communicative function. To justify a standpoint is to put forward pro-arguments, and to refute a standpoint is to put forward contra-arguments. Argumentation is aimed at increasing or decreasing the acceptability of a controversial standpoint maintained by the listener or reader. In principle, the very act of arguing involves an appeal to the reasonability of the audience. In practice, arguers addressing an audience with a view to justifying or refuting a standpoint will generally presume that there are certain standards available for judging the quality of argumentation.

The new rhetoric examines argumentation in ordinary language; it seeks to a description of that kind of argumentation which can be successful in practice. One of the starting points for Perelman's endeavour was the realization that in the era of logical empiricism it was not possible to conduct a rational analysis of value judgements.[69]

Olbrecht and Tyteca regard classical rhetoric and dialectic as a single whole. For them *dialectic* is a theory relating to the techniques of argument, whereas *rhetoric* is a practical discipline indicating how dialectical techniques can be used to convince and persuade people. The new rhetoric approach suggests that we are not allowed to separate these three elements in discourses but, *vice versa,* we have to combine them, because its practitioners think that every discourse makes use of these three elements.

They call their new theory the new rhetoric rather than the new dialectic because they think that the latter is too confusing. One of the reasons for this is that Hegel adopted the term dialectic and used it for his philosophical purposes. Another reason is that Aristotle's rhetoric relates to orations and debates involving large groups of people and conducted for a specific purpose, to solve political and legal problems. The new rhetoric applies to oral as well as written argumentation addressed to any audience on practically unlimited subject matter.

This means that in scientific argumentation all argumentation is rhetorical; all we need to do is to separate logic and demonstration from other forms of argumentation. For Perelman, rhetoric is aimed at an audience and he distinguishes four different kinds of audiences that are not merely physical: the Self, the Single Interlocutor, the Specialised Audience and the Universal Audience. The difference between the last two lies in the kind of adherence you are looking for.

The efficacy of a discourse on the audience depends on 1) the premises used by the locutor, 2) the choice of presentation and 3) the arguments used. The premises refer to the "object of agreement": the "real" and "the preferable". [70] Thus, rhetoric has four elements: 1) the persuader, 2) the persuadee, 3) the aim of persuader to persuade the persuadee and 4) the argument as the means to attain the aim. Premises about reality use facts, truths and presumptions to persuade and convince. Not all facts are effective; only those that are true for an audience are facts. Furthermore, these conceptions that people hold and believe are true, are also true for Perelman. Presumptions refer to common sense: they are about normality and what people expect. Agreements about what is

[69] Perelman 1979.
[70] Perelman and Olbrecht-Tyteca 1971, p. 11.

"preferable" draw on values and hierarchies: they have six loci[71] of "preferability": quantity, quality, order, existence, essence and person.[72]

The use of suitable terms and premises is not enough: it must also be ensured that the audience recognizes the form of argumentation as logical. In order to do this the speakers and writers will form their argumentation as clearly as possible. Perelman and Olbrecht-Tyteca divide the quasi-logical argumentation into argumentation claiming a logical relation and argumentation claiming a mathematical relation.

The problem is that genuine logical contradictions can occur in systems with unambiguously defined term, which is impossible in ordinary language. The meanings of the terms are rarely defined unambiguously and enable different interpretations. In quasi-logical argumentation to claim a mathematical relation is very closely related to the locus of quantity.

It is important to notice that the whole idea of new rhetoric was to create a framework for all non-analytic thinking. Perelman and Olbrecht-Tyteca offer a rhetorical concept of rationality in which the soundness of argumentation is equated with the degree to which argumentation is suited for those for whom it is intended. As a result It follows that they also accept that the soundness criterion is that the norms of rationality that prevail are relative to a more or less arbitrary group of people.[73]

2.3.2. Rhetoric: An essential aspect of politics

In political sciences, some scholars speak of the idea of "reading" politics rather than of rhetoric. [74] To engage in "reading politics" means that we have to focus our theoretical gaze on the political language as a form of political action. In politics rhetoric has had a special role and it seems to have a variety of functions.[75] One of the key publications is *Political Innovation and Conceptual Change,*[76] and a set of leading Finnish scholars in political sciences have utilized it as an ideal in their own analysis on the Finnish political vocabulary.[77]

It follows that we have to scrutinize the problems of language in general.[78] This means that have to be prepared to go beyond the strong distinction between rhetoric and reality and the categorical distinction between "words and deeds". To speak is an act that is similar to the act of waving one's hand. The other issue that the rhetoric approach presupposes is that we have to discuss such classic issues as the differences between demonstrative, dialectical and rhetorical argumentation and how persuasion is involved in the argumentation. It also implies that we have to focus our interest on how "functionalizing" tendencies are embedded in politics.

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[71] Perelman and Olbrech-Tyteca prefer the Latin term *loci* to the Greek *topoi*.

[72] It would be interesting to compare Perelman's ideas and Thomas Reid's conception on common sense. One of Reid's key points was to stress that syntactic structures shared by languages often indicate features of our common sense conception of the world. Reid's most important critical contribution was his attack on the model of the mental offered by Locke and accepted by Berkeley and Hume. Reid has been also a sort of grey eminence behind the debates on social epistemology. Reid 1983.

[73] van Eemeren et al 1996, p. 119.

[74] Skinner 1978a and 1978b; Palonen & Hänninen 2004; Godin 2002; Godin 2003.

[75] Miettinen (2002).

[76] Ball, Farr and Hanson 1989.

[77] Hyvärinen, Kurunmäki, Palonen, Pulkkinen, and Stenius 2002.

[78] I think that Ludwig Wittgenstein is the key figure here. Also Jaakko Hintikka and Martin Kusch have brilliantly analyzed the various insights related to language. See Kusch 1989.

This kind of rhetorical analysis is not the same form of analysis known discourse analysis. The problem of discourse analysis is its trend to be inclined to some predetermined discourses. The rhetorical approach can be seen as an alternative because it emphasizes the idea that politics is a matter of action in which practice and theory are intertwined.

The social and political world is conceptually and communicatively constituted or, to put it better, pre-constituted. The notion of the linguistic constitution of politics embodies two general claims: First, a great number of political actions are carried out in and through language. Second, political beliefs, actions, and practices are partly constituted by the concepts which political actors hold about these beliefs, actions and practices. In other words, according to this constitutive view of language, who and what we are, how we arrange, classify and think about our world and how we act in it are deeply limited by the argumentative and rhetorical resources of our language. [79]

It is worth remembering that Weber wanted to purge the whole language of his contemporaries. He opposed the naïve realism and essentialism concerning the concepts and their usage by stressing that reality is an analytic borderline concept to which one refers to not as something knowable but as something inexhaustible by all forms of conceptualizations.[80]

Weber's research programme is interestingly continued in the work of Skinner. While he is usually not recognized among the Weberologists, he combines the Weberian approach with the Austinian speech act theory and classical rhetoric.[81] For Weber, the commitment to the vocabulary of the contemporaries is a rhetorical strategy seeking to persuade some special audience. This strategy consists of a variety of rhetorical moves and illustrates a shift towards and appraisal and conceptualization of contingency in terms of *Chancen*. This Weberian moment in the history of political thought is one of the most important starting points of this study.[82]

Skinner has strongly advocated the interconnectedness of politics and rhetoric. His claim is that a whole community of language users may be capable of applying such highly general terms as being or infinity with perfect consistency, but there is no concept which answers any of their agreed usages. [83]

Rhetoric and the ideal type of innovating ideologist

The rhetorical perspective offers an alternative to normative theory which attempts to minimize the role of politics as activity.[84] One of the fundamentals of contractarian theories juxtaposing the "state of nature" and "the state of civilization" is that the formation of a polity by signing of a "contract" ending the state of nature turns the polity into a realm in which the maximal freedom of the state of nature is irrevocably lost. Yet the state of nature remains as a model, and as much as possible should be maintained of it in order to minimize the loss of freedom. The polity of the contract theories is "depolitized" as far as possible, and they construct a special space that must be

[79] Farr 1989.
[80] Palonen 1999a.
[81] Palonen 2003b.
[82] Palonen 1998.
[83] Skinner 1989.
[84] Palonen has interestingly attempt to advocate the rhetorical perspective as an alternative to the monopoly of normative theory. See Palonen 2002.

constantly maintained. In other words, all forms of uncontrolled politicking must be repressed and political action is reduced to specific moments, to the act of contracting and its analogies.

All this implies that we question the necessity of functionalizing politics by transferring a set of economic or other mechanistic models or metaphors onto the political sphere. One of Skinner's most important ideas has been a rhetorical re-description of the relations between political life and political theorizing. In general terms, no doctrine can be so indispensable that it should be accepted regardless its political costs.[85]

Skinner's point of departure in his speech-act oriented approach is the action perspective in which the relation between texts and contexts is a crucial one. According to Skinner's view of linguistic action texts are always linked with contexts: they are implicit parts of texts rather than opposed to it.[86] Contexts do not determine action but they imply a horizon of possibilities.

The relation between politics and rhetoric becomes apparent when we consider the history of parliamentary procedures and practices in the ideal situation where the speakers express their views for and against a proposal. In our parliamentary system politicians have also a special competence in "timing" their actions and it has been crucial in sophist and rhetorical styles of thinking. Skinner's main point is to discuss the strategies and tactics rendering political change legitimate by altering the rhetorical dimension in the use of the descriptive-evaluative language. Skinner asks simply: How is it actually possible to manipulate an existing normative vocabulary in such a way that legitimates new and untoward courses of action? He suggests that the innovating ideologist has two distinct strategies. The first consists of manipulating the standard speech-act potential of an existing set of descriptive terms. The agent's aim is to describe his own actions in such a way that even though he may be using a set of terms usually applied to express disapproval, he is nevertheless using them to express approval or at least neutrality in this particular situation.

There are two tactics available to the innovating ideologist to carry out his strategy. First, he may introduce some wholly new and favorable evaluative-descriptive terms into the language. The other possibility is to coin new terms to describe the allegedly new principles and then apply them as descriptions of the apparently untoward actions one may wish to see commended. The other common version of this tactic consists of turning a neutral description into a favorable evaluative-descriptive term. The creation of new slogans and keywords is a key strategy for the successful modern politician because they can provide new topics for the political agenda. The second tactic is connected with linguistic action, and its point concerns abandon all pejorative usages. [87]

The point of the second strategy is to challenge ideological opponents and force them to reconsider *"…whether they may not be making an empirical mistake… in failing to see that the ordinary criteria for applying an existing range of favorable evaluative-descriptive terms may be present in the very actions they have been condemning as illegitimate"*[88]

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[85] Palonen 2005.
[86] Palonen 2003b, p.39.
[87] The term *Finnlandisierung* used in debates on Finnish in the foreign policy in the 1970s is a very good example of that tactic.
[88] Skinner 1988a, p. 115.

One of Skinner's legacies to the study of contemporary political thought is as Palonen[89] has noticed his insistence on the omnipresence of a normative dimension of the key concepts such as democracy, freedom and equality.

In his nominalistic approach Palonen[90] has divided politics into the two verbal figures of politicization and politicking. Understanding politics as activity as a *Bewegungbegriff* in the Koselleckian sense, the primary "performative" operations are simply politicization and politicking; the former refers to the marking of a *Spielraum* of contingency and the latter to performances within this *Spielraum*. Polity is a limiting case demarcating that which is "confirmed" as a commonly accepted *Spielraum* of politicking in a situation, while policy refers to regulated forms or "lines of politicking of any agent engaged in politics". This kind of reading turns politics into a verbalized and temporalized phenomenon: it allows us to understand that politics may be manifest in thematically different but interconnected styles of activity. Those activities have an inherent potentiality to contradict to each other.

Such a conception of language embodies two things. First, a lot of political actions are carried out in and through language and, second, political beliefs, actions, and practices are partly constituted by the concepts which political actors hold about these beliefs, actions and practices.[91]

Skinner[92] distinguishes two main modes of conceptual change through rhetorical description, namely renaming and the reinterpretation of meaning. Both of them are facilitated by the reassessment of its significance or by the revaluation of the activity. It is obvious that the process of conceptualization itself consists of renaming as politics; something becomes political if it is named as such. Therefore, it is possible to think that the re-conceptualization in politics is a process of redefinitions of terms or that it is a process of giving names to previously unidentified objects.

Such conceptualization has two separate levels for Skinner. On the one hand, it can be appreciated as a move within the situation and, on the other hand, as a perlocutionary effect of the alteration of the conceptual horizon. The change may alter the current debate or sketch an original view on politics worth remembering and explicating. The original move, considered as a marginal move, may open a totally new *topos*. It is important to be aware that Skinner's account of rhetoric has nothing to do with the media or communication rhetoric. For Skinner rhetoric is the name for an orientation towards the world that makes such an approach possible, and at the same time fully acknowledges the constitutive role of politics in conceptual change. As Palonen puts it in his analysis on Skinner's rhetorical perspective: "*The rhetorical attitude of questioning all authorities and theory monopolies and arguing in a mode of making weaker logos stronger as a strong resource against all depoliticizing claims in the name of order and in the name of truth as well.*"[93]

All this implies that the pursuit of political theory must be reconsidered. To be a theorist is to be a critic. It follows that theorists must not seek theories as such. Rather, they should seek new problems and re-conceptualizations. While this is often understood as a form of criticism, it is not directed against abstract propositions but beliefs, actions, and practices in the political domain. The conceptual change may be

[89] Palonen 2003b, p. 56.
[90] Palonen & Parvikko 1993.
[91] Palonen & Parvikko 1993, p. 27.
[92] Skinner 1996.
[93] Palonen 2003b, p. 171.

explained in the terms of two issues: how the political actors try to solve speculative or practical problems and how their criticism has exposed in their beliefs, actions and practices.

Language constitutes the political world; it is an essential part of political reality. This means that in order to examine that reality we have to abandon the idea of considering language as a neutral medium. To put that differently, naming things is an essential part of politics. It follows that beliefs, actions and practices in politics are partly constituted by the concepts used by the actors and for whom language is an arena of political action.

Conceptual histories tell stories of conceptual change and political innovations. *"The surest sign that a society has entered into the secure possession of a new concept is that new vocabulary will be developed, in terms of which the concept can then be publicly articulated and discussed."*[94] Therefore, it is important to understand how concepts emerge out of earlier conceptual material. Furthermore, concepts figure also in theoretical constellations and conceptual schemes, and a single concept is always linked with other concepts. The scholar interested in conceptual histories seeks to find explanations for the emergence and transformation of concepts where actors use them for political purposes. The political concepts are alive only in relation to political actors who use and change them.

The meaning of political concepts must be understood in terms of contexts within which actors put them in use: to study them is to examine changes in contexts and use. In addition, we have to keep in mind that politics is always dealing with power. To be in power means that one are able to govern the use of language: It means that one is able to set or at least suggest criteria for applying political concepts, to determine or suggest the range of things these concepts refer to in the political world and to influence the range of attitudes expressed by these concepts.

In his *Notebooks* Antonio Gramsci[95] stresses in his analysis of hegemony that it is necessary *"…to combat economism not only for in the theory of historiography, but also and especially in the theory and practice of politics. In this field, the struggle can and must be carried on by developing the concept of hegemony."* The point Gramsci makes is relevant for this study: his claim involves the idea that language is a crucial material force in political struggles.

Another side of conceptual histories is that various phenomena and developments, both political and apolitical, that are often understood as self-evident must be reconsidered because their background is often an outcome of political struggles. To analyze the contemporary concepts and conceptualizations requires an open attitude toward contingency. Many issues understood as "self-evident" seem to become problematic in historical analysis; to study conceptual histories is to study the contemporary world.

Historians of science have usually thought that science implies progress. This is not the case in conceptual history because scholars refuse to subscribe the idea of seeking universal criteria when analyzing their material. Also, concepts understood as "scientific" must be analyzed as participating in political struggles as well as politicians and journalists. The concepts are equal in the sense that there are no differences between them. From this it does not follow that the uses of concepts are equal unless reference is made to their contexts.

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[94] Skinner 1978b, p. 358.
[95] Gramsci 1971, p. 165.

It is apparent that the German project "*Geschitliche Grundbegriffe*" and the Cambridge research project have different viewpoints onto how to understand concepts in politics. A leading figure in the latter project has been Skinner[96] with his interest in linguistic conventions, speech acts and rhetoric moves. One of the central themes in Skinner's studies is the problem of text and its context. His claim is simply that in order to understand single texts we have to understand the conventions and debates of that historical era. For Skinner the context is a project of construction in the sense that in many cases there is no context without that construction. While a scholar constructs such a context, she or he simultaneously accepts that there are also other contexts. If a scholar has no linguistic competence a single text or speech act becomes inaccessible and incomprehensible.

In his *Begriffsgeschichte* Koselleck[97] maintains that concepts create the point in which action, ideas and structures meet each other. Social and economic structures constrain the boundaries of options in which we are able to use these concepts. He also stresses that the concepts reproduce and transform those structures and makes a distinction between expectations (*Erwartungshorizont*) and experiences *(Erfahrungsraum*). The historical events may change concepts and concepts always include a variety of historical times. It is the implicit strata of temporal times that pose disputes on concepts and their meaning.

This concerns Koselleck's view that the moves of emancipation following the Enlightenment presuppose a political limit, based on the acknowledgement of the heterogeneity of purposes. It is its neglect that turns the Enlightenment into an apolitical utopia.[98]

2.3.3. Rhetoric as a methodological alternative in economics

An interesting account of rhetoric which is important for this study is the rhetoric of economics. The tradition, usually linked with neo-pragmatism and the discursive turn in economics[99], has also links with hermeneutics.[100] One of the most famous advocators of the rhetoric approach is Deirdre McCloskey, whose argument for utilising rhetoric in economics is based on the failure of big Methodologists (usually positivists and Popperians) to understand the professional activities of economists. Small methodologies, on the shopfloor level, are more useful in terms of practices. If scientific theories are underdetermined, and observations are theory- laden and science is social, interest-laden, situated, contextual and contingent *a priori* philosophical speculation it does not capture the actual practice of successful science. Metaphorically speaking the role of the philosophers of science as methodological rule-makers is compared to that of governmental bureaucrats.[101]

The key issue for McCloskey is persuasion: what is worth of our attention is persuasiveness and nothing else. The study of persuasion is a domain of rhetoric; the study of persuasion in economics forms the rhetoric of economics. In other words, all discourse aims to influence a particular audience and the rhetorical strategies preferred by the practitioners of a discipline reflect their views on what it is that can be known.

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[96] Skinner 1969.
[97] Koselleck 1985.
[98] Palonen 2002.
[99] McCloskey 1985.
[100] Don Lavoie has written an excellent book on these issues; Lavoie 1991.
[101] McCloskey 1994, p. 20.

Rhetoric is in this sense epistemic. Later McCloskey has shifted towards a more liberal definition of "rhetorical analysis" so that also Kuhn and SSK are rhetorical approaches for McCloskey.[102] This is very strongly in contrast with the view of Collins & Yearley, who think that discourse analysis has been abandoned within SSK.[103]

McCloskey, Arjo Klamer [104]and many other economists advocating the rhetorical approach argue that economists have to persuade each other and it is to achieve that end that they work on different arguments. The work on a model is part of a theoretical argument but to present the results of an economic test is something else. The connection between these two arguments is often loose because they often follow their own logic, rules and conventions.

Klamer[105] has distinguished between philosophical arguments (about the implied view and non-scientific values), common-sense arguments (any reasonable person will of course choose the best option) and epistemological arguments (arguments about the nature of science and the proper scientific strategy for economists). The point of the rhetorical approach is for Klamer its ability to bring out and characterize differences.

Stories and models in economics

> *"Metaphorical thought is a distinctive mode of achieving insight, not to be construed as an ornamental substitute for plain thought."*[106]

The contribution of the rhetoric of economics advocated by McCloskey has other interesting impacts on our understanding of the special status of economics among the social sciences. Traditionally, philosophers of science interested in scientific models have concentrated on the model-theory relationship but if we try to understand why those models help us to understand the economic world we have to interpret them as if economists were telling stories about the world. As Gibbard and Varian[107] argue in their analysis on theoretical models in economics stories are an integral part the ways in which the models work. Modelling involves questions, structures and stories. But as Mary S. Morgan[108] remarks, their analysis does not explain how the story about the model itself is told.

Metaphors are never precise, complete, or literal mappings. If they were precise, they would not be metaphors. The juxtaposition involving a degree of similarity and dissimilarity can have both creative and damaging effects. The use of metaphors in economics has often been explicit, and it is often argued that modern economics is dominated by the metaphor of a mechanistic system. In economics, there has been also another strand where also biological metaphors have been adopted to illustrate economic phenomena. One of the key points justifying the use of biological metaphors has been that both economic and biological systems are complex. It is also self-evident that the economy involves living human beings; it is not a mere mechanistic world of billiard balls and planets.

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[102] McCloskey 1997, p. 102.
[103] Collins & Yearley 1992, p. 305.
[104] Klamer and Colander 1991.
[105] Klamer 2001.
[106] Black 1962, p. 237.
[107] Gibbard and Varian 1978.
[108] Morgan 2002.

Yet both the biological and the mechanical analogy have a prominent problem: the conceptualization of the human agent. Neither of those analogies provides any room for individual choice.109 In the view of McCloskey 110, models are metaphors and stories are something different; they are different but complementary modes of explaining. For her economic models are metaphors, they are discipline's "poetics". She argues that stories come together with models in counterfactuals and the inherent contradictions between the elements persist. The vaguer the model, the better the story is and the more exact the model, the more absurd history comes.

Metaphors and stories connect the economists' explanations of the world; metaphors are static and forward-looking, stories are historical and time-based. Stories are histories about actual economies and metaphors involve hypothetical economies with imagined but not necessarily idealized properties. Models need stories.

One of the simplest models in economics is the supply and demand curve. Economists typically fill in the gaps when they use the model by introducing a variety of interpretations how to use the model. In other words, the model involves the option of answering questions but within the limits of the particular model. This implies that models have certain peculiarities of narrative modes of reasoning. Narratives are ambiguous about causality and necessity: "*narrative does not demonstrate the necessity of events but makes them intelligible by unfolding the story which connects their significance.*"[109] To quote McCloskey:

"*Economists, especially theorists, are for ever spinning "parables" or telling "stories". The word story has in fact to have a technical meaning in economics, though usually spoken in seminars rather than written in papers. It means an extended example of the reasoning underlying the mathematics, often a simplified version of the situation in the real world that the mathematics is meant to characterize…Here the story is the modifier, the mathematics the subject.*"[110]

This quotation nicely points to the ways in which stories relate the mathematics to the world. In other words, we use a mathematical characterisation to answer questions relevant to the world. In so doing we tell stories linking them back to the world. McCloskey portrays these two links as happening together.

The first link is about the way in which the models are built, and the second link concerns the way in which stories link mathematics to the world. [111] The first link involves deeper questions about the nature of representation or denotation used, and this is often understood as the realism of assumptions. But most economic models are not built on realistic assumptions, which has been one of the problems in the philosophy of economics. But there are still a lot of problems we have to find answers for.

One of them is the problem of how to link stories and explanations. Traditionally, explanations are characterized as answers to question why whether we portray stories as answers to those questions. In other words, we use narrative as a cognitive tool: it is a tool with which we explain something or come to understand more about the world. In contrast to the wide discussions of the philosophy of history or literature, there is little similar debate dealing with the methodology of economics.

In building a model, we try to represent the situation in the world in such a way that we incorporate into it our general theoretical claims or hypothesis about the world. But when we use economic models, we do so in order to relate the general claims back to the

[109] Mink 1970.
[110] McCloskey 1983.
[111] Morgan 2002.

specifics of the world.[112] Narratives are often misunderstood; they are more than chronicles because they give more than a listing of the order of events. The narrative sits between theory and the world in terms of a generalizing device because models involve the process of simplification i.e. the model is always more simple.

The rhetoric of economics has generated a lot of criticism[113], and the rhetorical approach has been accused of irrationalism and objected to the "so what" question. Some critics have pointed to the dangers embedded in rhetorical analysis. Yet McCloskey´s argument and answer is simply that rhetorical analysis can improve economic prose, teaching, economists´ relation to other disciplines, economic argumentation and even the temper of economists.

Uskali Mäki[114] has argued strongly *pro* rhetoric emphasising its adequacy and usefulness for economics from the realist point of view, in particular. His view is that rhetoric must not be excluded from the agenda of economics and its special nature as a form of scientific knowledge. It is a viable option that must be implemented in economics.

In short, Mäki argues that in our discussion on rhetoric we must always reconsider which side – realist or anti-realist we favour. The realist alternative is to view rhetorical persuasion as an attempt to discover and communicate truths about the economy, which has an objective existence. Whereas plausibility is a pragmatic notion with a coherentist bent, truth in the realist sense is a semantico-logical notion. Realists are willing to incorporate the notion of plausibility in their epistemology, but not in their semantics and ontology.

The non-realist pragmatist tends to conflate these fields and thus also the notions of plausibility and truth. For a realist truth is an objective property of statements that can be discovered; plausibility is a subjective property subject to creation and re-creation. Rhetoric is seen as constitutive of scientific justification and discovery, rather than as constituting the nature of truth. This is the main reason for confusion amongst the anti-realists and others, Mäki argues.

His suggestion is that the notion of rhetorical persuasion is to be analysed in terms of belief, coherence and plausibility. As a result he is able to present a coherence theory of justification without committing himself to an antirealist coherence theory of truth. Mäki has two aims: first, to illustrate that McCloskey`s conception of rhetoric is an example of antirealist truth theory, second, to break the monopoly of antirealist rhetoric and to create space for the improving the persuasiveness of the rhetorical approach for studying economics.

An old characterisation of beliefs says that a belief is a property predicable of human beings in their relation to statements. We may say that we have beliefs in the truth of statements. Plausibility is a predicate of that kind: a statement is plausible if a person or a group believes in it. The plausibility of a statement is conferred upon it by other statements, which bear a certain relation to it. Plausibility is an epistemic and pragmatic notion and it comes in degrees like a belief.

Rhetorical persuasion is the transference of plausibility by the means of arguments. Whereas the persuadee finds the premise plausible, the persuader tries to illustrate that a

[112] As Morgan in her analysis notes economists use the term "model", in the sense that certain theoretical claims or resources are built into the model though that is not all that is in the model. To understand models like this is very close to Nancy Cartwright's simulacrum account of models in physics. See Cartwright 1983.
[113] Rosenberg 1988.
[114] Mäki 1993a.

statement may be formed upon that premise. A rhetorical argument connects a conclusion to a set of premises so that the conclusion is coherent with the premises. The premises must be chosen so that the persuadee believes in them and that a belief is transformed into a conclusion by presenting an argument.

This is the basic idea of Mäki´s conception of the coherence theory of justification. It starts from defining the system of beliefs and connects it with plausibility and coherence in terms of argumentative persuasion. What is important in Mäki´s account is that he distinguishes clearly between epistemology, ontology and semantics. He promotes the alliance of the correspondence theory of truth with the coherence theory of justification and denies that rhetorical persuasion contributes to the truth of a statement. What persuasion contributes to is the plausibility of a statement.

In his defence of realist "bottom up" philosophy of economic rhetoric Mäki argues tat there are no self-justified, privileged epistemic foundations for economic knowledge. The truth of a statement is independent of the rhetorical arguments given for or against it in any rhetorical situation. The statements are true or false because of the way the world objectively is. This amounts to a correspondence notion of truth. Plausibility is a relational in two ways: it relates to other statements and to human beings with their beliefs. The relationality of plausibility is pragmatic and logical. Truth is relational in the semantic sense, because it is a matter of relationship between linguistic items and their objects in reality.

His thesis is that one may coherently think that linguistic items have both the rhetorical and representational aspects at the same time. Truth is a semantic attribute of statements, and acceptance and belief are epistemic attributes belonging to human beings. Rhetoric is good when it directs persuadees to accept true statements as true and to reject false ones as false. According to Mäki this is possible if we reject both the modern position of correspondence theory of truth plus the foundationalist theory of justification and the non- realist position of coherence theory of truth plus the coherence theory of justification and replace it by his own suggestion. This is the correspondence theory of truth plus the coherence theory of justification.

In his realist account of rhetoric the world and truths about the world are not dependent on persuasion amongst economists and their audiences.[115] The occurrence of rhetorical persuasion does not alone rule out the possibility of attaining and communicating persuasion-independent truths about economic reality. His point is that although economics, as it is currently practiced, is nothing but a rhetorical game of persuasion, it might in some cases be correct, but from this it does not follow that it is correct about everything.

It is important to notice that in Mäki's view we do not have to replace the realist idea of scientific discovery by the rhetorical idea of invention as Alan Gross has suggested.[116]

[115] Mäki 1988; Mäki 1998; Mäki 1993a; Lawson 1997; Niiniluoto 1999.

[116] Gross's argument is that truth is a semantic attribute of statements and acceptance and belief are epistemic attributes of human beings. Although economists usually refer to their models and theories as "useful"," valid", "plausible" and so on, they use those arguments as rhetorical resources available to them. Those model- worlds have a mediating role and epistemic perspectives they provide do not to create worlds of their own, but instead possibly help us to uncover objective aspects of the one world. In his opinion we can think seriously about the possibility of pursuing truth in economics and it is suited for the rhetoric of economics very well. See Gross 1990.

2.3.4. STS and rhetoric

Steve Fuller has explicitly stressed the fruitfulness of rhetoric as a theoretical resource[117] and advocated in his many works the idea of rhetoric and the program of social epistemology as an alternative framework for STS studies. His endeavours have been partly very philosophical and sometimes too idiosyncratic as models for actual research, but in spite of his deficiencies Fuller has been an important source of inspiration in this thesis. Fuller[118] has plausibly argued in his smart analysis on Kuhn that Kuhn was not a cause but merely a symptom of the larger deformations of philosophy, politics and economics of science in the United States after the Second World War.

Another STS scholar who has inspired me is Andrew Barry.[119] Barry's focus has been on Europe, and European integration. One of his major claims is that we have to locate science, technology and politics at the heart of European integration and analyze it as a form of new political governance. As a STS scholar Barry owes theoretically a lot to ANT scholars, especially Bruno Latour and Michel Callon.

His radical conclusion is that although political institutions and identities are important technology has become central to any analysis of political life. Barry is very much advocating Foucault-type analysis of technology and he sees the new political culture as a form of constructing a new political machine for Europe. As such, Barry's contribution is important.[120]

SSK and STS - a lot of theoretical heterogeneities and antagonisms

Obviously, Kuhn was one of the most important catalysts for the SSK and STS, but naturally there are also other important figures including William Whewell who coined the term scientist in 1840 and actually opened the field called "History and philosophy of science", (HPS).

As Steve Fuller[121] has pointed out Whewell's project entailed a twofold strategy: 1) Eliciting principles of epistemic growth that could be transferred across all disciplines and that could be made the possession of all disciplines (physics as an ideal) and 2) Favoring the study of certain revolutionary periods in which the process of major epistemic change was more evident. In other words, the internal and external aspects of science must be seen as an interactive processual forum in which the other aspect does not exist without the other. This was also one of Kuhn's points.

It is thus obvious that recent enthusiasm on science and technology studies owes a lot to Kuhn's ideas. Yet it can also bee seen as a defence of sociology or as an enterprise to make sociology not only a legitimate but a highly relevant discipline to study science and scientific knowledge.[122] Within those traditions two different variants can be distinguished. The first, *The Strong Program* was introduced by David Bloor in the late 1970s. The Strong program can be reduced to its four methodological principles: a) causality, b) partiality, c) symmetry, and d) reflexivity. Those principles are important in

[117] Fuller 1993.
[118] Fuller 2000.
[119] Barry 2001.
[120] I will return to his elaborations later but he is not referring to rhetoric or rhetoric analysis because his account is very close to Foucault's idea of discourse.
[121] Fuller 1993; Whewell 1987.
[122] One of its key points was to criticise both Karl Mannheim's idea of sociology of knowledge and Robert K. Merton's idea of sociology of science.

terms of the sociological explanations of the propositional contents of beliefs or theories held by scientists.[123] The second variant, often defined as a *determined defence of social constructivism*, is based partly on ideas elaborated by Berger & Luckman´s[124] in their analysis of knowledge and its social nature based on Schutzian phenomenology.[125]

It is thus important to note that the Strong program and ethnographic traditions are very different in many respects. The Strong program stresses four issues: a) external factors are significant; b) it stresses causal explanation, not interpretative descriptions of scientists and their community; c) it prefers sociological reconstructions of historical materials rather than contemporary cases; d) the focus of its interest is in scientists as holders of beliefs, not actors.

When compared with the Strong program the ethnographic tradition appears markedly different: 1)it has produced a lot of detailed studies on scientific practice; 2) the focus of studies is mainly on micro level and macro level is unimportant; 3) the methodological preference is on qualitative methodology (fieldwork, ethnographic inquiry, participant observatory); 4) negotiation is seen as a general principle for studying scientific knowledge as study object: this means that scientific knowledge is the product of an ongoing, continuous, and radically contingent negotiation among scientists, their agents, and institutions; 5) nature is seen more as an object of construction than one of discovery - scientific communities are epistemic and practical communities; 6) their aim is to consciously challenge scientific rationality and realism by arguing that nature plays little role in scientific knowledge.[126]

The starting point for a social constructivist is the acting subject with his/her beliefs, intentions as an actor. The basic activity of a scientist is based on the construction of scientific facts and theories in local communities. Facts and theories are seen as fabrications based on the processes of selections, interpretations and negotiations.[127]

These guidelines, supported by most of social constructivists, have also been a fashionable object for very aggressive philosophical and scientific attacks and wars focusing mainly on social constructivism and its problems.[128]

The STS tradition has a strong tradition of "laboratory studies", which applies to a broad variety of different kind of approaches as ethnomethodology, discourse analysis, semiotics and other approaches coming from sociology, anthropology and political sciences.[129]

The most controversial and provocative suggestions have been introduced by such ANT theoreticians as Bruno Latour, Michel Callon and John Law.[130] They have suggested that one of the key problems for STS scholars is how to detach oneself from the western philosophical tradition in which such traditional oppositions between subject/object and society/nature play a major role. Their aim is to find a new provocative methodology which helps us to transcend the traditional dichotomy

[123] Bloor 1976.
[124] Berger & Luckman 1972.
[125] Collins 1985; Knorr-Cetina 1981; Knorr-Cetina & Mulkay 1983.
[126] See Hands 2001, p. 190.
[127] Latour and and Woolgar 1986; Knorr- Cetina 1981; Lynch 1985.
[128] Sokal & Bricmont 1998; Niiniluoto 1999.
[129] See Knorr-Cetina 1981; Knorr-Cetina & Mulkay 1983; Latour 1987. One of the most appreciated scholars in this tradition is microbiologist Ludwig Fleck and his famous Genesis and Development of a Scientific Fact. One of the key concepts in Fleck's approach was the concept of thought collectives and, interestingly, Thomas Kuhn in his foreword stresses that his and Fleck's ideas have a lot of common.
[130] See Jasanoff & al 1995; Law 1999.

between human/non-human and the opposition between human and natural sciences so that we may be able to analyze socio-technical transformations in a different manner.

Latour and his associates have stressed strongly *the interest dimension in* scientific inventions and innovations.[131] Also, the role of translation and the necessity of political rhetoric in innovations and actor-networks have been in the core of their theoretical developments.

For them, scientific work is a form of writing aiming to produce "literary inscriptions"- e.g. figures, curves, diagrams and written reports. The proper core of science is the rhetorical use of language in social contexts - "the organisation of persuasion through literary inscriptions".[132] This persuasion has one very peculiar feature: "*The function of literary inscriptions is the successful persuasion of readers, but the readers are fully convinced when all the sources of persuasion seem to have disappeared*".[133] The ANT theoreticians have attempted in their network analysis to elaborate a vocabulary enabling them to analyse how actors "build networks" or to "enrol others" as a process of seeking tools by which actors can manipulate, transform and create interests.[134] They speak of "enrolment" as the construction of networks and of "translation" as an umbrella term for different methods of enrolment.

Translation can be understood as a pure "interéssement": what someone is doing or as the more complicated form of "problematisation".[135] The latter form of translation means that the network builder attempts to create support for his project by presenting it as a necessary step towards reaching the goals of other parties. This kind of persuasion is a very essential part of Latour´s detailed analysis of different kinds of enrolment and translation tactics to be applied in order to be successful in the network builder´s project.

Latour and Woolgar[136] speak of the "modalities" that one statement might have in these processes of persuasion. They distinguish five modalities: 1.wild speculation, 2.plausible suggestion, 3. reporting the findings of others, 4.fact stating (teaching texts) and 5.being-taken-for-granted.

A statement reaching the modality 5 has become "black boxed". Latour's argument is that scientific knowledge is a kind of dialectics from artefacts to facts.[137] Starting from a statement/artefact, it transforms itself into a fact, tacit knowledge and instruments and then the process re-starts. Latour´s point is that we have a kind of continuum which forms the institutions of science: literature- laboratory- machine- tribunals of reason- centres of calculation.

His point is that science is a process of closing black boxes so that all struggles and fuzzy histories are not remembered. Such statements can function without being argued for to support of further, other claims. Latour and Woolgar argue that the debates and struggles have this kind of "modality logic" in scientific context.

It follows that the aim of scientific struggles and debates is to reach the "blackbox" status or at least the fourth modality because nobody denies the significance of the foundational statements after reaching those levels. In other words, Latour and Woolgar argue that there are no foundational nor basic beliefs in science; there is nothing given,

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[131] Ylikoski 2001; Ylikoski 2000.
[132] Latour & Woolgar 1986, p. 88.
[133] Latour & Woolgar 1986, p.76.
[134] Latour 1987, p. 44; Latour & Woolgar 1986, pp. 76 – 82.
[135] Latour 1987, pp. 108–132.
[136] Latour & Woolgar 1986, pp. 78 – 86.
[137] Latour 1987, p. 44.

there are no incorrigible or privileged beliefs. All we have is a set of social facts with plenty of communal support.

Scientific action or activity is a social property and the credibility of an actor is dependent on other persons in a social context. In order to achieve this goal, scientists must utilize a variety of tactics and strategies but they remain constrained by others and their reactions. For Latour and Woolgar,[138] to interpret the realm of science as a market means that scientists have only one utility function: credibility. In order to obtain their goals they act as if they were agents in the market. They talk about costs, profitability, investments, risks, opportunities, and returns. Latour and Woolgar have proposed that science must be characterized as a field of competition where scientists act as capitalists trying to monopolize the field by accumulating scientific authority.

After having reached the monopoly position, they attempt to define the most significant and real research problems. They ask: what are the appropriate research methods and what are the important theories from their position in the field? If Pierre Bourdieu's invention was to consider scientists as entrepreneurs, Latour's and Woolgar's contribution is to consider science as a market and credibility as its central attribute. Scientists act like stockbrokers: they possess a lot of knowledge, they have the necessary competence and training, and they are very much dependent on reputation.

Reputation is like a paramount good in science, a kind of universal currency. It is one of the most important resources for convincing other experts in science as well as non-experts inside and outside the context of science. In their evaluation of credibility Latour and Woolgar distinct three aspects: 1) the source's epistemic competence: what is the level of competency, 2) the moral character of the source: what is the level of trustworthiness and 3) the credibility in relation to third parties: what is the possibility of testimony? Latour and Woolgar do not think that the pursuit of credibility is a psychological motivation for scientists; it is rather a part of competition that the game *science* involves.

Knorr-Cetina,[139] who has strongly defended the role of social construction in her laboratory studies, has argued that among scientists there is also a variety of "transepistemic arenas" and a set of resources like funding, careers, important people and so forth that they must take into account if they want to play the game. Scientists have to apply in their rhetoric very different means in order to direct their persuasion to different audiences and players both in academia but also outside it. They have to obtain support from their sponsors, journalists, businesses, politicians, bureaucrats and the larger public. Various disciplines have various strategies and tactics that depend on their needs and audiences.

H. M. Collins[140] has suggested in his empirical programme of relativism that STS scholars must focus their attention to controversies. They are interesting and useful because:

a) They make possible to study arguments, ideas, concepts and theories.

b) They illustrate the mechanisms of closures as the tactics and strategies the scientists employ in order to force their opponents into agreement.

Collins[141] pays attention to two of them: rhetorical closure and closure by the redefinition of problem.[142] While the first is a body of tactics by which scientists attempt

[138] Latour & Woolgar 1986.
[139] Knorr-Cetina 1981, p. 118. Later Knorr-Cetina speaks of "epistemic cultures". See Knorr-Cetina 1999.
[140] Collins 1981b; Collins 1985.
[141] Collins 1983, p. 95.

to weaken their resistance by argumentation, the second is a method of changing the scale. They make it possible to relate the closure mechanisms with social and political context.

But what is the SSK and STS writers' real point? Firstly, they want to stress strongly the social and cultural dimension of science. This means that they insist determinately that we have to admit the possibility of relativism and the constructive elements in scientific action.

Secondly, in order to do so they or some of them want to re-conceptualise the old dualism favoured by the Mertonian sociology of science suggesting that we have "social" factors affecting "mental productions".[143] In other words, we have to abandon the idea that we have some internal logic of science, which can be explained by social factors conditioning the form, content and dynamics of cognitive products. Instead, we have to replace the vocabulary so that we ask how nature and society are co-produced: it can be seen as an attempt to overcome the Kantian dichotomy of subject/object or society/nature.

Thirdly, their argument is that the new vocabulary by which they blur the distinction between natural objects and artefacts helps us to understand the role of social communities in scientific cultures and histories and how artefacts convert themselves into facts in those communities and what role argumentation and rhetoric play in that metamorphosis.

One of the problems in social studies in science is that it is often very difficult to grasp what is the intended *explanandum* or whether the author intends to explain anything. Also, the theoretical apparatus used for the explanatory work may be very imprecise: the concept of interest has a different meaning for sociologists than philosophers. It is worth noting that philosophers speak about credits and sociologists about credibility. In fact, philosophers seem to understand credit as a psychological motive but Latour and Woolgar do not view credibility like that. Rather, hey seem to say that there is no common motive or goal for scientists apart from the fact that they are forced to participate in the cycle of credibility.[144]

The employment of theoretical resources within the SSK and STS traditions has been rather liberal because the origins of these traditions are so diverse. This has caused the current situation: the traditions have evolved slowly from different heterogeneous theoretical aggregations and become different internally homogeneous and often paradigmatically contradictory variants debating bitterly with each other.[145]

There have been at least two generations in the SSK and STS traditions. The first generation – the Strong Program and social constructivism and the second generation - the ANT and the reflexivity branch.[146] One important historical divide is the year 1992 when the article "Epistemological chicken" by Collins and Yearley was published. In this article they argued that the point of the SSK is to argue that, on the one hand, scientists' beliefs are caused by social factors and, on the other hand, the SSK is no longer a version of "discourse analysis" as it used to be. Metaphorically speaking, the SSK has touched its bedrock.

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[142] Pinch & Bijker 1987, pp. 424–428.
[143] Shapin 1995.
[144] Petri Ylikoski has introduced an interesting account of causal explanation but it must be excluded here.
[145] See Barnes, Bloor and Henry 1996; Collins & Yearley 1992; Shapin 1995; Bloor 1999.
[146] Hands 2002.

The problem of the market in STS

One of the recent developments in the STS tradition points to the problems of economy and economics. As Barry and Don Slater[147] argue in their analysis on contemporary economic life, there are two commonplace observations. The first observation is that the production and consumption of knowledge, information and culture have become increasingly central to economic activity. The generation of new knowledge and other immaterial goods is thought to be increasingly important for economic success. The second observation is that there has occurred a huge growth in the production of knowledge about economic life. A point of departure of their economic sociology is the recognition that the forms of knowledge produced about economic life are performative, not just descriptive or analytical. In other words, these practices of knowledge production create various phenomena.[148]

Knorr-Cetina[149] and Donald MacKenzie[150], among others, have increasingly focused their attention on economic analyses and financial knowledge. Callon[151] has repeatedly insisted that sociologists must rethink their relation to economics, and sociologists must study carefully the role of economics in the constitution of markets. Instead of viewing economics as a bad science it would be better to view it as a set of technical practices that have a strong relation to real economies. *"Social science [including economics] is no more outside the reality it studies than are the natural and life sciences. Like natural science it actively participates in shaping the thing it describes."*[152]

Barry and Slater think that there are a lot of reasons why the simultaneous utilization of economic sociology and science and technology studies is valuable. First, whatever the object of economic knowledge is, be it the consumer or the market, something is always constituted as being external to these objects. In other words, the frame or boundary of a market, or capitalism, or any other economic object, is itself contestable and negotiable. If the objects of economic knowledge are invented, they can also become contested, politicised and transformed. Yet Barry and Slater do not think that capitalism or the global economy is a unified totality. Rather, they insist that we have to analyze how those generalised notions have been both informed and operationalized through various specific forms of political and governmental practice.

Second, the recognition of the importance of innovation and creativity in economic activity points to the path-dependency of historical change. As sociologists and economists have shown, social and technological forces drive and shape the direction of technological change.[153] But this does not mean that we have to understand the social as a context within which invention happens. Rather, we have to understand the social as something which is itself transformed through invention.

Third, the importance of innovation and creativity in economic life points to a broader set of questions concerning the way how the relation between social and material objects is conceived. In short, material objects are never purely material; their force and effects depend on their relations with other elements, including information. But this informational environment, for example in the case of a drug molecule, is not

[147] Barry and Slater 2005.
[148] Osborne and Rose 1999.
[149] See Knorr- Cetina and Bruegger 2002a; Knorr- Cetina and Bruegger 2002b.
[150] MacKenzie 1996.
[151] Callon 1998a; Callon 1998b.
[152] Callon 1998b.
[153] MacKenzie and Wajcman 1985.

simply external to the drug. Information is not a set of signals because information can become information in so far as it becomes bound into a complex environment, including an environment of material objects.

Fourth, economic transactions increasingly take place through technological mediation, and these tools are not neutral tools of economic policy or practice. Such contemporary terms such as "network society" and "globalisation" point to the role of technologies in conceptualising and reconfiguring economic action.

If the STS tradition in the 1980s wanted to challenge the technological determinism and advocate a view saying that technology is socially shaped or socially constructed, the technological economy following Callon's footsteps wants to adopt a different position. If the earlier versions of STS considered the economy as a set of factors or forces influencing the direction of the technological change and the design of technological artefacts, those advocating the technological economy approach insist that the distinction between the social and the technical i.e. the distinction "human" and "non-human" is problematic. First, it is impossible to differentiate between these two aspects because they have been disrupted in the process of technical change. Second, the very idea that the social is something like a structure is problematic because it has been impossible to give a purely social explanation of technological change as technological objects themselves form a crucial part of what the social is.

Such a view is based on two central ideas: the actor-network and translation. *"By translation we understand all the negotiations, intrigues, calculations, acts of persuasion and violence thanks to which an actor or force takes, or causes to be conferred on itself, authority to speak or act behalf of another actor or force."*[154]

The notion of translation, originally a term created by Michel Serres[155], emphasises the way in which the identity of actors, and their relations, is always in process. It also conceives that translation is a political process in which politics is conceived not in terms of competing ideologies or interests, but as a calculated Machiavellian act. In other words, the process of technical change could not be explained by reference to various social, political and economic interests. Technical change is itself a form of politics that both reveals and translates the identity of social and economic actors.

Within this approach Barry and Slater identify four specific points of contact between STS and economic sociology. First, the phenomenon of technical change itself: there is a long tradition of the political economy of innovation from Smith and Marx to Schumpeter that addresses the question of relations between economic and technical change; yet most conventional economics treats technology simply as an exogenous variable. But as we have seen, the technological economy deconstructs both the independent and determining character of technology. If the earlier STS generations wanted to open the black box of scientific knowledge, now we must open the black boxes of the economy. It follows that we have to focus our attention onto the technical details of economic and financial analysis: financial markets are not an imperfect sphere of economic rationality, but a sphere in which the "economic" and the "social" interweave seamlessly.[156]

Third, the focus of investigation, empirical case studies, must be put on the question of how the formation of economic realities proceeds. It means that contingent, heterogeneous and local, particular economic forms are important rather than structural

[154] Callon and Latour 1981, p. 279.
[155] Serres 1974.
[156] MacKenzie 2003.

analyses. This implies that the distinction between macro and micro levels of analysis must be carefully reflected.

A fourth point of contact concerns the importance of metrology and calculation[157]. Metrology and metrological practices (such as quality control, financial analysis, audit or environmental monitoring) create new realities (calculable objects) that can, in turn, be the object of economic calculation. Measurement seems to function as an "anti-political" device by reducing the space of possible contestation.[158] On the one hand, metrological and calculative practices may serve to open up new objects to political reflection and contestation and, on the other hand, calculations are always contestable. As we know, the use of calculations in the natural sciences does not end debates and controversies, and there is no reason to imagine that the development would be different in the social sciences.

Calculation is both a technical and ethical practice; it is not something that agents are naturally able to do once the markets have been formed. The capacity to calculate depends upon the separation or individualisation of objects into discrete transactable entities, with temporally stabilized properties that can be placed within a frame of calculation. In the case of markets, material reality consists of legal inscriptions, spatio-temporal arrangements, regulatory institutions that govern the form, shape and circulation of objects, as well as metrological devices that stabilise accounts of their properties.

It is important to understand that Callon's approach is a critique of contemporary approaches in economic sociology because calculativeness is not only a property of "economic man". For Callon *homo oeconomicus* exists and his aim is not to give a soul back to a dehumanized agent. "*The objective may be to explore the diversity of calculative agencies, forms and distributions, and hence of organized markets. The market is no longer that cold, implacable and impersonal monster that imposes its laws and procedures while extending them even further. It is a many-sided, diversified, evolving device which the social sciences as well the actors themselves contribute to reconfigure.*"[159]

For Callon markets and economic rationality are derived from the analyses of contingent social arrangements and they are not manifestations of deeper processes. He does not see that macro-structures can be treated as a higher level of abstraction but rather as another kind of locality, as a similarly heterogeneous assemblage of agencies. But if we set our focus on micro-level contingency we have difficulties to visualize the replication and transformation of structuring processes over time. Political economy has traditionally captured these structuring processes by referring to some intrinsic forms of capitalism and it is difficult to write histories of capitalist economies without the notion of capitalism as a unified totality, or the idea of a universal process of development or modernisation.[160]

In analyzing the relation between politics and the economy sociologists tend to adopt a particular spatial metaphor. The economy is more or less solid foundation on top of which rest political and ethical principles. But Callon wants to utilize a totally different metaphor in which the concepts of frame and externality have a major role instead of determining what is below and what above and makes three remarks.

First, politics is generally placed outside the frame of economic calculations because measurement and calculation have the effect of cooling the temperature of political

[157] Latour 1999.
[158] Barry 2005.
[159] Callon 1998b, p.51.
[160] Barry and Slater 2005.

debate. They have anti-political effects and all possible objects of political contention are placed outside the frame.

Second, framing forms a kind of surface on which forms of political reflection, negotiation and conflict can condense. Callon's interest is to understand the new forms of politicisation and his suggestion is as follows. On the one hand, the rise of the service economy, the "economy of qualities" leads to an increasing focus on the quality, qualification and re-qualification of products. Although some of these qualities might be measurable and quantifiable they are always contestable. On the other hand, the organisation of markets has become a collective issue and the economy becomes in this sense political. The problem is to develop forms of political institutions that make it possible to debate the question of how markets should be organized. The demarcation line is not drawn between those who favour markets and those who favour state ownership. Rather, there is a series of debates both concerning the form of market regulation and control and the particular role of economic experts and laypersons in economic government.

Third, Callon's analysis does not revolve around an opposition between life-world and system world or between instrumental and communicative rationality as in the case of Jürgen Habermas. His analysis draws inspiration from etnomethodology and symbolic interactionism and he wants to follow in his analysis the trajectories of actors themselves. The role of the economic sociologist is neither legislative nor interpretative, but experimental.

Barry[161] has utilized Callon's approach in his analysis of the anti-political. A conventional account of politics stresses the politics of election, political parties and governments, and this kind of account of politics relies on the idea of a careful framing of political actions and events. It demands the development of anti-political as well as political technique.

The contemporary discussion on "new economy" and its many cognate terms - information society, network society, knowledge-based economy, cultural economy and so forth is at the heart of something important. The diversity of labels and metaphors points to the inevitable convergences between technology and economy and, in particular, they stress the significance of technological innovation. This means that information and knowledge are placed at the centre of economic processes. But these extremely broad definitions of information and knowledge are used because they stress the increased centrality of cultural and social relations in economic processes. These broad notions must be, argues Barry, understood as descriptions of an increasingly dematerialised and networked economy. They form part of attempts to establish new material arrangements and rather are models of the political and economic future.[162]

Meaning finitism in SSK

Bloor,[163] in his evaluation of Wittgenstein's account of rules and rule-following wants to defend the collectivist reading of Wittgenstein. For an individualist, a rule in its simplest form is just a standing intention; for a collectivist, it is a shared convention or a social institution. Bloor is defending the collectivist account but not because he is against the individualistic account but rather because individualism as well as collectivism has no

[161] Barry 2005.
[162] Barry 2001.
[163] Bloor 1997.

essence. We can distinct a generalized ideological individualism; those who want society to be organized in extending the scope of the market.

As a point of departure Bloor takes Wittgenstein's famous problem, the mystery of the compulsion of rules, the "hardness of the logical must[164], and he uses it as an example how to continue the sequence of the even numbers 2, 4, 6, 8, 10, 12, 14. If we have a rule of the kind we have no physical necessity to do a certain thing. Rather, we must do the thing in question if we are to conduct ourselves rightly. We can do something else, but then we do something wrongly. So the necessity we are dealing with is like a moral necessity. Then we can say that the mysterious character of rule following is not mysterious at all. It must be accepted as a plain matter of fact.

In order to be able to understand these problematic issues we can choose the view, meaning determinism. This is the claim that the compelling and infinite character of rules derives from the property called "meaning". In other words, rule following is possible by our power to grasp the meaning of the concepts used in the rule. Grasping a concept is a purely individual achievement, an individual mental act.

Wittgenstein rejected meaning determinism and argued that rule following is not a simple, impenetrable matter of fact. His account was extremely simple in its general outline. First, rules are social institutions or social customs or social conventions. Second, to follow a rule is therefore to participate in an institution and to adopt or conform to a particular custom or convention. To obey a rule is similar to playing a game of chess, customs.[165]

Bloor has together with Barnes and Henry suggested that the Wittgensteinian account of rule following may be called meaning finitism. In order to understand rule following we should look at how we learn to follow rules, and how we might teach someone a rule was Wittgenstein's advice. "*Once you have described the procedure of this teaching and learning, you have said everything that can be said about acting correctly according to a rule.*"[166]

Another very important aspect of meaning finitism is that it rejects the traditional classical distinction in semantics i.e. the "extension" and the "intension" of a term. The meaning of a term is said to fix the extension. For a finitist there is no such thing as the "extension" i.e. propositions have no longer a determinate content. Particular things, or individual objects, exist in advance, but not classes of things. When philosophers think of the "extension" of a term they think of an envelope surrounding a set of objects. They imagine a line drawn round them limiting a definite area.[167]

"According to meaning finitism, we create meanings as we move from case to case. We could take our concepts or rules anywhere, in any direction…We are not prevented by "logic" or by "meanings" from doing this…The real sources of constraints [are] our instincts, our biological nature, our sense experience, our interactions with other people, our immediate purposes, our training, our anticipation of and response to sanctions, and so on through the gamut of causes starting with psychological and ending with the sociological."[168]

Barnes, Bloor and Henry[169] summarize meaning finitism as follows: 1) The future applications of terms are open-ended; 2) No act of classification is ever indefeasibly correct – similarity and analogy rather than identity; 3) All acts of classification are

[164] von Wright, Rhees and Anscombe 1978 p.121.
[165] Wittgenstein 1953, p.199.
[166] von Wright, Rhees and Anscombe 1978, p.26.
[167] Bloor 1997, p. 24.
[168] Bloor 1997, pp.19–20.
[169] Barnes, Bloor and Henry 1996.

revisable; 4) Successive applications of a kind term are not independent; a successive application of a word changes the array of exemplars and thus influences subsequent acts of classification; 5) The applications of different kind terms are not independent of each other.

According to Bloor, we might say that social institutions must be analyzed as self-referring systems of talk and thoughts, and he gives a couple of examples. To say someone "I welcome you" is to welcome them. This kind of language use is an example of a performative utterance: it makes itself true by being uttered. In other words, an institution is a collective pattern of self-referring activity. This self-referential model explains, according to Bloor, how the rule itself is part of the currency of interaction, and a medium of self-understanding. The rule "exists" in and through the practice of citing it and invoking it in the course of training, in the course of inciting others to follow it, and in the course of telling them they have not followed it at all or not followed correctly. [170] Any attempt to justify the "must" will only lead us back to the practice itself. And this is exactly the "linguistic idealism" Bloor is defending: the ontological status of an institution is a reality having no existence independent of our collective thoughts about it, and references to it.

Another very interesting development in SSK has been made by MacKenzie who has written a series of interesting analyses focusing on economics and economic issues such as financial markets, financial derivate markets, and accounts. As a SSK scholar, MacKenzie [171] strongly defends the idea of finitism and reminds that finitism holds for all terms from everyday observational terms to mathematical terms. The quantitative as well as the qualitative aspects of science and technology can be analyzed according to the idea of finitism.

His analysis on option theory and the construction of derivates markets is based on "Barnesian" performativity although he has leanings with Callon's ideas. In other words, he uses the terms a label for a particular subset of the performativity in economics. His claim in the case of the Black-Scholes-Merton model is that the market practices informed by the model altered economic processes towards conformity with the model, and the model was thus an instance of "knowledge substantially confirmed by the practice it sustains.

MacKenzie stresses that it is too easy to ask: Is the realm of economic theories or models real or not? We must rather ask whether the use of those theories or models will make the world it posits more real, or less real.

MacKenzie's point is to argue that economic models and their products make possible to "calculate" derivates; to legitimate, to compare, to evaluate, to price, and to hedge them. He uses the terms "Barnesian performativity" and "counterperformativity" simply as new names for self-fulfilling and self-negating prophecies and reminds that we are not dealing with some mysterious power of words. We can never identify performativity as a purely linguistic process but investigate the social, cultural and political nature of the process.

[170] Bloor 1997, p. 33.
[171] MacKenzie 1990.

3. METHOD AND MATERIAL: HERMENEUTICS AND TEXTUAL ANALYSIS OF STI POLICIES

3.1. Two rhetorical perspectives to STI policies

If the premise of this study is that the concept of politics is a key to understand politics and political phenomena and if the concept of policy is understood as a limit of politicking and the concept of polity as a limit of politicization it follows that STI policies must be examined as linked with these issues. It means that, on the one hand, STI policies are examined as a construction of a new policy program where the point of the construction is to establish new forums for politicking and, on the other hand, STI policies are examined as a generator of polity in which the focus is on politicization, on the construction of new issues and horizons.

The political agenda of STI policies can be seen as follows. As mentioned earlier the rationale of STI policies is twofold. First, it seeks to find justification for the STE hybrid and, second, it seeks to dissolve the idea of horizontality into those policies. It follows that there are two complementary views to STI policies: the theoretical and the practical one. In this study, I will call them *the RIS perspective* and *the RIP perspective*.

While the RIS perspective highlights the top-down aspect and focuses on the theory linked with STI policies, the RIP perspective studies the bottom-up aspect and focuses on the practice of STI policies. The first RIS perspective provides a horizon of *scientification of politics* and focuses on the role of scientific knowledge in STI policies. This perspective enables us to examine STI policies as a process of justification in which a belief becomes justified when there is something that justifies it. This can be reduced to a variety of epistemological dilemmas such as the dilemma of fact and fiction in science and politics.

The second RIP perspective provides a horizon of *politicization of science* and focuses on the role of political government in STI policies. This perspective allows us to examine STI policies as a process of legitimation in which not only epistemological issues but also norms and values must be taken into account. By utilizing these two perspectives we are able to analyze how rhetoric is embedded in STI policies.

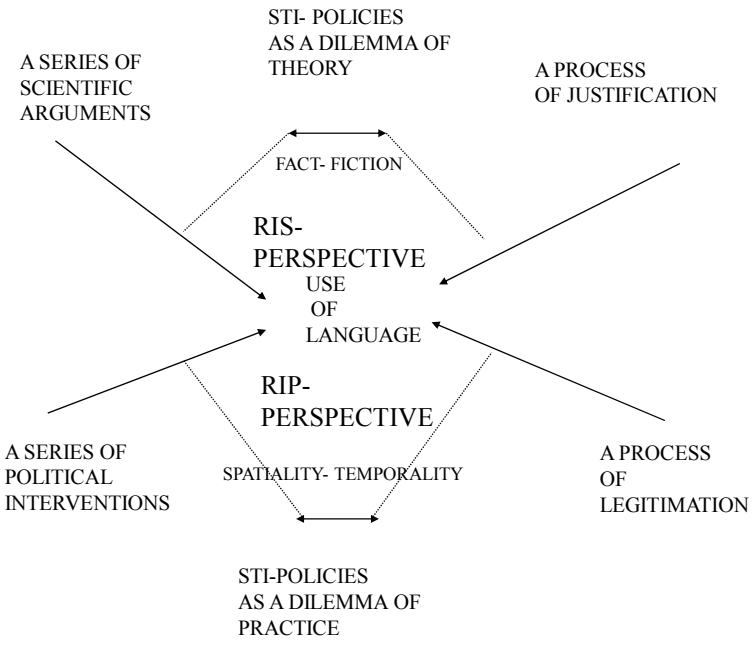

Figure 2. Two rhetorical perspectives

3.1.1. RIS perspective on STI policies: From theory to practice

In terms of this study, the RIS perspective primarily focuses on the theoretical core of STI policies. On the one hand, policy makers speak about the NIS framework as an enterprise to find *a theoretically coherent and scientifically plausible enough rational justification for STI policies and,* on the other hand, they speak about the necessity to start *a series of political interventions in pursuit of legitimating and implementing it* in pursuit of establishing a totally new culture of political administration based on the idea of innovation.

This kind of account of rhetoric is similar to Perelman's view[172] in that argumentation aimed at justification is a rational activity which stands alongside formal argument and is complementary to it. Argumentation in the ordinary language is never compelling and in argumentation there is no question of validity but of plausibility. In other words, Perelman and Olbrecht-Tyteca offer a rhetorical concept of rationality in which the soundness of argumentation is always related to an audience.

One approach to the rationale of STI policies is to examine it as an enterprise to find an answer to questions about modality. In other words, the rationale of STI policies is composed of questions about necessity (or what has to be, or what cannot be otherwise) and possibility (or what can be, or what could be otherwise).

One of the most interesting aspects of the NIS framework is that policy makers interpret and advocate the new framework as "a paradigm, as a political agenda having scientific justification and as a tailored answer to the complex problems of globalization

[172] Perelman & Olbrecht-Tyteca 1971, p. 281.

and technological change. The ideological core of STI policies is designed skilfully in the sense that it utilizes openly the problems of modal logic: a modal is an expression ("necessarily" or "possibly") that is used to qualify the truth of a judgement. This ideological core is understood in the STS context as technological determinism, or technological imperative; the progress of technology is inevitable, unavoidable and irreversible. [173]

Within the STI policy context this means that the process of argumentation proceeds by introducing a variety of "rational scientific concepts and plausible models" having correspondence with "politically realistic scenarios". This gap between the "possible" and the "necessity" is followed by a series of political interventions linked with plausible political scenarios in pursuit of finding a credible position in terms of power and of finding thre *raison d'etre* of that policy so that they are able to make sufficient interventions and reforms in order to change all conceivable obstacles and barriers in the existing political culture and political governance.

One of the key issues embedded in the NIS - framework is to make the dynamics of the science, technology and economy -hybrid as plausible as possible and to make the STE -hybrid a justified and legitimated basis of those policies. But what is the point of the STE hybrid and what makes it so important?

It is important to be aware of the fact that the term, STE hybrid, is used in this study for analytic purposes. It resembles to a great extent John Pickstone's analysis of the history of medicine in which he uses the acronym, STM hybrid to mean the science-technology-medicine hybrid. In his analysis Pickstone differentiates between two different approaches to the history of medicine: on the one hand, the WoKs perspective (Ways of Knowing) and, on the other hand, the WoWs perspective (Ways of Working, or Acting). These two perspectives are complementary in the sense that they both include four internal elements, the WoKs reading, natural history, analysis and experiment, and those of the WoWs rhetorics, craft, rationalization, and invention. These eight elements coevolute by a series of acting on/with "objects" by a) texts (rhetoric vs. reading), b) kinds (natural history vs. craft), c) compounds (analysis vs. rationalization), and d) controlled systems (experiment vs. invention).[174]

Interestingly, Pickstone admits that his model and use of the acronym STM is a conscious choice and that these acronyms as well as Latour's "technoscience" are prone to a variety of interpretations having nothing in common. For example, the recent discussion of Mode 2 or any other similar enterprise in pursuit of understanding the changing role of academic research in our society is interesting but such enterprises have a tendency to become unhistorical.[175]The idea of differentiating between two complementary approaches to knowledge is strongly based on two different concepts: the concept of knowledge per se embedded in the WoKs and the concepts of commodity and service in the WoWs. In other words, Pickstone intuitively holds that this kind of differentiation is not problematic.

In his critique on Pickstone's framework Barnes[176] remarks that his most important contribution is that he challenges the idea of "technoscience" as such[177]. There are a considerable number of English words that are obvious derivates of four key ancestors:

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[173] Bijker & Hughes & Pinch 1987.
[174] Pickstone 2000; Pickstone2005.
[175] In terms of this study my sympathies go along with Pickstone and I am very aware of the problems of my approach of being too general or too abstract.
[176] Barnes 2005.
[177] Ursula Klein has made an interesting analysis of technoscience. See Klein 2005b; Klein 2005a.

"ars", "scientia", "techne", and "episteme". The problem is that it is hard to make firm distinctions between the meanings of these four kinds of words.

Nowadays, we speak of science and technology as if they both had a mysterious composite essence with two different entities having two different characteristics. We usually think that science is the knowledge (and/or the trusted methods of extending knowledge) of a specific field of learning, and technology is the practice (or the study of the practice) of the various applied sciences and mechanical arts. Science and technology may be confronted as if externalities. In other words, we speak of the effects of "science and technology" upon the culture or society of which in truth they still remain a part.

We often perceive science as a reified realm, separated from the everyday life of human beings as a set of concepts and classifications, or theories as a distinct mode of knowledge and expertise. The current concern with science and technology as practices and processes is based on the idea of regarding them as sets of socially organized and embedded practices not as a reified Platonic realm. This is Pickstone's contribution to STS, argues Barnes.

The language of the technological imperative is often full of inexplicit, taken-for-granted assumptions. It also has an animated, visionary and prophetic tone. The key problem is naturally how to understand the concept of technology. The term technology has in English usage four different senses[178]: a) that of science policy studies, in which technology encompasses all scientific and engineering activities; b) that of government statistics, in which labour activities in the technology category include all workers up through engineers as opposed to scientific workers; c) that of engineers, who would limit technology in craft techniques; and d) the common dictionary definition of technology as the science of industries.

Stephen Klein[179] introduces four definitions of technology as artefacts or hardware, as sociotechnical systems of production, as technique or methodology, and as sociotechnical system of use, and Carl Mitcham[180] has developed this in his analysis of technology by introducing four different approaches to technology: technology as knowledge, technology as activity, technology as object and technology as volition. All this implies that technology is embedded in our practices as a form of knowledge and that the use of the term varies a lot.

Mirowski[181] provides a totally different approach to the dilemma of STE. He has in his recent studies tried to open the Gordian knot of science/economy problematic and argues that the previously pertinent disciplines such as Philosophy, Economics, Science Policy were thoroughly reconstituted in the post-World War II period in the American academy. The post-war phenomenon of analytic philosophy[182] is one element; the rise of American Neoclassical economics is another; the post-war construction of politics is the third and the rise of Mertonian sociology of science, constituted as a study of science purely from the outside looking in is the fourth.

But what is the point of the STE hybrid? One of the key points of the STI policies is that it openly promulgates a totally new view onto science and technology as well as to economy although its bottom line is still very traditional: the more economic growth, the more wealth and well-being.

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[178] Fores 1970.
[179] Klein 1985.
[180] Mitcham 1994, p. 159.
[181] Mirowski 2004, p.
[182] McCumber 2001.

In other words, STI policies have a history of their own in which scientific knowledge is linked with politics in many ways. One of the paradoxes hidden in the idea of STI policies is that, on the one hand, it introduces a set of new models and representations to understand the recent changes in the economy by highlighting a sort of unavoidability and determinism embedded in those transformations and, on the other hand, it openly lists a group of deficiencies of the traditional approaches and encourages scholars and researches to find new interpretations and models to understand and analyze science and technology.

Because the contemporary economic phenomena are so complex, we have to be unprejudiced and tolerant and introduce a new spectrum of approaches and methods to be used in order to understand those complex phenomena. Although the impetus of the NIS, one of most important theoretical frameworks used in STI policies, is explicitly to expand its theoretical nexus and open the black box, a corollary of contradictions is discussed among the economic methodologists.

3.1.2. RIP perspective on STI policies: From practice to theory

If the fulcrum of the RIS perspective is to analyse the STI policies as a dynamics from scientific representations to politics, the RIP perspective provides a totally different approach. By setting the focus on a dynamics from politics to scientific representations it highlights the problem of politics as such. The RIP perspective allows us to link the theoretical dimension embedded in STI policies with the practical dimension of those policies. It means that STI policies are evidently linked with the challenge of the new political governance in which a lot of issues are still in progress.[183]

The political ethos embedded in STI policies strongly highlights the problem of change and contingency and the necessity of large societal changes in our socio-cultural environment by stressing that its proper focus is not on science or technology or economy as such. Rather, the ideological focus of STI policies highlights the significance of activity and initiative and discounts passivity and reactionary attitude echoing Marx' s famous dictum: "Philosophers have hitherto only interpreted the world in various ways; the point is to change it."[184]

It follows that the ultimate target of STI policies is not only to focus its interventions to economic sphere to enterprises, customers and economic policies but rather to engender a variety of political and societal changes in the society as a whole including the political and administrative context itself. The quest for socio-cultural political reforms surprisingly resembles Hayek's account of conscious order *taxis* and spontaneous order *cosmos*.[185]

Seppo Tiihonen[186] in his analysis of political governance highlights three new elements of governing: the renewal of the governance linked with the state and public administration, the renewal of the governance of the markets, and the renewal of the governance linked with the whole society. Its major aim is to generate a totally new framework to understand public sector governance and its functions.

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[183] Antiroiko 2004.

[184] Marx, K. Online archives; the Finnish scholar Heikki Patomäki has provided an interesting interpretation to this Marx's dictum. His point is that one of the paradoxes related to modern economics is that since the theory and the world do not correspond, we have to change the world rather than the theory. See Patomäki & Teivainen 2003, p. 23.

[185] Caldwell 2002.

[186] Tiihonen 2004, p. 32.

This implies three sets of complementary interventions: a set of public administration interventions which focuses on legality and is linked with public sector administration, a set of interventions which clarify public market functions, and a set of interventions which focus on the governance of public services. In terms of practices the new discourse highlights the efficient institutions and institution building, democracy as well as networking and trust. According to Tiihonen, the key issue is to re-define the task of state.

The most influential discuntants are economists who emphasise economic reasons. In a typical task catalogue those discutants suggest that the contemporary state is said to have responsibility "*1) to establish rules and institutions aiming at enforcement of contracts and protection of property rights to help expand the role of the markets, 2) provide a legal and regulatory framework that reduces transaction costs and promotes market efficiency through strategic market intervention in case of market failure by providing public goods (defence, law and order) and by providing information (for consumer protection), 3) promote macro-economic stability, 4) address externalities (environment protection), and 5) regulate monopoly (utility regulation and competition policy).* "[187]

Christopher Hood, who has specialized on the study of executive government, regulation and public sector reform,[188] has investigated administrative philosophies, doctrines and the role of persuasion in administration. Administrative philosophies include a set of doctrines - a set of maxims - and a set of justifications - a set of reasons for adopting doctrines.

A doctrine can be described so that it is *"a set of doctrines that lies half-way between "theory" and "practice" – where "theory" means an attempt to explain some part of the environment, so as to make all observations about it consistent with one another, with the sole purpose of approaching "truth" or understanding; and "policy" means a statement of intention towards some part of environment, designed to initiate and guide actions in it so as to make all actions consistent with one another, with the purpose of furthering or preventing change. A "doctrine" then, looks both ways; it makes plain, but in the manner of "revealed truth" rather than the tentative hypothesizing of theory; it shows what must be done, but as if it were from necessity rather than the instrumentation of policy. The doctrines of actors are derived from theories that are not questioned; policies are derived from doctrines that purpose to be "fact".*[189]

According to Hood, the primary object of a doctrine is influence and its key test is its persuaveness. The problematic for a doctrine is to provide the link between argument and acceptance and in order to solve the problem a variety of methods of proof are used. Hood's argument is that NPM (New Public Management) and late cameralism[190] as sets of administrative philosophies have a lot of common. This is seen in the following issues: the use of the term "public management", the stress on administrative technology as the key to effective state management, the view that execution should be separated from high policy, the central emphasis on the financial system of the state, the preference of avoiding direct state management of complex transactions or processes, the essentiality of top-down and centralist nature in practice, and the lack of questioning of the parameters of social and political order within which public management operates.[191]

[187] Tiihonen 2004, p. 199.
[188] Hood 2006, pp. 13–19.
[189] Dunshire 1973.
[190] Hood and Jackson 1991.
[191] Hood 2006, pp. 181–182.

The RIP perspective enables us to study these problems of political governance and analyzeits hidden ethos. The ethos of political governance becomes visible in the idea of eGovernment strongly advocated in the EU in recent years. The idea of eGovernment is closely linked with the Lisbon strategy and its key argument the knowledge triangle-research, education and innovation -hybrid as a motor of knowledge–based society.

The term, eGovernment, is defined by the European Commission as the use of ICT in public administration combined with organisational change and new skills in order to improve public services and democratic processes and to strengthen support to public policies. eGovernment is an enabler to realise a better and more efficient administration. It improves the development and implementation of public policies and helps the public sector to cope with the conflicting demands of delivering more and better services with fewer resources.[192]

The aim of the EU eGovernment program is to enable organisational change, to revise central-local cooperation and coordination, to redefine public-private relation, and to strengthen best practice ethos in political government. The concept of the eGovernment includes four other subcategories: the concept of eAdministration, the concept of eDemocracy, the concept of eService and the concept of eGovernance.[193]

The ideals of the program are as follows: first, we will have a public sector that is open and transparent: governments will be understandable and accountable to the citizens and open to democratic involvement and scrutiny. Second, we will have a public sector that is at the service of everybody; the user-centred public sector will be inclusive, that is, will exclude no one from its services and it will respect everyone as individuals by providing personalised services. Third, we will have a productive public sector that delivers maximum value for taxpayers' money; it implies that less time is wasted standing in queues, errors are drastically reduced, more time is available for professional face-to-face service, and the jobs of civil servants can become more rewarding.[194]

These challenges are translated in the EU jargon into the back office and the front office framework. The back office is a term related to the front office which in this context is a user interface to an online service. The back office receives and processes the information which the user of a service enters in order to produce and deliver the desired service. This may be done completely manually, fully automatically or by any combination of both.

In some cases such a service is produced by one unit or back-office, in other cases several back-offices of the same service supplier agency or of different agencies, at the same government level or at different levels may be involved. In order to recognise the complexity involved and to achieve the comparability of different cases a common terminology is needed[195].

The concept of eGovernment is sometimes replaced with other concepts such as digital government or online government but it is noteworthy that the concept of eGovernment has a strong political connotation and is a developmental concept. It is likely that the term loses its political potency and will be replaced with other concept such as u-government (ubiquitous government) or m-government (mobile government). The whole point of eGovernment is to utilize information technology in re-organizing the public sector and its administration.[196]

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[192] Millard, Iversen, Kubicek, Westholmand Cimander 2004.
[193] EU - The European Commission (2002); EU - The European Commission (2005b).
[194] EU- The European Commission (2003c).
[195] EU - The European Commission 2008.
[196] Grönlund 2002. See also URL= <http://www.epractice.eu/en/home/> 13.1.2009.

But sometimes the concept of eGovernance is seen as a "relational" concept in which the point is highlight the governance element embedded in it. In effect, the concept is seen as a development concept for political government and administration itself as is the case in the OECD definition of eGovernment.

> "E-government provides an opportunity to develop a new relationship between governments, citizens, service users and businesses, by using new ICTs which enable the dissemination and collection of information and services both within and outside of government (government to citizen; government to business; government to government) for the purposes of service delivery, decision making and accountability." [197]

What makes the eGovernment procedure so interesting is that it illustrates the contemporary problem of government. It seems very obvious that the landscape of government is changing i.e. the relationships (power and responsibility) between the players – between service providers and industry, between the public, private and third sector, and between government and citizen.

The new forms of governance are emerging due to the changing organisational and economic structures. This has profound consequences for the way in which we understand and exercise citizenship. It is clear that eGovernance is not just about putting government services online and improving their delivery, but also constitutes a set of technology-mediated processes that may change the broader interactions between citizens and government.[198]

One of the key evaluation frameworks utilized in the eGovernance proposal is the Good Practice Framework. The aims of the framework are characterized as follows:

> "The objective of the action is to establish a framework to facilitate the exchange of good practices, their transfer when appropriate and learning from experiences at local, regional, national, European and international level in order to foster strong commitment and continuity in the practical implementation of eGovernment."[199]

The usefulness of the framework is that it clarifies

> "critical issues that might hamper the transfer of good experiences such as the legal aspects of the process of re-using successful developments among the different administrations, the ownership of the systems and their relationship with the public tendering procedures which the public administrations have to follow, the various aspects of the public-private partnership undertaking."[200]

The exchange of good practices is needed because it helps us to evaluate how

> …to change management and organisation of work (back office/government process re-organisation) within the administrations because it is important that all future users and stakeholders are prepared and qualified to manage the technology and eGovernment solutions.[201]

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[197] OECD 2002.
[198] Millard et al 2004, p.7.
[199] EU - The European Commission (2005c).
[200] EU - The European Commission (2005c).
[201] EU - The European Commission (2005c), p. 2.

In this study the welfare cluster case illustrates all those problems discussed above.It also provides an interesting arena for analyzing the problems of political governance embedded in STI policies. In effect, the welfare cluster case makes transparent how a variety of problems of politics are present in STI policies.

The welfare cluster case is interesting because it was Finland's own attempt to start a variety of reforms nowadays implied in one subprojects of the eGovernment, the eHealth program. Finland, as well as Sweden, Denmark and Norway, started to renovate their health policies in the second half of the 1990s and the welfare cluster was the Finnish version of that renovation.

Terminology used in the European Commission linked with health care technology programs has varied in the course of time. During 1989 - 1994 the research program was called "Advance informatics in Medicine" in the Framework Programme 2 and 3. The emphasis was on regional networks and telemedicine applications. In the Framework Programme 4 (1994 - 1998 the program was called "Health telematics", and the emphasis was still on regional networks and telemedicine applications. In the Framework 5 during 1998 - 2002 the program was called "eHealth", and the emphasis was on internet-based applications and patient empowerment. In the Framework 6 (2002 - 2006) it was called "ICTs for Health", and the emphasis was put on prevention, personalisation, patient safety, knowledge infrastructure, and support to molecular medicine (biomedical informatics).

An action plan adopted by the European Commission on 30 April 2004 shows how information and communication technologies (ICTs) can be used to deliver better quality health care Europe-wide.[202] ICT for Health systems includes tools for health authorities and professionals as well as personalised health systems for patients and citizens. Examples include health information networks, electronic health records, telemedicine services, personal wearable and portable communicable systems, health portals, and many other ICT-based tools assisting disease prevention, diagnosis, treatment, health monitoring and lifestyle management.

3.2 Hermeneutical understanding as the basis of the analysis

In principle, we might distinguish between two different interpretations related to causation. According to the first interpretation, causes are to be regarded as handles or devices for manipulating effects. One version of this interpretation can be found in different theories of action. According to the second interpretation, causes are usually events (singular events or event types), but they might also be things, states of affairs or universals so that causation is often understood as a sort of mechanism. One very controversial version of the second interpretation is naturally David Hume's thesis that a cause is "*an object, followed by another, and where all the objects similar to the first, are followed by objects similar to the second.*"[203] For Hume causation is based on experience, it is not *a priori*; we perceive two different states of affairs and link them together using the idea of causation.

These two approaches constitute the core of methodological debates in social and human sciences and often provide a borderline between those who stress the speciality of human and social sciences and those who do not find anything special in them. In

[202] EU - Commission of the European Communities COM (2004).
[203] Hume 1986, p. 54.

practice, this controversy is often seen as a controversy between quantitative or qualitative methodology and is often translated into the dilemma of the agent-structure relationship.[204]

The controversy involves two important fundamental problems along which the proponents of the competing research traditions consistently differ. [205] The first of them concerns the epistemological significance of individual agents and their choices vis-à-vis the structures that define their positions, roles and identities in relation to one another (the problem of methodological individualism/collectivism). Does the ontological primacy of individual actors also accord them with epistemological primacy *vis-à-vis* the structures that constraint, or give meaning to, their actions?

The second problem concerns the relative significance of concrete material factors, or hidden "fuzzy" ideal factors in the analysis if individual motivations and patterns of social interactions. Can the material features of social life (wealth, resources, rules, social networks and so forth) be more directly observed than the ideal features (norms, identities, symbols, cognitive schemas and so forth) accord to the former a greater epistemological significance in the interpretation of social phenomena?

As Rudra Sil[206] argues the real problem in the study of politics is that we often have to make a choice between a problem-driven and method-driven approach. While the collective output of social scientific research is usually evaluated outside the academy primarily in terms of its utility in relation to concrete problems, individual scholar has to face tradeoffs between acquiring greater mastery of a given method and seeking a deeper understanding of a given substantial problem.

In social sciences a scholar need to offer claims about methodological rigor and substantive utility in order to be taken seriously in the eyes of a particular research community. There are scholars who share a common academic interest in a particular substantive problem and there are scholars who share a common interest in a particular methodological approach and theoretical vocabulary. It follows that research communities embrace often conflicting understanding of what problems are significant and what methods are appropriate for tackling them. In this study the substantial problem has played the major role and, in effect, it has also dictated the methodological choice because of the following reasons.

If we accept the idea that the use of language plays an important role in politics it makes the role of a scholar difficult. In other words, it is extremely important to be aware of how to understand her or his position in relation to politics. Politics has traditionally had two faces. First, it is a phenomenon that must be interpreted; it is a target of interpretation and, second, politics is a process of advocating a particular interpretation; it is an enterprise to justify and legitimate a particular interpretation. It follows that scholars and scientists necessarily participate in that process of interpretation in a way or another.

Thus, the role of critical reflexivity in studying politics is of a great importance and it is logical and coherent to start this study by clarifying a couple of very radical theses focusing on these issues. Or to put it differently, I want to argue that to study political phenomena is different from solving cross-word puzzles or finding a murder. Its aim is

[204] Giddens 1984.
[205] Sil 2000.
[206] Sil 2004.

not to transform the unfamiliar to the familiar and to discover something as a piece of new knowledge but rather find new perspectives to see the world.[207]

The first thesis is that research is a particular form of interpretation. Its starting point is the idea that we always have preconceptions and the aim of the research is to change those preconceptions. Every interpretation is possible to contradict and to every interpretation is possible to give another interpretation. No interpretation can ever be a comprehensive or ultimate one; to study politics means that you are obliged to take a relativist stand because the knowledge in political sciences is always based on a variety of prejudices. The aim of the research is to change those prejudices by introducing new interpretations.

The second thesis is that interpretation is a series of intellectual operations. As is the case in policy formulation and implementation, the interpretation process is also a kind of procedure. In other words, the research process is a kind of composition process in which a sort of intellectual procedure must be adopted. This analytic procedure provides a kind of intellectual repertoire with which the scholar is able to establish the essential themes and substantial nodes of the study.

The third thesis is that the research in political science resembles politics in many respects. Every phenomenon has or may have a political dimension. Nothing is sheltered from politics - including the research itself. This kind of interpretation is based on the idea that politics is a matter of controversy and conflict. It is no sense to ask whether this or that is a matter of politics. Rather, we have to ask how this or that becomes political, part of politics. Politics is always a matter of definition.

The fourth thesis is that the paradigmatic data, a source of knowledge and information, in political sciences is a text and the use of other sources must be proportioned to texts. All political phenomena have always a kind of textual reference whose recognition and explication is the precondition for identifying the political phenomena. Similarities between theatre performance and political action are obvious in the sense that theatre performances are based on of texts but performance as an action is always more than a text. Action makes both politics and theatre alive. One of the central arguments for those two rhetorical perspectives is that the totality of STI policies is a political process and it has to be studied as such. It means that this study is very lnked to the rhetorical tradition in political sciences.

The fifth thesis is that the researcher must examine politics as a two-layered process - as a corollary of political phenomena but as a corollary of concepts as well. The research interest must be focused on concrete political action and on political thought linked with that action. Traditionally, political thought and political action are understood as distinctive camps of research. While the other camp attempts to clarify and analyze the philosophy behind the action, the other camp attempts to focus on concrete political phenomena.

These five theses introduced above can also be read as an approval of hermeneutical thinking as a methodological way of addressing the problem studied here. Since the concept of hermeneutics is for many synonymous with obscurity and sloppy thinking[208], it would be reasonable to clarify how hermeneutical thinking helps us to grasp the totality of STI policies.

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[207] I am very much utilizing Palonen's ideas concerning the research process in political sciences. Palonen 1988.

[208] Martin Kusch, for example, mentions this problem in his *Knowledge by Agreement*. See Kusch 2002.

The term "hermeneutics" is usually understood to be a theory of understanding and interpretation of linguistic and non-linguistic expressions. The hermeneutic tradition has roots in ancient Greek philosophy. In the course of the Middle Ages and the Renaissance, hermeneutics emerges as a crucial branch of Biblical studies.

One of the central figures in the development of early modern hermeneutics is the Italian philospher Giambattisto Vico. Vico opposes the Cartesian thinking and argues that thinking is always rooted in a given cultural context.[209] This context is historically developed, and intrinsically related to ordinary language, evolving from the stage of myth and poetry to the later phases of theoretical abstraction and technical vocabularies. If we want to understand ourselves, we have to understand the genealogy of our own intellectual horizon.

Vico's idea is to grant a role for the historical sciences; he offers a model of truth and objectivity that differs from those entertained by the natural sciences. The historian does not encounter a field of idealized and putatively subject-independent objects - she rather investigates her own world. Vico argues that there is no clear distinction between the scientist and the object of her or his studies. Understanding and self-understanding cannot be kept apart; self-understanding does not follow any law-like propositions. It appeals to tact and common sense within a given historical context of practice and understanding.

Martin Heidegger, one of the key philosophers in modern hermeneutics, thinks that the fundamental familiarity with the world becomes transparent through the process of interpretation. Interpretation does not have a propositional nature; it makes things, objects, the fabric of the world appear *as something*. Yet, this is possible only in the background of the world, as a totality of practices and intersubjective encounters of the world that is opened up by *Dasein*'s being understandingly.

For Heidegger hermeneutics is not a matter of understanding linguistic communication. Nor is it about providing a methodological basis for the human sciences. For Heidegger hermeneutics is ontology; it is about the most fundamental conditions of man's being in the world. Whereas Vico initially started the critique of the Cartesian notion of certainty, Heidegger tries to analyze how Cartesianism is part of modern philosophical reason. It is also one of the leading themes in his opus magnum *Being and Time*.[210]

Heidegger[211] argues that for Descartes the task of philosophy is to show how the subject can rationally establish the norms of epistemic certainty whereby a given representation is judged to be true or false. It is very close to the idea that the truth and the methods provided by the natural sciences are very close to each other. Heidegger claims that such a model forgets the most fundamental, pre-scientific aspects of our being in the world; this is one of the key points in Heidegger's hermeneutics. It is the hermeneutics of facticity, as Heidegger calls it, and that is what philosophy actually is.

Heidegger's account of understanding is not a method of reading nor any kind of procedure of critical reflection. It is not something we consciously do or fail to do, but something that we are. Understanding is for Heidegger a mode of being, and as such it is a characteristic of human being, of *Dasein* as he calls it. The world of *Dasein* is the mental horizon of D*asein* that consists of its presuppositions, expectations, attitudes and beliefs. In fact, understanding is a dialogue between *Dasein*'s world and everything that

[209] Vico 1975.
[210] Heidegger 1962.
[211] Ramberg and Gjesdal 2005.

terminates the disclosure of its possibilities. *"As the disclosedness of the 'there', understanding always pertains to the whole of being-in-the-world. In every understanding of the world, existence is understood with it and vice versa. All interpretations, moreover, operate in the fore-structure. This circle of understanding is not an orbit in which any random kind of knowledge may move, it is the expression of the existential fore-structure of Dasein itself"*[212]

Heidegger's account of assertion is of a great importance. He claims that only through assertion is the synthesizing activity of understanding and interpretation brought to language. In disclosing the as-structure of a thing interpretation discloses its meaning. Assertion pins down this meaning linguistically. The linguistic identification of a thing is not original but it is predicated on the world-disclosive synthesis of understanding and interpretation.

This account covers our enterprises to solve the truth-value of the assertion. The world-disclosive truth of understanding is more fundamental than the truth presented in the propositional structure "a is b". This Heideggerian reformulation of the problem of truth is a new conception of the hermeneutic circle. It refers to something completely different: the interplay between our self-understanding and our understanding the world. The hermeneutic circle is no longer perceived as a helpful philological tool, but rather as an existential task which each of us confronts.

Heidegger's student Hans-Georg Gadamer wanted to combine the Heideggerian notion of the world-disclosive synthesis of understanding with the idea of education (*Bildung)* in culture. In his major work *Wahrheit und Methode* Gadamer explains Heidegger's conception of the circular process of understanding as follows: *"Interpretation begins with fore-conceptions that are replaced by more suitable ones. This constant process of new projection constitutes the movement of understanding and interpretation. A person who is trying to understand is exposed to distraction from fore-meanings that are not borne out by the things themselves. Working out appropriate projections, anticipatory in nature, is to be confirmed. "By the things" themselves, is the constant task of understanding."*[213]

Gadamer's major claim is that the human being is a being in language. It is through language that the world is opened up for us. We learn to know the world by learning to master a language. Hence we cannot really understand ourselves unless we understand ourselves as situated in a linguistically mediated, historical culture. To put in other words, language is our second nature.

It follows that historical works can never be studied as neutral and value-free objects of scientific investigation. They are part of the horizon in which we live and through which our world-view is shaped. We are formed by these great works before we are given the chance to approach them with an objectivizing attitude.

In other words, Gadamer argues that in the process of analyzing texts we never fully understand its original context or the intentions of its author. Tradition is always a living process. The past must be understood as a fabric of interpretations that becomes richer and more complex as decades and centuries pass.

Furthermore, Gadamer argues that we do not address the texts of tradition, but the canonical texts address us. We identify the authority of a text by engaging with it in textual explication and interpretation, by entering into a dialogical relationship with the past. For Gadamer, this movement of understanding is the fusion of horizons.

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[212] Heidegger1962, p. 194.
[213] Gadamer 1979, p. 267.

In a process of interpretation we understand something that at first appeared alien. It follows that we participate in the process of interpretation and gain a better and more profound understanding not only of the text but also of ourselves. In other words, the co-determination of text and reader is Gadamer's version of the hermeneutic circle. The meaning of the text is not something that we can grasp once and for all. Gadamer's philosophical point is that our historically conditioned being is always more being (*Sein*) than conscious being (*Bewusstsein*).

It is worth noting that in his critique of Gadamer Habermas argues that Gadamer places too much emphasis on the authority of tradition, leaving no room for critical judgment and reflection. His critique is that Gadamer's account uncovers his political naiviety. Hermeneutics, Habermas argues[214], must be completed by a critical theory of society.

He does not claim that Gadamer's approach to hermeneutics is completely mistaken; the fundamental problem with Gadamer's hermeneutics would not be solved by calling for a hermeneutic method. The idea of a formal method is indeed convincingly criticized by Gadamer. Habermas suggests that one must work out an adequate standard of validity - the quasi-transcendental principles of communicative reason. Only then can hermeneutics, guided by the social sciences, have a real role in advocating emancipation and social liberation.

Gadamer's answer was that his aim was never to dispense with every appeal to validity, objectivity, and method in understanding. Rather, it highlights the role of prejudice in our understanding. In fact, it is his version of the hermeneutic circle. The concept of prejudice is important for Gadamer because he highlights the priority of the question in the structure of understanding.[215] All interpretation is necessarily prejudiced in the sense that it is always oriented to present concerns and interests, and it is those present concerns and interests that allow us to enter into dialogue with the issue at hand.

The basic model of understanding is for Gadamer that of conversation. In a conversation there are conversational partners that seek agreement about some matter at issue. But such an exchange is never completely under the control of either conversational partner, but is rather determined by the particular issue. Conversation occurs in language and is thus always linguistically mediated.

Because conversation and understanding presume an agreement, Gadamer argues that all understanding involves something resembeling a common language. All understanding is interpretative, and, insofar as all interpretation involves exchange between the familiar and the alien, so all interpretation is also translative. Gadamer doe not rule out the possibility of other modes of understanding, but he gives primacy to language and conceptuality in hermeneutic experience.

His thesis is that we are 'in' the world through being 'in' language. Language is that within which anything that is intelligible can be comprehended; it is also that within which we encounter ourselves and others. In this respect, language is itself understood as essentially dialogue or conversation. Like Wittgenstein, Gadamer thus rejects the idea of 'private language'.

Gadamer claims that language is the universal horizon of hermeneutic experience and that the hermeneutic experience is itself universal. This does not mean that the experience of understanding is familiar or ubiquitous. Hermeneutics concerns our fundamental mode of being in the world and understanding is thus the basic

[214] Habermas 1988.
[215] Gadamer 1979.

phenomenon in our existence. Understanding is in Gadamerian view a mode of insight with its own rationality. It is irreducible to any simple rule or set of rules, it cannot be directly taught, and it is always oriented to the particular case at hand. According to Gadamer tradition, prejudice, language, and habit can be sources of truth, as well as an error, and this constitutes a point of departure for the methodology of this study.

Gerard Delanty has listed the dominant tendencies of the hermeneutical approach as follows. *Interpretation*; the hermeneutical approach stands for the subordination of explanation and description to interpretation. *Anti-scientism*; the approach stresses a strong separation between social and human sciences and natural sciences. *Value-freedom*; the strong role of interpretation in the hermeneutical approach is often linked with a departure from positivistic social science and the approach has been accused on relativism. *Humanism*; different cultures and times have different values and it must be involved in our interpretations. *Linguistic constructivism*; the hermeneutic approach stresses the importance of language as the basic structure of society. *Intersubjectivity*; the hermeneutic approach presupposes an intersubjective relationship between science and its object.[216] These hermeneutical underpinnings constitute a basis for the methodological resolutions of this study.

3.3. Textual strategy for the analysis

In this kind of study the research problem is linked to the distinction between texts (*textum*)[217] and contexts (*con-textum)*. It is, of course, possible to see texts without their contexts but the point of the rhetorical perspective is that "meanings" are always linked with their contexts. Therefore, we have always need to pose the questions related to a text: what is its real content, what is its form, whose text it is, to whom it is addressed, and when and why has just this text become real.

One of the most curious aspects of meanings is that they may change and they may differ considerably, but all texts carry their original contextual index outside its own context.[218] The political meaning of a text changes every time when the context changes. Contextual barricades are therefore very essential in terms of interpretation.

It follows that we must be aware of those contexts in the sense that the distance from "the unfamiliar" to "the familiar" must be critically reflected. To understand something better always presupposes a kind of *Verfremdung*-attitude.[219] This attitude is sometimes defined as an act of de-contextualization or as an intentional heuristic intellectual process in pursuit of finding new interpretations for texts in question. It is possible to give a narrow interpretation for it and understand it as a particular *Zeitdiagnose.* The point of de-contextualizing is not that those interpretations are definite and undisputable; its point is rather to highlight some aspects at the cost of some other aspects.

Another perspective to see those barricades is the point Koselleck makes in his *Begriffgeschicht* project when he focuses on the development and invention of the fundamental modern political and historical concepts. For him the era of *Sattelzeit* (ca.1770 - 1850) is the most important. According to Koselleck, all political and social

[216] Delanty 2005, pp. 42–43; Apel 1972; Kusch 1986, pp. 163–164.
[217] Etymologically the Greek word textum refers to texture or textile and con-textum refers to fabric-what is interwoven to it. It is a kind of background that makes "figures" recognizable.
[218] Palonen 1988, p. 64; Collingwood 1986.
[219] *Verfremdung*- effect is one of the cornerstones of Bertold Brecht's theatre theory. His idea was that the audience must be regularly reminded that they are watching a fictional play.

concepts must be seen in a historical context. As the political, cultural and social theories today are openly used as an aspect of politics and this is a kind of starting point for self-reflexivity in this study.

Hence, the research is a cyclic cognitive process in which the proper object of the study is examined and analyzed within a process of "reading politics". This implies that both of those rhetorical perspectives, the RIS and RIP perspectives, are utilized in the process.

It follows that the proper object of this study is defined as a complex in which *texts, contexts,* and *interpretations* form a totality. When the aim of the research is to understand the totality of STI policies as a theoretical and practical challenge it has to find new horizons and interpretations for those policies. Although this study deals with Finland and its transition to STI policies in the 1990s it is apparent that the Finnish case resonates with cases in many other countries as well.

The analysis is based on Skinner's idea of rhetorical re-description. What the re-description means to this study is that STI polices must be analyzed as a series of rhetorical moves by which we are able to disassemble hindsight and canonized interpretations.[220] It follows that we have to focus on issues, linguistic conventions and meanings of concepts. The rhetorical perspective implies that we need not ask whether the search for real meanings is possible. A rhetorical move is only an instrument for opening new chances.

Another important aspect of re-description is that the focus must be set on the legitimation process because it is legitimation analysis that helps us to understand "the point" in Skinner's sense.

In his version of rhetorical re-description of politics as a concept Palonen[221] introduces nine topoi: irregularity, judgement, policy, deliberation, commitment, contestation, possibility, situation, and play & game. He uses the rhetorical term topos in its original sense as a "common place" from which to search for arguments and conceptions. The *topoi* serve as principles that organize the narrative and form a definite thematic complex by treating spheres, agents, content, and the direction of politics as mere contextual conditions of conceptualisation. Palonen stresses that each *topos* includes a broad range of possibilities for conceptualising politics independently of the conditions of its initial use.

In the use of *topoi,* the conceptual history of politics can be abstracted from both the history of events and processes and the fragments of explicit debates on the concept. The initial connections between the sphere and activity concepts of politics were equally metaphorical. The opposition between them concerns the questions of whether a metaphoric transfer and de-contextualisation of the activity is legitimate and whether the activity itself should be called politics. The defenders of the sphere concept follow the linguistic model of the ordinary and extended meaning of a concept.

If we consider the irregularity criterion as a borderline case of the politics-as-sphere concept, the remaining *topoi* can be divided into two means of conceptualizing politics. The first four - prudence, policy, deliberation and commitment - can be understood as such *topoi* that are oriented toward continuity in activity. The last four - contestation, play, situation and possibility - operate with the moment of discontinuity serving as the constitutive event of politics-as-activity.

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[220] Skinner 1988a, p. 280.

[221] Palonen utilizes Quentin Skinner's idea that we have to examine the conceptual changes in terms of the rhetorical re-decsription of concepts. See Skinner 1996.

It is also possible to divide the *topoi* into three thematically interconnected clusters. Prudence and policy refers to modes of conceptualisation that directly attempt to qualify activities, deliberation, commitment and contestation to opposed criteria of distinguishing the political moment within an activity, while chance, situation and play & game refer to the contingency of chances as the constitutive criterion of politics.

In this study the analytic focus is on the Finnish STI policies. The aim of the re-description is to stress the ambiguities and controversies embedded in STI policies. The study utilizes the idea of a *hermeneutic circle*: our understanding of the parts is dependent on our understanding of a larger whole, which, again, can only be understood on the basis of the parts. The movement back and forth between the parts and the whole of the text, is an important theme in this study.

The rhetorical analysis in his study is a process of hermeneutical circle which is composed of **four cycles of analysis.**

The first cycle is called *the cycle of contextualisation* in which the aim is to characterize the external and internal contexts of the Finnish STI policies.

The second cycle is called *the cycle of re-contextualisation* in which the aim is to open up the interpretations related to those policies and, in particular, explicate the welfare cluster case as an illustration of those policies. This cycle is mainly based on the interviews with key persons who participated in the formulation of the welfare cluster policy and its implementation. A special report based on these interviews has been published in 2005[222].

The third cycle is called *the cycle of de-contextualisation*. It consists of **five thematic moves**. This cycle is the core of the analysis and it is also called the rhetorical re-description of STI policies.

The fourth cycle is called the *cycle of re-interpretation* closes the analysis. It seeks to open up new horizons for understanding STI policies as a scientific and political construction.

3.3.1. Empirical research questions

The empirical research in this study can be seen as a series of textual analyses including three cycles as follows.

The first cycle focuses on the analysis of *texts in pursuit of contextualisation*. Its aim is to analyze the case of Finland and, in particular, focus on the dilemma of Finland and NIS. This cycle is based on the following research questions:

1. How and why did Finland decide to utilise the NIS framework in its science and technology policies? The core of the question is to analyze the history of science and technology policies in Finland and to find out about its international origins.
2. How and why did Finland decide to utilize the cluster framework in its industrial policy renewal? This question seeks to analyze the emergence of cluster thinking in Finland and to find out about its international origins.
The second cycle concentrates on the analysis of *texts in pursuit of re-contextualisation*. Its aim is to analyze Finland's success story and highlight the curiosity of the welfare cluster case, in particular. This cycle is based on the following research questions:

[222] Tarkiainen 2005.

3. How are the welfare cluster and STI policies linked to one another? The aim is to analyze the welfare cluster case as a theoretical dilemma of STI policies.
4. *Why did Finland start the welfare cluster intervention and what makes the case so exceptional?* The aim is to analyze the welfare cluster as a practical dilemma of STI policies.
The third cycle is composed of the analysis of *texts in pursuit of de-contextualisation.* The cycle is called here the rhetorical re-description of STI policies iand it will nclude five thematic moves. These thematic moves enable us to analyze or "re-read" the research object from two rhetorical perspectives in which both the theoretical and practical aspects of STI policies are analyzed.
5. How and why are scientific knowledge and STI policies linked to each otherr? The aim is to analyze the theoretical dilemmas embedded in STI polices
6. How and why are political governance and STI policies linked to each other? The aim of the question is to analyze the practical dilemmas embedded in STI policies.
The fourth cycle is called the re-interpretation of texts in pursuit of finding new horizons for STI policies by making a synthesis of the three previous cycles. Its aim is to locate new horizons and interpretations for STI policies as a particular form of political and cultural activity. This cycle is based on the following research question.
7. How and why are rhetoric and STI policies linked to one another? The point of the questions is to analyze the problem of rhetoric embedded in STI policies and find new interpretations for them.

3.3.2. Use of empirical material

The empirical analysis of this study focuses on the evolution of the Finnish STI policies between 1990-2005. The materials utilized are referred to as texts. The textual material is used in the process of "political reading" according to the five theses introduced in Chapter 3.2.

While this kind of approach involves a variety of methodological problematic issues, I will concentrate here on two of them: the problem of documentation and the problem of delimitation. I have resolved the first problem in this study so that all the empirical materials used in the study have been documented very carefully. The quotes from document materials and personal interviews have been separated from the text but the other quotes have been italicized within the text.

The second problem may be characterized simply as follows: how to select adequate empirical materials and discard inadequate materials? The problem in the case of STI policies is a critical one: there are a lot of traditional written documents available and also plenty of material in digital form. Almost all the key documents, including a variety of policy strategies and guidelines, policy papers, and scientific reports related to recent science and technology policies in Finland, are available in traditional or digital form, and naturally the similar type of material is available in the OECD and EU internet services as well.

Today, a skilful scholar interested in science and technology policies may gather a vast amount of textual material including a long list of policy documents and their backgrounds and he/she can also access a huge reserve of secondary materials including scientific publications and conference presentations in a very short period of time. The crucial question for a scholar is thus how to organize this vast reserve of empirical data and what are the criteria for organizing it.

This is naturally one of the most crucial aspects in collecting empirical data. In this study the strategy I have followed the following strategy.

1) *Document material.* This study utilizes a variety of political documents related to STI policies including a variety of policy papers and documents as well as plenty of research reports and studies produced in the Finnish and international contexts. Almost all documents utilized in the study are in the form of publications: different kinds of reports and strategy papers, study reports, articles and so forth. Document material can be classifed into two sub-groups.

   a) National level. This group includes the Finnish science and technology policy documents, reports and surveys from the 1980s to 2008. Those documents can be divided into the following groups:
   Science, technology and innovation policy: Council of State accounts and resolutions; reviews and other publications of the Science policy Council, (later the Science and Technology Policy Council of Finland); strategy documents and annual reports and memoranda of the Ministry of Trade and Industry, TEKES, the Ministry of Education and the Academy of Finland.
   Information society policy: National Information Society strategies, reports of the Information Society Advisory Board and the Information Society Council; strategies of the Ministry of Transport and Communications, the Ministry of Finance, the Ministry of Social Affairs and Health; official papers of the Government Information Society Prgramme and other reports and surveys published by SITRA.
   Economic policy: Strategy documents, annual reports and memoranda of the Ministry of Finance.
   Social policy: Strategy documents, annual reports and memoranda of the Ministry of Social Affairs and Health and STAKES.

   One important type of documents are the government programmes since1989. These documents are important because they constitute an interesting frame for the Finnish political culture in recent years. In these programmes governments present their political goals, clarify priorities and guidelines for improvements. A Finnish curiosity is that the governments tend to follow very carefully those programmes. These programmes are understood as a binding contract among political parties involved, and they are also used as a "checking list" by the opposition.

   b) International level. These materials cover the OECD and EU science and technology policy documents, reports and surveys from the 1980s to 2008.

   OECD: OECD is known for its publications - Outlooks, Country surveys and Statistics. All the publications utilized in this study are documented as carefully as possible.
   EU: EU has a strategy of its own, and its current policies emphatically stress the digital option: all important documents related to science,

technology and innovation policies are available through various internet services.

The OECD and EU documents are important and valuable for this study because they provide a valuable and necessary context for my theoretical and practical analysis of the Finnish STI policies. Finland, as a member of the OECD and the EU, has been very willing to fulfill quickly and precisely the proposals and obligations of these international actors. In terms of Finland's STI policies, the OECD as a think-tank and the EU as a political machine are the most powerful organisations set the substantial rules for those policies and who develop varieties of procedures to be used in implementing those policies.

2) *Statistic*s: Statistical data is used in this study mainly as a supplementary source of information. The role of statistical data is of a great importance in STI policies and its argumentation. Thus, the deliberate use of statistical data is arguable.
3) *Personal interviews:* One very important empirical source is the interviews with 14 welfare cluster key persons interviews carried out in 2004. The interviews were carried out in a semi-structured manner so that the themes and most of questions were planned in advance but a lot of flexibility was allowed during the interviews. The duration of interviews varied from one and half hour to two and half hours.[223] The backgrounds of the interviewees varied; all of them were closely linked with the idea of the welfare cluster. Some of them participated in its implementation very actively while others were "grey eminences" behind the curtains. This discrepancy produced several interesting analyses and individual remarks, but it also provided a mirror to reflect the actual policy-making and its practices. The interview data, a compilation of transcriptions on the basis of recordings, functions as a contrast to the other materials in the sense that the key persons were able to interpret very freely how they understand the development of the welfare cluster intervention. Simultaneously, they also assessed the totality of STI policies. Most of them saw it as an evolutionary learning process in which scientific knowledge and political governance were at its core.

[223] The lists of interviewees and thematical questions is in Appendix.

4. INNOVATIVE FINLAND AS A PART OF EUROPE AND INTERNATIONAL CONTEXT

4.1. OECD and its role as a think-tank

After the Second World War, the leading industrial countries such as USA, Soviet Union, France, Germany, and the UK established a series of political interventions in order to find mechanisms and procedures in pursuit of legitimating a particular governmental sector. Gradually, also smaller countries started to organize their administration in similar ways. These arrangements, as Salomon[224] points out, mark an irreversible turning point in the relations between science and technology as a national asset and the direct intervention of governments in the direction and range of research activities. Traditionally, one distinguishes between four different phases of science and technology policies[225] from the Second World War until the early 1970s.

The first phase was characterized by high public faith in the efficacy of science and the prestige of scientists took place mainly in the United States and the United Kingdom. The evolution of the Cold War dominated this period and was characterized by a considerable increase in research budgets. A large proportion of the budgets, in bigger countries more than three quarters, went to military, nuclear and space research. The OECD had an important role as a catalyst in the diffusion of mechanisms to orient the R&D effort.

The second phase began in the early 1960s and was characterized by the gradual emergence of economists and system analysts as an intellectual resource. If the earlier phase was linked with the euphoria of science and technology the second phase focused more on other issues. In the era of the Cold War the role of science and technology in economic growth was reduced to technological competition. The argumentation was based on the idea that the real problem was technological gaps between the United States and Europe as well as the gaps between developed and less developed countries. Science and technology policies must be subjugated to this problem, and fill the gap.

The third phase has been described as a period of disenchantment with science and technology and as a period of questioning and challenge. The attack on science became from both the Right and the Left.[226] The Right viewed science as a wasteful pastime of high professionals who did not care about economic and industrial development and the Right denounced science and technology as instruments of military and economic domination, disregarding society's needs. High-technology industry was regarded as regressive in its impact on income distribution and science itself anti-egalitarian in its organization and morals. Economic growth was no more a blessing for the mankind.

The fourth phase is normally associated with the Brooks report and the new perspectives which it opened. The OECD report 1971 was also important in the sense that the priorities of the 1960s were re-examined and re-ordered. The concern was now more on social well-being and less on technological progress as such. One of the main

[224] Salomon 1977.
[225] Salomon 1977; Freeman and Soete 1997; Salomon 1987.
[226] Lemola 2001b.

recommendations of the report was that science and technology should be an integral part of social and economic development. This implies closer relationships between policies for science and technology and all socio-economic concerns and governmental responsibilities than had existed previously.

The oil crisis in 1973 changed the course of science and technology policies so that all industrialized countries shifted their research effort to energy. Yet the difficulties the industrialized countries faced were more deep-seated and required a totally new orientation to science and technology strategies. The change in the science and technology policies was partly linked with these developments, but it was also closely associated with the competetion with Japan and the Japanese "national system of innovation".[227] The institutional model of science and technology policies moved from Washington to Tokyo.[228]

If the NSF, the National Science Foundation in the United States, has originally been a catalyst for science and technology policies, the OECD has been the organisation which has globally been the most influential in the domain of science and technology policies. The OECD is often seen as an impartial and independent international actor, as a gigantic international think-tank.

In reality, it has a curious political history of its own. The birth of the OECD is very much tied with the developments in international politics after the Second World War. Later it was an important political instrument against the Soviet Union and communism in the era of Cold War. In sum, it has been a strong political and ideological link between North America and Europe.

Since its establishment in 1961the OECD's vocation has been to build strong economies in its member countries, improve efficiency, hone market systems, expand free trade and contribute to development in industrialized and developing countries.[229]

In 1950 the Chairman of the OEEC council put forward an action plan for the economic integration of Europe specialization of activities, division of labour and the creation of a single European market. In 1951 the Americans shifted their policy regarding the aid within the Marshall Plan in favour of NATO. The September 1951 NATO conference in Ottawa decided that the OEEC would deal with European economic questions, including those relating to the functioning of NATO. In 1961 the OEEC was superseded by the OECD, a worldwide body consisted of the original founder countries plus the United States and Canada. NATO and the OECD were two arms of a Western strategy providing security and prosperity in the post-war Europe.[230]

Nowadays, the OECD wants to be a pathfinder, a power house of policy discussions leading to agreed best practices, and stress multilateral learning in political administration. Its contemporary strategy seems to follow Arnold Toynbee's idea that the rise and fall of civilizations is dependent on two legs: the economic/technological leg of wealth creation and the socio/political leg of distribution, equity and environmental health.

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[227] Freeman 1977.
[228] Salomon 1985.
[229] The forerunner of the OECD was the Organisation for European Economic CO-operation (OEEC) formed to administer American and Canadian aid under the Marshall Plan. Its first objective in 1948/9 was to prepare the European Recovery Programme and make proposals for freeing trade. By the end of 1950 60% of private intra- European trade had been freed, the percentage was in 1955 84% and in 1959 89%.
[230] The OECD does not have the same political clout of the United Nations and not the operational power of the IMF, the World Bank and the World Trade Organisation. It has the analytic capability, the professional impartiality and the capacity to innovate. See Gass 2003.

As an international organisation the OECD[231] provides a forum for 30 member countries where they can compare and exchange policy experiences, identify good practices and promote decisions and recommendations. Dialogue, consensus, peer review and pressure are at the very heart of OECD. It is one of the world's largest and most reliable sources of comparable statistical, economic and social data.

The OECD has been of a great importance for Europe and later for the development of the EU. Originally, the analytic focus of the OECD has been on the market economy but its scope is changing. The matrix is moving from consideration of each policy area within each member country to analyses of how various policy areas interact with each other across the countries. Such issues as effects of social policy and globalisation have become part of its matrix.

One of the leading frameworks the OECD has advocated has been the knowledge-based world economy. The mission of the Directorate for Science, Technology and Industry (STI) is to help OECD countries to understand and shape the evolution of a knowledge-based economy, and, to adapt national policies to achieve the highest innovation potential and seize opportunities provided by technological change and globalisation. The directorate provides indicators, analysis, recommendations and "soft-law" guidelines to help governments to formulate policies on science, technology, innovation and industry issues. The Committee on Industry, Innovation and Entrepreneurship examines framework conditions for competitiveness in industry and services, productivity growth and the implications of globalisation and technological change.

> "Accelerating innovation and globalisation are transforming the drivers of economic growth and development in our time. The OECD is helping its member governments and other stakeholders to understand and, where necessary, influence these trends. A fact-based analysis and dialogue on these issues is more essential than ever to maintain the relevance and effectiveness of national policy making."[232]

The key question for the STI is how scientific research and technological innovation can best contribute to economic growth. One of the tasks is to examine innovative performance in individual OECD countries and in specific sectors, such as biotechnology, energy and knowledge-intensive services. It is also developing new approaches to assess the effectiveness of national science and innovation systems, including business research and development, public science systems and industry-science linkage.

[231] OECD 2007, p. 7. The key activities of the OECD are Economic Growth and Stability; Employment, Social Cohesion and Environment; International Trade and Taxation; Governance; Development of Non-Member Economies; Statistics; Communications. The members meet and exchange information in committees devoted to key issues, with decision-making power vested in the OECD Council. It is composed of all the members under the chairmanship of the Secretary-General, meeting regularly at the level of Permanent Representatives. At ministerial level the Council meets once a year. There are about 200 committees, working groups and expert groups in all. Some 40 000 senior officials from national administrations come to OECD committee meetings every year to request, review and contribute to the undertaken by the OECD secretariat.

[232] OECD 2006, p. 2.

In principle, the STI has three levels. First, it continues the methodological work related to statistics and databases.[233] Second, it makes policy analyses and country reviews.[234]

Third, it provides practical tools, recommendations, rules of the game.[235] OECD's way of working is based on a continued monitoring of events in its member countries as well as outside the OECD area, and includes regular projections of short, medium-term economic developments. The OECD Secretariat collects and analyses data, after which committees discuss policy regarding this information, the Council makes decisions, and then governments implement recommendations.

It is also argued that the idea of science and technology policies only seems to be a newcomer because, in reality, it has been present before the Second World War. After the war a variety of interventions took a decided, organized and institutionalized form.[236] The widely used OECD- definition[237] of science and technology policies means the collective measures taken by a government in order, first, to encourage the development of scientific and technical research and, second, to exploit the results of this research for general political objectives.

These aspects are complementary, policy for science and technology (the provision of an environment fostering research activities) and policy through science and technology (the exploitation of discoveries and innovations in various sectors of government). Scientific and technological factors affect political decisions and, at the same time, they condition the development of economy, social life and also defense policy. The idea of science and technology policies is determined by the idea of a deliberate integration of scientific and technological activities into the fabric of political, military, economic and social decision.[238]

Because of the differences in national histories, cultures and political contexts, there is a broad diversity among countries in their goals, priorities, directions, ranges and instruments and in the performance of science and technology policies. As Henry Ergas[239] has pointed out, technology policy was linked in some countries to the objectives of national sovereignty and he calls them "mission oriented" countries (USA, UK, France) and "diffusion oriented" countries (Sweden, Germany, Switzerland). The countries belonging to the latter category are closely bound up with diffusing capabilities throughout the industrial structure and its development. Japan was for Ergas a category of its own because its technology policy was both mission-oriented and diffusion-oriented.

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[233] This work includes revision of the OECD Oslo Manual on measuring Innovation; Publication of the biannual OECD Main Science and Technology indicators; Update of the OECD databases on Patents and Business R&D; Development of "blue sky indicators"(new indicators of policy and innovation performance).

[234] These analyses focus on Management of science and innovation systems; Public-private partnerships for research and innovation; Globalisation of R&D; Intellectual property rights (IPR), innovation and economic performance, management of IPR by public research institutions; Sectoral patterns of innovation, including innovation in services; Reviews of national innovation policy; International science and technology co-operation for sustainable development.

[235] This consists of guidelines to access to research data from public funding; country-specific recommendations for the improvement of innovation policy; evaluation and guidance on the effects of governments R&D funding on business R&D strategy.

[236] Lemola 2001a.

[237] See OECD 1963; OECD 1971.

[238] Salomon 1977.

[239] Ergas 1986.

The priorities of the OECD member countries were concentrated on the same technologies and it raised concerns about overcapacity. The new science and technology policy framework was also increasingly interventionist in the spirit of liberalism.[240] In the late 1980s the science and technology strategy in the OECD countries changed so that the ICT sector became a key to economic progress and a pillar of the knowledge-based economy.

> "Scientific advances and technological change are important drivers of recent economic performance. The ability to create, distribute and exploit knowledge has become a major source of competitive advantage, wealth creation and improvements in the quality of life. Some of the main features of this transformation are the growing impact of information and communications technologies (ICT) on the economy and on society; the rapid application of recent scientific advances in new products and processes; a high rate of innovation across OECD countries; a shift to more knowledge-intensive industries and services; and rising skill requirements."[241]

Later, this pillar has been constructed as a list of challenges for governments. Governments need to make public research more efficient, foster the diffusion of knowledge and address the interests of a more diversified set of stakeholders. In other words, public research systems face new challenges of globalization because the globalization of scientific and innovation networks has become more and more important. This is particularly important for small and medium-size countries.

Another cornerstone of science and technology policies in the OECD has been regionalization; it became, in particular, an important strategic aspect in all EU member countries in the 1990s. It included a lot of initiatives and interventions such as the creation of technical research centers and laboratories, technology transfer centers, commercial and technical assistance and information centers, venture capital funds, science parks and incubators. The EU policies consist of a lot of governmental issues such as best practices, assessment and evaluation.

This was the background for the new science and technology policies. The OECD[242] countries started to put emphasis on the stimulation and support of industrial innovation as a major blanket element of national economic and industrial strategies. In particular, the new science and technology policies focused on the rapid development of new technologies and their application in the economy. It followed that governments became involved in planning, financing and managing large national programs related to promising technologies. This also widened the university-industry cooperation, and the governmental measures in relation to R&D included also application, diffusion and commercialization.

As Keith Pavitt[243] remarks in his analysis, the investments in basic research are totally different issues in the United States and in small countries. The small north-west countries like the Nordic countries, Netherlands and Switzerland are the world's biggest investors in academic research and they have the biggest outputs without heavy investments of their own. The capacity to understand and use the results of basic research performed elsewhere requires considerable investments in institutions, skills, equipment and networks. Those countries have succeeded in producing considerable

[240] Caracostas and Muldur 1997.
[241] OECD 2000.
[242] OECD 1985; OECD 1988.
[243] Pavitt 2001.

inputs into world class business firms in engineering, medical products, electronics and mobile telephone.

Pavitt also refers to a "European Paradox" according to which Europe is strong in basic research but lacks the entrepreneurial capacities of the USA to transform it into innovation, growth and jobs. His conclusion is that although the US developed theory for the public support of basic research has held up well in practice it still has a lot of deficiencies. The US support of basic research has neglected the training of basic skills and it has not advocated the meaning of investments in supporting institutions, equipment and networks. All these issues are present in contemporary STI policies.

4.2. NIS: A new political agenda for Finland

The history of the Finnish science and technology policies starts with the foundation of the Royal Academy of Turku in 1640 as a Swedish university. It comprised four faculties and the main purpose of the Academy was to train clergy, civil servants, physicians and officers to convey and utilize the best available knowledge. When Finland became part of Russian Empire in 1809, Csar Alexander I expanded the university and in 1882 higher education was moved to Helsinki.

The new university was a community in favour of the Humboldtian ideals of science and culture, studying humanity and its living environment by means of scientific methods. Its task was to promote the development of "the Sciences and Humanities within Finland and, furthermore, educating the youth for the service of the Tsar and the Fatherland." The University of Helsinki was the only university and higher education institution in Finland in those days

The Helsinki school of Economics and the Technical school of Helsinki were founded in 1911. The Swedish-speaking Åbo Akademi was established 1917 and the University of Turku was opened in 1920. The basis of the existing structure of the Finnish universities started when the University of Oulu was established in 1959 and other new universities were established in the Middle and East Finland in the 1960s.

Government research institutes have been a significant component of Finland's research system. The establishment of the Geological Survey Centre of Finland, the Agricultural Research Centre, the State Forest Research institute, the Water Research institute, the Geodetic Institute, and the Meteorological Institute date back to the 19th century or the early 20th century.[244] The Technical Research Centre of Finland was established in 1942, and there are nowadays around 30 government research institutes.

The Academy of Finland was established in 1946 but at first it was only a college of recognized scientists and artists of exceptional merit. Later the Academy of Finland has become an important aspect of the Finnish research system. Before the 1960s there was no research policy in Finland, only two state research councils, one for the humanities and the social sciences and one for the natural sciences. In 1969, the number of research councils was raised to six including councils for the humanities, natural sciences, medicine, agriculture and forestry, technology, and social sciences.

In terms of the institutionalization of science and technology policies, the 1960s and the 1970s were important for Finland although the development was slower than in many more developed OECD countries. The reason for organizational and institutional reforms in economic policy and social policy as well as in other sectors of the public administration was economic. Finland's production structure was very narrow and very

[244] Lemola 2001b.

much dependent on the forest industry and its level of technology was also very low compared to the country's other competitors.

Science and technology was seen as an instrument of industrial renewal and Sweden became a model for implementing those reforms. The Keynesian growth policy played also an important role by advocating government intervention in supporting and promoting the innovative activity of firms.[245] But what occurred in Finland in the 1960s?

Jussi Välimaa[246] has in his analysis of the history of Finnish higher education stressed two issues. The national university was politically and culturally an important locus in the making of Finnish national identity. Probably this aspect has strengthened the high social status that universities and higher education degrees enjoy in Finland. Another important aspect of the history of higher education in Finland is that it follows the logic of expansion in the 20th century. At the end of the century the number of universities has grown from one university to 20 universities and 32 polytechnics and the number of students from 2300 to 248900 students. The establishment of the new university network in the 1960s and 1970s was based on the idea that the founding of a university was seen symbolically, culturally and economically important to the development of a given region. All this was a sort of implementation of a welfare-state agenda; to create equal educational opportunities, including equal access to higher education, became an important object of that agenda.

When analyzing the historical development of the Finnish science and technology policies, Tarmo Lemola calls this Finnish development in the 1960s and 1970s as a preparation phase including three important aspects in the 1960s. The first aspect was linked with the development of higher education and the renewal of universities which started in the 1950s and continued until the1970s. There were three reasons for the renewal. First, there was a growing awareness of the importance of higher education and basic research for economic and industrial development. Second, there was a political pressure to expand the Finnish university system outside Helsinki in order to boost more equal regional development. Third, to find a solution for the pressure of the large post-war generation was a social and political necessity.

The second aspect was the establishment of the Science Policy Council in 1963; the prime minister as a chairman, four other ministers, and the chairmen of six research councils. In the beginning the Council was concentrating on the development of research under the Ministry of Education. The Council had no funds of its own and no direct administrative authority, but its opinions and recommendations had a great weight. The most visible role the Council has been to initiate science and technology policy programs.

The third aspect was the establishment of the six research councils in which new mechanisms for planning, coordination, and financing R&D were created. The reform of research councils was oriented to the development of basic research carried out in the universities but the preparations with the aim of improving the conditions of industrial R&D started also. The establishment of the Finnish National Fund for Research and Development (SITRA) in 1967 was part of it.

All these aspects constitute a kind of basis for the Finnish science and technology policies. In reality, the start-up of the Finnish science and technology policies was full of disputes and contradictions and there were several competing ideas and aspirations on

[245] Lemola 2001b.
[246] Välimaa 2004.

how to organize the development of the Finnish system.[247] One model was to build on the universities without any central national agency. Its advocators wanted to put emphasis on the development of university education rather than on the development of university research. Another model very much supported by governmental research institutes was based on the idea that universities should concentrate on education and the role of governmental research institutes must be increased. The third model was based on the development of the Science Policy Council that would be a centralized science and technology agency independent of sectoral ministries.

The result was a dualistic structure with a particular policy domain for science and a particular policy domain for technology. The original idea of centering the governance around the Science Policy Council, the Ministry of Education, and the Academy of Finland failed because particular strong interest groups linked with technical and industrial R&D managed to intervene and introduced their own model. Simultaneously, since 1968 the Ministry of Trade and Industry began to support research and product development of firms, and it also received an additional resource for goal-oriented technical research.

The Finnish science policy had now four levels. The first level, the Science Policy Council chaired by the prime minister, became a high-level political body which introduced the Finnish science and technology policy guidelines. The second level was divided into two sectors: the Ministry of Education took a special role as a coordinator in science policy, and the Ministry of Trade and Industry coordinated as a coordinator in technology policy. The third level was the financing level in which the Academy of Finland and the Ministry of Trade and Industry together with SITRA played an important role. The fourth level was comprised of the universities, government research institutes, and companies. This organizational structure was to become the basis of the Finnish science and technology policies later.

At the turn of the 1970s the Finnish science and technology policy was characterized as "the years of rationalization and planning".[248] At the end of 1960s the research councils were encouraged to draw up science policy programs in their own sectors but the results were poor. The next planning round was clearly influenced by the Brooks Report[249] and the first Finnish national science policy program was published by the Science Policy Council in 1972. Interestingly, the major task of science policy was to estimate on the basis of general social policy, the need for research in various disciplines and allocate resources on the basis of these estimations.[250]

What was distinctive to the Finnish science and technology policies in the 1980s was the promotion of governmental interventions focusing on industrial innovation. In other words, the new thematic core of the technology policy was the competitiveness of industry. Its focus was on the development and application of new technologies, and its motivation, as mentioned earlier, was based on the Japanese economic and technological success.

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[247] Immonen 1996.
[248] Lemola 2001a.
[249] OECD 1971.
[250] See Salomon 1977. The program was also the first Finnish plan for increasing the financing of R&D from 0.9 % of the GNP- share in 1971 to 1.7 % in 1980. But the program was not implemented and R&D expenditure in 1979 was only 1.1 % of the GNP, one of the lowest among the OECD countries. This development was linked with the 1973 oil crisis, and the breakdown of the euphoria in science policy was the other side of the coin.

Due to the recession in the mid-1970s the development of the Finnish economy was slow and the attempts to accelerate scientific and technological development unsuccessful. There was a national consensus on the necessity for technological development and a clear pressure to find a new way for science and technology policies. The report of the Technology Committee is an excellent example of those political changes.[251] Its key conclusion was to stress the significance of information technology, and the applications and recommendations suggested include the strengthening of science and technology policy by increasing resources and emphasising the fields of high technology.

One of the most important consequences of the committee was that it led to the formation of the National Technology Agency (TEKES) after the Swedish model, the Board for Technical Development 1983. TEKES is by now the key planner and executor of the new technology-oriented policy. R&D loans and grants, as well as appropriations for goal-oriented technical research were assigned to TEKES. The development of national technology programs, following the models of Sweden and Japan, became a new and important policy instrument for TEKES. The national technology programs have been very influential in terms of increasing national cooperation between companiess, research institutes and universities. TEKES has also been a national instrument for the development of international cooperation and it had an important role in organizing Finland's participation in Eureka in 1985 as well as in preparing the country's participation in the European Union's research framework after 1987.

The late 1980s also saw the creation of new programs and organizations associated with technology transfer, diffusion and commercialization. The nation-wide networks of technology parks and centres of expertise were set up in Finland simultaneously. The technology parks have introduced many new instruments for commercializing products and initiated spin-off projects and incubators. The venture capital market has been less developed in Finland. As a symbol of the technology orientation of the 1980s the name of the Science Policy Council was changed in 1987 into the Science and Technology Policy Council.

A determined shift to the NIS framework

In the late 1980s the Finnish economic development was rapid: the share of knowledge-intensive production grew, technical development was rapid, and productivity growth was faster than in the OECD countries in average.[252] The growth of the metals and engineering industry in the 1980s was 50 % and the electronics industry grew by 150 %. The share of high-technology products in industrial exports in 1980 was 4 % and in 1990 11 %.

The reviews of the 1990`s Science and Technology Policy Council of Finland in 1990, 1993, 1996 and 2000 provide a comprehensive picture of how the strategies of the Finnish STI policies changed.[253] The profits of paper industry exports was higher than that of Finland's rivals, and the growth rate of Finnish patenting in the United States was one of the fastest in the world. Finland was labelled "Japan of the North". But in the early 1990s everything changed. Finland's gross domestic product declined 20 per

[251] Technology Committee 1980.
[252] Vartia and Ylä-Anttila 1996.
[253] Eela 2001.

cent between the years 1991-1993, the stock market collapsed, the value of the Finnish currency was 40 per cent from the level prevailing at the beginning of the decade, foreign debt and the budget deficit grew rapidly, unemployment approached 20 per cent and the country's banking system was in a deep crisis.

Finland recovered from the crisis surprisingly quickly. One important factor was the rapid growth in exports. In the late 1990s export accounted for a larger share of the GDP than ever, and the growth of the ICT cluster, in particular, was phenomenal. The share of the ICT cluster is nowadays the largest export industry, and the traditional paper industry less than one quarter. But there was also another big surprise behind the corner waiting for Finland: the big ICT bubble in 2001. This implied a severe recession with a lot of bankrupties and unemployment in the ICT sector. [254] But the late 1990s reveal a strong faith on the ICT sector and the promises of new economy, as it was called. Many economists were very suspicious of the new paradigm and criticized its rationale later with well-reasoned arguments.[255]

It is often claimed very convincingly that one particular company, Nokia, played an important role in Finland's recovery from recession.[256] The development of the Finnish science and technology policies in the 1990`s is linked closely with the Finnish system of organizing the governing of science and technology policies. The cornerstone of the Finnish system is the Science and Technology Policy Council of Finland: the scopes, ideals, goals and objectives of the Finnish application of NIS adhere strongly to several suggestions that the Council has made since 1990.[257] The role of the Council together with two ministries, the Ministry of Trade and Industry and the Ministry of Education, has proved to be essential in terms of the strategic and operational management of the Finnish application of NIS.[258]

The Finnish application of the concept "national innovation system" has stressed that a national innovation system is a whole set of factors influencing the development and utilization of new knowledge and know-how. The advantage of the concept is that it allows us combine all these factors and examine it as a system. It follows that the prevailing atmosphere in society influences the production and application of new knowledge as well as interaction and cooperation between different actors play an important role in NIS. As the internationalization process influences the activities of an innovation system and it means that there is a need to improve conditions creating innovations nationally. In this period the ethos hidden in the idea of the national innovation system was strongly linked with the idea of linking the idea of science and technology policies with the idea of public policy.

The introduction of NIS in Finland has been a long process comprising a series of interventions in which the scopes, goals and measures seeking to construct a new culture

[254] Koski, Rouvinen and Ylä-Anttila 2002.
[255] Stiglitz 2002.
[256] This becomes apparent when we look at Nokia's impact on the growth of the Finnish GDP, and its fluctuations. In 2000 Nokia's share of the Finnish GDP was 1.7 percent, and in 2001 its contribution was 2.8 percentage points, when the total GDP growth was 5.6 percent. In 2000, Nokia was responsible for almost one third of the total GDP growth whereas, in 2001, the Finnish GDP growth stayed below one percent and Nokia's contribution was close to zero. It is worth noting that in 1969 Nokia received 34 000 euros from the Technology Office of the Ministry of Trade and Industry (TEKES predecessor) and in 2000 Nokia received TEKES-funding worth 8 million euros. In the second half of the 1990's the share of TEKES finance of Nokia's total R&D expenditure has been around 1.5 percent on average. See Yli-Yrkkö and Hermans 2002.
[257] Miettinen 2002.
[258] Lemola 2001b.

of innovation have been specified and focused. One very important change in terms of specifying the idea of innovation policy occurred in the mid 1990s when the Science and Technology Policy Council introduced the concept of a knowledge-based society as a complementary concept into the national innovation system. This new strategy was very much in line with the Finnish national strategy for information society introduced in 1995.

This new strategy following carefully the recommendation of the OECD puts emphasis on the significance of learning and knowledge, instead of information, and allowed to link employment with STI policies. The point was that knowledge-intensive growth has a strong influence on the national economy but labour market measures do not ensure adequate preconditions for knowledge-intensive growth. Therefore, there is a need for various innovation policy measures relating to R&D, education, competitive conditions, laws and regulations for the protection of intellectual property, national and international cooperation networks, and technology transfer and exploitation.[259]

The adoption of NIS in Finland can be seen as a cyclic policy process in which the reviews published by the Science and Technology Policy Council illustrate the phases of the process exhaustively.

The first cycle, the introduction of the concept of a national system of innovation in 1990, stressed that the factors influencing the development and utilization of the new knowledge and expertise need to be located. In other words, the emphasis was more on thematic level: the mission was that the issues must be taken seriously under consideration. In terms of legitimation it is worth noting that the Cabinet Economic Policy Committee defined in 1992 that the NIS is a central developmental target in the preparation and pursuit of economic policy. It was also the point of departure for the Ministry of Trade and Industry to industrial policy.[260]

The second cycle, introduced in 1993, set its focus on structural policies. The concern for economic policy and its development was the issue number one. The review of 1993 stressed the significance of knowledge and know-how as the cornerstones of international success. This implied the development of knowledge-intensive regions and fields within the Finnish know-how context, particularly in information, materials and biotechnology. Also, the investments in R&D and education sector were mentioned as means to improve the Finnish position in the global market.

One explanation for this interpretation is naturally the deep economic recession in Finland in the beginning of the1990s. The political point was to connect the NIS framework with both the structural development of the Finnish political governance and that of the Finnish industry. This coupling was justified with the efficiency argument and the problems of the public sector in general. Another important aspect of the Finnish situation was the heavy unemployment problem Finland faced. The country's membership in the EU in 1995 also changed definitively the R&D- policy climate in Finland.

The third cycle, introduced in 1996, sets the focus on the interactions between various actors in the context of innovation; both sides, those who produce knowledge

[259] The most important single act in 1996 was the government's recommendation to increase investments in R&D and raise the GDP- share of R&D expenditure to 2.9 percent by the year 1999. As a result state funding rose in the years 1997-1999 by a total of 250 million euros, that is to say, the state's annual research appropriation increased 25 percent from 1997 level. Most of the additional funds came from the partial privatisation of state-owned companies and they were channelled through national technology programs.

[260] Miettinen 2001.

and those who utilize knowledge, must be included under the umbrella of NIS. The 1996 review is in many ways the most significant only and it can be seen as a theoretical and practical attempt to link the NIS framework with the Information Society framework. The review strongly stresses the significance of innovations and innovation activity, and the competitive challenges hidden in the information society spread rapidly across the society. Interestingly, the review suggests a set of fundamental concepts to be used: the national innovation system (NIS), the regional innovation system (RIS), the industrial policy based on clusters, networks as a kind of imperative to interaction, know-how and expertise as a precondition of inventions, innovation and national competitiveness.

The fourth cycle, introduced in 2000, focused on strengthening the interaction modes and models between various actors. The NIS remained the central concept by which the Finnish science, technology and innovation policy and the long-term strategies must be set up. The interesting feature in the review was that it stressed strongly the regional aspect and regional development: all science parks and centres of regional expertise were to be essential elements in the innovation system. The strategic focus was now in regions and in the future. The 2000 review interestingly illustrates the normative dimensions of innovation policy. The text is written as if there was a strong consensus about the innovation policy strategy. In other words, one important phase of innovation policy was completed; it has a strong legitimation in Finland and the next step is to continue the policy implementation.

The fifth cycle, introduced in the 2003 review, is of a great interest because the Finnish innovation policy seems to change the course totally. If the earlier reviews stressed explicitly the interactive role of technology and economy, the 2003 review stresses exclusively the social aspects of such a policy. The speciality of the 2003 review is the introduction of the idea of social innovation as an essential aspect of the innovation policy. It means that the term of NIS and, in particular, the idea of an "innovative system", must be replaced with a new term, "innovative environments". The fifth cycle can be seen as a preliminary arrangement for a totally new approach and mentality.

In other words, the political agenda of STI policies has become now closer to public policies rather than science and technology policies. Its vocabularies are inherently "social" and its ideological emphasis is on such issues as "social capital", "institutional reforms", "the new public sector", "creativity and learning".[261] Its core focuses more on the interaction between the private, public and third sector, and its ideological aim seems to be to open the locks of routines, habits and institutions.

4.3. EU and the horizontal innovation policy

If the focus of traditional science and technology policies was on the generation of scientific knowledge and fostering industrial applications seeking to support technological innovations, the idea of innovation policy in the EU is different. Its major aim is to pay attention to the interactive and systemic characteristics of innovation processes and their institutional, organisational and social backgrounds.[262]

This wider perspective emphasizes the utilisation of technologies in the economy and society, entailing a need for a closer integration and tighter integration of these policies

[261] Castells & Himanen 2002; Hämäläinen 2003; Hämäläinen & Heiskala 2004; Himanen2004.
[262] Borras 2003.

and other policy domains.[263] This horizontal aspect of innovation policies has generated a lot of discussion on the contents and structures of innovation policies.[264]

It is very apparent that the idea of innovation policy is linked with some other developments in the OECD. These links become obvious if we examine closer the other OECD directorate, the Public Governance and Territorial Development Directorate (GOV). It identifies changing societal and market needs and helps countries adapt their governmental systems and territorial polices. This involves improving government efficiency while protecting and promoting society's longer-term governance values.

GOV provides various forums where countries can exchange ideas on how to address the governance challenges they face. The two committees – the Public Governance committee and the Territorial Development Policy committee - and several specialist groups aim at improved public sector governance through comparative data and analysis, the setting and promotion of standards, and the facilitation of transparency and peer review. It promotes understanding of the dynamics of public management and territorial development policies in different societal and market conditions, and to safeguard the long-term interests of all citizens.

> "In today's fast-moving world, governments need to rethink their role to meet the challenges posed by forces such as globalisation, decentralisation, new technologies, and the changing needs, expectations and influence of citizens. Good governance principles transform not only the relationship between governments, citizens and parliaments, but the effective functioning of government itself. These principles are: respect for the rule of law; openness, transparency and accountability to democratic institutions; fairness and equity in dealings with citizens, including mechanisms for consultation and participation; efficient, effective services; clear, transparent and applicable laws and regulations; consistency and coherence in policy formation; and high standards of ethical behaviour. The OECD seeks to analyse and develop solutions to the common challenges and needs of governments, and to promote good practices that enhance the effectiveness of democratic institutions. Work on public governance includes activities on e-government, regulatory reform, public sector budgeting and management, citizen participation in policymaking, and fighting corruption." [265]

These two aspects of innovation policy have been embedded in the whole idea of NIS. The horizontal aspect of innovation has been also the essential part of European integration and a cornerstone for new political European governance.

It is worth noting that the birth of the European Union is closely linked with the history of the OEEE and the OECD. In 1950, the French Foreign Minister proposed integrating the coal and steel industries in Western Europe. In 1951, the European Coal and Steel Community (ECSC) was set up by Belgium, West Germany, Luxembourg, France, Italy and the Netherlands with Jean Monnet as its first President. In 1957 the same six countries signed the Treaty of Rome[266], creating the European Atomic Energy Community (EURATOM) and the European Economic Community (EEC). The explicit aim of the treaty was to create a "common market".

In 1967, the institutions of the three European communities emerged:there was now a single commission, a single Council of Ministers and the European Parliament.

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[263] Lundvall et al 2002; OECD 2002.
[264] Häyrinen-Alestalo, Pelkonen, Teräväinen & Villanen 2005.
[265] OECD 2005.
[266] EU- The European Commission (2006b).

Originally, the members of the European Parliament were chosen by the national parliaments, but in 1979 the first direct elections of the European Parliament were held and the citizens were allowed to vote the candidate of their choice.

The Treaty of Maastricht 1992 introduced new forms of co-operation. By adding the inter-governmental co-operation to the existing community system the treaty created the European Union. This means that the member states of the European Union have to take joint decisions on many matters ranging from agriculture and culture to consumer affairs and competition, and from the environment and energy to transport and trade.

One of the ambitious issues of the EU has aimed at is the idea of the Single Market in which goods, services, people and capital could move around freely. In 1992 the EU decided to go for economic and monetary union involving the introduction of a single European currency managed by the European Central Bank. In 2002, when euro notes and coins replaced national currencies in twelve of the fifteen countries, this became a reality.

But in terms of innovation policy the 2000 Lisbon Council is a milestone. Since then the European Union has paid more and more attention to innovation policy and used the knowledge- based economy framework as its fundament. Especially the role of the European Commission has been very important.

Interestingly, the European Commission[267] does not regard innovation policy as a blurred hybrid. Rather, it wants to highlight the evolutionary aspect of innovation policy distinguishing between three different generations. If the first generation was based too much on the idea of linearity and the focus of the second generation was more on the recognition of the complexity of the innovation system, the third generation of innovation policy wilfully widens the scope of policies by adjusting its focus on the interfaces with different policy domains and by placing innovation at the heart of each policy area. This horizontal coordinating aspect of innovation policy has become more and more important: it is the core of the third generation.

One of the most important achievements of the 2000 Lisbon Council is that it introduced the idea of open coordination.[268] As the Open co-ordination relies on a mixture of voluntary participation, the setting of agreed common objectives and achievable targets, and, to an extent, peer pressure to achieve these. In the complex world of EU policy, it has been chosen as a key tool for the Commission to monitor and encourage progress towards ambitious goals set for the Union as a whole by Member State politicians. Where the EU does not have the competence to legislate it relies on national parliaments and governments acting in concert, within their own distinct institutional, legal and cultural contexts.

Open coordination was used in monetary and economic policy in the preparations for the introduction of the euro. In employment policy too, open coordination was introduced in the European Employment Strategy in 1997. This was designed to reduce unemployment within the EU by encouraging member states to take action to improve their labour markets. Policy has to be made nationally, since the institutions and legal make-up of the European social model vary so widely.

The method has proved to be useful because it allows policy-makers from different fields to exchange experiences and methodologies, ensuring that as time goes, both the Commission – as co-ordinator – and the national and regional participants learn to maximise its effectiveness.

[267] Legrand et al 2003.
[268] EU- The European Commission (2003).

Subsequently, open co-ordination has been applied to the fields of social exclusion and poverty, to the development of the Information Society, to the Internal Market, to risk capital markets, to R&D, and to innovation.

The whole history of the European Union's innovation policy starts from the year 1995 when the Green Paper on Innovation was published. The First Action Plan for Innovation in Europe was published in 1996. In order to contribute the idea of innovation policy the European Commission has used a broad of set of policy instruments.

The Commission is responsible for *Annual Country Reports* which highlight innovation policy trends and priorities seeking to progress towards the relevant Lisbon objectives. It also produces *European Innovation Scoreboard* (EIS) which is the main statistical tool of the "European Trend Chart on Innovation" under four categories: human resources, creation of new knowledge, transmission and application of knowledge, innovation finance, outputs and markets. A very important policy tool related to EIS is *Trend Chart workshops* which provide policy makers with the opportunity to embark on intelligent benchmarking. Together with the National Innovation Policy Database and EIS, the workshops build up a comprehensive picture of innovation policies across Europe. Those workshops can be seen as an implementation of the "open co-ordination" approach laid down by the Lisbon Council in 2000.[269]

The importance of the innovation policy becomes apparent if we analyze the Communication from the Commission in 2003[270]. The objective of the Communication is to describe the diverse routes to innovation and analyze the consequences for the design of innovation policy and to find new means by which innovation policy is put into action. The important point is that structures, problems and opportunities relating to innovations are not necessarily similar in all the world's major economic areas. While innovation policy takes place mostly at the national and regional levels, the aim of the Communication is to intensify co-operation for the strengthening of innovation in the EU.

After the Lisbon strategy achieving the world reference for innovation performance is the ultimate and explicit aim for the EU. It strives to become the most competitive and dynamic knowledge-based economy in the world. It represents an opportunity that means also better living standard over the coming years.

According to the Communication, R&D is an essential factor for long-term growth and European prosperity. If the innovation policy was based earlier on the linear model of innovation, now the design of policies must be based on a totally different approach. It follows that the design of public policy becomes the most important asset among the political instruments available. The aim is to encourage and support innovative enterprises as much as possible.

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[269] The European Commission also publishes communications and consultations on innovation. The list of communications provides a good picture of the European innovation policy: Communication "Innovation and Growth" 1998, Communication "Innovation in knowledge-driven economy"2000, Communication "Innovation policy: Updating the Union's approach in the context of the Lisbon strategy" 2003, Communication "More Research and Innovation - on the Implementation of the Community Lisbon Programme 2005, Communication "Putting knowledge into practice: A broad-based innovation strategy for the EU" 2006.

[270] EU – The European Commission (2003e). There are also many other documents available but their content is very similar to this one. Recently, there has been a lot of critical discussion concerning the Lisbon strategy. As a strategy it has been too ambitious and uncritical.

In other words, the design of public policy should be addressed to understand and analyse the weaknesses of innovation in the European context. The designers of this policy must ask: what is the real nature of the innovation process and what are actions that could be taken. They must identify effective responses and implement them in order to be able to design the political context that will contributes novelty.

The Communication stresses that the innovation phenomenon is multidimensional and that it sets pressures to those responsible for designing public policy. Although the route from an invention in the laboratory to innovation is an important aspect of innovation, the main problem is the phenomenon itself. Radical innovations are rare and they are often based on the findings of new high technology. Usually, innovations are incremental, based on a long series of small steps and it makes the design of public policy difficult.

The Communication stresses that while research is a major contributor to innovation, it is only a starting point. Without entrepreneurial action there is no value creation and no innovation. The other side of this is that the speed and efficiency of diffusion of innovation through economy are critical to productivity and economic growth. It follows that the critical aspects of innovation competition and imitation, are both equally important.

The both descriptions of the innovation process – the linear and systemic models - highlight R&D as a decisive factor. However, those models usually forget other aspects of innovation. Capacities and performance in non-technological forms of innovation, and market factors are not present in them and thus unsubject to analysis. This may explain why the data from countries do not match with their performance and strong economic growth.

In terms of the design of public policy the innovation terrain is very complex, but the Communication wants to highlight three main dimensions to be focused on in the future. The first is the "policy governance" dimension. This means that the policy should influence the innovation capabilities and behaviour of enterprises at local, regional, national, EU or even global level. The coherence and complementariness of the different levels is the key point. The second dimension is sectoral and includes many factors affecting different industrial sectors that must be recognized and whose relative weight must be considered in each sector. The third dimension is interaction with other policy areas. Innovation policy must be implemented via other policies and, therefore, innovation concepts must be increasingly embedded in these policy areas, according to the Communication. The main obstacle to effective policy is that while innovation is everywhere, it is nowhere.

The earlier Communication 2000 identified[271] that there are five priorities to steer action in Member State and EU-level actions: a) the coherence of innovation policies, b) a regulatory framework conducive to innovation, c) the creation and growth of innovative enterprises, d) the improvement of key interfaces in the innovation system, and e) the need to encourage societies to be open for innovation. This means that the diversity of public policies that have influenced or may potentially influence on innovation performance must be put on the centre of analysis.[272] The Communication 2003 suggests that the Member States should build and strengthen innovation strategies by adopting an approach that is well co-ordinated across all government departments with areas of responsibility having a bearing on the conditions for innovation. It

[271] EU –The European Commission (2003a); EU – The European Commission (2003b).
[272] EU- The European Commission (2002); EU- The European Commission (2003c).

mentions that the Science and Technology Policy Council in Finland as an example of good practice and suggests similar actions to other countries. The second aspect of systemic policy-making is a better integration of research, innovation and competition policy. It follows that the "vertical" coordination and the specification of mechanisms related to that coordination are of a great importance because they interlock EU, national and regional levels. One implication is that there is a clear need for more adequate analyses and utilization of statistics dealing with innovation, innovation systems and innovation performance.

The underlying point in finding new directions for European innovation policy development is that the innovation imperative must be developed further. This means that the European Union must focus on competition policy; it is one of the main factors of innovation. Another key is the Internal Market policy. A wellfunctioning Internal Market, without barriers to trade across borders, encourages competition in goods, services, capital and the mobility of people. It is also important to develop a European Regional Development Fund towards the encouragement of innovation and to create an environment favourable to enterprises by developing better taxation policy. This involves many changes in existing policy areas. In particular, the instruments available in fiscal policy must be considered thoroughly.[273]

The Communication 2003 lists a variety of suggestions to be implemented as soon as possible in order achieve the goals of the Lisbon strategy. The list includes a set of actions in pursuit of better performance: 1) the stimulation of greater market dynamism, 2) the promotion of innovation in the public sector, 3) the strengthening of the regional dimension of innovation policy. A successful innovation policy could help to reduce the productivity gap between the Union and the major economic areas such as the United States but only if the European characteristics suggested by the European social model are recognized.

Evidently the innovation policy has been an important aspect of policy making in the EU following the Lisbon strategy. Interestingly, it has become the ideological and political core from which variety of policy aspects are reflected and assessed. The Lisbon strategy and the implementation of innovation policies have been subjected to criticism. Wim Kok's high level group has suggested[274] that the strategy must be sharpened by focusing on economic growth and employment. It follows that the strategy should address to five areas: the knowledge society, the internal market, the business climate, the labour market and environmental sustainability. In order to achieve the goals of higher growth and increased employment, powerful, committed and convincing political leadership is required. Members states and the European Commission must re-double their efforts to make change happen. The group criticizes that the Lisbon strategy was loaded with too many goals, its coordination has been weak and the priorities have been mixed.

The innovation policy in the EU has also been a subject for criticism in Finland. The expert group chaired by Esko Aho[275] presented a strategy to create an Innovative Europe. To achieve this goal requires a combination of a market for innovative goods and services, focused resources, new financial structures, and mobility of people, money and organisations. These constitute a paradigm shift that goes well beyond the narrow

[273] For example in Spain tax incentives apply not only to R&D but also to expenditure on technological innovations.
[274] EU- The European Commission (2004b).
[275] EU- The European Commission (2005d).

domain of R&D and innovation policy. One of their central recommendations is a Pact for research and innovation in which the efforts should be addressed to three areas.

The first recommendation is the creation of an innovation-friendly market for businesses in Europe. This needs actions on regulation, standards, public procurement, intellectual property and fostering a culture that supports innovation. The second recommendation involves the 3 per cent target as an indicator of innovative Europe but it is not sufficient. Measures to increase resources for excellent science, industrial R&D and the science-industry nexus are needed. The third recommendation relates to mobility. It means that the measures improving the mobility of human resources are needed. Europe also needs a more effective venture capital sector and new financial instruments for its knowledge-based economy. It also means that the existing barriers and structures preventing interaction and networking must be abolished. Innovative Europe is possible only if these recommendations are taken seriously.[276]

The European commission advocates the new programme in the following manner:

> "The Lisbon European Council of March 2000 set the objective of making Europe the most competitive and dynamic knowledge- based economy in the world by the year 2010.
> By strongly and firmly placing competitiveness at the heart of the European political agenda, the reinvigorated 'Lisbon process' aims at making Europe a more attractive place to invest, by boosting the entrepreneurial initiative and creating a productive environment where innovation capacity can grow and develop. In order to fully meet the Lisbon goals, a particular attention has been given to ensuring coherence and synergy among all actions implemented at the EC level in the field of innovation and competitiveness. Following the recommendations of the 2003 Spring Council, the European Commission has decided to put forward a proposal for the implementation of a Competitiveness and Innovation framework Programme (CIP) which is meant to become the main legal basis grouping all Community actions in the field of innovation and competitiveness."[277]

[276] In October 2006, the European Commission has adopted a decision on establishing Competitiveness and Innovation framework Programme (CIP) for the period 2007-2013. The program provides a coherent framework for all Community actions implemented in the field of entrepreneurship, SMEs, industrial competitiveness, innovation, ICT development and use, environmental technologies and intelligent energy. The final budget for the CIP is 3.62 billion euros. The programme is structured around three main blocks of activities: The Entrepreneurship and Innovation Programme, particularly focussing on SMEs; The ICT Policy Support Programme, to support the adoption of ICTs in business, administrations and public sector services; The Intelligent Energy Europe Programme.
[277] EU – The European Commission, 2006.

5. THE FINNISH CLUSTER POLICY AND THE WELFARE CLUSTER CASE

5.1. Transition to cluster framework in the finnish industrial policy

In Finland the development of the cluster approach has been a long process that has links with industrial policy renewal in the early 1990s.[278] The Finnish industrial policy renewal had two origins. Firstly, it was clearly a genuine enterprise to find a new broader approach to an old policy in which the forestry and metals industry were the two pillars of economy and, secondly, it was an essential part of implementing the NIS paradigm in general.

The "NIS thinking" had gradually entered policy discussions and it was easy for policy makers to adopt the cluster approach. While earlier interventions were very practical, the 1996 Science and technology policy council review (STPC review 1996) discussed clusters at a general level. The main objective for the inter-ministry cluster-based programmes was to improve collaboration between the various ministries and sectors of government.

The idea of those programmes is of course based on the cluster approach but their primary aim was to open up a totally new arena for science and technology policy developments. The programmes wanted to gather all the stake holders - research institutes and companies - but also sectoral government research laboratories and users together so that joint projects could be planned and executed.

By introducing the inter-ministerial cluster programmes the government wanted to duplicate work that had been done earlier. The management of these programmes was carried out by programme steering committees, comprised of the funding organisations and the major stakeholders. The specific objective of those programmes was to create and improve linkages between government (ministries), research and industry. The political aspects of the Finnish cluster programmes were versatile. They provided a totally new approach to emerging industrial contexts and they opened up new political instruments to integrate science and technology policies in a new way. In other words, these programmes strongly advocated cross-disciplinary thinking and new alliances between actors.

Within the history of Finnish industrial policies the cluster programme was a chain in a long process. The idea of industrial policy was introduced in Finland as late as in 1969 when KTM-68 committee published its report.[279] The report was important in the sense that it lists a set of suggestions to be involved in the totality of industrial policy. It makes a clear distinction between industrial and technology policies and, in particular, it recommends the development of R&D policies in Finland as soon as possible. According to the report the concept of industrial policy comprises the following elements: funding, R&D- system, education and energy policies.

It is worth noting that the KTM-68 report illustrates the Finnish political culture and the committee system as an essential aspect of policymaking. The committee system was an essential aspect of policy making at the time and offered a forum for introducing new ideas and reforms to Finland as well as illustrating the controversies embedded in

[278] Romanainen 2001.
[279] KTM 1969 - Komiteamietintö 1969. See also Kaukiainen, Pihkala, Hoffman and Harmo1988.

politics. The Finnish committee system has been an important part of the Finnish political culture; it has served as a sort of mediator between the interest groups and the government.[280] Also, the system has been important in terms of preparing various reforms and initiations and developing existing political practices. The reports of committee also illustrate the development of political practices in Finland.[281]

In the 1970s the governance of the Ministry of Trade and Industry was re-institutionalized by differentiating two departments: Industries Department and Technology Department.[282] The establishment of KERA (Fund for underdevelopment areas) in 1971 and the post-1975 new legislation on regional planning intensified the development of regions.

In the 1970s one of the most difficult political issues in Finland was the problem of European integration. In 1973, when Finland became a member of EEC and Urho Kekkonen was re-elected as President with the help of an emergency law extending his presidency by four years mainly due to these problems. The ethos of the Finnish system of political governance was in the 1970s very much that of "rational planning".[283] Interestingly, the aims of industrial policy were justified by a set of economic theories in which the aims of structural policies were linked with the allocation problem of national economy. Both Unto Lund[284] and Reino Hjerppe[285] stress in their dissertations that structural planning must be based on the idea of efficient resource allocation. One of the basic issues in economics is the scarcity problem that requires answers to three questions: what to produce, how to produce, and for whom to produce. There are a variety of schools in economics stressing different aspects of those questions.

In principle, there are two general paradigms, the paradigm of distribution and the paradigm of production, and the points that scholars from schools are similar in many respects. Lund points out that the task of economics is to find means and instruments for economic policy. He stresses the significance of long-term forecasting and linear programming and suggests a list of economic areas to be applied in allocating resources in government economic policy.[286] Another interesting example is Hjerppe's and O.E. Niitamo's study on the exploitation of economics in societal planning in which they advocate the idea of operational research as an ideal of organizing the follow-up system by utilizing the capacities of computers.

This kind of functional approach was very much in fashion among the social scientists in the 1970s. The task of social sciences was to introduce a variety of methods that would describe "the state of affairs in society". It followed that the development of

[280] The committee system was suspended in the 1980s and the contemporary system favours one-man committees in which one particular expert gathers the information and makes a couple of scenarios and lists of suggestions for decision making system. It has implied a totally different account of political government and its practices.
[281] Tuori, K. 1983.
[282] The aims of industrial policy were listed as follows: the strengthening of competitiveness and investments to competitive industrial sectors, the advancement of R&D activities, the enlargement of state-owned industries, the development of education and labour policies to support the extension of industries, the promotion of deregulation in export and the re-development of the system of loans and credits, the development of regional policies and the improvement of operational preconditions for industries in underdeveloped regions. Teollisuuden kehityspiirteitä 1970-luvulla, KTM, maaliskuu 1972.
[283] Summa 1988.
[284] Lund 1973.
[285] Hjerppe 1975.
[286] Lund's book is often seen as a classic in terms of the Finnish social democratic tradition. See Jääskeläinen 2001, p. 23.

social indicators, input- output analyses, means-end hierarchies and systems of programming was seen as a legitimate function for the social sciences. The fundamental idea was to create a set of instrumental and rational instruments for linear and cybernetic planning systems.[287]

This idea of social planning was strong in Finland in the 1960s and it became one of the most important instruments in terms of developing public administration. The requirement for the relevance of social research elicited the growth of demand for expertise in social sciences. The purpose of planning was to improve coordination in public administration by introducing a set of appropriate means based on scientific analysis to be utilized in pursuit of achieving the goals set by politicians. The planning ideology was, on the one hand, based on the idea of the Nordic welfare state and, on the other hand, on the reforms in accountancy and financial administration in the public sector.[288] From the scholars' point of view the idea was the "scientification" of welfare issues to legitimate a variety of social policy reforms a piecemeal social engineering.[289]

While the planning ideology was full of optimism, it was also full of contradictions and controversies. In particular, it illustrates nicely the bureaucratic and technocratic tendencies of capitalism that Weber calls the problem of rationalization. In reality, the expectations were too high on both sides, and there was a lot of disappointment within the political governance; the view of scholars themselves was also very critical. Their critique focused on such issues as the problems of power, democracy and participation, the inconvenience of instrumental rationality and alternatives for incrementalism, the problems of strategic planning and rational decision making.[290] This was also in line with the OECD recommendations highlighting the significance of centralized planning and coordination in the 1970s.

The renewal of industrial policy in the 1980s was based on the recommendations of two committees: the report of Technology committee and that of KTM-81.[291] The Technology Committee was a grand committee with a variety of subsections that had representatives from industries, commerce and administration, political parties as well as from research institutes and universities. According to the report the aim of industrial policy is to create a favourable environment for entrepreneurship and investments by linking the development of new technology with economic growth. The conclusion was that Finland must raise the GDP share of R&D expenditure to 2.0 per cent and increase public funding in education significantly.

The report claimed that the most important area in economic growth was a high-tech aggregate of microelectronics, telecommunications and industrial automation. The definition of policy was strongly based on the "picking the winners" ideology but it also included the know-how related to science. In the regional policy the focus must be set on technology transfer and subsidiary policies; the argumentation was now based on development and geographical theories rather than on economic theories.[292]

If the idea of the Technology committee was to introduce new horizons for science and technology policies, the KTM-81 committee was an explicit intervention to pursuit of renew the political administration of science and technology policies. The central aim of industrial policy was now the enhancement of the growth of productivity, the

[287] Uusitalo 1976.
[288] Lampinen 1985.
[289] Allardt 1976, pp.328–333.
[290] Summa1988, pp. 52–53.
[291] KTM - Komiteanmietintö 1980; Komiteanmietintö 1981.
[292] Vartiainen 1998.

competitiveness of industry and its structure. In terms of industrial policies the most important aim is, on the one hand, to specify the focus and, on the other hand, to link other policy sectors with the aims of that policy. The task of industrial policy is to provide a horizontal strategy in which all other policy areas were part of that policy. This same goal was also strong in the 1993 strategy of the Ministry of Trade and Industry.

The committee recommended that the cooperation between the Ministry of Trade and Industry and the Ministry of Education would be re-organized so that the Ministry of Trade and Industry were responsible for reparations of technology policies. This aim became concrete after the establishment of the Science and Technology Policy Council in 1986. The birth of the Council was interesting because the representatives of science policy were strongly against the idea. The work of the Council was organized so that the prime minister was its chairman. There were also two secretaries-general, the other representing the Ministry of Trade and Industry, focusing on the science policy issues, and the other representing the Ministry of Education, focusing on technology policy issues.

The Science and Technology Policy Council increased the reconciliation of science and technology policies and clearly highlighted the significance of economic and technological elements in science policy. It is worth noting that in the 1980s there was a clear tendency to find scientific justification for technology policy.

One of the first attempts was Raimo Lovio's and Lemola's study[293] in 1984 in which they stressed the meaning of innovations and the significance of public technology policy in terms of the national economy and its success. It was extremely important, the scholars argued, that Finland must raise its investments in natural sciences and technology as well as in education. One of the major problems of the Finnish industrial policy was that it was strongly based on singular industries and homogenous products rather than on heterogeneous combinations between them.

The report is important in many respects. First, it introduced a totally new approach to industrial policy based on the ideas of Freeman's school and evolutionary economics. Second, it also introduced an idea of industrial complexities, very close to the idea of cluster. Third, it highlighted the significance of collaboration between users and producers as a precondition for industrial policy. Fourth, it advocated the idea of networking between branches of industries as well as advocating the meaning of cooperation between various ministries.

In the late 1980s the focus of industrial policy was again on politics because of the change in international contexts. It also expanded the domain of industrial policy towards European integration and internationalization. The vision for Finland[294] highlighted two issues: the change of international context and the idea of creating the Internal Market in Europe. One of the cornerstones of industrial policy was the European Monetary System (EMS), and Finland, together with many other small countries, started to consider joining the EMS in the coming years.[295] The prediction was that also EFTA- countries were to join the system in the 1990s. It is also obvious that the government also silently accepted this definition of policy.[296] Before the fall of the Berlin wall, all public documents in the late 1980s and in the early 1990s were formulated so that all references to full membership in the EU were excluded but, in

[293] Lemola and Lovio 1984.
[294] KTM 1987.
[295] Korkman 1992.
[296] Jääskeläinen 2001, p. 29.

reality, since the 1980s there was an elite coalition in Finland advocating the idea of globalization and the defence of EU integration.[297]

The definite aim of industrial policy was to highlight the creation of infrastructures and preconditions for industrial policy that contrasted with traditional industrial policy in which regional policy was linked with a variety of subsidies. The aim of new regional policy was to create environments and preconditions favourable for companies and their development.

The shift toward the cluster framework

In the early 1990s Finland was in the middle of an economic crisis and the Economic Council of Finland ordered a series of reports to discover means to a variety of problems.

Traditionally, all policy documents and strategies related to industrial policy were prepared carefully under the control of various interest groups but the work on the new strategy was organized totally differently.[298] The Ministry of Trade and Industry was indifferent in terms of theories and theoretical frameworks and thus it was natural that the key concept for the new industrial strategy was that of cluster. It was an analytic concept used also in other Nordic countries, and it was also a central part in the cluster research project started by ETLA. One of the central points of the new strategy was that it must be in line with the industrial policies of other European countries.

The cluster framework is applied in the new industrial strategy,[299] but the method of implementation was curious. The first step was to build up a strategy in 1992-1993, the second step was to conduct a stray in 1992-1995 and the third step was to publish a vision of industrial policy.[300] The original strategy process was based on ten expert groups, and their role was to act as think-tanks.[301]

What makes the cluster approach interesting is that it was the first time when the industrial policy strategy was warranted by referring to a scientific model as a justification. The new strategy was also exceptional because it was very much in line with the industrial policy guidelines in the EU. The main principles of competition policy were embedded in its broad framework as well as such important issues as investments in technology and education. One of the leading ideas in the new strategy was that industrial policy in Finland must not concentrate on a single industry, forest industry, but it should focus on the development of preconditions for a set of existing and emergent industrial clusters.

The idea of the cluster framework was to shift the traditional focus of industrial policy to preconditions of industries, networks and infrastructures, competition and factors of production. The old tricks were not valid any more. The new strategy emphasized two new important areas. First, the new strategy was openly advocating the idea of market failure; the new strategy was justified by the claim that the state must

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[297] Väyrynen 1999, p. 30.

[298] The preparation of the new strategy was given to a small group of civil servants including one scholar, Pekka Ylä-Anttila from ETLA and the work was carried out very quickly within six months ; Jääskeläinen 2001, p. 125.

[299] KTM 1993.

[300] Teollisuuspoliittinen visio- maailmantalouden murroksesta kestävään kasvuun, Julkaisuja 2/1996, Kauppa ja teollisuusministeriö.

[301] But in reality it was two persons from the ETLA who wrote the report. Pekka Ylä-Anttila was responsible for the strategic framework and its argumentation, and Hannu Hernesniemi wrote the cluster descriptions. The civil servants in the Ministry of Trade and Industry wrote the conclusion. Jääskeläinen 2001, p. 127.

have a strong role in those policies. It followed that the priorities of the Finnish industrial policy are created in accordance with the national aims and with a vision for the future. In other words, the strategic scope was subordinated to a set of national characteristics.

Second, its other strategic contour was on the idea of a strong competition policy. That is to say that the focus of the new strategy was to stress the significance of the market mechanism by highlighting the significance of a series of institutional reforms as a precondition for industries. While the scope of their new strategy provided an exceptionally broad approach to the development of industries, this kind of approach has been very common in the Nordic countries and it was also hidden in the KTM-81 committee report.[302]

The concept of the cluster was above all understood as a strategic tool through which policy makers aimed to underpin the dialogue between actors and communities and the forging of strategic alliances and networks. As a term, the welfare cluster proved to be ambiguous and very fruitful for policy making.

To choose the term was a conscious political act; it was also a step forward in strategic sense. On the one hand, it was a strategic political move towards new industrial infrastructure and, on the other hand, it was a move towards a new structure of science and technology policies. The cluster policy framework provided a theoretical tool in terms of renewing the industrial policy structures as well as in terms of increasing the domain of that policy.

When the Ministry of Trade and Industry published its Industrial political vision in 1996 it was a cut off to the cluster development in the sense that the cluster framework had provided a tool for a larger political process. The economic policy review by the Government in 1996[303] gave a new meaning for the term cluster so that the emphasis was on networks. Now the term had a larger societal content shifting the main focus on cooperation between government and industry. The stress was now on the role of the state and the public sector; the aim of the policy was on the balanced national economy, a low interest level, a firm currency and a competitive taxation policy. The review suggests that if the government manages to reckon with all these aspects the operational preconditions for enterprises and companies will be sustainable. One example of the new policy was a welfare cluster.

In the Finnish context TEKES has played an important role of implanting the cluster- framework to technology policy. Since its foundation in 1983, TEKES has been an independent actor in the Finnish science and technology policy.[304] Technology programmes have been powerful instruments in Finland. In 2004, TEKES provided 171 million euros to financing technology programmes. In autumn 2005, a total of 22 extensive national technology programmes were under way. Technology programmes are used to promote development in specific sectors of technology or industry, and to pass on the results of research to business in an efficient way.

It is worth noting that TEKES has utilized the cluster framework for two different purposes. Within the cluster framework TEKES has financed a variety of cluster

[302] Jääskeläinen 2001, p.131.
[303] KTM, 1996b.
[304] If the number of its staff was 20 persons in 1983, today there are 350 persons working for TEKES in Finland and its six offices abroad.

programmes as well as having used the framework in order to analyze and reorganize its own institutional structures and strategy.[305]

The two technology programmes of TEKES (in 1997 and 1999) are of a great interest because both utilized the cluster framework in their strategy construction. The oddness of the cluster framework is that it seems to be very flexible and useful for many purposes.

TEKES has revised its strategy and its institutional structures many times. I 2005 it published a new strategy where its base - mission, vision and values – determinesits objectives, methods, policies and actions. The primary objective is

> "…to promote the competitiveness of Finnish industry and the service sector by technological means. Activities aim to diversify production structures, increase production and exports, and create a foundation for employment and societal well-being".[306]

The renewed strategy is still based on the cluster framework. The application of the core areas is derived from the cluster analysis and, surprisingly, the Finnish and English versions are different. The Finnish version emphasizes the opportunities in the health sector and highlights the significance of health and social services in terms of national economy and competitiveness but the English version remains silent about these issues. The cluster framework is still today an important aspect of the Finnish technology policy; we have to remember that TEKES has its own technology-oriented role in the Finnish science and technology policy context.

Naturally, it is possible to explicate the reasons for the use of the cluster framework in many ways. The cluster framework has proved to be a successful framework although it is a very difficult concept in terms of technology policy tradition: the traditional approach to technology is based on different types of technology and the term cluster blurs these technological know-how constellations. The cluster framework has changed not only the technology policy language but it has also changed the strategy as such. The latest strategy mentions at the same time the clusters and sectors i.e. it refers to governmental issues and existing boundaries between professions, expertise and lines of business.

Another important actor VTT, Technical Research Centre of Finland, has been more traditional and its organisation is based on various technologies.[307] Its own role is to function as an expert organisation that carries out technical and techno-economic research and development.[308]

In 1997 the Finnish Ministry of Trade and Industry published a review where the cluster framework was replaced by the market failure framework[309]. The analysis was based on a very liberalist interpretation and some criticized its inappropriateness for

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[305] This is very coherent and takes into account the fact that professors Guillame and Zegveld had suggested in their evaluation in 1995 that TEKES should catalyze five cluster programs as some other countries. See Jääskeläinen 2001 p. 182.

[306] TEKES 2008a. See also TEKES Online Annual Review 2007.

[307] In 2005 it has eight expertise areas- environment, materials, pulp and paper, ICT, nuclear, renewables, transport and life science.

[308] Established in 1940 its history is a very interesting aspect of the Finnish research system evolution VTT with its 2800 employees, over 5000 domestic and foreign customers and EUR 210 million turnover in 2004 has been very active in the welfare cluster research context. See Michelsen 1993.

[309] KTM 1997.

Finnish policy makers.[310] Although the cluster framework was problematic, the new approach to technology policy was outmoded. A kind of cluster framework breakthrough took place in 1996[311] when the Government decided to increase public R&D funding between 1997 and 1999. The aim was to raise the national research input to 2.9 % of the GDP by 1999 by increasing the efficiency of support and co-operation between the different players in the innovation system. The finances of the cluster program were based on the revenue from state-owned companies. The Science and Technology Council of Finland also adopted the concept of cluster in its analysis.[312]

The aim of the program was to intensify the function of the national system of innovation. Most of its resources was channelled to TEKES and the Academy of Finland, but also the resources of the universities and VTT were increased and a cluster program was established.[313]

The content of the term cluster is again, very broad among 300 diverse projects. It implies that all relevant partners are called together to participate and that the governmental and administrative boundaries are broken intentionally. A closer analysis of the brochures of various cluster programmes proves that the projects seem to interpret the concept of cluster very freely. Many of them are carried out jointly by the industry. Various governmental actors stress openly that their project advocates and illustrates a new action model for policy making. The term cluster is now understood as a governmental tool. The central benefit for political governance is that the cluster projects contributed new co-operation and partnerships, yet many projects yielded only internal administration processes and discussion between various fields of administration.

The cluster framework was an important part of constructing the Finnish industrial policy but it was also used in labour policy. The main reason for that was the membership in the EU in 1995 and the options that the ESF (European Social Fund) funding provided. ESF funding was coordinated by the Ministry of Labour in Finland and it started to utilize the cluster framework to forecast the changes of labour market and professional skills.[314]

The cluster framework was useful from the Ministry of Labour viewpoint in terms of analysing the changes of labour market from a wider perspective. However, it was used, above all, as a heuristic and illustrative tool. The evaluation of ESF project during 1995 - 1997 points out that most projects adopted the cluster framework in very superficial ways. They used the term but clearly in a rhetorical sense.[315] However, there was still interest in the cluster framework because in 1998 - 1999, apparently due to the fact that some researches inspired by future studies and forecasting methodology, advocated the cluster framework openly.[316] The recent preference of forecasting methodology in political governance becomes understandable seen in this context of change. As Ian Hacking argues, the taming of change has been a long historical continuum; forecasting

[310] Jääskeläinen 2001, p. 184.
[311] OECD 2005.
[312] Jääskeläinen 2001, p. 185.
[313] The total value of the cluster program without the welfare cluster varies but some calculations estimate it worth 600 MFIM including the public funding 361 MFIM. See Pentikäinen 2000
[314] Jääskeläinen 2001, p. 193.
[315] Jolkkonen, Moore and Pirttilä 1998.
[316] Heinonen, Mykkänen, Pantzar, Roponen 1996; Jääskeläinen 2001, p. 94.

methodology provides a tool by which security and order is assured in today's extremely contingent world.[317]

5.2. The welfare cluster – An idiosyncratic intervention

Why did Finnish policy makers make the decision to apply the cluster framework? What made it so seductive? There are many explanations available but let us start from the idea as such.

Professor Michael E. Porter from Harvard is the person behind the cluster framework. His expertise is focused on business administration and strategic thinking. Porter has been very influential as an analyst of such issues as national competitiveness and an advocator of strategic thinking in public administration and national economies. His interpretation, derived from game theory, is that there are five forces that determine the attractiveness of a market: the bargaining power of customers, the bargaining power of suppliers, the thread of new entrants, the thread of new substitutes and the intensity of competitive rivalry. This analysis based on five forces has been criticized a great deal and many have attempted to introduce a sixth force in order to develop a better theory.[318]

Policy makers in Finland utilized Porter's theory of the competitive advantage of nations where the competitiveness and future growth prospects of the industry form the core of the analysis. Porter's popularity among policy makers has been a small mystery but also very understandable. Porter's theory is an answer to changes in the global market. As a theory it is very simple, opposing mainstream economics and advocating openly the strengths of evolutionary economics and hermeneutical aspects.[319]

In his book *The Competitive Advantages of Nations* Porter has two central ideas: a model of the sources of competitiveness and a cluster-model. The diamond model explicates the sources of competitiveness of an industry or a region and can be used as a strategic and political tool. The national competitiveness is based on its industries' capacity to be innovative and regenerate its modes of production and products.

The diamond model (1990) that is derived from the model of five forces consists of four determinants that influence competitiveness: 1) factor conditions, 2) home demand, 3) related and supporting industries, and 4) firm strategy, structure and rivalry. Porter contends that regions must develop a competitive advantage based on their ability to continuously innovate. Innovations are based on the following four key elements:

1) ***Factor conditions***, such as a specialized labour pool, specialized infrastructure, and sometimes selective disadvantages that drive innovation;
2) ***Home demand***, or local customers who push companies to innovate, especially if their needs or tastes anticipate global or local demand;
3) ***Related and supporting industries***, nationally competitive local supplier industries who create business infrastructure and spur innovation and spin off industries;
4) ***Industry strategy, structure and rivalry***, intense rivalry among local industries that is more motivating than foreign competition and a local "culture" that influences individual industries' attitudes toward innovation and competition.

[317] Hacking 2002, p. 58.
[318] Brandenburger and Nalebuff 1995.
[319] Jääskeläinen 2001, p. 81.

In addition to these areas, the Porterian approach includes the roles of the government and chance. Historical accident and/or government actions tend to play significant roles in the early development or the location of local industrial clusters.

One of the concepts of this theory is the concept of cluster. It is usual that both of those models are called clusters. Clusters illustrate the networks and organisations of production. A cluster is born in a situation in which the sources of competitiveness toughen one another.

The original idea was to adopt the cluster framework in order to enhance the creation and growth of advanced and specialized production factors as well as to stimulate the emergence of strong industrial networks[320]. If the diamond model was employed as an analytic tool for the determination of the objectives of broad policy-making, the cluster model was used as an evaluative tool to analyze the competitiveness of Finnish business and industry.

One way to understand the cluster approach is to identify four cluster types in terms of presence and absence. The types are the absence of cluster, the presence of a potential cluster, the presence of an emerging cluster and the presence of a functional cluster.

The first situation is that there is little interaction between firms and there is little or no institutional support. Potential clusters are characterized by the presence of interconnected firms and industries, by the emergence of fragmented and low density business networks, by the absence of synergies between firms and the absence of synergies between firms and by the absence of tools that would enable policy- makers to intervene. Emerging clusters are characterized by the presence of a critical mass of firms and industries, by a certain concentration of the activities of firms at the local level, by entrepreneurs' low awareness of the potential gains from a cluster, by low synergy due to the lack of a common vision among stakeholders and by the presence of efficient linkage mechanisms.

The presence of a functional cluster is identified 1) if entrepreneurs are involved greatly in their region; 2) if there are entrepreneurs who identify themselves with the regional system; 3) if there is good common infrastructure including good services; 4) if there are good business practices and the exchange of knowledge between players.

Historical developments towards social technology

It is interesting how quickly the ideas of clustering and networking diffused across the various administrative fields. In particular, the reception of the welfare cluster was very enthusiastic. One explanation for it was that there were a lot of activities close to the idea of welfare cluster in progress. For example, STAKES (the National Research and Development Centre for Welfare and Health) had started many projects on various welfare issues with close links that were quite similar to the idea of the welfare cluster. It seems that in Finland three different dimensions of the progress assimilated into the process, and were later coined as a welfare cluster.

First, STAKES (formerly National Board of Social Welfare) had participated actively in many international and EU programs since the late 1980s. Those programs were focusing on elderly and disabled people, and one of the slogans it wanted to contribute was the "barrier free" or "design for all" ideology. These research projects and experimental programs wanted to highlight primarily such policy issues as housing and physical environments as a pre-condition for providing social and health care services.

[320]Hernesniemi, Lammi, Ylä-Anttila 1995; Penttinen 1994.

The bottom line of those R&D -programs was very simple. We must not only focus our interest on services but rather to take into account a variety of infrastructures of those services. It implies that often the focus must be laid on technological contexts such as the context of housing policies and urban planning, the context of architectural interior design, the context of construction industries and building practices. All these programs wanted to pose a very simple question: Why not to design housing environments, proper houses and individual homes taking into account also the needs of elderly people and the disabled? The ethos of these programs stressed strongly that different forms of professional interaction and networking beyond traditional private/public boundaries are important.

The general director of STAKES, Vappu Taipale, published an article in 1994[321] where she suggested that the idea of the welfare cluster must be taken as a framework for analyzing both the services, the training and education in the social and health care sector and the co-operation between research and industry. The article was very influential in the sense that it produced the Oulu welfare cluster project in 1995[322]. STAKES wanted to interpret the concept of welfare cluster so that it would refer to a complex composed of five elements: welfare services, education and training, research and industry.[323] The idea was to call together various partners with no earlier interaction in order to fuse their various interests, needs and perspectives.

All those developments had a longer history because in 1991 SITRA published a report that was a kind of manifesto advocating the new approach called social technology. Its prime interest was to highlight the problems related to social welfare and technology, and it was also a kind of umbrella concept for the Marjala housing fair in Jooensuu, Eastern Finland. One of its major arguments was that there was a great need to adjust the focus from hospital technology toward non-institutional care and services.[324] It also advocated the barrier free framework as a new ideology for blurring the relation between the social and the technological.

In Finland, one of the most epochal reforms in terms of non-institutional care was the adoption of the emergency telephone for elderly and disabled people in the 1980s.[325] Simultaneously, Finland participated actively in various programs at Nordic and EU level. The aforementioned SITRA report stresses strongly professional issues and the lack of technological investments in social welfare. Ironically, the most prevailing technological equipments in use in those days were in many municipalities a bicycle and a kick sled. The concept of social technology was referring to low-technology and, in reality, as it never got through in media, the broader concept of welfare cluster replaced it later.

Second, another player that had specialized on welfare cluster issues for many years was VTT. In contrast, its competence focus was mainly on hospital care and health technology. Its interest was on medical sciences, pharmacology and ICT, and it highlighted clearly high technology and such technical devices as diagnostic instruments and other medical care products. [326] Its emphasis was more on technology and industry co-operation and hence very much in line with the welfare cluster analysis made by ETLA.

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[321] Taipale 1994.
[322] Koivukangas & Valtonen 1995a; Koivukangas & Valtonen 1995b.
[323] Ohinmaa, Pietilä, and Valtonen 1999.
[324] Vesanen, Kokko and Halme 1991.
[325] It is curious that there are no systematic surveys or studies of that reform to this day.
[326] Rouvinen, Saranummi and Lammi 1995.

The *third* player which traditionally was active in many issues linked with welfare issues was SITRA. The Fund was set up in conjunction with the Bank of Finland in 1967 in honour of the 50th anniversary of the Finnish independence. One of the most promising projects coordinated by SITRA was the EMA project[327]. Its aim was to promote the growth of disabled equipment industry in Finland, and to support independent living at home among elderly people. The idea was to collect all significant players and especially companies together. The interest of entrepreneurs faded away very quickly because of rivalry and the project was soon closed. Another project, a kind of follow-up to the former, was created to build up a rehabilitation network connecting know-how in specialised medical care, rehabilitation and physical education. The centre of the project was the concept of senior gym and the aim was to construct the concept and address the European market but it also failed.[328]

All those actors had very different views on the relation between welfare and technology. If STAKES stressed the role of welfare services, VTT highlighted more ICT-issues and health care industries. SITRA wanted to increase awareness of the meaning of networking and the problem of marketing welfare among the Finnish SME companies.

The key findings

In Finland the cluster analysis was carried out by some ETLA economists as a part of the renewal of industrial policies. The scholars end up dividing the nine Finnish industrial clusters into four classes:[329]

a) ***Strong clusters*** (forest industry),

b) ***Semi-strong clusters*** (basic metal and energy technology),

c) ***Potential or emerging clusters*** (telecommunications, well-being and environment)

d) ***Latent or defensive clusters*** (construction and foodstuffs).

The analysis suggests that many originally factor-driven clusters have developed gradually from technology-driven or knowledge-driven clusters. According to the analysis the fastest growing industrial clusters are those of telecommunications, well-being and environment.

In the original cluster analysis the term was clearly an analytic tool by which scholars identified the issues of well-being and health care. Very soon the term started to live a life of its own. The reason why the policy makers preferred the term welfare cluster and dispensed the health care cluster is doubtless connected with the Finnish economic crisis and the financial problems of the state. In any event, the findings of the ETLA analysis are extremely interesting.

As its point of departure is a kind of SWOT analysis. The strength of Finland is that the system of social and health services is of very high quality. Finland has also been

[327] Rauhala-Hayes, Topo and Salminen 1998.
[328] Later, SITRA was also involved in a marketing research company set up for the Finnish wristcare innovation addressing to the US market It also failed because it turned out that the US market was full of various gatekeepers (e.g. doctors) and in practice proved too difficult for the Finnish innovation. Hyysalo 2004.
[329] Hernesniemi et al 1995.

successful in health care technology and especially in specialized medical care technology, but Finland has no tradition in these issues unlike Sweden and Denmark.

The weakness of the Finnish welfare cluster is that there is no real Finnish welfare cluster in the sense the analysts have understood the term because of the following reasons. First, technology companies related to welfare and well-being were relatively small, and pharmaceutical industries were small and young. Almost all Finnish firms were operating in a very specialised niche, market segment, and many of those firms are based on one particular invention by its owner. Second, the peculiarity of the Finnish technology enterprises in health care is that although they are usually considered as very innovative their marketing performance has been poor.

The calculus [*1:10:100]* illustrates very well the problems those companies have. If an entrepreneur has an idea or an invention, it equals the resources [1]. In order to start large scale production he/she needs ten times more resources to produce it, and if he/she wants sell the product in the market he must allocate ten times more resources than the production expenses were.

Another aspect of the Finnish welfare cluster is that pharmaceutical companies have merged. In 1985 there were 13 companies, but now there are only four. One of the main reasons why the development of Finnish pharmaceutical companies has been so unsuccesful is the patent legislation. The problem of pharmaceutical development work is that it is a long-term, expensive and risky effort but to copy the finalized and tested products is often fairly simple. To copy the product is possible if the production method is different from the original. The Finnish pharmaceutical companies and the development of medical products in general have very much been favouring the Anglo-Saxon medical tradition.[330]

The most promising areas in the welfare cluster were fitness and sports equipment as well as functional foods. However, the most promising related and supporting industries were in the emerging ICT sector. The irony is that later the term welfare cluster seemed to refer to ICT-sector only, and all those other aspects were unimportant.

According to the ETLA analysis the possibilities embedded in the welfare cluster can be reduced to the issue of ageing. Ageing must be seen as a huge innovation potential hidden in the Finnish welfare service system if we approach the dilemma with open eyes. This implies two radical accounts. First, we have to pay attention to the possibilities of technology in welfare and well-being and, second, we have to focus on the problem of the welfare market.

The analysis highlights strongly that these two issues are linked with the problem of efficiency in the system of social and health care services. The point the analysis makes is that if we seriously want to maintain our welfare service system we have to find new cost-effective and innovative solutions to both institutional and non-institutional care. The argumentation proceeds so that if we put our interventionist focus on technology

[330] Most of the technology companies with links to the welfare cluster are situated according to the analysis close to university towns and they have very close ties with universities and research institutes: Helsinki, Turku, Tampere, Oulu and Kuopio. Mainly for the historical reasons the cooperation with pharmaceutical companies and universities has been less developed. In 2006, the total health care expenditure was 12.4 billion euros, accounting for 7.4% of the GDP and the medicines expenditure was about 2 billion euros, accounting for 16.5% of the total health care expenditure and 1.2% of the GDP. The public sector pays 77.7% and the private sector 22.3% of the health care expenses. With a share of 40.2% in 2006, the municipal sector is the largest individual financier of the health care expenses. In 2007, the reimbursements from the health insurance were slightly over 3 billion euros, up about 6% from 2006. Medicines accounted for 36% of all reimbursements from the health insurance. Pharma Facts, Pharma Industry Finland.

and interpret social and health care as a market, the only possibility we have is to develop technology and new forms of services. This means that there is a room for technological development and services produced by private companies.

According to the analysis the real target of the welfare cluster must be the Finnish welfare system and its deficiencies. One of these big problems concerns the non-transparency of the system. The conclusion was that the boundary between the provider and the producer must be clarified. The reason was that the Finnish welfare service system is very much based on the Finnish local government system, and this system distorts the market conditions and prevents fruitful competition. The final conclusion is that as a political intervention the welfare cluster must highlight these structural and transparency problems. In other words, only then can the innovative environments be possible and the challenges embedded in the welfare cluster real.

One of the most original arguments of the analysis is that if the welfare cluster is not a real cluster it must be used as a catalyst of innovation. This means that the strategy must focus on three assets. First, it must exploit the differentiation into the public and non-public R&D units and therefore link universities and research institutes with R&D. Second, the creation of strong national networks for marketing and trade must be started immediately. Third, the utilisation of diversified industrial know-how and production development must be started as soon as possible. This strategy was important because the operation context of the Finnish welfare industries was often on SME context.

The welfare sector and social and health services were thus as important parts of national competitiveness. They were also a resource for well-being, but they were also an option for innovations and new markets.

In contrast to other Finnish industrial clusters, the welfare cluster analysis highlights the problems of the public sector. The analysts assess that a deciding factor for the welfare cluster is how governmental officials understand and utilize the possibilities available. The most important aspect of the welfare cluster is how are governmental officials able to translate the argumentation and to take into account of the needs of the Finnish industry?

The core of the welfare cluster is thus that the public sector is a catalyst of innovation. The aim of the welfare cluster is to find and experiment a variety of cost-effective innovations. This implies that the infrastructures of social and health services must be re-organized. The benefit of the re-organisation is that only then does the welfare cluster have a real value.

The conclusion that the analysts make is of a great interest. They argue that it implies two strategic moves. The first is that Finland must increase the market mechanisms to tolerate rivalry and increase entrepreneurship within the social and health service sector. The second is that this implies an increase of technology in social and health care. As a matter of fact, it is the only choice for genuine and real efficiency in welfare sector.

The analysis clarifies that cooperation and collaboration with other industrial clusters must be self-explanatory but the links with the ICT cluster are even more important. The analysts predict that the most promising Finnish cluster is the ICT cluster but the second will be the welfare cluster. If we compare Finland and Denmark in terms of welfare clusters, it would imply that our export would overrun e.g. the Finnish energy industry. The prediction is that this might not be possible before the years 2005- 2010.

What is also obvious is that the conclusion that the ETLA- scholars made, the core of its political intervention being on the Finnish welfare model and its dependency of the public sector is problematic. In various OECD countries the systems of welfare are very different and depend on historical and cultural differences and it implies that the role of the public sector in the social and health services is totally different.

It is obvious that the original agenda of the welfare cluster shifted gradually towards technology policy and closer to the development of Information Society. In 1993, the US government published The *National Information Infrastructure Agenda for Action*, the first comprehensive statement of the administration's visions and goals for the NII initiative that provides an overview of the goals and objectives of NII. [331] This very influential document did not mention the information society but rather encouraged investments in new technology and networks. It became an important document for the development of the information society in the USA and in other countries. A similar document, the Bangeman report, was published in 1994. It advocated the idea of the information society. Its core was on the development of the ICT sector industries but its approach was different from the NII -report.[332] The Information Society report was a list of recommendations for the European Council, and it strongly highlighted the opportunities of that revolution for Europe and European citizens.

The authors of the report forecast that the Information Society benefits European citizens and consumers, the content creators, Europe's regions, governments and administrations, European business and small and medium sized enterprises, European telecommunications operators, equipment and software suppliers, and computer and consumer electronics industries.

In Finland the development was also very rapid. If the report on Finland's future and alternatives in 1993 attempted to illustrate various scenarios for Finland, it does not mention the notion of information society at all. [333] Later the Parliament established the Committee for the Future, originally on a temporary basis, but later in 2000 the Parliament decided to make it a permanent committee. The idea of the information society became an essential part of the EU's political rhetoric; it provided new challenges for European collaboration and human interaction. It also became the ideological core of the development of EU governance and its administrative scenarios.

It is very natural that Finland, as a member candidate of the EU, also wanted to follow the NII and the Information Society pathway in its strategies. The Finnish strategy of the information society was published in 1995. This so called TIKAS report includes seven sub-reports. The Finnish strategy was very national and patriotic and in many respects very Finnish; one result of the strategy process was that Finland started to advocate itself as a leading information society.

As a part of the TIKAS process the Ministry of Social Affairs and Health also introduced its strategy on how to implement and adopt the Information society developments in its activities.[334] SITRA became a kind of nexus for the political legitimation of the information society. SITRA published a lot of material advocating the unavoidability of the ICT revolution, and its different programs advocated the point

[331] Malhotra, Al-Shehri & Jones 1995.
[332] Bangemann 1994.
[333] VN, 1993.
[334] Sosiaali- ja terveydenhuollon tietoteknologian hyödyntämisstrategia, Työryhmämuistioita 1995:27, Helsinki:STM, 1996.

that there are huge challenges hidden in the idea of the information society. There are only few examples of publications having direct links with the welfare cluster and its themes.[335]

In the information society context the welfare cluster was rather an eccentric experiment. One reason for this was that its political agenda was not linked with the information society as such. Its origin was on industrial policies and it was far from the concrete issues of social and health policies.[336] When the information society reports were published by MSAH the situation changed.[337]

The welfare cluster from the MSAH perspective was now seen as a form of technology policy rather than as a form of industrial policy. In the latter half of the 1990s the welfare cluster was not part of science and technology policies but rather a part of the Information Society strategy. The real links with these policies were exposed later.

It seems to be obvious that the term welfare cluster was more like a buzzword.[338] As a political term it aroused interest and it sounded fascinating. Some STAKES scholars specialized on the welfare cluster problems conjecture in their study suggesting that almost all decision makers in social and health care were familiar with the term and thought that they have understood its content. It was an essential part of the fashionable welfare jargon in the late 1990s.[339]

The Finnish social and health service system was based on a complex system of legislation and regulation in which municipalities were responsible for organizing services autonomously. The system was principally based on the idea of the public sector performing in two roles as a purchaser and provider. The whole idea that there would be market in the late 1980s in social and health service system was not acceptable. It was argued that the municipalities dominated the system.

After the year 1993 there have been four strategies for Finnish municipalities[340]: (a) The public sector produces the services; the public sector funds and organizes the services; the public sector supervises and regulates. (b)The private sector produces the services; the public sector funds and organizes; the public sector supervises and regulates. (c)The private sector produces the services; the public sector funds and organizes and the public sector supervises and regulates. (d) The private sector produces the services; the private sector finds and organizes services without any supervision and regulation.

The idea of the welfare cluster was, on the one hand, to promote the application of new technology in those services but, on the other hand, it also, as we have seen earlier, advocated the rigidity of the Finnish system. Its more or less explicate aim was to bring about changes within the Finnish welfare service system which was a problem.

In fact, the socio-political situation in 2040 in many developed countries will be different from the current situation. The invention the ETLA analysts made was that they wanted to combine the problem of ageing with the problems of welfare in general. The scholars explicitly forewarned politicians and policy makers that if we continue our aging policy without any changes, the finance of our existing system collapses. The most alarming aspect of aging is, as the scholars rightly remind, the phenomenon of double ageing. It means that while the number of older people increases, the number of the

[335] Lilius 1997.
[336] Rauhala- Heyes, Topo and Salminen 1998.
[337] STM, 1998a and STM 1998b.
[338] Godin 2003.
[339] Ohinmaa, Pietilä and Valtonen 1999.
[340] Lehto 2003.

oldest people increases more quickly. The problem is real because the probability to be involved in the systems of institutional care increases significantly after the age of 85. It implies that the use of medicines increases as also does the investment in medical care and medication.

In the early 1990s one of the most burning issues in Finland concerned the strong emphasis on institutional care. There were 12.5 beds per 1000 inhabitants while e.g. Denmark had only 5.6 beds. A conclusion made by the analysts was that Finland has become to a cul-de-sac. The Finnish institution favoured system was too expensive and ineffective and, in particular, the demographic changes in the future implied new non-institutional social and health care models and solutions.

Elderly people as a population group provide new options and possibilities for the Finnish industry. The conclusion made by the ETLA analysts was to focus on independent living issues. It means that we have to connect the emergent radical developments of social and health care with the developments of technology and implausible opportunities, and changes will be ready. The analysts remind that the earlier the entry occurrs the better it will be for Finland. It was a real opportunity Finland must take advantage of.

Recently, EU policies related to ageing have radically changed. After the publication of the Green Paper "Confronting demographic change: a new solidarity between generations "[341]in 2005, the problem of ageing has become an important part of EU policy making. What is worth noting is that the Green Paper links the challenges of the Lisboa strategy with the challenge of ageing. It also means that the EU must institute birth-friendly policies and address the possible contribution of immigration in a balanced way.

The Green Paper stresses that that it is necessary to continue to modernize social protection systems, especially pensions. Public policies must take these democratic changes into account in all policy areas concerned. In Europe, because of the varieties of the social protection systems it has followed, the focus has been more on families: families are the cornerstone of public and social life. Taking into account all 25 member states, the problem of ageing is more a problem for families; the Finnish and Nordic welfare state model is only an exception in a rule. Reconciling work and family life is a key policy factor for both women and men, and necessary for solving demographic problems in Europe.

It is natural that these institutional circumstances affect the behaviour of consumers. In Finland the public sector is the most important provider of health care as also in many other OECD countries. The size and growth of the public sector is usually described by the proportion of GDP. In the European countries the average expenditure of public sector has been higher than non-European OECD countries.[342]

Taking into account all this, it is interesting that the issue of ageing became so important. In retrospect, it is easy to see that one of the most important driving forces was the economic recession; the national economy of Finland was really in crisis but what made the issue of ageing so important, was that it was understood as a political challenge in the context of industrial policies.

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[341] EU - The European Commission 2005.

[342] In 2003, the average expenditure in EU countries was 48 per cent from GDP- in Sweden it was 58 per cent, in Ireland 35 per cent and in Finland 51 per cent of GDP: health care system in Finland has been and is still today very moderate in international comparison. Actually, Finland spends least of all among Nordic countries, VATT- Talouden rakenteet.

My interpretation is that although ageing was a real problem having lot of political potential the skilful ETLA analysts linked the problem with other problems of the Finnish welfare society. Ageing was a real challenge but what was more important was that it reflected the Finnish system of welfare services and its strong dependence on the public sector. The increase of competition in the welfare sector was the proper issue that the ETLA analysts wanted to highlight. In other words, the analysts did not make any radical conclusions. Rather, they suggested a critical attitude. They spoke with the mouth of experts, nothing else.

All this makes the issue of ageing very sensitive in the sense that it refers to a real problem. The analysts translated it in order to enrol their original aims.[343] Later, this problem was translated into a form of economic efficiency and technological effectiveness.

In reality, the problem of ageing is far more complex and difficult. In terms of social policy and social protection ageing is often associated with the problems of health and diseases, but it must also be seen in a broader perspective within the system of social health. Most preventive care and non-institutional services allocated to elderly people is in Finland, as well as in many other countries, outside the public health care system.

One of the central arguments advocated by those working with the elderly has been that ageing is not a matter of disease or diagnosis as such. It is a particular phase in the life-span and it should not be reduced to a matter of medicalisation. In ageing, the medicalisation of death plays a central role in the sense that suc issues as the definition of a healthy and normal human being as well as the decisions related to medicine and other medical interventions become important.

In a way it is curious that the most important argument for the welfare cluster as a political intervention was very close to the analysis made by Besley and Gouveia[344] who have identified in their analysis three basic "types "of health care systems. Type 1: Finance and delivery by the private sector (e.g. the US, Turkey); Type 2: Public finance and substantial private delivery (e.g. Canada, German, the Netherlands); Type 3: public finance and delivery (e.g. Sweden, Finland, UK). Many recent reforms have aimed to move type 3 systems towards type 2. The welfare cluster was a clear intervention toward type 2.

Another interesting aspect of the welfare cluster was that the issues it highlighted have become important in the EU. It is possible to interpret the welfare cluster as a learning experience. Finland was a kind of specimen for this kind of policy making. Naturally, similar trends occurred also in other Nordic countries, in Sweden, Norway and Denmark, in particular but also the experiments in the Netherlands and the UK as well as in Canada were very similar.[345]

[343] I am referring here to ANT theory. I will return to these issues later.
[344] See Besley and Gouveia 1994. This discussion on public economics and the economics of health care has a long tradition. See also Barr 2001; Barr 1993.
[345] Godin 1997.

6. RE-CONTEXTUALISATION OF STI POLICIES IN FINLAND

6.1. Finland and STI policies: A success story beyond compare

In this chapter I will re-contextualize the Finnish STI policies by utilizing a variety of assessments and evaluations of those policies. Those evaluations provide two different pictures of Finnish STI policies. The first picture is very adulatory and positive; Finnish STI policies form a success story. In other words, Finland, as measured by a set of statistical indicators based on international standards, has been one of the most successful countries in implementing STI policies in this millennium. This view is so plausible that Finland is often used as a show case for those policies. This view stresses two issues.

First, Finland has performed high intellectual capacity and assimilated its policies into the NIS framework very quickly. Second, it has re-organized its policies and political administration in accordance with the NIS guidelines admirably. This has encouraged the progress of competitiveness and economic growth as well as developed Finland as a modern flexible society. This kind of view is a sort of visiting card Finland readily delivers to foreigners.

Another view of Finland is slightly different, not as polished and perfect as the former view. This view stresses controversies and struggles behind the curtains. In other words, it suggests that the success of Finnish STI policies is a series of coincidences and successful and well-timed decision-making. It is an outcome of skilful and active politicking. Although the Finnish actors have been active and skilful, Finland's success is mostly a series of fortunate incidents.

This view becomes tangible and concrete in the welfare cluster case. The cluster programme, as shown above, was a part of the public additional appropriation programme in the late 1990s in which the government wanted to improve Finland's R&D performance. The programme reflects the fact that the government had a lot confidence and trust in the NIS framework at the time. It also illustrates a political shift towards new thinking. The focus was now clearly on the R&D issues rather than on something else. The investments in R&D are also investments in the future.

The aim of this re-contextualisation analysis is to examine these two complementary views and, in particular, to focus on the latter view. The analysis utilizes a variety of policy documents and a stock of surveys and studies linked with STI policies including thematic interviews[346] with key persons carried out in 2004 focusing on the welfare cluster. The reason for carrying out such an analysis is that it helps to analyze the political aspects of STI policies and makes them visible.

In recent years, in the STI policy context policy makers have introduced the term the Finnish model. The Finnish model is a political construct, a coinage that refers to Finland's capacity to adapt to the changing economic and political context in the era of globalisation. It can be read as a heroic saga where a hero, a small Finland, bravely battles against difficulties and adversaries in the era of globalisation.

According to many international studies and surveys a key issue in the Finnish model concerns Finland's competitiveness among industrialized developed countries. Finland's

[346] Tarkiainen 2005.

competitiveness has been high for many years. There are many institutes that produce statistical information linked with competitiveness and although those surveys utilize different statistical methodologies, the figures and rankings are surprisingly parallel.

Among those institutes producing a variety of international statistical information is the World Economy Forum (WEF). It introduces itself as follows:

> "The World Economic Forum is an independent international organization committed to improving the state of the world by engaging leaders in partnerships to shape global, regional and industry agendas."

WEF, incorporated in 1971, and based in Switzerland, relies on the motto "entrepreneurship in the global public interest". In other words, WEF believes that economic progress without social development is not sustainable, while social development without economic progress is not feasible. One of the most important tools of WEF is the Global Competitiveness Report series.[347]

The Nordic countries are ranked highly because they share with Switzerland a broadly similar institutional and structural profile. The Nordic countries have better rankings on the macro economy pillar of the GCI structure since they all run budget surpluses and have lower levels of public debt. Finland and Sweden have best institutions in the world and occupy places in the top ten in health and primary education and in the top three in education and training - where Finland's first position is remarkable for its long standing. According to the report the Norodic countries show that transparent institutions and excellent macroeconomic management, coupled with world class educational attainment and a focus on technology and innovation, are a successful strategy for maintaining competitiveness in small, highly developed economies.[348] The most problematic pillars are market efficiency and the market size.

The Institute for Management Development's (IMD) located also in Switzerland has released the World Competitiveness Yearbook since 1989.[349] Finland's ranking fell from the previous year, which was due to the lack of foreign direct investments and high taxation rate. A well functioning education system, good public administration and cooperation between industry and universities are listed as Finland's strengths.

In the European Innovation Scoreboard Report 2006[350] ranks Finland together with Sweden, Switzerland, Germany and Denmark the European innovation leaders. The methodology the report applies is different in the sense that it distinguishes five key dimensions of innovation – innovation drivers, knowledge creation, innovation and entrepreneurship, applications and IPR and this means that although the trend is similar to other reports it highlight also some very interesting challenges. Also leading countries such as Finland must critically reflect the problem of innovation efficiency i.e. how to

[347] The recent report 2007-2008 based on the Global Competitiveness Index includes nine pillars: a) the basic requirements - Institutions, Infrastructure, Macro economy, Health and primary education; b) the efficiency enhancers - Higher education and training, Market efficiency, Technological readiness; c) the innovation and sophistication factors - Business sophistication and Innovation ranks the countries as follows: 1) The United States, 2)Switzerland, 3) Denmark, 4) Sweden, 5) Germany and 6) Finland. World Economic Forum, 2008.

[348] According to the report Finland's most problematic factors are: tax rates, restrictive labour regulations, tax regulations.

[349] The IMD yearbook 2007 is based on a different methodology in which Economic performance (79 criteria), Government Efficiency (72 criteria), Business Efficiency (71 criteria) and Infrastructure (101 criteria) place Finland in position 17 among 55 countries.

[350] EU - The European Commission 2006.

transform their innovation assets (education, R&D and innovation expenditures) into innovation results (turnover from new products, employment in high tech sectors, patents) is of particular interest.

The 2007 Index of Economic Freedom is a survey based on the work carried out by the the Wall Street Journal and the Heritage Foundation, and it covers 10 freedoms from property rights to entrepreneurship in 161 countries.[351]

A very special aspect of the Finnish science and technology policies has been the development of the Finnish university system. The annual number of doctoral degrees more than doubled in Finland during the 1990s, and the growth has continued in the early years of the 21st century.[352] In relation to its population and GDP, Finland is one of the world's biggest producers of scientific publications, ranking ahead such traditionally strong countries in scientific research as the UK and Germany.[353]

The R&D expenditure has been growing without interruption since the early 1990s, mainly owing to business enterprises but in recent years also due to increased expenditure in the higher education sector. Business enterprises account for 71 per cent of R&D expenditure. The increase in business enterprise R&D expenditure is due to the electronics industry.[354] One interesting dimension of science and technology policies is the number of Finnish patent applications.[355]

Finland's performance measured by using different indicators linked with economic growth and competitiveness has been excellent in this millennium. In other words, Finland's success is a indisputable fact, nothing else. But, as we will see later those international comparison studies involve a variety of problems and difficulties. Most of these problems are either purely methodological or downright ideological. [356]

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[351] The top five are Hong Kong, Singapore, Australia, United States and New Zealand whereas Finland's rank is 16, Denmark 13, Iceland 15 and Sweden 21. This study suggests that in terms of economic freedom Finland is quite liberal.

[352] For example in 2006 there were 1,409 new doctorate degrees and in 2004 there were nearly 13,000 employees with doctoral degrees, which makes about 0.5% of the workforce. The employment of PhDs is good; the rate of unemployment (2.2 % in 2004) among PhD degree holders in Finland is among the lowest in international terms, Ministry of Education, KOTA Database.

[353] In 2005, Finnish researchers produced 8,300 publications, the highest figure ever recorded. The number of publications by Finnish researchers in international esteemed scientific journals has increased 2.5-fold during the past 20 years. In relation to population, the number of publications produced in Finland in 2005 was 1,600 per one million inhabitants. See OECD 2006.

[354] In 2005, nearly 5.5 billion euros were spent on research and development in Finland. Over 77,000 persons of which over one of the half of the research personnel worked for business enterprises were employed in the R&D sector. In all, one third, 26,400, of the R&D personnel were women. Source: Statistics Finland – Science, Technology and Information Society Statistics, R&D In the period from 2002 to 2004 37 per cent had product innovations, 28 per cent process innovations and 26 per cent innovation projects. Half of manufacturing enterprises had innovation activity and 14 per cent of them had all of these, that is, product and process innovations and innovation projects. Thirty-seven per cent of all service enterprises had innovation activity and 10 per cent of them had innovations relating to goods or services, process innovations and projects aiming at innovations. Among the service industries, innovation activity was most widespread in data processing, where 67 per cent of enterprises had had innovation activity in the period 2002 - 2004, Statistics Finland – Science, Technology and Information Society, innovations.

[355] The patent applications were at its highest at the turn of millennium. When 2,500 application were submitted, Statistics Finland, Science, Technology and Information Society Statistics, Patenting.

[356] Finland's ranking in those studies has dropped in recent years. In 2008, Finland's position was 15(IMD) and some Finnish scholars have admitted the problems of those surveys. See Helsingin Sanomat 15.2.2008 "Suomen sijoitus kilpailukykyvertailussa laski".

6.2. Welfare cluster: Key persons' interpretations and remarks

Cluster programmes as a part of additional appropriation programme

The SITRA expert group[357] that evaluated the additional appropriation programme presented in the late 1990s lists a variety of findings that justify that the additional public appropriation had a positive impact on private research investments, personnel training and employment. The programme was important in terms of integrating the new and the old economies[358], and it had positive effects on regional development. The cluster programmes have made it possible to initiate fruitful cooperation between the various sectors and to provide a valuable link between technology and public services.

The expert group did not only find a series of successes but it also listed a set of policy suggestions for the future. It recommended that the basic orientations for the next policy steps should be planned differently and therefore introduced the following suggestions: 1) The focus must be put on improvement in building up the competencies of individuals, sectors, and systems; 2) It must more clearly stress the co-evolution of public and private R&D; 3) The focus from R&D must be widened to innovation and problem-solving; 4) There must be better balance between high-tech, integration of the new and the old economics, and diffusion; 5) Finland must pay attention to its attractiveness internationally and improving her influence in Europe; 6) The ethos of the future policies must be against marginalisation (regions, workforce, individuals).

In effect, the expert group highlighted that strengthening the conditions for basic research is the most important aspect of the knowledge-based economy. The argument is reasoned by the logic that without trained people and ideas Finland is not able to attract or keep world-class companies. This implies that it is necessary to invest in the development of the university system and its scientific infrastructure but also to start systematically review university research. The development must be focused on the support of inter-disciplinary research and its infrastructures, and it must focus on the creation of closer linkages between basic, applied and industrial research.

The expert review strongly highlights the role of the cluster mechanism as a catalyst for progress. It wants to extend the life of the clusters although none of the clusters has yet reached any level of maturity. Therefore, the clusters should be understood as an experiment and a new form of learning where the creation of interactive nexuses for the exchange of experiences forms their political core. If the technology push type of innovation policy has been successful earlier, it is now the time to focus on a more customer-driven policy. In some cases, this involves shifting the focus from invention on true innovation. According to the report the key actor in this arena is TEKES.

In terms of customer-driven policies it is important to understand the customer in the contexts of different cultures and religions, and cultural know-how has an important role in developing new products and services. It follows that the Finnish innovation system must not be based on technology transfer policies but rather on knowledge transfer policies.[359] All this can be seen as a critique of the Finnish innovation system as such. Interestingly, the critique has two different targets.

[357] Prihti, Georghiou, Helander,Juusela, Meyer-Krahmer, Roslin, Santamäki- Vuori & Pulkkinen 2000.
[358] The idea of new economy was based on the idea that high-tech industries and knowledge-intensive services offer the highest growth potential. See also Koski et al 2002.
[359] This theme has been very important in STPC reviews.

First, it can be read as a critique of the enthusiasm related to the Finnish STI policies in the late 1990s and, second, it can be read as a critique of the Finnish version of NIS. The first critique has never been fashionable and popular in Finland. As a matter of fact, the overall impacts of additional appropriation expressed by the expert group were positive, which implies that the decision to increase R&D investment in Finland was a right step. The second critique has been present in Finland on many occasions and levels and it has been transformed into a self-critique. The bottom line of the critique has been very simple: the Finnish innovation system is not even half-ready.

Welfare cluster - an experiment of what

All the issues that the SITRA expert group wants to highlight are of a great interest if we examine one particular cluster programme, the welfare cluster. Although the SITRA report advocates customer-driven policies and sees that the benefits of the cluster programmes must be understood as a learning experience, we may pose a couple of simple questions: What kind of experiment was the welfare cluster case eventually? Was it an experiment of customer-driven policies or what?

It is evident that the welfare cluster must be linked to the development of the Finnish industrial policies. The new industrial policy strategy of 1993 changed the traditional context of the Finnish industrial policies. While the earlier strategy had put emphasis on companies as a part of regional policies and recipients of direct subsidies, the focus of the new strategy was clearly on the general infrastructure of industries. Direct support was replaced by indirect support in which the introduction of new policy instruments had a major role. Also, the traditional policy instrument – devaluation – had no use in policy making because of EU- integration.[360]

The industrial policy vision in 1996 was very close to the industrial strategy of 1993 in the sense that it utilized scientific arguments. Yet its theoretical apparatus was different. It utilized the market failure framework and stressed the role of efficiency as a precondition for economic growth. If the cluster framework was designed by a small group of scholars and experts, in the case of the industrial policy vision the interests of the economic life were taken into account. The idea was to find a solution to the deficiencies of the cluster policy. The cluster policy framework was too abstract and general; to adopt it into a concrete substantial problem was difficult.[361] However, the reception of the vision was quiet and partly negative.

All those developments culminated in the late 1990s in Macropilot, the welfare cluster intervention *par excellence*.[362] Simultaneously, a variety of projects linked with the welfare cluster were launched. Among various actors SITRA was the most vital as that it started a long and broad range of welfare cluster projects focusing on the problems of care for the elderly and on the options of older people's independent living at home. Another pole of SITRA's policy interventions focused on marketing issues in the well-being sector and on various attempts to build up networks of welfare companies. In retrospect, almost all those projects failed if ICT projects are excluded.[363]

In the mid-1990s TEKES launched a series of technology programs such as TDM (Digital media in medicine), iWell and some programs in medicine. Although the

[360] Jääskeläinen 2001, p.134.
[361] KTM, 1996 a.
[362] Kivisaari, Rouvinen & Ylä-Anttila 2002.
[363] Source:Interviews 2004.

challenge of biotechnology was originally part of the welfare cluster framework and its analysis, it quickly disengaged itself e cluster framework.

A kind of flagship of the welfare cluster,as it was marketed in those days,was its biggest single project, the Macropilot project, started 1999 and was closed in June 2001. The idea of the Macropilot was to test a variety of regional ICT applications in social and health care, nd its aim was to support a seamless linking of services by a variety of service providers in terms of the client's needs. It was based on the more extensive IT strategy of the MASH and its practical aim was to test a safe and more effective way transferring electronic client data in a form of an electronic client card. This implied a lot of other problematic issues including, for example, that the Parliament passed a special law to comply with the project.[364]

The Macropilot assessment report openly highlights that the project was in practice full of problems and difficulties, all due to poor preparation, bad organisation, inappropriate supervision and idealistic scheduling. The Macropilot was of course only one single project and it can be seen as an example of the customer-driven project. Yet the welfare cluster as a whole was much more interesting as a profound policy experiment consisting of a variety of political and ideological issues.[365]

From its very beginning the welfare cluster was interpreted as a highly problematic case in terms of science and technology policy practices. *Prima facie,* it was a multi-facetted internally contradictious policy intervention in which many traditional boundaries were knowingly transgressed. In other words, it can be seen as a series of experiments toward horizontality in STI policies, and it involved a lot of internal dynamics that later proved to be problematic in many respects.

Some of these difficulties show the welfare cluster proceeded as a political process. This makes it possible to investigate what kinds of appraisals and interpretations of the case have been presented. Although the interviews provide a lot of new horizons for the analysis I will focus here on four aspects that the key persons wanted to highlight.

The first aspect of the welfare cluster was the problem of definition: what is the welfare cluster. The definition problem is a very typical aspect of political terminology and the words are used as if they had a received interpretation which is not the case.

The second aspect of the cluster was linked with the improvement of collaboration between two ministries, MTI and MSAH[366]. This aspect is a link to horizontality and it is based on the idea that all political government must participate in STI policies.

The third aspect concerns the problem of ageing. The demographic changes in the future in all western industrialized countries will be one of the most crucial issues that policy makers must commit themselves to. Above all, the problem deals with how to maintain a system of high quality health and social care services.

The fourth aspect was that the welfare cluster must be understood as an experiment or as a policy exercise rather than as anything else.

All adversities and difficulties of the welfare cluster illustrate very well the various dimensions of the science and technology policy renewal. In order to assess all those difficulties I will first highlight the most important ones that the key persons wanted to pay attention to. Later I will discuss these issues further.

The biotechnology entity was too problematic, fashionable and expensive in terms of technology policies. It was also an ideal case in terms of traditional science and

[364] Ohtonen 2002.
[365] The evolution of clusters is still today a problematic issue.See Virtanen & Hernesniemi 2005.
[366] MTI=Ministry of Trade and Industry; MSAH = Ministry of Social Affairs and Health.

technology policy unlike other developments in the welfare cluster. Most key persons admit that the very traditional technology programs of TEKES linked with well-being and the welfare cluster, were quite successful and influential. The advantage of those programs was that they were clearly defined and compact unlike many other projects and actions within the welfare cluster.[367]

It is interesting that the cluster framework proved to be so powerful, and also extremely useful in defining the aims and structures of technology policy. In other words, the cluster framework seemed to be flexible and analytic enough as a political tool. As a policy framework, cluster thinking was useful in terms of broadening the traditional scope of technology policies, because it was not used as a practical decision making framework. One controversial aspect of the cluster policies was that the cluster framework was imported from outside to the MTI – the know-how and knowledge of it within the ministry was poor. However, the ministry and its high officials started to market it to other ministries. The problem was very obvious; the cluster framework was a theoretical construction with thin links with political administration. The situation was similar in other countries.[368]

The idea of the welfare cluster was appropriated very quickly. This was natural because the welfare cluster gathered the polarities of earlier experimentations and experiments in Finland as we have seen earlier. The developments of VTT in hospital technology and the ideas generated by STAKES and its predecessor National Board of Social Welfare converged with each other.

A curious aspect of the welfare cluster is that it is extremely difficult to assess the total expenditures of the cluster because there were a great number of other projects linked with it.[369] In the following chapters I will examine in detail how the key persons linked with the welfare cluster interpreted the birth of the welfare cluster and how they understood the problems that it invoked. A short report dealing with the key persons' interviews was published in Finnish in 2005.[370]

6.2.1. From simplistic theories to complex practices – a problem of translation

> "The welfare cluster produced a lot of activity which is important as such. Sometimes I have pondered whether it had any real international intentions. The idea of the welfare cluster was to understand international competitive industries. It was a starting point, not the idea of attracting more money to the region in order to generate new things. It was not a bad thing, but… (Interviews 2004)"

One of the major problems in the welfare cluster as most of the key persons wanted to stress, was how to define it: what is actually an entity called welfare cluster? Is it a real entity in the real world, a fictional construction, a scientific model, a kind of theoretical description or what?

Many interviewees wanted to point out that although many terms used in politics are empty or blurred, they ought to be "realistic" in the sense that it must refer to some real and concrete aspects in the world: in the case of the welfare cluster this was problematic. In Finland, there was no real welfare cluster but only a possibility for Finland. Cluster

[367] Source: Interviews 2004.
[368] Penender 1999.
[369] In the context of cluster programmes the real sum allocated to MSAH in 1997-2000 was 27 million FIM but naturally the real sums were bigger.
[370] Tarkiainen 2005.

analysts suggested that Finland should try to benefit from it. In other words, the term welfare cluster was a speculative term but its political potency was apparent.

> "One of the major issues concerning the welfare cluster is simply: is it real? I would rather think of innovation environments. Innovative environments imply entrepreneurs and experts. That cluster idea stresses an industrial perspective - that is to say that the current philosophy should be changed into attractive, dynamic platforms for enterprises and that the whole complex ought to be rethought. (Interviews 2004)"

Many interviewees thought that the term was worthwhile because of its analytic potency to discuss the problems of welfare sector in general. But in terms of policy practices, the term was impotent because it did not provide any practical advice for policy makers facing concrete situations.In practice, the locks were still locked.

The attractiveness of the term was based on its ability to describe the new emerging global environment. It shifted the political focus on different issues from the traditional science and technology policy including industrial policy. In so doing it combined two different world views together.

> "We were searching for such commodities-goods and services, that possess or will possess hidden potentiality for competitiveness and export. The Finnish dilemma was then, in the early 1990s how to cope with the breakdown of export. We found a variety of products e.g. dental chairs, hospital technology- a very potential branch. In addition, there were problems like double-ageing and the cost-efficiency problem of the public sector. A huge demand potential! At the crux of that cluster there was a group of companies and industrial branches providing commodities related to well-being and welfare, and one of the most important purchasers was the public sector. We wanted to increase cooperation and partnerships between the private and public sector. We approached the domain in which politics mattered. Most of the welfare services belong to the public sector's activities. (Interviews 2004)"

It was a kind of chimera for policy makers in the sense that the welfare cluster embodied a variety of issues embedded in STI policies. Actually, for policy making it was a huge chance; an option, full of potentiality and complexity that nobody afford to neglect.

In retrospect, the origins of its political attractiveness are very obvious. However, to argue that the introduction and adoption of the cluster policies was a result of its framework's excellence is problematic. Vice versa, it is more plausible to argue that the theoretical models that the policy makers tried to apply did not change the domain of politics and policy making as such. The idea of the welfare cluster rather provided a theoretical resource by which policy makers were able to generate a variety of issues linked with new political governance. It explicitly created a new forum for discussion and interaction.[371]

> "Cluster" was a good title but you have to generate action rather than to control the use of the concept. To be in interaction implies that novelties and synergies between local, regional, national and global emerge. But the term - welfare cluster- I doubt a health care cluster – a more usual term - would have been better. We wanted to inform that our aim was broader and in the ultimate analysis we wanted to contribute to people's welfare in general, and one aspect of it was that we simultaneously support

[371] Jääskeläinen 2001, p. 217.

> the technology development in welfare services – well-being cluster in English. (Interviews 2004)"

Furthermore, it is plausible to argue that the use of the cluster framework changed the infrastructural setting of industrial policies. It introduced a totally novel synopsis for industrial policies and re-defined the role of actors. The scope of the new synopsis was different from the traditional one; although its theoretical core was the economy and the national competitiveness, its political aim was to highlight the meaning of societal environments as a core of industrial policies. The focus was now more on infrastructural issues rather than on industrial policies as such.

But the whole idea embedded in the welfare cluster was difficult to articulate. The problem was that it seemed to generate a lot of new questions but it did not give any concrete answers. The theoretical power of the cluster framework was apparently confined and difficult to translate into practices. Although the ETLA analysts wanted to highlight the meaning of the demand side in terms of generating the real Finnish welfare cluster, the distance between suppliers and production was too big. The welfare systems – the systems of social and health care - and their organisational structures and expertise were too complex and full of historical and cultural inertia. However, the welfare cluster was, in spite of its deficiencies, a new and unprecedented political innovation.

The renewal of those complex systems of expertise and professions and their working environments embodies a great variety of professional perspectives and interest approaches such as productivity, quality of services and the development of working environments.

Yet, in reality, the welfare cluster as a term was unclear and as we will see later, the later events and developments blurred the term even more.

6.2.2. MTI and MSAH dialogue: A challenge for horizontality

> "Here we have a fallacy when we discuss the progress of the welfare cluster - what happens today because of it, or without it. The bottom line is that in relation to the market we have tried to act as an opposing force. (Interviews 2004)"

The speciality of the welfare cluster was that it started a dialogue between the two ministries. The dialogue proved to be difficult in the sense that it articulated many other issues, some of them apparently ideological and political. In order to understand the problem of that dialogue we have to focus on two highly problematic issues: the problem of transparency and the problem of privatisation in the social and health service sector.

As mentioned earlier, the welfare cluster has been a conscious political intervention also in the terms of horizontality embedded in the NIS framework. This aspect became also a dividing factor because the political process *par excellence* drifted towards an open controversy between two ministries, the Ministry of Trade and Industry (MTI) and the Ministry of Social Affairs and Health (MSAH). What was the collision about and why did the cooperation seem frequently to be impossible?

> "In terms of policies there is a great contradiction and confrontation between the Ministry of Trade and Industry and the Ministry of Social Affairs and Health. The other promotes and supports chances of business and entrepreneurship. MSAH promotes people's welfare and good life. The question is whether they are in real contradiction. To ask a question like that is fruitful. Before the welfare cluster we

> never thought that this kind of interaction existed and that both policy sectors would be put into the same basket. (Interviews 2004)"

It follows that the controversies and conflicts are understandable in the sense that although there was a consensual understandiong behind the whole idea, the interests and aims of the two parties were ultimately different. The reasons for that controversy were numerous but one of the most obvious ones is connected with the problems of boundaries and legitimacy; especially with the problem of how to legitimate boundaries between these two policy sectors as well as the differences in paradigms and procedures.

It is important to be aware that in the early 1990s the Ministry of Social Affairs and Health, in particular, was in a problematic situation because of the deep economic recession. Its institutional structures and infrastructures were in danger and its governmental and economic resources were diminished substantially.[372] Because of these problems MSAH was obliged to set its strategic focus on completely different issues than MTI.

It could be said that its *raison d'etre* was at risk; many rapid societal changes and transformations made the traditional Nordic welfare state system vulnerable to criticism. In Finland, political debates turned into the problems of the public welfare services[373]and one of the hottest issues was the problem of the welfare state as such. In retrospect, there was a clear need for radical reforms in social policy but the problem was how to start the reform. To argue that the welfare cluster was part of that discussion is not to argue that it was only a single part of it. Its role as a political intervention was more important in the sense that it started a lot of discussions and opened the door for new debates. It also started a dialogue between the two ministries. This dialogue has become later one of the key issues in the debates linked with the internal market in the EU.

When analyzing the key actors' answers it seems very apparent that the welfare cluster as a horizontal intervention was a conscious aim, but it proved to be more complex than many thought. One of the reasons was that the welfare cluster thinking was linked with the Macropilot project. The Macropilot project changed thoroghly the original welfare cluster design with industrial policy being its important aspect because the responsibility and funding was now in the hands of the Ministry of Social Affairs and Health. The link between industrial polices became weaker and many interviewees think that the Macropilot- project broke it finally.

> "MSAH took over the Macropilot project management. Instead of providing something for enterprises, the real recipients were municipalities and federations of municipalities. First, they claimed – I read those documents recently- that both enterprises and public sector actors will benefit. But when one reads the policy announcement carefully one notices that there were no companies. Only municipalities and federations of municipalities were valid participants. (Interviews 2004)"

Thereafter, MSAH started to plan and compose the project within its own political instruments and tools. What followed was that this turn changed totally the idea of the welfare cluster. Now, the welfare cluster was a totally different policy intervention. Its focus was on ICT issues and it was clearly a part of the Information Society strategy; its core was now the social and health service system and the slogans of the Information

[372] I will discuss the problem later in details.
[373] Andersson et al 1993.

Society were its political message. In retrospect, this was a very logical and coherent form of policy making.

Controversy 1: Transparency in the public sector

In terms of the boundaries of various policy areas and their legacy the welfare cluster intervention was extremely problematic.It was also problematic in terms of transparency.

> "While speaking about the accomplishment of a market MTI strongly advocated the idea that it is the service system that must be reorganized. Whereas we stressed that it is a political issue. All political parties in Finland are of the opinion that the public sector must be a provider for welfare services, it has the responsibility over needs. The issue is how services are rationalized and intensified by using market mechanisms in this context. (Interviews 2004)"

The analysis on the key actors' opinions and conceptions shows that they share a lot of with the whole idea of the welfare cluster. To a great extent the original idea of the intervention was based on industrial policy arguments. Its implementation made the intervention more concrete. It was clear that the welfare cluster must start from the welfare service context and its interventionist focus is infrastructural and indirect. The idea of mediation was its core but the proper problem was that it was beyond the boundaries of a traditional MTI policy area. Although this kind of intervention was rational, it was not reasonable.

> "As a cluster the welfare cluster was different from other clusters. The funding of other clusters was organized through traditional channels- through the Academy of Finland and TEKES. This went totally differently. MSAH took over the Macropilot project. (Interviews 2004)"

In addition, the intervention was politically very laden, a sort of political minefield but its architectural design was brilliant. Its ideological target was based on the infrastructure argument saying that the Finnish public sector was too heavy, ineffective and full of psychological and institutional barriers.

Its brilliance in terms of politics was that it seemed to refer to a variety of political realms simultaneously: first, it highlighted the development and renewal of the industrial policies i.e. its original aim was very plausible. Second, it also highlighted the renewal of the Finnish system of welfare services where the horizontal aim was linked with the first aim. Third, it coupled these two issues by reminding of the problem of the public sector and so provided the basis for the translation procedure. Fourth, it set its focus on the welfare sector as a generator changing the original purpose upside down. Fifth, it highlighted the options available on the welfare sector stressing the hidden possibilities embedded in it. In sum, it transformed the problems of the Finnish welfare system into a set of challenges to STI policies.

> "The barricade or barrier is if such innovations emerge in the public health care that nobody seems to be interested in completing them into products or to earn money with them. All are involved in everyday work and in the troubles of scarce resources. The mechanisms for creating and diffusing innovations lack. We ought to have a distinct organisation - an enterprise for example - specialized in products and in making such models or ICT application or whatever real. Its interest should be to

> disseminate the outcome. This becomes possible i there were enough incentives. It does not work just now. (Interviews 2004)"

As many interviewees emphasise such extensive approach, including a conscious intervention to transgress the traditional policy territories, was a kind of catalyst for contradictions and disputes. Within the totality of the political governance, different policy areas have histories, usually including remarkabel struggles and controversies. Each policy area has a disciplinary heritage and legitimacy of its own. The birth of various policy areas is an outcome of political struggle and those policy areas represent the power of different professional expertises and practices. But many key actors think that in the end the welfare cluster intervention had more advantages than disadvantages.

> "The import of the term of welfare cluster enabled us to understand that it was a matter of interaction between service providers and enterprises and in terms of policy making a matter of cooperation between MTI and MSAH. That is to say, it was about interaction between industrial and social policies. A novel big issue was whether these two actors could encounter and support one another. Is it possible to enhance simultaneously welfare policies and industrial policies? Those policies were traditionally in isolation. My answer to a question is that what was before the welfare cluster is that in terms of welfare services there were earlier higher walls between the enterprises and the public sector. (Interviews 2004)"

The starting point for the cooperation was controversial. Traditionally, the cooperation between those two ministries was insignificant; the other was promoting the interests of business and industries and the other was promoting people's welfare and well-being. The problem in cooperation was whether there was a problem at all.

> "In terms of policies there is a great contradiction and confrontation between the Ministry of Trade and Industry and the Ministry of Social Affairs and Health. The other promotes and supports chances of business and entrepreneurship. MSAH promotes people's welfare and good life. The question is whether they are in real contradiction. To present suc a question is fruitful. Before the welfare cluster we neither thought that this kind of interaction existed and both policy sectors would be put into the same basket. Or, to put it otherwise, it was not possible to think of private and public sector cooperation. All these elements existed before the welfare cluster, but it joined some earlier disconnected elements together and at least gathered people around the same table. But it did not imply that there was a real change. It provided only a new perspective – a helicopter perspective to see that these issues are interrelated. (Interviews 2004)"

One of the most important sources of controversies was the Finnish welfare state model in which the municipalities have a key role in organizing and providing welfare services including the system of education, the system of libraries and many other leisure time and cultural activities as well as most of the social and health services.

The Finnish social and health care service system was strictly under the MSAH control; the ministry made decisions related to funding and it also supervised the system. MSAH made also a short-term and long-term strategies for the policy area, and it was its responsibility to develop the legislation and to defend its funding apparatus and its legitimacy. It was natural that the welfare cluster transgressed the traditional boundaries of policy areas. Also, it was understandable that all the interventions aiming at changing the Finnish system were provocative from the MSAH perspective.

> "Then our logic was that we are not interested in externalizing the core activities which in our thinking belong to the public sector. We must search for new technologies supporting the decisions of our policy making system. MTI wanted to reorganize the whole process on the outsourcing and marketing bases. We wanted to stress the responsibility and political decision making in organizing and enhancing these issues. I have always been a sceptic with clear distinctions between purchasers and providers. That is the way Britain and other countries have chosen. It includes advantages. It works in certain situations but it has deficiencies. (Interviews 2004)"

The central argument for reconstructing the Finnish system of welfare was its non-transparency. The point of the argument was that the Finnish system was a hidden system of political bargaining behind the curtains. The system was very much based on the ideas of political democracy and while municipal autonomy was seen as good in principle, in practice, it was full of faults and flaws. In the end the mandates and argumentation procedures of MTI and MASH were totally different.

Controversy 2: Privatisation argument

Perhaps the most controversial issue the welfare cluster invoked was the problem of privatisation in the social and health care sector. The ETLA analysis highlighted this point openly.

In the Finnish social policy the role of the public sector is extremely important and it has long historical origins. In the Finnish system the constitution safeguards economic, social and educational basic rights for all people living in Finland.[374] The realisation of these basic rights is guaranteed by the state and the municipal authorities. From the standpoint of social policy the right to comprehensive social protection is one of the key fundamental rights.

Social protection is made up of preventive social and health policy, social welfare and health services, as well as sickness, unemployment, old age and other benefits. The aim of social protection is to safeguard the working and living environment of the population, and to ensure good standards of health and working ability, sufficient income, services and social security at different stages in life. Practically every household receives at some point some form of income transfer or uses social and health services. This was pointed out concretely in one interview.

> "Our Finnish cultural way of acting is very conservative. It seems impossible to think that we would follow Sweden and externalize hospitals and health care centres. They all share a very generally known problem- if the accounting documents indicate losses – what to do next. The experiences from abroad are unambiguous: the payers pay in the end. In Finland, it is reasonable to think that the Helsinki-Turku -Tampere region would be suitable for this kind of market orientation. In rural areas such services are not profitable. If we take the competition option it follows that services are too expensive. These issues are difficult, they cannot be measured with money. Money is attached to a single patient as well as his/her care and then we have to take the whole national context and the resources available. It is impossible to think that if I have been well today and all the money has been spent so I have to be healthy the rest of the year. (Interviews 2004)"

[374] Strategies for Social Protection in 2010, MSAH publications 2001:12.

The Finnish social protection system is structured in line with the principles of the Nordic welfare model in which the most important aspects include the following areas: It is based on the principle of universality which covers the right to all social protection for all those living in Finland; it is based on a strong public sector; its basis is in tax funding with respect on the legislative rights of residents and citizens, and the principles of equal treatment and proportionality.

The public sector has a central role in the development of social protection. MSAH directs and guides the development and policies of social protection, social welfare and health care. It defines the main course of social and health policies, prepares legislation and key reforms, and oversees their implementation.

The problem of markets and competition was not among the first issues in MASH's policy agenda; it was naturally an essential part of the Finnish health care service system in which the private sector had a clear role together with the public sector. Traditionally, the argument against the market ideology was that there was no market in social and health care or should such market exist it was only a quasi-market. One aspect of the welfare cluster was to start this kind of discussion.

> "The most difficult issue of the Advisory Board was attitude to business. The juxtaposition between MTI and MSAH was more than apparent. There were many negotiations on the high level and Matti Vuoria and Markku Lehto almost bridged it. In particular, the lower authorities did not accept the idea and saw that the focus of the welfare cluster should not be on the privatisation of social and health sector. (Interviews 2004)"

Some of the interviewees claimed that the privatisation discussion was important to start. The brilliance of the welfare cluster intervention was that its point of departure was on the demand side. In other words, the ETLA analysts wanted that the whole idea of the intervention was to generate the ideas and make them transparent for industries. But it was only the other side of the intervention because the opposing side was more provocative. However, this was a conscious aim, as one interviewee admits.

> "We come here very quickly to the distinctions in which the definition of the market and the non-market and the role of the public sector are important. That kind of demarcation was important for MTI. How to intensify activities? What role might competition have in this service sector, that is, how to increase the spectrum of service providers and to facilitate enterprises entries to the welfare sector? It is one of those political dimensions embedded in the welfare cluster - to increase the possibilities of enterprises de facto. And, of course, there is the competition argument. (Interviews 2004)"

If the aim of the welfare cluster was clearly to start the renewal of the welfare sector, it was natural that the authorities in MSAH saw the situation differently. One of the nicest aspects of the welfare cluster was that it made it possible to change the subject. The subject was the reform of the public sector including the welfare services and therefore it was necessary to speak about new scenarios. The new subject was that the welfare cluster represents a huge possibility for Finland; it concealed a new Nokia. This was the real point, not the problems of the welfare sector as such.

> "In terms of welfare policies we had arrived at the situation in which some questioned the role and dimension of the welfare sector with relation to its warranted aim. There

were elements of economic recession but also ideological changes. The whole process started in our sector from the idea of finding new Nokia-type conceptions and success stories. Was it possible to think of finding a service model suitable for export? (Interviews 2004)"

In retrospect, it is easy to find other reasons for the privatisation argument although it was clearly an ideological comment. The principles for funding the Finnish welfare services changed in the early 1990s and it also provided a new horizon for this kind of discussion. The old system was based on the strong steering system and control by MSAH and the new system established was far more liberal. The autonomy of the municipalities organising and providing most of the services increased., MSAH lost simultaneously its central instruments and tools for efficient governance. The municipalities were autonomous to make their own decisions according to the changes in the funding system. This opened doors for competition and the market ideology.

"From the MTI-side the interventionist focus was on such issues as the development of the industrial policy and the private vs. the public juxtaposition in the welfare sector. Originally, the starting point was the integration of industrial and health policies with innovation policies. MTI wanted to highlight the economic aspect and issues related to the public vs. private dilemma. Which segments of health service sector should be arranged on a business basis? It was of a particular interest in the early 1990s when the legislation changed so that also municipalities were not obliged to produce those services - they were only responsible for providing the social and health services and they could purchase them. The proper problem is still up in the air, understanding the role of partnerships in development activities. (Interviews 2004)"

As many interviewees remark the intervention was of a great importance. It posed a lot of important questions, among them the question of controversy. Is the controversy between those two ministries real or constructed? It seems as if the welfare cluster had opened the eyes of the authorities; it revealed something important for developing the Finnish welfare service system and tells something of the Finnish industrial policies. It provided a totally new perspective from which it was easy to see that these issues are linked with each other more closely than people used to think.

6.2.3. Ageing – A real problem or not

"The message is quite sad. Thereafter we tried to be in contact with some European parliamentarians and other opinion leaders and introduce the theme of ageing within the sixth framework but it was a disaster. Naturally, we have now the seventh framework but my point is that we lack the structure. In Finland, STAKES is not liable, neither TEKES nor Finpro. The theme of ageing is no-man's land. In order to export we ought to have a structure. (Interviews 2004)"

In terms of political rhetoric one of the most brilliant ideas was to link the idea of the welfare cluster with the challenge of ageing. The demographic change in developed and industrialized countries is and will be one of the most difficult political issues of the future. The argument of ageing was not a new one but the welfare cluster intervention emphasized a variety of issues usually ignored in debates. It strongly stressed that the demographic change must be taken into account, but this involves two big problems.

First, the costs of social and health care will increase and therefore the reform of the existing system of welfare services is necessary. It follows that the system based on the high standard of taxation and the public sector system must be reformed. Second, the existing system does not pay attention to the customer's perspective – some of them elderly people of the future have significantly more purchasing power and their needs are important.[375]

A very usual argument has been that ageing implies the increase in the need for care among the ageing population. It means that the ageing population will increase the costs of social and health care; ageing entails more sickness and a lot of pressure for the health care system. Ageing also implies also the decrease of functional capacity increasing the need for care increases.

> "To link ageing and the welfare cluster is a bit problematic… what different elements are hidden in ageing – post-industrial society, globalisation, education and competition? If we want to focus on ageing it is obvious that there is a lot of chances. My point is to ask whether we have understood the challenge of ageing really and my answer is no, simply not really. (Interviews 2004)"

Another very usual argument has been that ageing involves a Pension Bomb. In other words, the pension system will collapse because the active part of the population is not able to finance the system. This aspect also refers to the scarcity problem of the working force and the possible growth of immigration from abroad.

Both conclusions are naturally very controversial as there is a great disagreement among experts about what are the real impacts of ageing. While ageing is usually interpreted as a problem, it is also possible to interpret it as a challenge and resource. The traditional scenarios of ageing are often based on a kind of gloomy thinking.

But although the welfare cluster was closely linked with the ageing issue, it proved to be very complex and problematic. It was clearly a political issue and all the attempts that the Finnish actors wanted to advocate at the EU level failed. In terms of ageing there was no real political consensus in Europe; there were only single programs but no common policy program. The problem of ageing was clearly a national issue because it belonged to the basket of social policy. Every member state makes the decisions related to ageing and social policy independently.[376]

> "The history of the COST A5 program was unfortunate because its closing in 1996 also closed a lot of networks and activities. Thereafter, there was no home base for those activities; COST A5 was the only network. It was simply closed. (Interviews 2004)"

[375] In Finland, in the year 2005 16% of the population were over 65 years old; the prediction is that in 2030 26% and in 2040 27% of the population are over 65 years old. It means that if in 2005 there are around 840 000 people over 65 in 2040 there will be ca. 1, 400 000 people over 65, Source Tilastokeskus, väestötilastot.

[376] Health care in Finland is primarily funded from tax revenue. In 2003, total health care expenditure was almost 11 billion euros, amounting to 7.6 % of GDP. It is below the average for the OECD countries. In 2002, municipalities funded 43 % of total health care expenditure, while the government funded 17 %, health insurance 16 %, households 20 % and other private bodies (e.g. insurance companies) 4 %. The share of client fees in 2002 was 8, while municipalities paid out 67 %, and the government 25 %.

The original idea of the welfare cluster was to advocate the new consumer-driven health care system as an incremental rather than revolutionary process. The problem in the Finnish system was that the consumer-driven ideology and its management were far from everyday routines and practices. However, the consumer- driven thinking and ideologies have rapidly spread to Finland and there is a broad consensus among actors that the impacts of old tricks are very restricted.

> "This well-being technology is demanding in the sense that there are a lot of rules, regulations and high thresholds. To pass that regulation jungle and get all approvals and licences as regards the product or service you are marketing, it takes time. Because the systems of health care, funding and management vary so much between different countries, the embedding of innovations is on average more difficult than in the more homogenous industrial and consumer sector. (Interviews 2004)"

The original idea of the welfare cluster seemed to be too ambitious. The frustrating conclusion was that innovations were context-dependent and that there were a lot of problems in transferring them to other contexts. Different countries and regions seem to have not only totally differently developed management systems but also totally different information and communication systems.

Most key persons stressed that it was naïve to think that an excellent idea or a technological invention compatible with the Finnish environments and platforms would be an excellent idea or invention also in some other countries. Although the hardware systems up to a certain point were similar in each country the software systems are totally different. The conclusion was that there was no use to design information and communication systems without taking into account the professionals and practices.

It is more than obvious that as a result of this the issue of ageing became an essential part of the welfare cluster as a sort of translation. It was not a solution to the problem because the issue of ageing proved to be more difficult and politically more controversial than the policy makers wanted to admit. The welfare cluster turned out to be a political rather than a technical case.

All these issues played an essential role in the key person's attempts to analyze the real nature of the welfare cluster. Almost all accepted the view that we need good slogans and new terms in politics; almost all also advocated the view that the welfare cluster case is a lesson for policy making but only one of them was wandering and critically analyzing the problem of ageing.

6.2.4. The welfare cluster – An important lesson for policy makers

> "It was a learning process for all and the effects of the welfare cluster have been very important. It has been a lesson for all of us. (Interviews 2004)"

It is interesting that the cluster framework proved to be so powerful and useful in defining the aims and structures of technology policy. In other words, the cluster framework proved to be so flexible and analytic that it could be used as a political tool. As a policy framework cluster thinking was useful in terms of broadening the traditional scope of technology policies, it was not used as a practical decision making framework.

One controversial aspect of the cluster policies was that the cluster framework was imported outside the MTI the know-how and knowledge of it within the ministry was poor. However, the ministry and its high officials started to market it to other ministries. The problem was obvious; the cluster framework was a theoretical construction having

only weak links with traditional mentality in political administration. The situation was similar in other countries.[377]

> "The welfare cluster produced a lot of activity which is important as such. Sometimes I have pondered whether it had any real international intentions. The idea of the welfare cluster was to understand international competitive industries. It was a starting point, not the idea of attracting more money to the region in order to generate new things. It was not a bad thing, but… (Interviews 2004)"

The biotechnology entity was too problematic, fashionable and expensive in terms of technology policies. It was also an ideal case in terms of traditional science and technology policy, contrary to other developments in the welfare cluster. Most key persons admit that the traditional technology programs of TEKES linked with well-being and welfare cluster issues were quite successful and influential. The advantage of those programs was that they were clearly defined and compact unlike many other projects and actions within the welfare cluster.

> "If we think of pharamacial industries, biotechnology and hospital technology they are different technologies utilized in the medical diagnosis and care. In my mind the welfare cluster focused more on the dilemma reorganizing service system with the help of new technology. It is a much more complicated issue. (Interviews 2004)"

Macropilot was seen in this sense as controversial. The idea of Macropilot was closely connected with the cluster policies and it is often seen as a test of those policies.[378] We have to keep in mind that the Finnish cluster program in the late 1990s was financed by the returns obtained from the sales of state-owned companies and Macropilot was based on the shares allocated to the domain of the MSAH.

In terms of resources Macropilot was an attractive enterprise for both ministries. It was a new resource for the MSAH after the long series of socio-political cuts since the early 1990s. For the Ministry of Trade and Industry it was a new option for horizontal policies. But both of those ministries were later disappointed because contrary to expectations the Macropilot project proved to be extremely complicated and full of obstacles and difficulties. It became difficult for MSAH in terms of cooperation with companies and various institutional partners, and it also became a disappointment for MTI because of the adversities with cooperation with other policy sector.

It is interesting that the representatives of both of these ministries saw the cluster program differently. MSAH advocated strongly the ICT dimension and wanted to stress the technological aspects of new institutional structures and services. It also wanted to guard its traditional policy domain. For MASH Macropilot was primarily a technological intervention.

> "A point of departure from our point of view was and is on practice and services. Our concern is not on technological innovation but rather on social innovation: how to organize services cost-effectively following social policy guidelines. This is our innovation that we adhere to. (Interviews 2004)"

[377] Penender 1999.
[378] Kivisaari et al 2002; Nykänen2002; Ohtonen2002.

The interest of MTI was not so much on technology as such but it rather wanted to highlight institutional and organisational aspects. This implied that it had to enter outside its own policy domain or territory. The adoption of new technology is a complicated process and it demands a lot of engineering and technological know-how but it also demands new institutional settings and new approaches to work as such. This cat and mouse game generated numerous debates and controversies between those two ministries.

> "People from MSAH stressed that they wanted to develop their own system. We thought that we ought to broaden the view and compare the international health care systems globally in order to develop our R&D infrastructure. People from MASH maintained that Macropilot and the welfare cluster were part of social policy, but only a neww by which to rationalise the existing system. (Interviews 2004)"

In retrospect, most evaluators and experts think that Macropilot was a failure; if it was not a total failure it was surely not a success story. This was also a common view among the key actors.

> "One of the biggest failures in Macropilot was that many important decisions related to participants and companies were made at the local government level. The motives were often regional. In other words, the "shoulders" of enterprises and companies were very narrow. Another problem was simply the know-how. A rope is useless in pushing. (Interviews 2004)"

The criticism was cut-throat: the ambitious and unspecific goals of the project together with rapid schedule and fuzzy project organisation never met the real needs of institutions, organisations, companies and people. Because its basic premises and infrastructures were too vague, the objects of interventions too unspecific and its policy instruments inappropriate, it was natural that the outcomes were far from successful. Many have interpreted that Macropilot became a lesson for Finnish policy makers.

> "One very positive aspect related to the welfare cluster is that there are a lot of more people interested in these issues. In other words, there is more and more people who understand the problem. However, this is more about creating preconditions and infrastructures,and we could say that in spite of many difficulties and frustrations this has been a process of progression rather than that of regression. (Interviews 2004)"

According to many evaluations [379] related to the welfare cluster and the Macropilot project in particular the outcomes were controversial. The original idea of the Macropilot was that it would be one of the most extensive ICT projects in the world with a focus on the social and health sector. This aim was too ambitious. Its schedule was too tight, aims unrealistic and its management a failure. The interaction between the welfare services and the ICT sector was also difficult.

> "The problem of Macropilot was simple – its schedule was too fast and it was laden with inordinate expectation. It has parallels with biotechnology and its profit expectations are huge. They are unrealistic. They will never get it. It is a bubble. It is also ridiculous. We have to proceed more moderately. And then that assessment and

[379] Kivisaari et al 2002; Kivisaari 1997; Mäkinen et al 2001.

> evaluation! Before you did anything, it was decided that the assessment process starts. It does not matter. Now evaluators have done their work and if we have three cases on the elderly, they should have been important…This kind of assessment kills enthusiasm too early. All return to old practice sooner or later. (Interviews 2004)"

According to the original welfare cluster analysts the Macropilot was not a well-organized process with clear intentions and resources. One explanation the interviewees often gave was that MSAH was not able to and capable at organizing the project properly. In other words, the Macropilot was more like a political experiment or a heterogeneous process rather than a well-defined technology project with explicit aims and goals in the manner of TEKES technology programs.

Actually, TEKES and other technology policy infrastructures were not involved at all in the process. One of the most important reasons was MSAH and its policy traditions: it started to manage the project as if it were a mere social policy project. It also changed the agenda of the project so that the Macropilot was closer to information society projects than to industrial policies. This is understandable if we recall that the original idea of the welfare cluster was problematic from the MSAH perspective. It was more comfortable to work with the project in which the point was on information society. In spite of all the criticism the Macropilot was according to interviewees, an important and fruitful project.

> "The welfare cluster was implemented within a top-down framework. When you gather a sufficiently large group and all opinions must be taken into account, the outcome is a round compromise. It is no more a concrete entity. It involves various interests and expectations of different actors. Today, the focus is on services, development and changing of activities. Technology is seen as an enabling factor. It is adopted and utilized if it is possible and rational. The handle has been too often a technological one. Our way of functioning has changed a lot. We highlight more that soft side, development and opening of services. It is more ambitious in terms of internalization. (Interviews 2004)"

As mentioned earlier, one of the most difficult problem of the welfare cluster was that different stakeholders had totally different aims for it. Their perspectives and approaches were also different, and their interpretations of the core of the intervention varied. The other camp stressed the role of companies and enterprises and the other camp highlighted the role of the Finnish welfare system.

> "If I consider this in terms of the Ministry of Trade and Industry our aim was to stimulate enterprises so that it will engender export, revenue and business. You are not able to do it alone but you need partners from the public sector, hospital districts, and municipalities. They were important as a testing arena, as a form of feed-back. It is a very usual regional problem that solution is home-spun and meets regional needs. The idea of copying is lacking. (Interviews 2004)."

One of the paradoxes of the Finnish science and technology policies has been its character as a top-down hierarchical process in which implementation is primarily organizational. The welfare cluster was in this sense a challenge.

In order to understand how the welfare issues are interpreted it is important to be aware of the fact that the whole Finnish system of social and health services was based on

the idea of local government. Municipalities are important links in the Finnish democracy system as they are very autonomous in their decision making.

Earlier in 1993 MSAH had lost most of his regulatory instruments and this made the problem more complex.[380] The history of Finnish information technology applications in health care was a parallel with this. There was no architectural design between municipalities or regions but municipalities and hospital districts have systems of their own. In terms of development, all experiments and renovation processes became very difficult.

> "In Macropilot it became evident that municipalities and their boundaries are real - there is no single purchaser, there are a lot of them doing what they want. The other issue was that the enterprises were not able to construct networks in the need of database experts, telecommunication experts and so forth. They were incapable of doing so. (Interviews 2004)"

The problem was also that there were too many hopes for the intervention. The original idea to develop cooperation between two ministries was according to two key persons, in principle excellent but when linked with the other major issues it proved to be difficult in the welfare cluster case.

> "The original idea was to emphasize the role of actors not the ministries as such. The welfare cluster changed the situation so that the problem was rather how to dissipate the boundaries between industrial policies and social and health policies. How to get more genuine cooperation with MSAH and MTI? Perhaps in retrospect there was too much effort. Those ICT projects also failed. So many things must be included (Interviews 2004)."

In spite of difficulties the welfare cluster case was for the most of interviewees a policy experiment and a lesson. However, we may ask a lesson about what?

Most of interviewees stressed that the welfare cluster case was outstripped, a closed case in 2004, and most of interviewees wanted to take another perspective onto the problems linked with the intervention.

They would rather speak of the healthcare technology program 2004 - 2009, about FinnWell and its challenges. The objective of the five-year programme is to improve the quality and profitability of healthcare, and to promote business activities and export in the field.

The programme stresses now that technology improves the quality and profitability of healthcare services only if new procedures are developed simultaneously with the products themselves. FinnWell is one of the most extensive technology programmes funded by TEKES. The total value of the programme is 150 million, of which TEKES funds about one half and the participants of the programme invest the other half. The project has three focus areas: processes of health care, technologies for diagnostics and care, and IT related products and services for healthcare.

The original idea of the welfare cluster is now replaced with this gigantic new technology programme. The differences between the FinnWell and the original welfare cluster are very apparent. If the focus of the original welfare cluster was on welfare services including both social and health care services, the FinnWell is totally different.

[380] A new Municipality Act of 1993 shifted guidance, supervision, and norm giving from MSAH to municipalities.

Most interviewees stressed that the welfare cluster case was an important intervention. Only some expressed a view that the intervention was too political and ideological. They rather thought that the defaults and failures resulted from other reasons. Evidently, its procedure and design were poor, and the great degree of confusion and uncertainty were linked with the issues that the intervention wanted to highlight.

Most of the aims in the original design of the welfare cluster were political and ideological although only a couple of interviewees stressed this side of intervention. The original target of the intervention was to stimulate the welfare sector to push the actors in social and health care towards eliciting embryos of innovations and thus to help companies and industries in developing something totally new and radical. But the original target was blurred with other ideas in an interesting manner.

The first idea was to highlight the underdevelopment of the market in the welfare service sector by emphasising the privatisation argument. The second idea was to problematize the idea of the public sector by stressing the transparency argument. These two ideas became the core of the intervention; that is, the accountability argument and the efficiency argument displaced the original idea of the welfare cluster. The problematic core of the intervention was now focused on institutional settings of the existing system of welfare services. Hence, the public system of welfare services as such was challenged, and the idea of the intervention was turned upside down to increase transparency and explicate the rigidities of the welfare system. This became the core of the controversies between two ministries.

In the late 1990s these problems were analytically studied in some surveys and studies[381] implemented by the Ministry of Trade and Industry. Those studies had a clear political role in the sense that they wanted to describe the problems of the public sector and especially the problems of the Finnish social and health sector from a new angle.

The first study describes the procurement procedure and clarifies the selection process of a service provider from the service provider's standpoint. The conclusion is that the most prominent deficiencies of the procurement market of municipalities relate to the municipalities' unwillingness to externalize their services.[382]

The second study analyzes the impact of legislative regulation, public subsidies and taxation that distorts the competition on the social welfare and health care service market between the agents in the private, public and non-profit sector.[383]

The third study tries to find explanations for the reasons why the number of procurements of services made by municipalities from the private sector has not substantially increased.[384]

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[381] Lith 2000; Melin & Paunio 2001; Södergård 2001.

[382] These include the decisive role of price in the selection of a service provider, poorly compiled tender invitations, defects in the value added taxation in health care, social services and food provision and the finacial aid and subsidies granted by RAY382 for social services which distorts competition.

[383] Among the factors distorting competition were the special role of the service provision of municipalities and joint municipal boards and non-compliance with the Public Procurement Acts and some other problems in legislation. Also subsidies granted by RAY to service providers and the hidden value added tax proved to be major problems. Also other factors like aid to employment, municipal subsidies were mentioned.

[384] The study examines and analyses the local sector as a buyer of services from four primary standpoints. It attempts 1) to clarify the concept of local market as such, 2) to describe the current ways of operating as a buyer on the market, 3) to study the motives of operating on the market and identify the developing prospects of procurements of services, 4) to analyze a variety of obstacles to the development of procurements of services as an internal and external issue.

7. RHETORICAL RE-DESCRIPTION OF STI POLICIES

7.1. Point of departure for the re-description: the RIS and RIP perspectives revisited

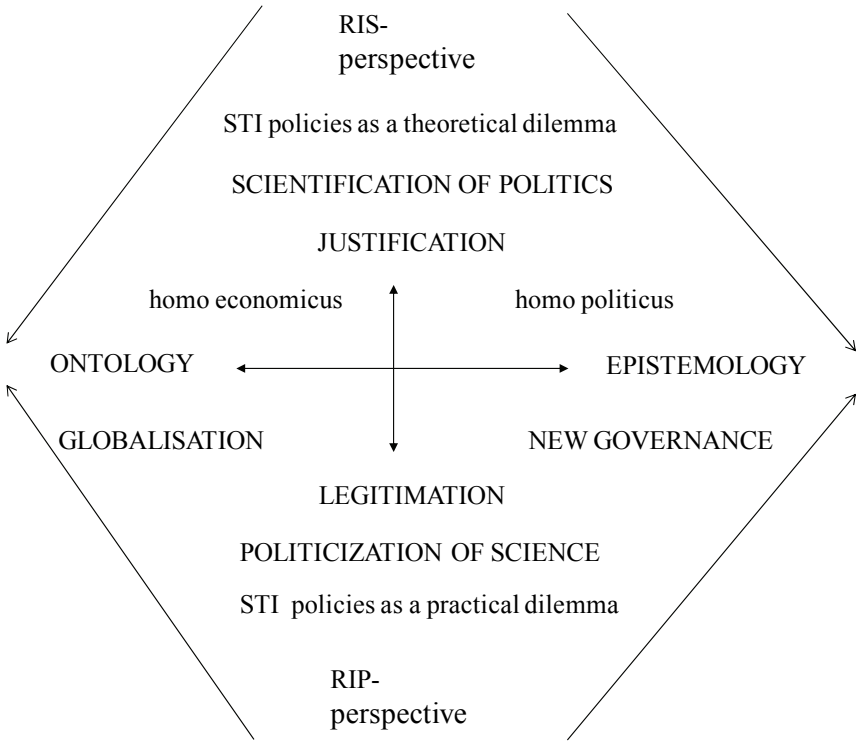

Figure 3. RIS and RIP perspectives revisited

As a controversial intervention the welfare cluster aroused a lot of critical discussion. Its political meaning was that it provided a new forum for many further initiatives and, in fact, it clarified a lot of issues linked with STI policies. But in order to be able to show that the welfare cluster as a political intervention was necessary for Finnish STI policies, we have to analyse the rationale of those policies in details.

My statement is that the welfare cluster case is of a great interest because it unlocks a variety of political dimensions embedded in STI policies. I will argue that as a singular case it has been one of the most important interventions in Finnish STI policies. Its speciality is that it adduces very important, politically sensitive problems of those policies. My conjecture is that the aspects involved in it will be the most difficult issues of STI policies in the future.

The key persons' interpretations on the welfare cluster imply a lot of interesting questions related to politics in general. The conclusion they made was that the welfare cluster must be understood as an experiment. My question continues: an experiment of

what? In order to be able to answer to this question we have to examine how rhetoric is embedded in STI policies and how it is used in the Finnish case.

This study aims to examine the scientific and political construction of STI policies. By making the distinction between the RIS and RIP perspectives I wish to stress that there are two different realms of STI policies described above. The first, the RIS realm, is gathered around the problem of STE hybrid justification and its core is to find a plausible scientific justification for the hybrid. The other, the RIP realm, is gathered around the problem of legitimation in contemporary political administration and its major argument is gathered into the globalization argument. This divide is often described as a collision between two different world views: *homo economicus* and *homo politicus*. To use Arendt's terms controversy shows that *vita contemplative* dominates *vita active*, *theôria* is placed above *praxis,* and *epistêmê* over mere *doxa.*[385]

In terms of STI policies the justification and legitimation are intertwined and interlocked in many ways. The aim of the re-description is to analyze both the theoretical dilemma and the practical dilemma of STI policies in order to open up new horizons and find new interpretations for understanding the STI policies and, in particular, its dependency on politics.

This means that STI policies must be analyzed as a totality in which the dilemma of fact and fiction in the economical sciences and the dilemma of spatiality and temporality in the political sciences are used in order to justify and legitimate those policies. The first analysis focuses on the dilemma of the STE hybrid in pursuit of clarifying how scholars have characterized the hybrid and what kinds of strategies they have employed in order to find a plausible justification for it. This means that the primary interest in this analysis is on how economists have understood the dilemma of fact and fiction.

The second analysis concentrates on the problem of horizontality embedded in STI policies. The aim of the analysis is to clarify complex links between the ethos of new political governance and STI policies.

Five thematic moves

In order to be able to analyze in detail what role rhetoric has in STI policies and how it works in practice we have to return to some very fundamental issues concerning rhetoric as an analytic tool in studying those policies.

Perelman and Olbrechts-Tyteca differentiate two different classes of premises: premises relating to "the real" and premises relating to "what is preferable". The first class of premises is composed of a corollary of facts, truths and presumptions by which they are able to convince and persuade the audience in question. Those premises are treated as not being subject to discussion but taken for granted; facts are statements about reality and they require no further justification. Presumptions are premises that imply that something is real or actual and that something else is anti-real and potential.

Perelman and Olbrecht-Tyteca[386] argue further that our knowledge of reality requires us not to simply accept everything we see as reality but we have to differentiate reality and appearance; it also follows that old concepts are no longer adequate and new concepts must be introduced. In other words, dissociation arguments divide the world into categories like "reality"/"appearance" "part"/"whole" or "abstract"/"concrete". This means that every association implies dissociation and vice versa.

[385] Arendt 1958.
[386] Perelman and Olbrechts- Tyteca 1969, p. 4.

In terms of this study I will apply Perelman's and Olbrechts-Tyteca's rhetorical framework as an analytic toolbox by which I am able to examine the complex of STI policies further. The rhetorical framework allows us to access a variety of difficult scientific debates embedded in STI policies concerning its rationality, logic, ontology and epistemology.

In order to be able to realize my rhetorical re-description I have differentiated five thematic moves as follows.

The first thematic move is to clarify some theoretical discussions related to the problem of science, technology and innovation i.e. the axis of science, vision and ideology. Those three elements were extremely important for Joseph Schumpeter who originally introduced the idea of innovation. Those issues have been also a very essential aspect of STI policies in general, and they are present in many ways in our contemporary discussions related to STI policies and their political aspects.

In the second move we will turn to examine how the scientific frameworks and models are involved in STI policies. The prevailing practices of STI policies utilize a huge resource of scientific frameworks and models seeking a coherent and plausible justification for these policies. In terms of justification, economics has a major role although other disciplines linked with the problem of the economy have become gradually more and more important.

The role of economics is natural for many reasons. One of them is the fact that the whole idea of innovation becomes from economics, or to be precise, from evolutionary and institutional economics. When analyzing the methodological debates associated with economics I will focus on the construction of NIS within the OECD context. My major interest is here on scientific debates related to the evolutionary and institutional economics and how the leading scholars give reasons for the NIS framework and what they actually argue.

In the third move we will return to the problem of government and legitimation linked with STI policies. At the heart of the new political administration is the role of the public sector. In the Finnish case it concerns how the welfare state works in the future. The Nordic welfare state is an outcome of a long historical process in which the public sector has been responsible for the development of welfare services. Now it is seen as problematic.

The problem of the role of the public government in general seems to be an essential aspect of STI policies. This move shifts my focus onto the interpretation of the cluster framework as a complement to NIS. While the cluster framework has been used more as a strategic and pragmatic tool for re-organizing the political government, it has also been used as a strategic framework seeking to explicate the agenda of future technology policies. The NIS framework and the cluster framework can be seen as a pair and the Finnish example, the welfare cluster case, illustrates how problematic the coupling of these two frameworks may be.

The point of the fourth move is to examine the dependency of STI policies on national environments. STI policies have been said to be exclusively a matter of national policies. Therefore, STI policies are made up of a variety of political instrumentation used as leverage to economic growth and wealth. This national aspect of STI policies amalgamates all the previous aspects in the sense that it highlights the point that STI policies are seen as a particular mode of policy as well as an inherent part of politics. STI policies must be linked with a complex of political debates in which issues like consensus, democracy, decision making, participation and legitimacy are included.

Rhetoric is increasingly essential when carrying through those policies. When analyzing the Finnish political culture further as a frame for STI policies, I try to clarify the success of Finland and the peculiarities of the Finnish political culture.

The fifth move functions as a sort of summary of the rhetorical re-description and its analytic focus is on the dilemma of concepts and models in STI policies. The aim here is to demonstrate how scientific concepts and terms as well as models and theories having scientific origin are utilized in STI policies. This summary stresses the decisive role of those models in justifying and legitimating those policies by highlighting two complementary aspects embedded in them. It is obvious that concepts and models function as performatives and that they seem to provide a catalytic resource for institutional reforms and policy experimentations.

7.2. Exploring the anatomy of STI policies: Rhetoric, ideology or what: The first move

7.2.1. The holy trinity of economy, technology and innovation

I will start this chapter by studying the genealogies of the idea of innovation. My first intellectual target is Karl Marx and his account of the relationship between technology and economy. I argue that Marx and his thinking are present in the current STI policies in many ways. But what makes Marx so important for STI policies? The answer depends on how we understand politics as we have discussed earlier. In order to be able to analyze the problem we have to return to some conceptual dilemmas related to politics as such. Those dilemmas become tangible when comparing two different approaches to economics: the neoclassical theory and the Marxian theory.

Marx and powers of economy and technology

One of the most important concepts of Marxian theory related to innovation is the concept of valorization. According to Marx, the essence of capital is the endless and limitless valorization of value, an essence which sets itself up behind the backs of people as he calls it.[387] The German original term for valorization is "*Verwertung*" (specifically *Kapitalverwertung*) but this term is difficult to translate. It is often wrongly rendered as "realisation of capital", "creation of surplus-value" or "self-expansion of capital" or "increase in value". In modern translations of Marx's economic writings, the term valorisation is preferred because it denotes a highly specific economic concept.

Marx's point is that in capitalism everything that exists reveals itself to be valorizable - as capable of being drawn into a cycle of valorization. Value is, neither money nor capital, but the essence of valorizing, which makes everything that exists appear as valorizable. Value expresses itself quantitatively as well as qualitatively in the potential or realized exchange against money. But despite the real appearance of reification, it cannot be identified with the thing 'money'. Nevertheless, the essence of capital expresses itself above all in money.[388]

In Marx's philosophy, the value relation remains in the economic and social dimension. It is the money-mediated social relations of commodities which cover up and distort the relations of working people to each other. Capital, as a relation mediated by

[387] STM 1998a and 1998b.
[388] See also Eldred 2000; Aronowitz 1988.

things, provides the economy with its form and also forms the basis upon which the superstructure is erected. The other social instances like the state, the legal forms, morality, culture, ideologies and even philosophy are supposed to be thought proceeding from this basis and correspond to it.

For Marx, the possibility that one may give up the ownership of one's own labour, and in doing so give up one's capacity to transform the world is tantamount to being alienated from one's own nature. This is what Marx calls commodity fetishism in which the things that people produce appear to have a life and movement of their own to which humans and their behavior merely adapt. His conclusion is that the exchange and circulation of commodities really are the product and reflection of social relationships among people. Under capitalism, social relationships of production, such as those among workers or between workers and capitalists, are mediated through commodities. They include also the fact that labor can be bought and sold in the market.

Marx's argument is that the alienation of human work is the defining feature of capitalism. He distinguishs industrial capitalists from merchant capitalists. Merchants buy goods in one place and sell them in another; they buy things at one market and sell them at another. Since the laws of supply and demand operate within given markets, there is often a difference between the price of a commodity in one market and another. Merchants practice arbitrage and hope to capture the difference between these two markets.

The capitalist mode of production is capable of tremendous growth because the capitalist can reinvest profits in new technologies. When the rate of profit falls below a certain point, the result may be a recession or depression in which certain sectors of the economy collapse. Marx understood that during such a crisis the price of labor would also fall, and eventually make possible the investment in new technologies and the growth of new sectors of the economy. He believed that this cycle of growth, collapse, and growth would be punctuated by increasingly severe crises.

If the debates on *homo economicus* focus on presumptions on human nature, the Marxian theory begins with the social relationships shaping and changing what human beings are, think and do. Neoclassical economic theory has a totally different approach to the problems of economy with different points of entry. The objects of the theories are different as the logics of these approaches are totally different.

If the neoclassical theory always connects prices, wages, and profits to its organizing concepts of individual preferences, resource endowments and technology and if its theory is an individual human nature theory of the meaning of those objects, the Marxian theory begins with the concept of class. It always connects prices, wages, and profits to this organizing concept: the Marxian theory is a class theory in which the meaning of these objects is its intellectual core.[389]

In the neoclassical theory all concepts are derived from priorities. Price is derived from what causes it, i.e. supply and demand. Then supply and demand are reduced to what determines them – the entry-point concepts of individual preferences, technology and resource endowments.

The Marxian theory develops differently. Each concept is complexly linked with other concepts of the theory. Its key concept of class is useful in exploring the specific interrelations and interdependence of class, prices and wages. Marxian theory is a never-ending process in which its entry- point concept is linked with others.

[389] Wolff & Resnick 1987, p 239.

In the Marxian view, the economy is ceaselessly changing and each change in the economic aspect simultaneously changes the non-economic aspects. It follows that in the Marxian view the economy is shaped by the influences flowing from all other aspects of society. It is also important to remember that Marxian theory prefers the term social formation rather than the term of society.

Schumpeter on innovation and capitalism

Schumpeter ´s idea of creative destruction in capitalism has been borrowed from Marx, who suggests that the main way for the capitalist firms is to increase productivity by introducing new and more efficient machinery. Companies that succeed in introducing new and more efficient technology will see their competitive position is improved.

"The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new method of transportation, the new markets, the new forms of industrial organization that capitalist enterprises creates… This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in."[390]

For an aggregate economy this implies that capital accumulation and rising productivity go hand in hand. Schumpeter argues that we must grasp that "… *the competition from the new commodity, the new technology, the new source of supply, the new types of organizations (...)- competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but their foundations and their very lives.* "[391]

Schumpeter sees three key elements in the economic development: the idea of innovation (as a cause), the role of entrepreneurs (its subject) and the bank credit (means). Economic development presupposes capitalism as an institution, and Schumpeter stipulated bank credit as essential to capitalism, not private ownership and the profit incentive, because it was for him a commercial society.

In capitalism, entrepreneurs demanding finance and capitalists supplying finance are linked through innovation, and profit and interest are related for the same reason. Schumpeter claims that interest does not exist in a static state, the source of interest is found in economic development and profit. His aim was to introduce a theoretical explanation of economic development rather than a historical description, as many understood his theory.

Schumpeter's major point is to focus on the dilemma of innovation by clarifying the concept itself. For Schumpeter, new products, new types or qualities of raw materials or intermediary products, the creation of new markets and new ways of organizing business are all innovations. In other words, he stresses that only successful innovations can be regarded as real innovations regardless of their transitory nature. Innovations vanish as soon as a sufficient mass of imitators has successfully entered the scene.

According to Schumpeter, innovation must be distinguished from inventions; innovation is a specific activity (function) carried out within the economic sphere and for a commercial purpose, while inventions are carried out everywhere and without any intent of commercialization. Pointing to a system perspective Schumpeter argues that we have to differentiate the "entrepreneurial function" in a capitalist system.

[390] Schumpeter 1942, pp. 82–83.
[391] Schumpeter 1942, p. 84.

The introduction of novelty is one important function: *"knowledge and habit once acquired becomes a firmly rooted in ourselves as a railway embankment in the earth. It does not require to be continually renewed and consciously reproduced, but sinks into the strata of sub-consciousness."*[392]

An entrepreneur is the key concept in Schumpeter's theory on economic development because of his/her role in carrying out innovations. It is very difficult to step outside the boundary of routines; to make an innovation is a challenging task, a risk.[393]

Schumpeter sees that innovative investment is not financed by savings but by credit creation. Interest is not concerned with a real economy and it is not an intermediary between savings and investments. Interest is a monetary and dynamic phenomenon but for him the independent variable is the innovation rather than the money supply.

It is apparent that Schumpeter's concept of creative destruction must be seen in a broader context. One alternative is to see it as a sort of triangle.[394] It follows that the first dimension of Schumpeter's theory explores the problem of routines in economic life and their transformation. The second dimension focuses on the quantitative analysis of waveform economic evolution. The third dimension highlights the co-evolution of economic life and socio-political life.

The concept of creative destruction may be seen as a theoretical tool for connecting the economics and the sociology of capitalist society. Because capitalism has been "the propelling force of the rationalization of human behaviour" it has had very fundamental influences over human beings and their actions.[395]

The classics introduced here stress the peculiarities embedded in the emergence of capitalism and market economy: Marx by articulating the dilemma of capitalism as such, Schumpeter and his followers by clarifying the dilemma of innovation. The genotypes of capitalism are still alive in contemporary STI policies although their phenotypes are totally different.

7.2.2. The mystical triangle of science, vision and ideology

Schumpeter on vision, model and ideology

One of the key arguments embedded in contemporary STI policies is that they advocate the necessity of institutional and structural reforms. This implies two major issues: the internal and external reflexivity of science and technology policies. The ultimate aim of those policies is to start a series of reforms to find new alternative interactions between science, technology and economy and further to link those reforms with general transformations-in-progress in political government.

According to Schumpeter, the scientific inquiry consists of two stages: the formation of vision and the building of a model. The first stage is based on the perception and judgement of issues to be explored and this is what Schumpeter calls a vision. The second stage is to analyze the material conceived by the vision according to the scientific rules of procedure.[396]

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[392] Schumpeter 1934, p. 84.
[393] Schumpeter 1934, p. 93–94.
[394] Andersen and Lundvall 2006.
[395] Schumpeter 1942, p. 125.
[396] Shinoya 1997, p. 59.

By distinguishing a vision from a model Schumpeter argues that these aspects are dependent on each other. He argues that ideology is a specific factor at the vision formation stage; ideology is incorporated into vision because scientific work takes place in a socially continuous process. *"Ideologies are not simply lies; they are truthful statements about what a man thinks he sees."*[397] They have a fundamental role in the formation of vision.

" (Vision) embodies the picture of things as we see them, and whenever there is any possible motive for wishing to see them in a given light rather than another light, the way in which we see things can hardly be distinguished from the way we wish to see them."[398]

This idea at the role of ideology and many other Schumpeter's ideas are derived from Marx. Schumpeter accepted Marx's idea of endogenous evolution and the self-destruction of capitalism. In order to minimize Marx's influence he criticized the economic interpretation of history. His proposition was that 1) the superstructure governs the economic process; 2) class structure is determined by diverse factors other than economic ones that makes phenomena often dynamic; 3) the social process of production displays an immanent evolution. [399]

Another very important person for Schumpeter was the economist Léon Walras, a major economic theorist.[400] Schumpeter's proposition was to make a double dichotomy, the static state versus the dynamic state, and refer to different economic phenomena implying different economic theories. Dynamic phenomena are, according to Schumpeter, characterised by innovation. It is important to understand that Schumpeter's idea on economic development as caused by innovation is based on the idea that the underlying idea of his thinking was the idea of equilibrium. Innovation is a destruction of equilibrium.

Schumpeter took Walras's general equilibrium theory as his ideal model because it established the conceptual framework and clarified the mechanism of the economic order. It made economics a genuine science. Theory is not a piece of fiction; it is real.[401]

But this inconsistency is only abstract because Schumpeter's scope is broader. A theory of evolution covers not only the economic area but also other social areas. The concept of innovation links Walrasian and Marxian ideology in a very interesting way.

Despite the destructiveness and destabilizing effects of innovation, the capitalist economic system has a remarkable adaptive capacity to absorb them quickly and revitalize itself as well. Despite its capacity to grow through effects of innovation the capitalist economic system cannot survive indefinitely.

Esben Sloth Andersen[402] in his analysis on post- Schumpeterian economics insists that Schumpeter's originality and importance to evolutionary modelling is important. Although he lacked relevant analytic tools for clearly expressing his vision of economic evolution he acknowledged the point. So his real contribution was that he opened the "doors" for evolutionary modelling in economics.

[397] Schumpeter 1951, p. 267–281.
[398] Schumpeter 1954, p. 42.
[399] Shinoya 1997, p. 81.
[400] Schumpeter 1954, p. 827.
[401] Andersen 2006.
[402] Andersen 1994.

If our aim is to analyze STI policies as theoretical constructions, we may ask how science and ideology are interlinked and embedded in those policies. One interesting perspective is provided in the work of Gaston Bachelard.

Bachelard's point is that images have enormous power in science, and scientific images have also role in poetry and the arts. In his "applied rationalism" he defends strongly the active role of the mind in knowledge. His point is that epistemic categories constructed in science are relative to the historical situation, and the objects constructed in mind are mediated through scientific instruments. Theories are "materialized" through them.

Although Bachelard persists to talk about epistemology his emphasis is on technology and technique, on doing and making, not on observing and theorizing. *"Concepts and methods, all are a function of the experimental domain; all scientific thought must change when confronted with a new experience: a discourse on scientific method will always be a circumstantial discourse; it will not describe a definitive constitution of the scientific mind."*[403]

Another interesting move Bachelard makes in his theoretical endeavour is that although his philosophy has resemblances with pragmatism his aims to revise our conceptions of scientific knowledge are more radical. His critique on pragmatism highlights the impotence of pragmatism to analyze some seemingly contradictory epistemological imperatives in modern science; one of them is that perfect knowledge should be both detailed and universal.

These contradictory tendencies can never simultaneously meet in any supposedly complete and perfect description of reality. The fault of pragmatism has been that it highlights science as a quest for knowledge of general laws and fails to see that the verification of such knowledge is intimately connected to the search for a detailed understanding of particular conditions and to the use of technology in conducting experiments.

Bachelard's proposition is a much more complex, multi-dimensional portrayal of the dynamics of science than a continuous approximation toward the truth proposed by pragmatists. His interest is in the factual interfaces between theory and material reality; Bachelard's answer to the problem is to focus on the treatment of the technology-science relation and to make a distinction between scientific and technological imperatives.

In the technological sphere goals are achieved and devices are constructed to perform functions for which they are designed. In modern technological innovations general principles are put to work through the process in which the detailed and general aspects meet and construct complex devices. In those processes science gains most confidence for its claims concerning material reality, but according to Bachelard the scientific progress is dependent on internal and epistemic contexts rather than on external factors. The acquisition of scientific knowledge is not for him an artefact at the mind but rather the interaction of thought and action.[404]

Bachelard insists that we have to move away from such theories which define scientific knowledge in terms of a static, logical organisation of theories. Then he moves on to the problem of how to attain such knowledge. He argues that neither logic nor a

[403] A quote in Tiles 2005; originally in Bachelard, G. (1934) Le nouvel spirit scientifique, Paris: Presses universitaires de France, p. 139.
[404] Tiles 1984.

concentration of statements, judgements, or truths can provide the framework within which we are able to discuss the epistemological dynamics of science. The real focus of epistemology should be put on the correction of concepts and theories to acquire more detailed knowledge; the recognition of change as a correction rather than a form of truth or falsity is the starting point for true epistemology. Knowledge and its acquisition are intertwined whether we are talking about science, technology, reason or action.

Bachelard's student Georges Canguilhem's key point is that science arrests time and constructs its objects as non-temporal forms not having a history. His epistemological concern focuses on the history of concepts. But the history of concepts is not the history of ideas, nor history of terms, of phenomena or theories. For Canguilhem, concepts are not embedded in theories and they do not derive their meaning from associated theories. They permit scientific questions to be formulated in a useful way, and theories provide scientific answers to those questions.

What is interesting here is Canguilhem's concept of scientific ideology. The concept attempts to describe how science-inspired visions are extended to social life and used as foundations of policy making. "*By scientific ideology I mean a discourse that parallels the development of science and, that, under the pressure of pragmatic needs, makes statements that go beyond what has actually been proved by research. In relation to science itself, it is both presumptuous and misplaced.*[405]

But not only scientific concepts but also technology must be involved in the formation of scientific ideology. Technology is nowadays political because it is an aspect of what is to be human, as Canguilhem[406] argues. It is political because it carries a certain *telos* of operations, it has always a direction. Technology is tied to our political self-understanding and our understanding of politics.[407]

In his theory of communicative rationality Jürgen Habermas[408] wants to clarify the problem of what he calls communicative rationality. These post-metaphysical movements as he calls them have criticized the substantive conceptions of rationality and put forward procedural or formal conceptions instead. They have also replaced foundationalism with fallibilism which deals with what is valid knowledge and how it may be achieved. They have contextualized or situated reason in actual historical processes. Those movements have highlighted pragmatic structures of language and action. This is an orientation toward practice and a move away from theory in which they have recognized the moral and expressive functions of language.

In his theory of universal pragmatics Habermas wants to construct the philosophical method of rational reconstruction. The basic concern in universal pragmatics is utterances in general: utterances are judged according to their communicative validity.

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[405] Canguilhem 1988, pp.57–58.

[406] Canguilhem 1994.

[407] One very good example of scientific ideology is the concept of "biodiversity" used in environmental policies. The concept is a scientific concept but it is used as an all-encompassing term referring to almost anything that is good and threatened in the natural environment. It is used as an umbrella type term that combines different disciplines of biological research but it was also used to convey a new perspective that articulated new perspective to environmental concerns. See Väliverronen 1998.

[408] See Habermas 1987. Habermas's theory has linkages with Merton's sociology of science in which he introduced a typology as a set of ideals that dictated the goals and methods of science and scientists' work. Communism; the common ownership of scientific discoveries and the abandonment of intellectual property rights, Universalism; claims are true in terms of universal criteria, Disinterestness; scientists are rewarded by reputation and publication, Organized scepticism; all ideas and claims are tested by other scientists.

This is why Habermas makes the differentiation between two social realms, the *system* and the *lifeworld* which designate two distinct modes of social integration in his theory.

The social integration carried out in the system operates through a functional integration of the consequences of actions. Economic and industrial systems are excellent examples of system integration: they have produced complex forms of social integration and interdependence despite their openly competitive orientations of individuals.

In the terms of the lifeworld the social integration depends upon the coordination of action plans and the conscious action orientations of individuals. It relies on processes of human interaction including symbolic and cultural forms of meaning, and the coordination is carried out through communicative action. Communicative action at the heart of the lifeworld is responsible for accomplishing several fundamental social functions such as reaching understanding, cultural reproduction, coordination of action plans, and socializing individuals.

Habermas makes a distinction between communicative action and strategic action: the coordination of action plans can be accomplished either through consensus or influence. Strategic action is oriented towards success, and communicative action is oriented towards understanding. Both of them are dependent on the lifeworld and occur in human interaction.

In terms of communicative action it is important to understand the meanings of the action plans and in terms of strategic action the mutual understanding is not the goal of interaction. Strategic action is for Habermas parasitic on communicative action because it subjugates communicative action to a devalued role as a form of instrumental reason.

One of the major claims Habermas makes in his theory is that all forms of interpretation must be forms of critique. All forms of texts consist of interests – his concept of interest is very similar to Gadamer's concept of prejudice. It is very important for the reader that he/she is aware of his/her interest. Habermas makes a distinction between a) technical interests which motivate empirical-analytic enquiry, b) practical interests which motivate humanistic sciences and c) emancipatory interests which motivate philosophical enquiry, whose objective is to lay bare how consensus is obstructed by various forces, be they psychological or social. [409]

The technical interest understood as a modern ideology governs the empirical and analytic sciences as a kind of epistemology; it is a cognitive interest in technical control over objectified processes. Specialists control political and economic policies, argues Habermas.

He follows the rationalisation argument advocated by critical theory. Herbert Marcuse[410] saw the scientific tradition as an ideology that subjected society to its control. Adorno[411] wanted in his *Negative Dialectics* to argue that all attempts by the subject to devour the object, our pursuit for identity, makes thought an accomplice of domination. Habermas continues by shifting the focus of rationality from the autonomous subjects to subjects in interaction. Rationality is a property of undistorted communication. [412]

His analysis of the public sphere[413] clarifies how public opinion in this transformation shifts from rational consensus emerging from debate, discussion, and reflection onto the manufactured opinion of polls or these of media experts. The

[409] Habermas 1972.
[410] Marcuse 1991.
[411] Adorno 1973.
[412] Martin 1996.
[413] Habermas 1989.

functions of media have transformed from facilitating rational discourse and debate within the public sphere into shaping, constructing, and limiting public discourse to the themes validated and approved by media corporations. The interconnection between the sphere of public debate and individual participation has broken: citizens have become spectators of media presentations and discourse.

In terms of this study Habermas's theory points out how scientific knowledge and its rationality are linked with the public sphere and how the ideological formation of public opinion advances. This becomes evident if we examine how scientific knowledge is used in the public sphere in relation to STI policies and its legitimation.

7.3. Scientific frameworks and models in STI policies: The second move

As discussed earlier, STI policies utilize a broad variety of vocabularies and models used in economics as an analytic resource to clarify the STE hybrid theoretical justification and its practical legitimation. In consequence, we may say that one of the major features of STI policies is to adopt concepts, terms and models developed in economics.

The STI policy documents openly advocate that the problem of innovation is the key issue. All disciplines and communities of science are welcomed to participate into the process of finding answers to the problem of innovation.

The whole idea of clarifying the problem of innovation by expanding the traditional domain of economy is very much convergent with some theories in institutional and evolutionary economics traditions. Their criticism against neo-classical economics is that its scope to economic phenomena is too narrow.

The intellectual core of STI policies is not a science policy reform as such. Rather, it seems to exemplify the state of modern economics, its quest for "cyborg sciences", and more towards a holistic, evolutionarily oriented multi-disciplinary approach in which all the traditional boundaries between disciplines are dissipated.

One of the key arguments in STI policy documents is that the economic world is inevitably changing and we ought to have new policies in congruence with those changes. What does it mean?

My point is that one of the main reasons for the success of NIS is that it skilfully utilizes the contradictions hidden in economic ontology. That is to say that its theoretical core is based on the idea that all intellectual and cognitive work must set the focus on the problem of economic ontology. Its aim is to revise the traditional ontological categories and presuppositions of our belief system and to persuade scholars and scientists to participate in such a revision.

Another aspect of NIS derived from the problem of economic ontology is the problem of epistemology related to economic world. This epistemological aspect becomes obvious in the problems related to the economic methodology. One way to think about methodology is to view it as the study of "methods", m-methodology or as the study of methodology, M- methodology.[414] The m-methodology is concerned with practical and specific issues, whereas the scope of M-methodology is broader and focuses on the issue of scientific knowledge.

[414] McCloskey 1985, p. 25.

7.3.1. The problem of fact and fiction in economics

Models and theories in economics

Economics, as the dismal queen of the social sciences[415], has had a special role among other social sciences, and this makes it powerful as a discipline. As a scientific discipline it has been an object of contest generating a lot of debates concerning its status as a science. One aspect of that discussion is the problematic connection between theory and "reality"; there has been a lot of debate related to "blackboard economics".

It is argued that economics is a system which lives only in the minds of economists, not in reality. When economists are unable to analyze what is happening in the real world they invent an imaginary world they are capable working with.[416] In other words, it is claimed that in order to be successful in economics you have to be excellent in mathematics and skilful in puzzle-solving and it has nothing to do with possessing a thorough knowledge of the political economy.[417]

But although the debate among economists has been vivid, it seems obvious that the disjunction between facts and fiction is misleading.

The concept of model has different meanings in everyday and scientific parlance: these mau include representational models, theoretical models and imaginary models. [418] All these views assume that models represent an object. The representational model is a man-made construct that represents something that is not necessarily man-made.

The point of theoretical models is that they do not describe all aspects of the object but rather provide a simplification for explaining or predicting certain phenomena. Theoretical models include mathematical, statistical and computational models. For their part. imaginary models make assumptions regarding the study object that are false.

To put it simply - facts make true statements true. But there is a lot of disagreement among philosophers what counts as a fact and what counts as true in the community of scholars. To say that this is a piece of fiction is to say that the object we are concerned with is fictional because its existence and the truths uttered about it are dependent on the particular descriptions of it. In other words, there are non-fictional real objects in the world and the model is fictional if it has no reference to any real objects.

It is often argued that economics is about modelling.[419] There is a lot of ambiguity with regard to the concept of model. In the narrow sense it can refer to mathematics but modelling can also have a broader definition. Model building can be seen as a type of fact-oriented activity in pursuit of isolating key causal dependencies in real world: models can be seen as economists' laboratories.

Modelling is often linked with the problem of scientific theory. According to the standard view, scientific theories are simply sets of statements. They may be true or false

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[415] Mäki 2002a.
[416] Coase 1993.
[417] One of the most important debates linked with the problem is Milton Friedman's famous essay on the methodology of positive economics. Friedman's point is that a theory or hypothesis must be judged by its simplicity and fruitfulness because truly important and significant hypotheses are often based on unrealistic assumptions. It seems that the more significant the theory the more unrealistic the assumptions. Friedman rejects testing of a theory by the realism of its assumptions and has influenced thoroughly the development of the Chicago school of economics.
Friedman 1966, pp. 3–16, 30–43.
[418] Achinstein 1968, pp.209–225.
[419] Mäki 2002a.

or corroborated or falsified on the basis of other statements about the empirical data.[420] According to the semantic view of scientific theory, scientific theories merely define a predicate. Theories are like a map; you create them but they do not say anything about the world as such.

The structuralist view of scientific theories is a variant of the semantic view of theories and it holds that scientific theories are structures rather than statements. Structures are related to their empirical claims by certain systematic logical relationships. Specifying these logical relationships is the main goal of the scientific theory.

Mäki argues further that the theoretical terms used in economics are totally different from those used in physics. The issue for economics is not the existence of the entities, but the way they are arranged.

One of the most interesting suggestions to see the relation between ontology and epistemology in economics is the Heilbroner- Milberg thesis.[421] Their argument is that adequate economic theories are consistent with a specific vision of capitalism as a complex social system characterized by capital accumulation as the driving force, the market as the organizational mechanism of allocation, the division between a private and a public sphere as dominant administrative principle. Their claim is that much of current economics has lost connection with such a vision.

It follows that economic ontology draws from different sources such as other social sciences, social actors' experience, philosophical arguments and categories, but the system of general conceptions about the economic realm does not determine the form and content of economic models. Heilbroner and Milberg simply argue that economic analysis without a vision is empty, merely a version of scholasticism.

The third aspect of fictionality in economics is the problem of economic institutions. Such institutions are the rules of the game. They are the structures that relate incentives and rewards, education and employment, agendas of topics, and standards of assessment. The economic institutions also shape the values and goals of practising economics. Or, to put it differently, economic models are socially constructed.

7.3.2. NIS as a policy framework

Birth of NIS in the OECD

Reijo Miettinen and Benoit Godin [422] have argued that the concept of NIS can be divided to two different families. The institutional family advocated by R. R. Nelson puts the focus on institutions and their role in determining the innovative performance. The knowledge family advocated by B-Å Lundvall focuses on knowledge and the process of learning. The origins of the knowledge economy are in the early 1960s and it re-emerged in the early 1990s.

The motive for NIS was that it helps to understand the differences between countries in terms of their capacity to innovate. It also clarifies how globalization affects national systems.[423]

The birth of the idea of linking the traditional science and technology policies with innovation is an outcome of a long and heterogeneous process. Although the OECD's key role has traditionally been linked with comparative statistics and the development of

[420] Hands 2001 p. 311.
[421] Heilbroner and Milberg 1995, pp. 106–109.
[422] Miettinen 2002; Godin 2003.
[423] The key OECD documents are: OECD 1992; OECD 1994a.

measurement,[424] the origins of the idea of innovation can be traced back to economics. It is apparent that the problem of innovation has been one of the most highly-debated issues among institutional and evolutionary economists, post-Schumpeterian, post-Keynesian and neo-institutional economists. For several decades, economists have been criticized for their failure to integrate institutions into their theories and econometric models. Partly as a response to this, scholars invented the concept of (NIS) National Innovation System.

A group of research institutes[425] has played a significant role with regard to marketing and establishing the paradigm for science and technology policies. Most of this preparatory activity has occurred within the OECD context.[426]

If we look closer how economic theorists attempt to dissolve the dilemma of technological change in the economic context, the significance of economic methodology becomes very clear. One of the most important issues in terms of economic methodology has been the debates contrasting *the equilibrium approach* with *the evolutionary approach*. The discussion has focused on such issues as what is technology like, what is its development like or what are the roles of science and market in innovations and what kind of mechanisms can be found beyond the phenomena.[427]

Evolutionary economics has its origins mainly in Schumpeter´s ideas on innovation and in those of many others such as Menger, Veblen and Marshall who have written about economical development and its nature. The leading theorists of evolutionary economics today, Nelson and Winter,[428] have in their path- breaking book "*An Evolutionary Theory of Economic Change*" provided severe criticism against mechanical neoclassical core assumptions: equilibrium thinking, profit maximization, the reversibility of time and the concepts of rationality and technology.

Their theoretical core has been the cultural evolutionary triad of blind variation, selection and retention. Although their theoretical work has focused on the interaction between variation generating, retention maintaining and selection realizing mechanisms in radical uncertain conditions[429], their problem is the lack of unifying theoretical basis.

There is a lot of debate among institutional and evolutionary economists. Central theoretical controversies include such issues as 1) how neoclassical and evolutionary theories attempt to understand and explain technological change, 2) how to solve the dilemma of technology and organisation in the strategic management of technology and 3) how the recent developments within the economic methodology and theoretical elaboration on technological change contribute to one another.

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[424] Godin 2002, p. 37.

[425] Those institutes are: Science policy unit, Sussex (SPRU); Maastricht economic research institute of innovation and technology (MERIT); MPI- research into economic systems, Jena; Centre for research on innovation, Manchester (CRIC); St´ Anna school of advanced studies, Pisa (LEM); Aalborg university (IKE-group/DRUID); Bureau d'Economie Theorique et Appliquee, Strasbourgh, France (BETA); Chalmers university, Inst. teknikens ekonomi och organization, Göteborg; Fraunhofer Gesellschaft-systems and innovation research, Karlsruhe, (SI).

[426] One of the leading persons importing the paradigm has been Christopher Freeman (1987) and his colleagues like Loc Suete, Keith Pavitt, Giovanni Dosi, Bengt-Åke Lundvall and many others. This very Europe- centered activity has of course had a parallel in the USA where Nathan Rosenberg, Richard R. Nelson and Sidney Winter have been the leading scholars.

[427] Freeman 1988; Dosi 1982.

[428] Nelson & Winter 1982.

[429] Nelson 1987; Dosi et al 1997; Andersen 1994; Metcalfe 1995; Vromen 1995.

It is strange that technological change has not been the focal point of a methodological endeavour[430], although it is well suited for epistemological analysis as an interface of social science and the natural sciences. Technological change throws light on how theoretical knowledge and observable world are related. This has played an important role in the evolution of intelligent life on the earth, and has been compared to that of language.[431]

One special group of evolutionary economists has been interested in innovations and innovation theories. It is easy to differentiate three sub-schools: the post-Schumpeterian tradition, Nelson& Winter tradition and the national innovation system-tradition.

The first tradition has emphasized such issues as: the sources of innovations, the structures of market and the dynamics of industries and lines of business. Freeman and Perez[432] have suggested the use of innovation taxonomy: incremental (changes of "technology systems") and radical (changes in "techno-economic paradigm") innovations.[433]

According to Perez the development of the technological paradigm involves follows some principles. The process starts with a big bang, and the first half is called the installation period. This is the time when the new technologies irrupt in a maturing economy and advance like a bulldozer, disrupting the established fabric and articulating new industrial networks, setting up new infrastructures and spreading new and superior ways of doing things. The second half is the deployment period when the fabric of the whole economy is rewoven and reshaped by the modernizing power of the triumphant paradigm.

The turning point from the first half to the second half is a crucial crossroads, often a serious recession, that involves a re-composition of the whole system. In particular, the re-composition involves the regulatory context that enables the resumption of growth and the full fructification of the technological revolution. The paradigm "dies" when the next big bang occurs.

Today, we are at the threshold of new technological revolution but nobody knows what it is excatly. Perez is very much involved in the system theory in the sense that her idea of technological paradigms is based on the idea of change in three dynamic subsystems.

The technological sphere where technological revolutions and techno-economic paradigms are constructed is the fuel of the capitalist engine. It has nothing or little to do with technological and scientific reasons. It is the mode of absorption and assimilation of innovations in the economic and social spheres that requires technical change to occur in coherent and interrelated constellations.

The economic sphere is where production and financial capital interact. *The institutional sphere* is the seat of politics, ideology and of the general mental maps of society of each period. It is also the sphere of norms, laws, regulations, supervisory entities and the whole structure responsible for social governance. During each surge there is coherence and isomorphism between the structure and the way in which firms and other sorts of organizations from schools to hospitals, political parties and

[430] Kyläheiko 1995, p. 5.
[431] Elster 1983, p. 9.
[432] Freeman & Perez 1988.
[433] In her analysis on technological paradigms Perez differentiates five successful technological revolutions: 1)The industrial revolution (1771), 2) Age of steam and railways (1829), 3) Age of steel and electricity (1875), 4) Age of oil, the automobile and mass production (1908), 5) Age of information and telecommunications (1971-). See Perez 2002.

government departments function. These three spheres interact in such a way that each time there is inertia in one. Most processes of advance development in the capitalist system take place by combining the forces of conservation with the forces of transformation.[434]

The second tradition has focused more on theories concerning economic change and growth. It has imported from Darwin's evolution theory to economic analysis concepts like selection, variation and inheritance.[435] The concept of path-dependency (QWERTY-argument) is used to describe the nature of technology. The tradition also stresses learning and routines and the strength of appreciative theorizing (simulations) in economy.[436] Winter and Nelson are interested in the processes of change, and they see that the behavior of a firm or an organization is analogous with a biological genetics. If the genes transmit the information that influences the behavior of an individual's routines, the routines are said to be their equivalent in firms. If in Darwinian theory the variation mechanism results from the error in genetic codes known as mutations, in Winter and Nelson's theory the concept of mutation refers to shifts and changes in the behavioral patterns and technical routines known as innovations.

The third tradition, based on various theoretical elaborations[437] and, in particular, the definition of national innovation system (NIS), is interesting. NIS equals "*the networks of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies "* .[438]

For R.R. Nelson, NIS is "*a set of institutions whose interactions determine the innovative performance of national firms*".[439] Lundvall characterises NIS as follows: "(it) is constituted by elements and relationships which interact in the production, diffusion and use of new, and, economically useful, knowledge."[440] The other group of the NIS authors focus on the analysis of institutions and describe the ways in which various countries have organized their NIS. This group uses more theoretical language and focuses on knowledge and the process of learning itself.

Lundvall[441] was the key person who influenced that the OECD started to advocate the NIS as a new framework in 1994. One line of argument derived from this has been Lundvall's[442] contribution to the concept of the learning economy: it signifies a society where the capability to learn is critical for economic success. Lundvall[443] stresses, following Arrow[444] and Rosenberg[445], strongly that learning is not only a transfer of information. It cannot be reduced to acts of transaction and transfer. There are four different kinds of knowledge: know-what (facts), know-why (principles and laws of

[434] Perez 2002, p. 155–157. Giovanni Dosi, an influental scholar in the field, who introduced the concept of technological paradigm and stressed the decisive role of technology in the economy, exemplifies this tradition very well. See Dosi 1982; Dosi 1988.
[435] Nelson & Winter 1982.
[436] Their evolutionary research program is based on Armen Alchian's classical article "Uncertainty, selection and economic theory" in which Alchian argues that the market acts as a kind of selection mechanism which forms the behavioral pattern of the firm in the long term. See Alchian 1950.
[437] List 1841; Schumpeter 1939; Kline and Rosenberg 1986; Lundvall 1985; Freeman 1987.
[438] Freeman 1987.
[439] Nelson 1993, p. 4.
[440] Lunvall 1992, p. 2.
[441] Lundvall worked as a deputy director of the OECD Directorate for Science, Technology and Industry (STI) in the beginning of 1990's.
[442] Lundvall 1992.
[443] Lundvall 2002.
[444] Arrow 1962b.
[445] Rosenberg 1982

motion in nature, in the human mind and in society, know-how (skills -tacit and explicit knowledge) and know-who (social skills).[446]

All these issues developed by economists have been a source of inspiration for developing the NIS paradigm. The OECD has had an important and decisive role in establishing this paradigm as a model for industrialised countries, which makes the idea of innovation policy highly interesting. [447] If the role of the OECD has been important, it has also been different as well and the knowledge-based economy approach has been a target for a strong critique. Although the concept of knowledge-based economy has been ambiguous and unspecific, the OECD has advocated it openly.[448]

The theoretical core of NIS is derived from the ideas of those schools: the idea of innovation, the role of technology as the generator in economy, the idea of institutional reforms, the idea of knowledge and know-how as a major element in economy and economic growth and competitiveness.[449]

Lundvall[450] gives reasons for why such systems should be national. The first reason has to do with history; the economic structure of a country evolves slowly through time and has a strong enduring character. The second reason refers to a common culture, language and institutions, which arguably facilitate interaction between firms and their environments. This "systemic-ness" of a country´s innovation activity varies across the countries but some countries like the Nordic countries appear to fit the theory well while some other countries like France, the UK and Austria do not.[451] This is very close to the OECD's Research System report in 1972[452] which suggested that *"Scientific and technological research viewed from an institutional approach cannot be separated from its political, economic, social and cultural context.*"

It is important to be aware that Lundvall's theoretical approach is different in many respects but he has strong sympathetic attitude towards system theory that becomes obvious in his definition of NIS: "*The national system of innovation is constituted by the institutions and economic structures affecting the rate and direction of technological change in society. Obviously the NIS is larger than the R&D system. It must, for example, include not only the system of technology diffusion and R&D system but also institutions and factors determining how new technology affects productivity and economic growth. At the same time, the system of technological change is, of course, less comprehensive than economy/society as a whole."*[453]

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[446] This simplifying analysis of learning has been criticized by many learning theorists. See Miettinen 2002.
[447] Miettinen 2002.
[448] The organisation has produced a list of reports on National Innovation System: National Systems for Financing Innovation 1995, National Innovation Systems 1997, Boosting Innovation: The Cluster Approach 1999, Innovative Networks: Co-Operation in National Innovation Systems 2001, Innovative Clusters: Drivers of National Innovation Systems 2001, Innovative People: Mobility of Skilled Personnel in National Innovation Systems 2001, Dynamising National Innovation Systems 2002, Governance of Innovation Systems 2005. See also Godin 1997; Godin 2002; Godin 2003.
[449] The theoretical core of NIS is derived from the ideas of those schools: the idea of innovation, the role of technology as the generator in economy, the idea of institutional reforms, the idea of knowledge and know-how as a major element in economy and economic growth and competitiveness. See also Miettinen 2002, Godin 2003.
[450] Lundvall 1992.
[451] Fagerberg 2003.
[452] OECD 1972, p. 199.
[453] Edquist & Lundvall 1993, p. 267.

Lundvall[454] has recently tried to defend the term national system of innovation. His argumentation is of a great interest. First, he argues that the popularity of the term is naturally based on its rhetorical power, but his point is that it has helped to extend the traditional set of policy instruments toward non-price competitiveness. The "system" dimension of the term has moved the attention in policy circles onto charge of research, innovation and industrial development from the linear model to interactive thinking about innovation. But there are also a lot misunderstandings and crude interpretations such as the relationship between university and industry in the case of pharmaceuticals and biotechnology, for example. Those too narrow definitions forget the "interactive learning" between firms in low technology sector that is important for innovation and is not reflected in the development of the European innovation policy.

One of the most interesting points Lundvall makes is that the NIS concept has been highly "dialectical". The idea of the NIS concept is to pay attention to the Schumpeter's Mark III[455]. In other words, the innovation system perspective brings in a broader set of actors and institutions to shape the innovation process. It brings networking among firms and knowledge institutions into the picture. His defence of the adjective "national" is very curious in the sense that he argues that the modern social science has surprisingly little to say about nation states.

The term "national" is important because the original intention was to confront national economic policy strategies and standard economics. It has also become important because of the problems connected with globalization.

In order to be able to explicate his arguments Lundvall introduces the idea of two complementary modes of innovation. The first mode is called the STI mode of knowledge management and learning in which the emphasis is to promote R&D, utilizing and creating access to explicit codified knowledge. The second mode is called the DUI-mode in which innovation strategies are mainly based on learning by doing, using and interacting. These strategies may involve organizational frameworks and such relationships between employees that utilize implicit knowledge and promote interactive learning.

Another very interesting aspect of Lundvall's defence is his discussion of theoretical concepts. His point is to argue that also in social science heuristic devices and unspecific concepts play a major role since they offer a broad and flexible framework for organizing and interpreting case studies and comparative analyses. In other words, the NSI concept is not a theoretical concept. It is both a political concept and an analytic tool in the sense that it combines a specific flexible perspective on the economyby suggesting what parts of the economy should be involved in the analysis. From a policy maker's point of view it is important that the innovation system concept can be connected to economic growth and economic development.

Mjoset[456] defines theory as "accumulated knowledge, organized by human mind, to be used for purposes of explanation" and states that all attempts to establish "general theory" or "grand theory" without historical context are doomed to fail.[457] Naturally,

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[454] Lundvall 2005.

[455] It is important to be aware that Mark III was not designed by Schumpeter himself. Mark I usually refers to individual entrepreneurs. Mark II refers to big corporations as major drivers of innovation and growth.

[456] Mjoset 2002.

[457] Lundvall accepts the idea that "grounded theory" produced on the basis of case studies and especially comparisons between specific cases is the most realistic ambition of social science. The more ambitious goal of transforming social science into mature science leads to disappointment and frustration.

there are theoretical elements in the NIS approach, and most of them came from SPRU scholars' empirical findings, the Sappho-study[458] and the Pavitt taxonomy[459]. Lundvall explicates nicely how the NIS- approach as an analytic framework is linked with mainstream neoclassical economy and with Austrian economics. He shows that while it is possible to apply the principles of rational choice to the analysis of innovation and analyze it as an allocation of scarce resources, the analysis of innovation systems moves the focus towards the combination of innovation and learning.

But then Lundvall makes an interesting move by highlighting the role of Friedrich List in his theoretical toolbox.[460] In his famous *The National System of Political Economy*[461] List argued that it is important to focus on the development of productive forces rather than on issues at allocation. His concept of the "national system of production" took into account a wide set of national institutions including those engaged in education and training as well as infrastructures such as networks for transportation of people and commodities.[462]

Both Freeman and Lundvall point out in the spirit of List that government has to take an active role in promoting technological infrastructure. To apply the concept of the national system of innovation to developing countries must be seen as a kind of "re-export" of Gunnar Myrdal's idea of negative and positive feedbacks, cumulative causation, virtuous and vicious circles and the importance of institutions as a modern version.

Their motive for using the concept of NIS has been to describe and compare relatively strong and diversified systems with welldeveloped institutional and infrastructure support of innovation activities. But NIS has been used mainly as an ex-post rather than as an ex-ante concept. By introducing the concept they have stressed the evolutionary and path-dependent aspect of innovation processes to be taken into account in developing those institutional structures and support strategies. Lundvall points out that another weakness of the concept is that it does not capture the power aspects of development.

7.4. New governance in STI policies: The third move

A very important aspect of STI policies is its horizontality thesis. This thesis allows us to link the STE hybrid construction with that of new political governance. This chapter analyzes first the problem of new governance and its linkage to liberalism suggested by Foucault. One of the key aspects in STI policies is its strong dependence on measurement and international comparisons. How this statistical measurement is part of STI policies is the second theme of this chapter. These two issues are involved in the idea of horizontality and it is my intention to analyze how scholars and scientists have

[458] Rothwell 1977.
[459] Pavitt 1984.
[460] Originally, the name of List was very important in his cooperation with Christopher Freeman in the early 1980's. List was a nationalist critic of economic theory and one of the forefathers of the German historical school. See Freeman 1995.
[461] List 1977.
[462] List was openly against the "cosmopolitan" approach of Adam Smith who argued that free trade was assumed always to advantage the weak as well as the strong national economies. His point was that there is the need to build national infrastructure and institutions in order to accumulate "mental" capital and use it to spur economic development rather than to trust "the Invisible Hand" to solve problems. It was a perspective and strategy for the "catching up" economy of early 19th century Germany.

analyzed the problem. The fourth aspect of new governance becomes visible in the debate on the welfare state. This debate illustrates a variety of problems embedded also in STI policies but is often reduced to the problem of globalization. Globalization in the global market has implied a kind of new regime of privatisation in which IPR and copyright issues have become increasingly important for enterprises and companies operating in the global market.

The other aspect of globalization can be reduced to the problem of nation states; what is the new role the nation states will play in the era of globalization. This involves a variety of interesting issues including the problem of the public sector and the notion of public good.

7.4.1. New governace and the ethos of liberalism

Foucault's analysis of political reason follows Weber's work as related to the mutations of politics and the history of systems of expertise. His strategy is to question the nature and limits of the political; the political for Foucault is itself a transactional space, a historically variable zone of rationalization and division.[463]

"We need to see things not in terms of the replacement of a society of sovereignty by a disciplinary society by a society of government; in reality one has a triangle, sovereignty-discipline-government."[464] Foucault's account of government is fascinating because it goes beyond the common idea that society has become dominated by routine, discipline and rationalization. He does not want to understand the idea of liberty as a fiction; vice versa he wants to analyze the conditions within which the practice of freedom has become possible. Freedom is neither an ideological fiction of modern societies nor an existential feature of existence within them. It must be understood as a formula of rule. Foucault links the analysis of the constitution of freedom with that of the exercise of rule.

For Foucault liberalism is an ethos of government rather than a historical period. It is not a substantive doctrine of practice of government in itself but it is the restless and dissatisfied ethos of recurrent critique of state reason and politics. Liberalism represents a cautious and self-critical approach to government; politicians should govern cautiously, delicately, economically and modestly.

His major argument is that government must be linked with the great discovery of political thought at the end of the 18th century with the idea of society. Government has to deal with a complex and independent reality that has its own laws and mechanisms[465]. The new reality is society. Liberal political reason is the historical condition of the very object of social sciences. Society is embedded in the social sciences by its concerns: the technical, the ideological and the political.

The social sciences can act as a technical solution to anxiety of drawing the boundary between society and the public authorities. Foucault wants to draw attention to the intellectual and practical techniques and inventions through which civil society is brought into being, distinct from political intervention but having contingent potential for political aspirations.

The separation of the state and civil society is the consequence of a particular problematization of government. Government cannot override the natural dynamics of the economy without destroying the basis on which liberal government is possible.

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[463] Barry et al 1996, p. 7.
[464] Foucault 1991.
[465] Foucault 1989.

There must be a political space in which the autonomy of society is preserved from the state intervention. It must also ensure the existence of political spaces in which a critical reflection on the state is possible.

In other words, the activity of rule must observe and maintain the autonomy of the profession and the freedom of public sphere from political interference must be reserved. Foucault's idea is to analyze the relations of the *ethos* of liberalism and its *techne.* Paradoxically, although neo-liberalism has tried actively to create the conditions in which entrepreneurial and competitive conduct is possible, it has provoked the invention and deployment of a whole array of organizational forms and technical methods to extend a field within which a certain kind of economic freedom can be maintained.

The relation between expertise and politics is important for Foucault but he is only one link in a long chain. The theme was central for in Weber's theory of rationalisation, as it was also for the Frankfurt school and for Habermas. While they all emphasize the historical relation between the technical and the political, but they thematize the nature and consequences of this relation differently.[466]

All these theorists highlight the ways by which expertise translates society into an object of government. It is important to be aware that Foucault sees the relation between the technological and the political so that it is not defined in terms of boundaries of the state or a functional apparatus. His answer is that politics must be investigated genealogically. It includes that we have to analyze ways of coding and defining or delimiting the possible scope of action and components of an apparatus of rule. Then we have to analyze the strategies and limits proper for rulers and then the relations between political rule and rules exercised by other authorities.

Nicholas Rose[467] argues that public authorities employ such forms of expertise that enable the governance of society at a distance without any direct forms of repression or intervention. According to Rose the key aspect of neo-liberalism is to develop techniques of auditing, accounting and management that enable a market for public services autonomous from central control. It follows that the new governance changes the role and nature of expertise as well.

The relation between government and liberalism is important for Foucault because there are two important aspects of liberalism: it is critical and it problematizes.

"Government is a problematizing activity… The ideals of government are intrinsically linked to the problems around which it circulates, the failings it seeks to rectify, the ills it seeks to cure. Indeed, the history of government might be well written as a history of problematizations…"[468]

Studies of government ask by which means, mechanisms, procedures, instruments, tactics, technologies and vocabularies authority and rule are accomplished.[469] Some scholars have found the term of high modernism useful because it provides a name for a certain governmentality that became prominent in the middle of the twentieth century. It privileged a particular conception of science and technology as forces for social progress, highlighted the status of architects, planners and engineers as governmental authorities, and prioritised the bureaucracy and the plan as its technologies of power.[470]

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[466] Barry et al 1996, p. 12.
[467] Rose 1993.
[468] Rose and Miller 1992.
[469] Dean 1999, p. 31.
[470] Scott 1998.

This means that liberal rule must be understood as a governmental issue, not as a philosophical, theoretical or moral issue. Government seeks to be practical because it connects itself with various procedures and apparatuses in order to affect them. It implies that we have to speak about governmentalities as practices for the *"formulation and justification of idealized schemata for representing reality, analyzing it and rectifying it"*[471]. Governmentality is a form of intellectual machinery or apparatus that transforms reality amenable for political programming.

Political rationalities have always a moral and epistemological form; their moral concern is the government as such and their epistemological aim is to embody particular conceptions of the objects to be governed and the subjects to be governed. They deploy a certain style of reasoning; language is itself a set of intellectual technique. Language makes reality thinkable and practicable: it renders contingent and complex practices in more accessible modes.

Foucault's principal interest was on the link between power and knowledge. One of the chief claims of his complex philosophy is that belief systems gain momentum as more people come to accept the particular views associated with the particular belief system as common knowledge. Such belief systems define the figure of authority – medical doctors for example and within such a belief system ideas crystallize as to what is right, wrong, normal and deviant. Within a particular belief system certain views, thoughts and actions become unthinkable.

These ideas, considered to be undeniable truths, come to define the particular way of seeing the world and hence normalized. This subtle form of power lacks rigidity, argues Foucault. It lacks any concrete form occurring as a locus of struggle. On the contrary, resistance defines power and becomes possible through power.[472] *"One needs to be nominalistic, no doubt, power is not an institution, and not a structure, neither is it a certain strength we are endowed; it is the name that one attributes to a complex strategic situation in a particular society"*.[473]

It is important to note that Callon's view on economics as a technology resembles in many respects Foucault's idea of a technology of government. As Barry and Slater argue, Foucault points to the historical formation of particular forms of economic actor; economic freedom, competitiveness and rationality are conceived as product of specific forms of technical artifice. Neo-liberalism, as Foucault argued, does not involve the absence of government, but is itself a form of government which is intended to operate through the constitution of particular economic arrangements.[474] Economic knowledge can destabilise as well as stabilise the formation of economic actors and markets. It can be both a technology of government and a technology of politicisation.

7.4.2. Measurement of science and technology

Theodor M. Porter argues in his historical analyses of quantification and measurement: *"I do not claim that quantification is nothing but a political solution to a political problem. But that is surely one of the things it is."*[475]

His thesis is that quantification is associated with the pursuit of objectivity, understood as impersonal knowledge. The language of mathematics is according to him

[471] Rose and Miller 1992.
[472] Kusch 1991.
[473] Foucault 1978, p. 93.
[474] Barry, Osborne and Rose 1996.
[475] Porter 1996, p. x.

well suited to embody objective adjustments because it employs highly structured and agreed rules which exclude personal idiosyncracy and subjective judgement. He emphasizes that effective quantification is never a matter of discovery, but always also of administration, hence of social and technological power. Porter regards numbers, graphs, and formulas primarily as strategies of communication and quantification for him is a technology of managing distance.

His central claim is that quantitative objectivity is in a way a form of standardization, where rules are used to confine and tame the personal and subjective. Quantification is well suited for communication that goes beyond the boundaries of locality and community. Science did not always idealise this mechanical form of objectivity, but has come to do so as an adaptation to modern political and administrative cultures - which it at the same time has helped to shape.

In his studies[476] he has tried to show that the history of quantification is the history of a social technology, reflecting a sensibility that is as closely linked to fields like accounting and cost-benefit analysis as to physics. The ethic of systematic calculation as a basis for social decisions - and often, as in inferential statistics, also for scientific demonstration - responds to a political culture marked by distrust of elites and even, in a way, of experts.

In other words, Porter is saying that our trust in numbers illustrates our pursuit of objectivity: it can be a political as well as a scientific goal. He is not saying that we have to reject the whole idea of quantification. Vice versa, his point is to find answers to the issue why quantification and measurement have become so important both in terms of scientific communities and of political governance.

One of Porter's key themes in his studies is to analyze the tension between the disciplinary and the mechanical senses of objectivity. The appeal to numbers is especially compelling to bureaucratic officials who lack the mandate of a popular election. A decision made by the numbers is *prima facie* fair and impersonal. Scientific objectivity provides an answer to a moral demand for impartiality and fairness. "*Quantification is a way of making decisions without seeming to decide. Objectivity lends authority to officials who have very of their own."*[477]

One very obvious aspect of quantification is "technocracy".[478] The definition of technocracy supposes that *"human problems, like technical ones, have a solution that experts, given sufficient data and authority, can discover and execute. Applied to politics this reasoning finds interference from vested interests, ideologies, and party politics intolerable. Its antithesis is decision making through the weighing of forces and compromise. Technocrats thus tend to suspect parliamentary democracy and prefer the "rule of the fittest" and a managed policy.*[479]

Technocrats wanted the authority to manage without being subjected to the constant scrutiny that parliamentary government entails. Technocracy means elitism and leans towards authoritarianism in the interest of productivity and efficiency.

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[476] Porter 1986.
[477] Porter 1969, p. 8.
[478] The word was invented in the United States but the Ecole Polytechnique, product of the French Revolution, is often seen as a major generator of technocratic culture in France.
[479] Porter 1995, p.146; a quote in Kuisel, R. (1981) Capitalism and State in Modern France, Cambridge: Cambridge University Press.

Benoit Godin, who has examined the role of statistics and policy making and, in particular, the role of the OECD in science and technology policies, provides sklightly similar picture of science and technology policies[480].

One of the paradoxes linked with the OECD statistics is the Input/Output model in which the only ratio used in statistics to measure efficiency in science is GERD/GDP where GERD, Gross Expenditures on R&D, is the sum of R&D expenditures in four economic sectors: business, government, non-private non-profit and higher education and GDP accounts for economic outputs. In reality, R&D is not a part of the accounting system of nations because during the revision of the system of national accounts in the early 1990s, the United Nations rejected the idea of including or recognizing R&D.[481]

The dilemma of GERD/GDP is that despite its alignment to the systems of national accounts, GERD is not really a national budget – it is a hybrid constructed from the results of several surveys. Some data comes from a survey (industry), others are estimated with different mathematical formulas (university), and others are simply proxies (government).Outputs measured via proxies rather than actual outputs, are constructed from different sources that do not share any common framework. IN this sense accounting in official statistics on science is a metaphor, not an accounting exercise as such.[482]

Godin has three reasons that explain today's orientation. The first one is the basic unit of science policy and analysis, efficiency. Economic growth, productivity and profitability rather than quality of life drive politics. The second one is that economic output is easier to measure than the social and cultural impacts of science because the data is available and standardized. The third one is that most studies are conducted by economists.

One of the first frameworks developed for the historical understanding of science and technology and its relation to the economy has been the linear model of innovation. The model postulates that innovation starts with basic research, then adds applied research and development, and ends with production and diffusion. The model has been very influential. A variety of academic organisations and economists in particular have disseminated the model widely and thus justified the fact that governments that support science and technology use such a model. Ironically, science policies have carried a linear conception of innovation for many decades. Many scholars have argued that the model is dead but it is reasonable to in the manner of Godin: Is this really the case?[483]

Godin's solution is to trace the history of the model because there is no explicit analysis of its history.[484] Godin suggests that it has three stages. The first stage (1900-1945) was concerned with the terms *basic research* and *applied science*. This period is

[480] In his extensive studies on the history of the OECD, Godin has clarified the historical backgrounds and influence of statistics on science, technology and innovation. He has focused on the OECD frameworks such as the Linear model of innovation, Accounting, Industrial competitiveness (hi-tech), Globalization, Growth, National innovation system, Knowledge-based economy, Information society, New production of knowledge, Triple helix and the creation of a variety of buzzwords linked with these frameworks.

[481] Minder 1991.

[482] Godin 2007a.

[483] Godin 2005a.

[484] The problem is that the history of science and technology policies refers to Vannevar Bush's Science: The Endless Frontier published in 1945, but Bush never talks about models, a term suggestying a mechanism whereby science translates into socioeconomic benefits.

characterized by the ideal of pure science and the problem of finding causal links between basic research and applied research.

The second stage (1934-1960) added a third term to the discussion, *development*, and this is when the standard three stage model of innovation is born. The reasons for this model were analytical and statistical. The last stage started in 1950 and continues today. It has extended the model to non-R&D activities such as production and diffusion.

Godin's main thesis is that the model is a theoretical construction of industrialists, consultants and business schools seconded by economists. Another claim Godin advocates is that the long survival of the model, despite regular criticism, is due to statistics. The model is based on statistical categories for counting resources and allocating money to science and technology, and it was standardized under the auspices of the OECD and its methodological manuals. The model has functioned as a "social fact", and rival models without statistical foundations have not substituted the model.

The distinction between basic research and applied research is for Godin an example of political rhetoric.[485] The dichotomy of pure science and applied science was a rhetorical resource used by scientists, engineers and industrialists for defining, demarking and controlling their profession, for financial support, for raising the status of a discipline (engineering), and for attracting scientists (industrialists).[486] The curiosity of the distinction is that at the same time basic and applied research were discussed as cooperating. In particular, industrialists have used the dichotomy in order to persuade governments to invest in research.[487]

Bush was utilizing this rhetoric in his famous book: *"Advances in science when put to practical use mean more jobs, higher wages, shorter hours, more abundant crops, more leisure for recreation, for study, for learning how to live the deadening drudgery which has been the burden of the common man for past ages. Advances in science will also bring higher standard of living, lead to the prevention or cure diseases, will promote conservation of our limited resources, and will assure means of defence against aggression."*[488]

In the early 1960s most countries have very similar definitions of research and its components, and the task of conventionalizing and standardizing the definition was given to the OECD. In 1963, OECD member countries adopted a methodological manual for conducting R&D surveys and producing statistics for indicators and policy targets. The Frascati Manual included precise instructions for separating research from related activities and non-research activities.[489] The manual recommended collecting and tabulating data according to the three components: *fundamental research* (research work undertaken primarily for the advancement of scientific knowledge), *applied research* (work undertaken primarily to the advancement of scientific knowledge with a specific practical aim), *development* (the use of the results of fundamental and applied research directed to the introduction of useful materials, devices, products, systems, and processes, or their improvement of existing ones).

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[485] The concept of pure science was used as a term distinguishing natural philosophy i.e. science motivated by the study of abstract notions and the mixed "disciplines" motivated by concrete notions.
[486] Godin 2005a, p. 7.
[487] One of the key figures was J.J. Carty, vice-president, ATT, who strongly advocated the benefits of cooperation of purely scientific research and industrial research in the 1920s. He developed the first full-length rationale for public support to pure research in which he argued that the natural home of pure science and of pure scientific research is to be found in the university. His conclusion was that the money necessary for the carrying out of a grand scheme of scientific research should come both from the state and from the industries. See Carty 1924.
[488] Bush 1945, p.10.
[489] Godin 2005b.

Godin makes a very interesting remark in relation to the role of economists in the development of Frascati model. When the idea of defining research by those three components was generally accepted, economists were still debating on whether development is to be included in the definition. Economists accepted the definition with the three categories and used it in industrial research analyses and in such measurements where the contribution of science to economic progress was analyzed.[490]

Traditionally, we think that it was Schumpeter who brought forth the concept of innovation in economic theory but, in reality, Schumpeter saw only a slight dependence between invention and innovation. The whole idea of a sequential model aroused from the technology push and pull debates in the 1950s and 1960s.[491] One of the key figures in those debates was W.R. Maclaurin, who suggested that if we make a sequence of five steps: pure science, invention, innovation, finance and acceptance (diffusion) we may understand the problem better.[492] These two models – the sequential model of innovation and the input-output model are crucial in terms of the linear model of innovation.

E. M. Rogers[493] an important scholar in the early 1960s depicted innovation as being composed of four elements: innovation, communication, consequences on the social system, and consequences over time. Later Rogers[494]defined that innovation are composed of six sequential steps: needs/problems, research, development, commercialisation, diffusion and adaptation, consequences. In the early 1960s the phase-like distinctions between invention, innovation and diffusion, and an understanding of them as a sequential process became social facts, taken for granted in OECD literature.[495]

7.4.3. Problem of horizontality in STI policies

If we look at the discussion related to cluster policies they seem to have close links with theoretical debates and criticism related to cluster theories. Some scholars have interpreted that the cluster policies are an example of policy formulations in which theoretical models – cluster and diamond models – are imported to the domain of policy making. Thus the cluster policies must be seen as an exemple of such policy formulations.[496]

What makes the argument interesting is the fact that Porter's studies and his model of clusters have been criticized a great deal by economist in particular[497]. In Finland, Porter's models and ETLA's cluster analysis were never understood as scientific endeavours as such but they were adopted as a practical framework.

The cluster policies in different OECD- countries are naturally framed by the circumstances of adoption in terms of political intentions and chosen instruments. Hogwood[498] uses the idea of a policy cycle to describe the life span through which an

[490] Matchlup 1962, pp. 178–9.
[491] Freeman 1982, pp. 211–214.
[492] Maclaurin 1953.
[493] Rogers 1962, pp.12–20.
[494] Rogers 1983, pp.136.
[495] OECD 1966, p. 9.
[496] Jääskeläinen 2001.
[497] Penttinen 1994.
[498] Hogwood 1987.

idea is implemented and evaluated, a process that corresponds that when an idea is translated into actions.

Benneworth and Charles[499] adopt the idea of policy process cycles into clusters by stressing the fact that policy processes proceed from the political axis to the bureaucratic axis.

- The first stage of a cluster policy is the decision to use a cluster approach. Once the decision has been taken, the particular national meaning and state role in the approach must be debated. The determination of the state role affects the policy as it directs the set of tools which can be used. In Finland, clustering was introduced as a high-profile policy enabling also other policy areas to join the process. It also made possible a common government approach.
- The second stage is the selection and designation of clusters.
- The third stage is a more technocratic phase from strategy formulation to programme delivery. This implies the identification of willing participants, the determination of the aims and targets for the cluster, and the planning and delivery of actions.
- The fourth stage is an evaluation and reporting-back stage where lessons are learned and the possibilities of subsequent policy phases evaluated. The policy re-emerges in the political sphere, where its appropriateness and efficiency as a policy measure can be democratically debated and decisions made over the future cluster policies.

In order to analyze cluster policies in practice Benneforth and Charles pose six questions: 1) Why do governments choose cluster policy? 2) How do governments set the criteria for targeting a cluster? 3) How are the cluster policy instruments chosen? 4) How are general framework policies customised to specific clusters? 5) How does a government shape the development of clusters? 6) What role do governments play in supporting innovation in cluster?

Rather than providing a detailed summary of their analysis I will only highlight a couple of issues the scholars point out. The first interesting point concerns the question what makes the cluster approach so popular and attractive. Benneworth and Charles (2001) have a very simple explanation: low costs and high potential returns. They make a very interesting distinction by separating clusters and clustering. Whereas the former refers to an economic phenomenon, the latter refers to political phenomenon. Clustering is a process whereby inter-firm linkages and cluster externalities are built up. As a result hitherto disparate firms gain competitive advantages from their interaction.[500]

However, the explicate aim of policy making is somewhat unclear. Therefore, we have to analyse carefully two issues. First, we have to pay attention to the learning problem and ask how clustering is possible without favouritism. It follows that all paradigmatic policy renewals may be analyzed as a learning curve or process where the focus is what should be done or or should not.

This takes us to the second interesting dimension of the cluster framework the problem of its flexibility. We may put it otherwise and ask what is the governmental shaping of clusters: what is the role of government in supporting innovation in clusters. One of the most genuine goals governments have had is of course to influence cluster

[499] Benneworth and Charles 2001.
[500] Lagendijk and Cornford 2000.

behaviour, and the cluster policy style must be congruent with the national features and political culture. The key feature of a policy cycle is simply that the policy's degree of innovation tends to increase with the strength of the driver of change: the earlier the idea of clustering is developed in the policy cycle, the greater the influence the idea can exert on the policy framework.

Cluster policies became popular governmental tools because of their capacity to boost innovative performance. Some scholars have found out that many successful regions and nations seem to create and build connections between firms and technological suppliers and boost integrated technology transfer into innovation.[501] Later this finding was translated so that the less successful regions and nations could improve their economic performance with institutional and policy reforms borrowed from more successful regions.[502] This kind of thinking is very much in congruence with the learning economy and the idea of learning regions in which creating territorial institutions and mechanisms to facilitate business-led interactive learning is a kind of imperative for policy actions[503].

As the OECD -report summarizes, the cluster approach is a part of the growing family of innovation systems approaches. [504] They reflect the systemic character of modern innovation processes and the fact that innovations depend on market and non-market induced interactions among actors. Those interactions and interdependencies are based on trade and innovation linkages, and information flows transcend the borders of individual sectors and industries. The cluster approach, as the report's writers argue offers insights into how these linkages and interdependencies are shaped, how they evolve over time and how they affect innovation. The cluster approach has proved to be an analytic instrument but it also offers a robust organizing framework for addressing or removing systemic imperfections. It has proved to be a useful framework for developing and applying new forms of governance, moving away from direct interventions towards forms of indirect inducement. There is neither a standard cluster approach nor is there a fixed policy recipe for implementing the cluster approach in practice.

According den Pim et al the lessons from cluster policies are very much systems thinking favoured analysis:

> 1) Every country and region has its own selection of clusters and specialisations with different characteristics and role in the economy. Cluster studies are useful analytic instruments for understanding better how individual economies are structured, their specialisations, and the role that various clusters play in the wider economy.
> 2) Clusters – perceived as reduced NIS – are the relevant selection and variation environments in which firms and other types of organisations such as intermediaries or knowledge institutions operate and innovate.
> 3) The notion of an "ideal" innovation cluster is a fallacy. We may have four different arguments for it.
>
> a) Clusters have different backgrounds and country specificities.
> b) Clusters differ according to the characteristics of the knowledge base and the way in which knowledge is diffused.
> c) Seen from the life-cycle perspective the stage of cluster development vary. The whole idea of a cluster life -cycle points to the fact that the form of facilitation by policy makers will vary over the lifetime of cluster.

[501] Priore and Sable 1984.
[502] Lundvall and Johnson 1994.
[503] Florida 1995.
[504] den Hertog and Bergman 2001.

There is considerable variation in networking practices. Networking requires not only a certain level of trust and preparedness, but also an ability to define common goals, to engage partnerships across industrial sectors, to set up relationships with research institutions as needed, and to establish links with end-users or their representatives.

In addition, the writers make some very valuable remarks concerning the usefulness of the cluster perspective from the perspective of policy making. For policy makers, working with an analytic concept like cluster, there is always the danger that they test the flexibility of a concept and wishful thinking comes into play. And this is exactly what occurred in Finland.

Policy makers should also evaluate and analyze the cluster environment carefully enough. Clusters should not to be built on technologies, as tendency seems to be because this too technological emphasis leads to a bias towards technological knowledge and clusters dominated by manufacturing firms. The third challenge is that the cluster analysis must be linked to parts of the value chain that exceed national borders. In order to succeed, policy makers should achieve the right mix between analysis and action. A successful cluster policy depends on how policy makers are able to create the right framework conditions for innovation. It enables them to identify the barriers and building relationships as well as networks. Cluster studies can be a way of opening up a dialogue on how innovations take place in a particular cluster and of learning how policy makers can contribute to this process. The cluster approach is both an analytic tool for policy makers and a working tool to proactively created platforms and programmes for cross-disciplinary programmes.[505]

Interestingly, the writers stress very strongly that innovative clusters are shaped by all kinds of policies. Each cluster is affected by a complex interplay of policies influencing the trading environment, sources of innovation, nature of places in which cluster resources come together and the regulations of the cluster. A focus purely on "formal" innovation or industrial policy, without a broad historically contextualised perspective, will yield a narrow and myopic view. The policies aimed at supporting innovation in a cluster should determine the factors that influence innovation in clusters. There is a need to look at a wider array of policies and their interaction in policy systems. It follows that cluster policy makers might need to intervene in policy areas and policy domains that may not be immediately associated with innovation policy.

The writers argue that cluster policy *is a rather general approach* to policy making and *an action tool* enabling framework conditions to be optimized for innovations in clusters. This requires an almost missionary orientation on the part of policy makers to convince others who are not primarily interested in innovation to take innovation on board as one of the relevant steering criteria.

Clusters provide for policy makers a way of dealing with increased complexities and a better targeting policy by addressing particular systemic failures that hamper innovations. The main task for policy makers is to promote innovation in clusters and hence facilitate the networking processes and create institutional settings which provide incentives for market-induced cluster formation and forms of co-operation in both emerging and mature clusters.

Following den Hertog et al some risks in cluster policy making can be identified. The major risk in cluster analyses and cluster policies is that policy makers and researchers focus only on high-tech clusters and ignore medium- and low- tech clusters.

[505] See also Romanainen 2001.

Actually, they think that our traditional way of characterising clusters as low-, medium- and high- tech categories is misleading. It follows that working with standard policy models and using tool-push approach can be dangerous. Policy instruments and working tools are developed for particular vanguard clusters (e.g. ICT or biotechnology) and subsequently applied to other innovation clusters without consideration.

Cluster policies should be seen as a kind of customising sets of policy tools to the needs of a particular cluster and not about applying a standardised a way in different clusters. There is no magic recipe for the success of cluster policies but it is a constant process of learning and improving. The most importantissue is to create awareness and a constructive debate about the situation in each cluster. The ideal outcomes are a common agenda and initiatives and policies that strengthen innovation in clusters.

For policy makers the cluster approach is a challenge in the sense that policy makers have to combine their analytic skills to obtain an in-depth understanding of the innovation dynamics and innovation style of a particular cluster. It demands the flexibility in terms of deciding the most appropriate role for fostering innovation. This requires a trajectory of experimentation and constant policy learning that involves a lot of trial and error.

One of the biggest challenges is how policy makers deal with strongly internationalized clusters. Interpreted as a learning process implies cluster policy that policy makers must be able to change their policy measures and policy programmes. They have to yield a top-down approach and they have to be an integral part of the decision making.

In conclusion, den Hertog et al[506] represent a very challenging list for policy makers:

- Close the gap between cluster analysis and daily policy practice.
- Understand the whole set of policy tools available.
- Understand which tools to use when.
- Handle complex cluster programmes and projects.
- Withstand the pressure to use cluster policies for traditional industrial policy purposes.
- Act in various capacities ranging from sparring partners, programme managers, stimulating dialogue etc.
- Combine a fairly pragmatic action-oriented approach but at the same time be able to reflect on policy making as well.
- Switch between various clusters that might have different needs in terms of support and steering.

One example is the EU context is the ISE project[507] financed under the Fourth Framework Programme. Its explicit aim is to analyze the barriers and bottle necks of innovation policies utilizing the innovation approach.

The summary report stresses strongly that STI policies should be conducted at the national or local level unless some specific arguments point to the EU level. The report as well as the SI- approach itself emphasizes interactive learning: communication across national borders. The innovation policy should be seen as a broad policy domain and take into account the following taxonomy: 1) *Policies* to develop and strengthen the knowledge infrastructure; policies depend to a great extent on national decisions and

[506] den Hertog et al 2001.
[507] Edquist et al 1998.

investments. 2) *Policies* to develop some basic institutions which affect interactive learning; policies that increase trust, willingness, and ability to co-operate. 3) *Policies* to create specific organisations to support innovation activities; policies to support patent offices, standard setting agencies and technical service agencies. 4) *Policies* to improve conditions for financing innovation. These policies are termed *framework condition policies* but there are also *targeted or selective types of policies* when governments wish to intervene in the support of entrance and innovators. 5) *Policies* selectively or directly supporting the development of science and technology; public investment in R&D a significant component of overall R&D and knowledge creation in most European countries. 6) *Public* technology procurement policy; a demand side policy in which the effort to provoke or trigger innovation is the key issue.

Turning the setting other way round allows us to ask what makes clusters so important in the innovation context. The OECD has been, as we have seen earlier, one of the most powerful promoter of the innovation and learning economy paradigm. Two influential OECD reports[508] on clusters are of a great interest.

Originally, the term cluster was proposed in the OECD as an organizing metaphor or a reduced NIS concept. *The Innovative Clusters* report highlights the fact that the national economy consists of several reduced-form innovation systems represented by various distinct industrial clusters. It implies that any country's overall innovation system would necessarily include composite features of the innovation underway. The NIS framework was seen by many large OECD countries as requiring a fairly homogenous central policy approach, whose acceptability would therefore be greatest in the small national economies represented by the Nordic countries and the Belgian/Flemish fringe of Europe.

In the large OECD countries a double-reduced NIS concept makes sense within another vague concept, the RIS addressed to a regional innovation system. This implies that the cluster framework plays a key role in the formulation and implementation of innovation policies in many countries.[509] One of the most interesting findings in many countries has been that the value-chain cluster concept is useful in terms of analyzing the emerging role in the core process of innovation.

If we want to understand the relationship between clusters and innovations we have to ask how individual firms absorb and embed available innovations or their inherent capacity to generate innovations. The cluster approach has been adopted by many countries since early 1990s but I will briefly discuss two cases, The Netherlands and Finland. The Netherlands[510] was one of the first countries to adopt a cluster perspective as a part of innovation policy.

Due to the novelty of the concept, the adoption of the cluster framework in the Netherlands has involved a lot of experimentation and learning. We may think that those experiments have been as much political lessons as conscious policy making. The introduction of the framework has taken place through four elements: competition policy and deregulation, general technology policy, macroeconomic policy, and solid and reliable physical infrastructure. The Dutch policy makers and the Ministry of Economic Affairs in particular have consciously attempted to create a favourable and stable entrepreneurial climate. Their argument has been that only then can firms focus

[508] OECD 1999.
[509] OECD 2001, p. 9.
[510] OECD 2001, pp. 361–376.

on improving their competitiveness and innovation potential. The policy has tried to identify that potential and stimulate innovative clusters.

One of the most important lessons the Dutch policy makers have learned is the fact that the government fulfils very different roles in different clusters. Each cluster is unique and the appropriate role for the government depends on the specific context of the cluster. Although the participants of a cluster may have a shared vision for strengthening the cluster, a follow-up is not automatic. The follow -up problem became transparent in some clusters that have been too broadly defined, making it difficult to agree on follow-up which would benefit all stakeholders.

Another issue the analysts wanted to stress was that it is useful to distinguish between newly emerging clusters from more mature clusters. The challenge in dealing with the new emerging clusters is that the boundaries are not easy to determine. This implies that it is important to understand and define all the relevant players in the cluster because the clusters are different. Clusters may vary along various dimensions: demand, the type of knowledge, or the way in which clusters create new knowledge. Science-based clusters are at the forefront of new technological developments and constantly generate new knowledge where other clusters absorb the knowledge outside the cluster.

The analysts list four aims for cluster policy by referring to the idea of systemic imperfection:

- Limited interaction. The firms do not interact and therefore potentially fruitful opportunities for learning and innovation may be missed. An appropriate policy response may be to facilitate the development of a common infrastructure to enable firms to communicate.
- Informational imperfections. The firm's lack of insight into future technological and/or business developments constraints the innovative potential of a cluster. An appropriate policy response is to develop a common understanding of these key trends together with industry and knowledge institutions. This can be done by means of foresight studies, technology radars, market studies or technology roadmaps[511].
- Mismatch between knowledge infrastructure and business needs. This refers to a situation in which public knowledge institutes develop knowledge too far from business needs. Knowledge may be too "scientific" and not sufficiently application oriented. The responsibility of an appropriate policy response is more on educational policy side and it raises many questions e.g. what parts of academia must be involved in the innovation policy agenda.
- Lack of demanding customers.

In Finland[512] the development of the cluster approach was a long process as discovered earlier. The Finnish industrial policy renewal had two origins. It was clearly a genuine enterprise to find a new broader approach to technology and industrial policies in which the forestry and metals industry were the two pillars of the economy. It was an essential part of implementing the innovation paradigm in general. "NIS thinking" had gradually entered the policy discussions and it made it relatively easy to get policy makers to adopt the cluster approach.

Earlier interventions were very practical, but in 1996 the Science and Technology Policy Council Review (STPC review 1996) spoke about clusters at a general level. It

[511] Technology roadmap refers to a political process where all relevant actors portray together a future path for a specific technology.
[512] Romanainen 2001.

followed that the cluster approach was integrated to the implementation of science and technology policy rather than being a dominant policy dimension. In terms of application Finland chose another way than the Netherlands. The main objective for the inter-ministerial cluster-based programmes introduced in the STPC review in1996 was to improve collaboration between the various ministries and the sectors of government.

The idea of those programmes was of course based on the cluster approach. Yet their primary aim was to open up a totally new arena for innovation policy developments. The programmes wanted to gather together all stake holders, companies, research institutes and companies, but also these sectoral government research laboratories and users to plan and execute joint projects.

By introducing the inter-ministerial cluster programmes the Government wanted to duplicate work that had been done earlier. The management of these programmes was carried out by programme steering committees, comprised of funding organisations and major stakeholders. The specific objective was to create and improve linkages between government (ministries), research and industry. The political aspects of the Finnish cluster programmes were versatile. They have provided a totally new approach to innovation policy and a new approach to emerging industrial contexts. They have also been valuable in terms of policy implementation. They have contributed to cross-disciplinary thinking and approaches in general.

The core of cluster policies has been the problem of re-organizing national government structures rather than Porter's idea of competitiveness as such. The framework has provided a legitimation basis for governmental re-organization as well as for new visions for science and technology policies.

The other aspect of cluster thinking has been the problem of the public sector as such. In the course of time this aspect has become more and more relevant and it was also perhaps the most problematic part of the welfare cluster case. This aspect is taken into consideration in the next chapter.

7.4.4. STI policies and the welfare state

The economic settlement of the classic welfare state is often identified with the Keynesian welfare state or Keynesian social democracy.[513] The governments consider it as their duty to secure a high and stable level of employment. This aim was linked with Keynesian demand management. One of the key arguments of the very complex Keynesian approach is that the market forces do not necessarily produce full employment and therefore governments should intervene in the economy by managing demand[514].

Post-war governments increased competition in order to maintain a high level of demand. The focus was on macro economic policy and demand management so that they would be able to control unemployment. It is important to understand that different countries applied the Keynesian apparatus in different ways. So Keynesianism does not only equate the classical welfare state because for example the USA and Japan have used Keynesianism but very differently.[515]

It is also problematic to find the link between the Keynesian economic policy and economic growth.[516] The oil crisis in the early 1970s changed the Western economies

[513] Hughes and Lewis 1998.
[514] Glyn 2001.
[515] It is important to be aware that Nordic welfare states and they used it otherwise than the UK.
[516] Castells 1991.

dramatically and also the Keynesian policy faced many problems. Monetarists argued that the Keynesian policy leads to increased inflation and stagflation.[517]

One of the most interesting accounts of Keynesianism is given by Bob Jessop. In his analysis Jessop differentiates between three complementary approaches to articulate the economic and the political in contemporary capitalism.

First, the regulation approach suggests that the market forces are merely one factor of the capitalist expansion. In its broadest sense the economy includes both economic and extra-economic factors, and it must be understood as an ensemble of socially embedded, socially regularized and strategically selective institutions, organizations, social forces and actions organized around it.

Second, Jessop treats the state as an ensemble of socially embedded and socially regularized institutions, organizations, social forces and activities around it. The neo-Gramscian analysis highlights the complex and variable articulation of government and governance in underwriting state power. The state system is far more comprehensive than judico-political institutions which cover, however, important socio-cultural aspects in their relations to the state.

Third, Jessop sees that the economy is an imaginatively narrated system that is accorded specific boundaries, conditions of existence, typical economic agents, tendencies and countertendencies as a dynamic system.

His description of Fordism focuses on four aspects: a labour process (the mass production of complex durable goods), a macro-economic system (mass production and consumption in a national economy), a social mode of economic regulation (institutionalized collective bargaining and a Keynesian welfare state) and its general implications for social organization and cohesion (an urban-industrial wage-earning society).[518]

Post-Fordism in terms of those four dimensions can be defined as follows: a flexible production process based on flexible machines or systems and flexible workforce; the dominance of a flexible and permanently innovative pattern of accumulation; supply-side innovation and flexibility in the main areas of regulation; a social mode that is too difficult to anticipate.

Jessop argues also that there has been an on-going transition process from a Keynesian welfare national state approach (KWNS) to a Schumpeterian workfare state approach (SWS). Politically, it implies that the domestic full-employment aim and redistributive welfare rights are de-prioritized in favour of international competitiveness.

The key features of KWNS are:

- Among the various spatial scales of formal political organizations, state level was regarded as primary. The key supranational institutions comprised various international and intergovernmental agencies; typically organized under U.S. hegemony these were designed to promote cooperation among national states in securing certain key conditions in the post-war economics.
- State economic strategies and economic regulation assumed a relatively closed national economy. The international economy was understood in terms of financial and trade flows among various national economies.

[517] Dell 2000.
[518] Jessop 1994.

- Among the various spatial scales of economic organizations, the national economy was accorded priority for state action, defined and measured in terms of national aggregates, and managed primarily in terms of targeted variation in these aggregates.
- The primary object of welfare and social reproduction policies was the resident national population and its constituent households and individual citizens.
- The primary units of the state's social basis were individual political subjects endowed, as citizens of the national state, with various legal, political and social rights, and who were organized as members of economic-corporate organizations and/or as supporters of responsible political parties.
- The axis of struggles over political hegemony at home was the "national-popular" and its realization in the development, expansion, and protection of such rights in an "economic-corporate" political process.

Jessop's central argument is that while such framework is no longer valid, it is alive in institutional and administrative settings and structures. The reorganization of the KWNS has started and deepened since the 1970s and it is articulated in three major trends: denationalization, destatization, and internationalization.

The first trend of denationalization refers to the politico-economic processes in which the traditional functions of national states are transformed and shift their traditional sovereignty towards various supranational regimes and coalitions. This process implies that the cultural, judicial, political, economic, social conditions of the national sovereignty are re-defined. Another side of this process is that the boundaries of spaces and scales at the sub-national level become unspecific and their interests go occasionally beyond the nation state interest.

The second trend is the shift from the centrality of government to more decentralized forms of governance. It involves movement from the taken-for-granted primacy of official state apparatuses towards a taken-for-granted necessity of varied forms and levels of partnership between official, parastatal, and nongovernmental organizations in managing economic and social relations. The emphasis is on promoting and/or steering the self-organization of inter-organizational relations.

Although public money and law would remain important in underpinning their operation, other resources – private money, knowledge and expertise – are also critical to success. In particular, there is a growing interest across a wide range of academic and professional disciplines and fields of social activity to be attached to network and partnership arrangements in corporate and regional governance. The expansion of regional-local, supranational, and trans-local or cross-border linkages has played a major role in the growth of governance at the expense of national government.

The third trend refers to the increased strategic significance of the international context of domestic state action and the latter's extension to wide extraterritorial or transnational factors and processes. This shift blurs the distinction between domestic and foreign policy and widens the territorial bases of actors who are either directly involved in decision making and/or whose opinions are taken into account.

This trend is reflected in economic and social policy insofar as the prime object of economic and social intervention by nation-states in North America and in the EU has changed from the well-balanced domestic performance of the national economy to its overall international competitiveness understood in very broad terms. It can be seen in the shift from the Keynesian welfare concerns of the post-war nation-states to less state-centred Schumpeterian workfare concerns in an emerging new political regime.

Economically, such concerns involve promoting product, process, organizational, and market innovations in open economies in order to strengthen the structural

competitiveness of the national economy by intervening on the supply side. Socially, they subordinate social policy to the needs of labour market flexibility and/or to the constraints of international competition.

Jessop suggests that the possible erosion of the nation-state is a decisive factor in contemporary politics but continues that erosion must be understood as a process of decomposition involving a progressive loss of effective state unity. This does not imply that specific state apparatuses tend to disappear, it rather entails that a loss of their coherence in securing state functions is tied to a specific state project. Erosion can be discerned in the internal disarticulation of state apparatuses and in declining effectiveness. Put differently, there is a loss of horizontal coherence across different organizational levels and of different domains of state activity. Schumpeterian workfare regime changes the focus of the national policies: 1) domestic full employment is de-prioritized in favour of international competitiveness; 2) redistributive welfare rights take second place to a productivist reordering of social policy; 3) the primary role of the national state is deprivileged in favour of governance mechanisms operating on various levels.

The first break means that job creation is seen to depend heavily on the active management of the supply side and on the flexibility of the labour force rather than from effective management of national demand. It naturally shifts the goals, guidelines and agendas of various national political reforms.

The second break is complicated and multifaceted. Jessop highlights a change in the "workfare-welfare" mix, an ongoing shift in the importance of welfare rights linked with tax and/or contribution based consumption of services. Welfare rights tend to become residualized and their provision subject to restrictions on demand and to downward cost pressures, especially for those excluded from the labour market due to age or incapacity.

Jessop's conclusion is that the emergence of a new accumulation regime and its mode of regulation i.e. the replacement of KWNS involve a cultural revolution as well as radical institutional innovation. Its central point is the emerging meta-narrative concerning globalization and its translation into pressures to prioritize the structural competitiveness; this meta-narrative has been linked with other widely accepted sets of diagnoses and prescriptions for the economic and difficulties confronting nations, regions and their various economic branches. According to Jessop the second major set of meta-narratives stresses the collapse of communism and the economic threads from East Asia.

One of the most important aspects of the continuing restructuring and reorientation of the Keynesian welfare state is in Jessop's view that governments highlight how essential it is in our global age to modify economic strategies, economic institutions, modes of governance and the form of the state. These must be redesigned to prioritize "wealth creation" in the face of international, interregional and intraregional competition.

States have become actively involved in generalizing new norms of production and consumption through such measures as privatisation, fiscal incentives to investment and enterprise, flexibilization and market proxies in the public sector, workfare and learnfare rather than social citizenship entitlements, and promoting public-private partnerships.[519]

All these aspects become more tangible in the light of the New Labour's third way policies.[520] The Third Way is seen as a new alternative different from the classic welfare

[519] Jessop has developed his ideas further. See Jessop and Ngai-Ling 2006.
[520] Giddens 1994; Giddens 1998.

state and the restructured welfare state but its basic values are based on the welfare state ideology. The most significant criticism against the Third Way is that the New Labour has moved from the equality to inclusion and from equality of outcomes to equality of opportunity.[521] It has advocated openly the knowledge economy and insisted that social policy is the other side of economic policy.

"Old style social democracy concentrated on industrial policy and Keynesian demand measures, while the neo-liberals focused on deregulation and market liberalization. Third way economic policy needs to concern itself with different priorities – with education, incentives, entrepreneurial culture, flexibility, devolution and cultivation of social capital."[522]

The New Labour tends to abandon redistributive, egalitarian policies in favour of moralistic and social integration policies. Viewing inclusion solely through work, policy makers understate the importance of services in kind. Its claim is that it has moved from fiscal redistribution through the tax and benefit system to an emphasis on redistributing opportunities and assets. The New Labour claims that if the right tended to stress the duties of citizenship and the left tended to stress the rights of citizens, the third way involves both of them. The third way of citizenship moves from "dutiless" rights towards "conditional welfare".[523]

The New Labour has pragmatically embraced the private sector and hence been very selective.[524] In comparison with traditional social democrats the New Labour will not subscribe to monetarism but they rather argue that the role for demand management is too limited. If the older social democrats focused on the problems of demand, macro-economic policy and full employment, the New Labour outs its focus on supply, micro-economic policy and employability.[525]

Bonoli et al[526] outline three types of welfare state responses to globalization. 1) Globalization requires welfare retrenchment to reduce public expenditure and taxes. 2) It requires more rather than less government provision of public services. 3) A middle type emphasizes the compromises between welfare and competitiveness.

The first position is based on the neo-liberal argument that the welfare state causes economic problems for governments – social welfare undermines incentives to work and savings for individuals. High tax rates persuade firms not to invest and they may find a better location. Bonoli and his colleagues argue that these arguments while limited, are valuable for governments in that they provide ideological ammunition for welfare retrenchment.

The second position argues a contrary view: competitiveness requires state welfare. Because rich western countries cannot undercut their wages they have another option. They have to choose high technology and knowledge which means that they need skilled and well-educated labour force.

The third position is a kind of compromise between welfare and competitiveness. It stresses investments in the health sector and education and prefers paid work rather than welfare: economic and social policies are different sides of the same coin. Shin detects some common trends in most welfare states – a market-conforming policy on business taxation, a reduction in the share of employers' contributions to social protection

[521] Lister 2000.
[522] Giddens 2000, p. 73.
[523] Powell & Powell 2002.
[524] Glennerster 2001.
[525] Giddens 1998; Giddens 2000.
[526] Bonoli and Taylor-Gooby 2000.

revenues, more limited income security programmes, an increased allocation of resources for active labour market programmes, and less state intervention in the labour market.[527]

There are three different views on the relation between politics and welfare: discussion on citizenship, institutions and politics as such. Pierson[528] has proposed a thesis which regards the welfare state as a politicized version of the modernization thesis; the welfare state is a product of successful political mobilization to attain full citizenship in the context of industrialism.

In his analysis Esping- Andersen (1990)[529] has distinguished three worlds of welfare capitalism – social democratic, Christian democratic and liberal regimes. Hs central argument is that politics has played a decisive role in the construction of welfare regimes. Today's problem is whether politics still matters.[530] The nation-states have naturally new pressures and challenges but there is little clear evidence of actual convergence. The impacts of globalization seem to be more ideological and provide a convenient rationale or excuse for political action or non-action.[531]

Horizontality and the public sector reform

One of the issues embedded in the transition of the welfare state is closely linked with the problem of horizontality in STI policies. My argument has been that to understand the welfare cluster intervention we have to link the idea of horizontality embedded in STI policies with the rationale of new governance. In other words, the idea of welfare cluster intervention must be understood not only in terms of STI policies but also in terms of reforming the public sector in general. In the early 1990s Finland also started a series of reforms in the public sector and the welfare cluster must be seen as a part of this process. But what is the point behind the public sector reforms?

One of the best selling management texts or business texts ever has been the book "*In Search of Excellence*" by Peters and Waterman.[532] It was based on Douglas McGregor's X-Y theory's eight themes: structure, strategy, systems, management style, skill, staff and shared values. This and another text written by Newman and Clarke [533]developing the "excellence" approach focus on building long-term capacity through transforming relations with customers and staff empowering staff. The approach aims at transforming the values and culture of the workforce and strengthening the commitment to organisations through partnership and the flattering of hierarchies.

Flynn[534] outlines six general issues: from equality of treatment to the promotion of different treatment for different people, from universal eligibility towards targeting, from public provision to the mixed economy of welfare, choice, from local policy to central control combined with an opposite move towards more local managerial and financial autonomy, and funding based on some measure of performance or volume of work. The

[527] Shin 2000.
[528] Pierson 1998.
[529] Esping-Andersen 1990.
[530] It is claimed that in the era of globalization such international agencies as the International Monetary Fund (IMF), World Bank, International Labour Office (ILO), Organisation for Economic cooperation and Development (OECD) and the European union have become more powerful than national states.
[531] Mishra 1999.
[532] Peters and Waterman 1982.
[533] Newman and Clarke 1994.
[534] Flynn 1997.

difficulty is to differentiate the old and the new management because the change seems to be non-linear and very complex.

Newman and Clarke argue that the organizational construction of the classic welfare state was structured by two modes of coordination: by bureaucratic administration and by professionalism. The new public management perspective is different because it advocates the application of market mechanisms and the marketization of public services. Ferlie et al (1996)[535] maintain that the evolution of new public management involves two modes.

The first mode, the NPM model 1, highlights the efficiency drive. It was dominant throughout the early and mid-1980s and its aim was to make the public sector more business-like. The second mode, the NPM- model 2, focuses on downsizing and decentralization, and on such issues as contracts, quasi-markets and contracting out.

A mixed economy of welfare has close links with the new management but its conceptual framework is different and utilizes the market, hierarchy and networks separation. It points to moves toward the greater use of markets but also towards the voluntary and informal sector as well. The state is part of a wider mix of welfare. This perspective involves also a kind of welfare pluralism. The distinction between production, finance and regulation is important here because the welfare mix perspective highlights the responsibility of NGOs and enterprises.

Paul Koch and his colleagues in their analysis of innovation in the public sector[536] remark that if we define innovation as deliberate changes in behaviour with a specific objective in mind innovation is often problem solving. The emphasis is on novelty as Green et al. remark: "*innovation is not merely synonymous with change. Ongoing change is a feature of most… organisations. For example the recruitment of new workers constitutes change but is an innovative step only where such workers are introduced in order to import new knowledge or carry put novel tasks.*" [537]

Koch et al.[538] mapped different kinds of barriers and drivers for innovation in the public sector as follows: *Size and complexity*: the public sector comprises extremely complex and large-scale organisational entities that may develop internal barriers to innovations. *Heritage and legacy*: public sector organisations are prone to entrench practices and procedures. *Professional resistanc:* there are professional groupings with their own communities of practice, belief systems and perspectives. *Risk aversion: p*ublic organisations are under the close scrutiny of both politicians and the media, and employees are not normally rewarded for taking risks. *Need for consultation and unclear outcomes:* the large range of stakeholder involvement generates a strong requirement to consult and review and planned changes. *Pace and scale of change:* there have been so many reforms that employees are becoming "innovation fatigued". *Absence of capacity for organisational learning:* there may be a lack of structures or mechanisms for the enhancement of organisational learning. *Public resistance to change:* elements of the public might be risk-averse. *Absence of resources:* there may be lack of financial support or shortages of relevant skills or other support services. T*echnical barriers:* there may be lack of technical solutions to the problem at hand.

In spite of all these barriers Koch et al find also a lot of important drivers or facilitators for innovation as follows: *Problem- oriented drivers:* people innovate in order to solve certain problem. *Non-problem oriented drivers:* innovations may improve on the

[535] Ferlie et al 1996.
[536] Koch et al 2006.
[537] Green et al 2001.
[538] Green et al, p. 2.

former situation. *Political push:* strategic change frequently requires strong, top-down, political will. *Growth of culture of review:* assessment practices may stimulate innovation. *Support mechanism for innovation:* authorities may implement policy measures aimed at funding and encouraging innovation. *Capacity for innovation:* public employees have often high levels of professional expertise, creativity and problem solving. *Competitive drivers:* performance targets may encourage the use of innovative approaches. *Technological factors:* technological innovation can be a strong determinant for subsequent innovation. *NGOs and private companies:* models developed by NGOs and private companies may be adopted by public institutions.

The discussion related to horizontality must be understood as a component of accountability as discussed earlier. The idea of accountability is based on the idea that governments are responsible to their citizens for the good governance of the nation. It means that the ministers and the cabinet are responsible to the parliament for policy formulation and general implementation. Also, ministers and their departmental staff are responsible for detailed policy implementation and the provision of specified public services as authorised by parliament to eligible citizens. The accountability obligation of the governments arises from the nature of representative democratic government. Democratic governments are elected by citizens to act in the best interests of the nation on their behalf. There is an implicit requirement for public trust in the operations of government, as is embodied in the responsibility for accountability.[539]

The birth of new public management in the 1980s is often seen as a reaction against allegations that governments are too large, inefficient, ineffective and unresponsive to change, and therefore they are not competitive enough. One of the key arguments among the public choice theorists, a group of economists from Chicago University, was that the number of government employers should be reduced through the privatisation of government enterprises and the outsourcing of remaining public services to private firms whenever possible.[540]

Privatisation and the welfare state: a dilemma of public good

The idea of the public sector is sometimes linked with the idea of public good. Most economic arguments for government intervention are based on the premise that the marketplace cannot provide public goods or handle externalities. Public health and welfare programmes, education, roads, R&D, national and domestic defence and so forth are often understood as public goods. But what are these public goods?

One of the most technical definitions[541] of a public good is made by Paul Samuelson who says that a public good is a good which once produced for some consumers can be consumed by additional consumers at no additional cost. In this way public goods have two characteristics: nonexcludability and jointness in consumption. Nonexcludiability means that it is difficult to keep people from consuming the good once it is produced and jointness in consumption is exactly Samuelson's definition. But although economists give a strict definition to the notion of public good, they usually refer in public debates to the public sector; it conveys the connotation of government production. In effect, public goods are often understood as government-produced goods implying that they should have those two aspects introduced above.

[539] Barton 2006.
[540] Hood 1995.
[541] Samuelson 1954, pp. 387–389.

Technological progress can create new public goods such as street lights, roads, radio and television broadcasting or health care equipment. In terms of economics public goods provide a very important example of market failure in which market-like behaviour of individual gain-seeking does not have efficient results. A classical dilemma related to public goods is the free rider problem and another dilemma concerns the term global public good.

Both of these dilemmas are present in the discussions of the welfare state. The premise of the welfare state tradition is that the state intervenes in the mechanisms of the market by regulation, by finance, by public production and by income transfers.[542] The first three interventions involve direct interference in the market mechanism and the fourth may have indirect effects.

In reality, the state interferes with the free market through a large number of regulations. Many of these interventions are relevant to the efficient and/or equitable operation of markets. The regulation of quality is concerned mainly with the supply side. Finance involves subsidies applied to the prices of specific commodities. It changes the slope of the budget constraint facing individuals and firms. Prices can be affected by a variety of taxes.[543]

Regulation and finance modify the market but they leave the basic market mechanism intact. The state can take over the supply side by producing goods and services itself; the state owns the capital inputs and employs the necessary labour. The finance and production must be separate forms of intervention. This distinction is usually critical in the issues of privatisation.

The Invisible Hand theorem asserts that a market allocation will be automatically efficient *if and only if* the assumptions of perfect competition, the absence of market failures, and perfect information all hold. If even one of these assumptions fails, the resulting market equilibrium will generally be inefficient and the intervention is appropriate. Perfect competition must hold in the product and factor market, and also in the capital market. The assumption is that economic agents must be price-takers and they must have equal powers. It means that there are no entry barriers in any market. In the presence of monopoly and oligopoly this is not possible.

One of the most problematic issues in the debates on public and private provision concerns the issue of privatisation which involves four different cases. The figure below illustrates the themes and tendencies involved in debates on privatisation. Box 1 illustrates the case in which production is private; here total supply is determined by producers; individuals decide how much to consume and pay for it themselves. Box 2 is otherwise identical with Box 1 but individual consumption is financed by the state. Box 3 illustrates private market subject to regulation. Box 4 illustrates private production modified by both regulation and finance.[544]

[542] Barr 1993.

[543] This idea was originally introduced by Arthur Cecil Pigou an English economist, who suggested the distinction between private and social marginal products and costs in welfare economics. His point was that governments can via a mixture of taxes and subsidies, correct market failures i.e. to correct negative externalities. See Pigou 1932.

[544] The figure is based on Barr's analysis which gives an excellent account of the problem. See Barr 1993.

PRODUCTION

FINANCE	Private	Public
Private	1	2
Public	3	4

Figure 4. Discussion on public and private provisio

This table becomes more tangible and closer to reality if we add regulation to finance and production. There are different options available.

- Option 1. *A pure private market*,
- Option 2. *A private market plus state finance (income subsidy*),
- Option 3. *A private market plus regulation:* 3a) a market in which there is the regulation of individual consumption, 3b) a market in which there is the regulation of total supply,
- Option 4. A market in which private production, state regulation and finance are intertwined: 4a) a market in which supply is wholly private, 4b) a market in which total supply is determined by state,
- Option 5. *A market in which public production, private allocation and finance are intertwined:* 5a) a market in which supply is determined by private demand, 5b) a market in which supply is wholly public,
- Option 6. *A market in which public is apart from private finance,*
- Option 7. *A market in which public is apart from private consumption decision*,
- Option 8. *A pure public market.*

The debates on these issues is a crucial part of modern politics and decision-making. One of the most difficult debates relates to social and health care. The main problem in the discussion has been: 1) how efficient or just is a competitive market for health care likely to be, 2) to what extent would public production and allocation be more efficient or just and 3) would any intermediate system involving both public and private sectors perform better than either of these two cases.

In Finland, the alternative 3 has been predominant in health care.[545]

"Since the market mechanism fails to reveal consumer preferences in social wants, it may be asked what mechanism there is by which the government can determine the extent to which resources should be released for the satisfaction of such wants .... A political process must be substituted for the market mechanism".[546]

The theories of welfare economics usually see the problem of efficiency/scarcity, known as Pareto optimality principle, as their major problem: "*The community becomes better off if one individual becomes better off and none worse off*". This means that the economy must achieve exchange efficiency in terms of whatever goods are produced for the individuals who value them most. It also means that there must be production efficiency, which means that in a given society with its resources the production of one good cannot be increased without decreasing the production of another.

The economy must achieve also product mix efficiency so that the goods produced correspond to those desired by individuals.[547] If there are important market failures such as imperfect competition, imperfect information, incomplete markets, externalities, public goods, and unemployment, the market is not Pareto efficient and the role of the government becomes crucial. In principle, there are two roles for the government either to make an intervention in the market, to make a Pareto improvement, or to start political processes and change existing bureaucratic and institutional structures. This kind of interpretation allows a lot of opportunities for political rhetoric. This has been also the situation in the debates concerning the welfare state.

If we want to think like a public sector economist and our problem is that societies make choices concerning the use of limited resources, then we have to present four questions[548]: *What is to be produced? How is it to be produced? For whom is it to be produced? How are these decisions made?*

This implies that governments must design schedules for their own production possibilities where they clarify for example the guidelines for the public -private allocation policies. The governments must also solve the problem of distribution by deciding the guidelines for their taxation policies and welfare programs. In Finland, the privatisation discussion has followed these guidelines.

7.5. Cultural and national dimensions in STI policies: The fourth move

A cornerstone of STI policies has been its dependence on national characteristics and histories. This national component has played a crucial role, in particular, in the Finnish decision making related to STI policies. The welfare cluster reveals another aspect of the Finnish STI policies because it was a very "Finnish" exercise. This also explains its idiosyncratic nature and highlights its significance for STI policies in Finland.

7.5.1. Consensus and the Finnish political culture

Nelson and Winter[549] have pointed out that public policies tend to follow certain nationally rooted trajectories because most of changes occur locally and the selection

[545] Järvelin 2002.
[546] Musgrave 1959, pp. 6– 8.
[547] Stiglitz 1999.
[548] Stiglitz 1999, p.14.
[549] Nelson & Winter 1982.

environment is comparatively constant. There are durable and important differences in national characteristics that shape and constraint national systems. Because countries learn and copy from one another policies have become more and more convergent.[550] Internationalization and competition among companies and nation states are certainly central reasons for such homogenization.

Dimaggio and Powell[551] suggest that the processes of homogenization should be analyzed as an isomorphic process. They argue that bureaucratization and other forms of organizational change occur as the result of processes that make organizations or organizational fields more similar, but they do not make them necessarily more effective. In the initial stages of their life cycle, organizations often display diversity in approach and form, but they seem to become more similar later.

Bureaucratization and other forms of homogenization emerge out of the structuration of organizational fields[552], and those aggregates attempt to constitute a recognized area of institutional life. Fields exist only if they are institutionally defined and structures. Dimaggio and Powell distinguish between three different mechanisms through which institutional isomorphic change occurs: coercive, mimetic and normative isomorphism.

Coercive isomorphism results from formal and informal pressures by organizations upon which they are dependent and by cultural expectations in the society within which organizations function. Coercive isomorphism can be subtle and implicit and stem from political influence and the problem of legitimacy.

Mimetic isomorphism results from standard responses to uncertainty. When organizational structures are unspecific, or goals ambiguous, or when environments create symbolic uncertainty, organizations may model themselves after other organizations. Uncertainty encourages imitation and in spite of the quest for originality, organizations must take into account other organizations. Naturally, if particular forms of organizations have been successful, organizations seem to follow them.

Normative isomorphism is related to the collective struggle of members of an occupation to define the conditions and methods of their work, and establish a cognitive base and legitimatization for their occupational autonomy. Professionalization, as Dimaggio and Powell call it, may lead to the formation of elites who define appropriate models of organizational structure and policy. As a result of this organizational structures may become rigid and taken for granted for decades. The political construction of science and technology policies in various countries seems to be very much in line with this kind of isomorphism.

Consensus and economic policy

One interesting perspective advocating a sort of isomorphism linked with the Finnish political culture is introduced by two Finnish economists, Jukka Pekkarinen and Juhana Vartiainen. [553] Their analysis focuses on the history of the Finnish economic policy seeking to explain the dramatic changes in the 1980s and in the 1990s. Finland's economic policies changed drastically in the 1990s when Finland joined the EMU and replaced the Finnish mark with the euro.[554]

[550] Lemola 2002.
[551] Dimaggio and Powell 1983.
[552] Giddens 1979.
[553] Pekkarinen and Vartiainen 1995.
[554] Scheller 2006.

In economic policy debates in Finland there has been a certain tension between two groups: the intellectual community of economists and a looser group of politicians, civil servants, interest organizations, press and the general public. Those two communities conceive of the scope, targets, constraints, tools and evaluation criteria of the economic policy in different ways. In Nordic countries including Finland tension between economic theory and economic policy has manifested itself in the argument that the formulation and implementation of national economic policies is one of the central tasks of the government. The whole existence of a nation-state is thus based on the country's economic performance. This has been especially evident in small open economies.[555]

These countries seem to have a relatively well-established national framework of ideas concerning economic policy, a framework is often called the national policy model. The policy model is nationally specific in the sense that no matter how similar the actual economic development of different capitalist countries, the style of argumentation about economic policy and corresponding balance among policy measures still differs remarkably from one country to another. The national policy model implies a lot of nation-wide coherence. In other words, there is a common framework to all parts of the national economic policy debate, which means that there is a common and coherent way to speak about the economy and formulate the problems and agendasof economic policy.

The national economic policy model is created out of the broad economic-structural, cultural, social and institutional context of each country, and there are several features that seem to have a storical legacy. One of them concerns *the economic structure of* each country. Here particular attention will be paid to the industrial structure of the economy, its stage of development, and to the structure of foreign trade as an external constraint on economic policy. Another feature is linked with ideological factors and concerns the role of *the state* in the economy.

The economic structure of each country is present in the *power* structure of classes and interest groups. Naturally the *institutional* features of states affect the ability of a government to innovate, implement and institutionalize different types of economic strategies. The status of government bureaucracy is relative to politically representative bodies. A strong bureaucracy may insulate policy from various policy pressures but it may also limit the influence of outside economic theorists over policy.[556]

As Pekkarinen and Vartianen[557] in their analysis on the Finnish economic policy tradition argue, the national model is "hidden" and taken for granted but in the era of crisis it becomes transparent. Consequently, the model itself finds itself in a crisis because the correspondence between economic theory and its structural determinates disappears. A national economic policy model based on the organization approach refers to a totality in which economic theory, political ideology, economic agents, national traditions, the stage of development and changes in the international environment form a complex system.

While the Finnish policy model has many parallels with other Nordic countries and, in particular, it is argued that it has similarities with Sweden, this is not the case. The Finnish model has displayed a rather one-sided emphasis on supply, cost and competitiveness factors, which relies on some pre-Keynesian elements such as the quantity theory of money for example, and Finland has never abandoned the principle

[555] Pekkarinen 1988, p. 3.
[556] Pekkarinen 1988, pp. 5–7.
[557] Pekkarinen and Vartiainen 1995.

of sound finance. Curiously, the Finnish policy model has only few links with post-war economics. On the contrary, even the model itself has been opaque, never spelled-out by economists or policy makers. The model stems from the interwar era and has been a part of the national culture.[558]

The Finnish policy model reflects the strong position of bureaucracy in Finnish policy making. Cabinets in Finland have traditionally been short-lived, but the role of bureaucracy has been enhanced. The Finnish economic policy has largely been a result of the bureaucracy's daily routines of policy preparation and implementation.

From the historical perspective one of the central aspects in Finland has been a strong governmental intervention in the economy. During the Second World War and, after the war, the state played a strategic role in the organization of production so that the country could pay its agreed war damage remunerations to the Soviet Union. The development of the productive structure and the fostering of necessary investments were seen as the main economic policy goals of the period. State-owned companies were established and the metal industry was created mainly through state initiatives designed to cover the war reparations. Simultaneously, new welfare programmes were also started. The public sector remained large, and both economic and social policies were interventionist.

A character of the Finnish policy model has been very obvious; the Finnish fiscal policy has been anti-Keynesian in character. It has relied on the principle of sound finance, that is, that the state has traditionally been a net saver. This results from the idea of balancing the budget without financing it by loans even though the state's own financial investments are counted like current expenditures. The emphasis has been on the need to enhance the competitiveness of the industry by curtailing its costs through fiscal measures. It has been in accordance with the old British Treasurer's View: every penny lent by the state diminishes private economic activity by the same amount.[559] In other words, Finnish fiscal policy has tended to reinforce rather than counterbalance the underlying cycles of the economy.

The Bank of Finland has played a major role in maintaining the continuity of the Finnish policy model at political and institutional level. It has controlled fiscal policy to oppose the growth of state expenditure and hamper attempts to implement more countercyclical budgeting. As a result the state has been seen as an economic agent comparable to any private one while it has operated perhaps more severe budget constraints than private economic agents.

Interestingly, the Finnish economic policy forms a domain of its own outside the Parliament and its political sphere. It is an autonomous domain in which the interest groups encounter and the role of the state has been that kind of a mediator between different groups. The Finnish economic policy can be seen as an example of corporatism.[560] As a result the economic policy is seen as a sort of engineering in which experts represent a set of calculations as a means to a certain ends set by politicians.

The second typical aspect of the Finnish economic policy has been to set its goals by stressing the significance of economic growth, structural development and the open sector. The ethos of economic policy in Finland has strongly been that it is of an apolitical nature because the important and relevant decisions are made outside *polis*.

[558] Pekkarinen 1988, p.16.
[559] Pekkarinen 1988, p.18.
[560] Pekkarinen and Vartiainen 1995, p. 53.

This aspect is complemented by the role of the Bank of Finland in fiscal policies and the special position of the Ministry of Finance when compared to other ministries.

The third element of the Finnish economic policy is linked with the role of bureaucracy in Finland. The tradition has been that economic policy is designed behind the curtain. Thus, most initiatives and reforms in economic policy are suggestions by a small group of civil servants and experts.[561]

The fourth typical aspect of Finnish economic policy is corporatism. The narrow characterisation of corporatism refers to certain structural characteristics of the wage bargaining institutions. A high degree of unionisation and vertically centralized organizational structures among employees and employers are features of corporatism. A broad definition of corporatism encompasses a state that is ready to negotiate with the interest organizations and interventionist in its economic policies. Corporatism is thus conceived as a tripartite bargaining structure between labour, capital and the state.[562] Interestingly, the Finnish corporatism has traditionally illustrated clearly the purposes of banks and export industries. In the 1980s the picture became more complicated.

As Pekkarinen and Vartiainen[563] point out, the serious recession in the 1990s was a test for the Finnish economic policy tradition. The traditions of fiscal policies, social corporatism and devaluation were all questioned. After the recession Finland took another course in economic policy but some aspects of the Finnish model remain to be seen.

It is very apparent that the EU membership has changed the toolbox of the Finnish economic policy. Although STI policies form a policy area of its own, it has always followed the guidelines coined in economic policy and its role has been to support the aims of economic policies.

7.5.2. From welfare to competitiveness

When analyzing the recession of the early 1990s, Kiander[564] claims that Aho's cabinet signifies discontinuity in the Finnish tradition of consensus-building and over-the-block co-operation. It utilized the recession mood to make unpopular reforms such as reductions in almost all welfare entitlements and public services. Although many decision makers and analysts viewed the necessity of those reforms, the government's inability to create co-operation between the interest groups made the crisis longer and deeper.

The next cabinet led by Paavo Lipponen manifested a widely desired return to older modes of political co-operation. Unpopular reforms were continued but this time together with the labour market parties. The reviews produced by the Economic Board[565] attest this clearly. During Lipponen's era the role of the Economic Board became very influential and important.[566]

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[561] Pekkarinen and Vartiainen 1995, pp. 371–372.
[562] Pekkarinen 1990.
[563] Pekkarinen and Vartiainen 1995, pp. 422–430.
[564] Kiander 2004, p. 8; Kiander 2007.
[565] Its members include major labour market organisations, senior civil servants from the appropriate ministries- the Ministries of Finance, Labour, and Social affairs and Health), leading research institutions, and certain individual experts. The persons writing the reports are usually senior experts from VATT or Statistics Finland.
[566] The reviews published in 29th February 1996, 31st December 1996, 28th February 1998 and 31st September 1998 belong perhaps to the most important. See Saari 2001.

An interesting finding in Kiander's analysis is that the government's instruments utilized during the recession in the 1990s were similar with those used during the 1970s recession. In both cases the key strategy for economic policy was linked with two issues: the competitiveness dilemma and the current account deficit dilemma. The logic of the strategy was very simple: if Finland is able to find a solution to those two dilemmas, it will stimulate the economy and economic growth. The third aspect was the employment strategy.

In reality, the recession of the 1990s was totally different from the earlier crisis. In his analysis of the cycles of the Finnish economy in 1978-2000, Kiander differentiates economic cycles, labour market cycles and economic policy cycles.[567] Kiander's conclusion is that the Finnish recession of the 1990s was self-inflicted in the sense that Finnish policy-makers enabled it by their own decisions.

One of those bad decisions was linked with the idea of tight monetary policies and policy makers' incompetence to cope with the process of deregulation and the bank crisis. Utilizing some other Finnish analyses Kiander[568] suggests that some elements in the economic crisis and its causes were the same: the tight monetary policies as well as the Finnish model of economic policy including its structural problems. The strong adherence to the economic model, combined with unskilful policy making, catalyzed the problems of the economy.

In his analysis of the anatomy of the recession Lehtonen suggests that the recession must be seen as a three-dimensional temporal process in which the economic crisis is its first cycle. The second cycle is labour market recession and the third cycle is social policy recession.[569] Although those three cycles were linked with one another and their anatomies are very different, the shadow of the recession was very long.

Finland recovered from the economic recession surprisingly quickly. The currency deprecation in 1992- 1993 helped Finland to gain a better competitive position and the Finnish mark depreciated. Rapid export growth, together with depressed domestic demand, caused an unexpectedly strong improvement in current account from a deficit of 5 % to a surplus of 7% of GDP.

Interestingly, Kiander argues that although the OECD has repeatedly stressed in its economic analysis[570]the importance of incentive-improving structural reforms as necessary conditions for sustaining improvement in employment, Finland's rapid recovery in the 1990s was not linked with structural reforms. Vice versa, very traditional macro-economic factors were of greater importance. Also, the Finnish political governance and corporatist institutions remained relatively stable. The structures of the welfare state and the central labour market institutions including trade unions with a high unionization rate and centralized income policy remained almost intact.

Kettunen, among others, argues that the Finnish political history can be viewed as a series of attempts to solve "the labour question" in one way or another.[571] One of the most obvious aspects of the Finnish political culture has been the trend to stabilize the

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[567] Between 1990- 1993 the average annual rate of economic growth was -2 % and the average unemployment rate increased from 3 % to 17%. See Kiander 2004, p.5.
[568] Kiander 2001.
[569] In 1994-2000 the annual rate of economic growth averaged 4.5 percent and employment growth was 2.1 percent. Between 1994- 2004 the Finnish GDP growth surpassed the growth rate of EU15 in nine years and also unemployment rate reduced from 17 percent in 1994 to 9 percent in 2001. Total employment rose by 15 percent at the same time, and employment rate increased 8 percent points. See Lehtonen 2000.
[570] OECD 1994b.
[571] Kettunen 2003.

polarity between the internal thread of international socialism and the external thread of international economy.

This implies that the idea of consensus has been very important in the Finnish political history from the nationalist movement to these days. Warrants for consensus can be found in a solution to solve two controversies of a nation state: the controversy between the national and the international and the controversy between the social and the economic.

The connections and alliances with other Nordic countries have been extremely important in terms of justifying and legitimating the idea of social policy but also in developing other policy sectors including the science and technology policy sector.[572] Nordic countries are not a homogenous entity but rather a diversified set of countries with different cultural and political backgrounds.

In Sweden especially the Swedish Social Democrats have advocated openly that the Swedish system represents the Third Way between capitalism and communism. In Finland the dominant strategy for a variety of social and institutional reforms has been to depoliticize social policies. Social reforms have often been translated into pragmatic and functional issues rather than into political questions. The ethos has been the same as in all policy sectors: this is good for us all of us and this is good for Finland as a nation.

Kettunen argues that in the Nordic countries the political coalition of workers and farmers and the consolidation of the practice of collective negotiations and agreements on the industrial labour market is not a series of compromises in pursuit of a common good. In view of the compromises achieved in tripartite negotiations each Nordic country has chosen a slightly different way but the Nordic comparative framework is extremely important in terms of defining social problems and solutions. The comparative framework enabled countries to construct systems of their own in comparison with other countries.

Another curiosity of the Finnish political culture is that after the Second World War the concept of the present society was coined with various attributes implying the emergent aspects of the future. One of the most curious attributes was the "Finnish society" indicating the division between the new social sciences advocating the idea of conflict and the historical school advocating the idea of national continuity.

As Alain Touraine[573] puts it *"The idea of modernity has always been associated with the construction of society: a mechanical society was transformed in to an organism, into a social body whose every organ contributed to its smooth working. Society was both a sacred body and an eternal soul which could transform savages into civilized human beings, warriors into citizens, and violence to law. This representation has not vanished, and it is still colours official discourses, but it has lost its power."*

He remarks further that the decline and fragmentation of objective reason has led to a gradual divorce between four cultural worlds: eros, consumption, the company and the nation. The technical world endures communication between these cultural worlds; what functionalist sociologists call "the social system" is no more than a technical apparatus. Technology has also a positive dimension in the sense that it protects everyone against cultural totalitarianism.

It is self-evident, as Kettunen emphasizes, that the traditional conception of society has lost its potential. Therefore, it is easy to understand the rise of civil society in political discussions in recent years because of the changes in the concept of society.

[572] Lemola 2001b.
[573] Touraine 1995, p. 144.

Although the idea of civil society is not linked in Finland with the critique of the welfare state, as is the case in Sweden, the political discourse related to civil society has been vivid.

In Finland, the role of bureaucracy and government has been very different from Sweden. If the government is understood among politicians and policy makers as a form of governance, in Finland the role of bureaucracy is understood in a very Hegelian spirit as an aspect of the state. Political administration has always had a special role in Finland: it has traditionally understood its role as a problem solver in political conflicts. Their task has been to introduce boundaries and limits of compromises but they have often translated their suggestions into a form of functional necessities. In other words, they have shifted many issues with political and interest potentiality to the realm of needs and government.

It is worth noting that the rationale of the Finnish social policy in the 1960s was tied to a kind of convergence in which the differences between Sweden and the Soviet Union were minimized. In spite of their differences both countries were examples of industrialized societies, not of two different political systems. Interestingly, this kind of convergence has been also a part of Finnish STI policies.[574]

In the early 1990s the introduction of the concept of "welfare society" to substitute the concept of the welfare state in Finland has been interesting. What may be surprising is that it has been very useful not only in defending the welfare state but in criticizing the contradictions embedded in it. The concept has been used as a critical tool against certain aspects of the welfare state and also as an argument for legitimating the advantages of the welfare state model.

What makes the welfare cluster case interesting is that it illustrates a variety of internal political undercurrents in Finnish political culture; its tendency to solve the problem of conflict by highlighting the functionality of the policy making. It also mirrors nicely the emergent social and political developments in which the meaning of the concept of society is changing. I agree with Kettunen who argues that the former social policy rationale has been replaced by the competitiveness rationale and the welfare cluster case illustrates this replacement.

Lisbon strategy and Finland

Before the EU membership one of the key themes in the membership debateswas the problem of social policy. The point politicians and policy makers wanted to stress was that the membership does not affect our social policies. It is a matter of national policies – Finland has a mandate of her own in social policy and if the EU membership changes something those changes are mostly positive. This kind of argumentation was in those days plausible, but the development of the EU in the 1990s has turned this upside down.

Today, the focus in EU in the European social model show how it is on the boundary between the single market and the member states' economic, education, employment and social security policies. It follows that there are a lot of contacts between the member states and the EU in issues related to social policies.

Naturally, Finland has its own responsibility for taxation and social security exists, but its EU membership has irreversibly changed the course of the country's social and health policy. If the political focus of the EU was put on the creation of the Internal

[574] Lemola 2002.

Market, today it is on the reform of the welfare states or the reform of the structures of the public sector[575]. The EU has tried to create a bordless area where people, goods, services and money can all move around freely. This four-fold freedom of movement is sometimes called "the four freedoms" and the EU legislation must be in congruence with those four freedoms.

It is important to be aware of the fact that while the EU is more than a confederation of countries it is not a federal state. The curiosity of the EU becomes visible in the method of decision-making in the EU. The Commission makes a proposal to the Council and the Parliament who then debate it, propose amendments and eventually adopt it as a EU law. In those processes they will often consult other bodies such as the European Economic and Social Committee and the Committee of the Regions. Within the EU only what the EU can do has been defined but no definition on what the member states can do has been given. The power of the EU is more or less a power of frames and preconditions rather than anything else as a legislator.

The other aspect of the EU power becomes apparent in the Lisbon strategy which includes two main policy strands: to pursue economic reform to prepare the knowledge economy and to strengthen the European social model by investing in people. One of the key arguments for the European social model is that it helps to manage the changes which the knowledge based society is bringing about. The key is to put people at the centre of the EU's policies.

This implies that the goal of restoring full employment is the key objective of economic and social policy. In other words, social policy must be seen as a complementary aspect of economic policy, as a factor of production and it must also be seen within the life-span context. Another aspect of the European social model is that the costs of social policy must be seen within the larger context.

Communication to the Spring European Council of 02 February 2005 highlights three issues: more growth, more and better jobs and better administration. In other words, all political interventions must be seen as within the context of economic policy, employment and political governance.[576]

In terms of social policy the Lisbon strategy interestingly stresses the needs to modernize the European Social Model, to invest in people and to prevent social exclusion. The problem is that there is no such thing as a shared European social model but rather a variety of models with some common features.

As André Shapir[577] argues in his critical analysis on the European social model the biggest challenge for the European economy is to become sufficiently flexible as to avail of the opportunities and surmount the threads. It requires reforming the labour market and social policies because itha failure to do so it could jeopardise two of its crucial policies, the Single market and the monetary union.

Shapir's second argument is that the notion of European social model is misleading. There are different European social models with different features and different performances: the Nordic model (high level of social protection, high level of taxation, extensive intervention in labour market, mostly in the form of job-seeking incentives), the Anglo-Saxon model (more limited collective provision of social protection merely to cushion the impact of events that would lead to poverty), the Continental model (provision of social assistance through public insurance-based systems, limited role of the

[575] Saari 2005.
[576] EU - The European Commission (2005c).
[577] Shapir 2005.

market in the provision of social assistance), the Mediterranean model (high legal employment protection, lower levels of unemployment benefits, spending concentrated on pensions). Shapir's argument, very similar to suggestions advocated by other think-tanks, is that only the Nordic and the Anglo-Saxon models are sustainable. But the problem is that the social model in small, consensual, wealthy and ethnically homogenous northern European countries is not a model for larger economies such as Germany, France and Italy with huge wealth and income differences and mass immigration.

Shapir's third argument is that the labour market and social policy are still strongly a matter for the member states alone, not for the European Union. His conclusion is that there is a strong case for reform in the continental and Mediterranean countries and he presents two reasons for focusing on those countries: first, the welfare state system is inefficient and, second, arithmetic. The combined GDP of the nine continental and Mediterranean countries accounts for two-thirds of that of the entire EU- 25 and 90 % of that of the 12 member states. Europe cannot and should not have a strategy for reforming the national labour market and social policies. It is up to each national government to devise and implement its own strategy. A two-handed strategy combining product and capital market reforms at the EU level with labour market and social policy reforms at the national level would be a superior strategy for reforming the national labour market and social policies alone. While the Lisbon strategy was an attempt to implement this kind of strategy, it has been too weak.

William Walters and Jens Henrik Haahr[578] have argued in their analysis on European integration that it has some parallels with the National Socialist proposal for a New Economic Order in the Nazi Germany. Its central point was the idea of *Grossraumwirtschaft* where Europe was perceived as an extended economic space onto which the Nazi dream of German economic autarchy, self-sufficiency and racial supremacy was projected. They do not argue that the New Economic Order continues with the European integration project; they rather argue that this unconventional comparison highlights the special character of the EU/EC model, with the indirect government as its central feature. The common market can be seen as a particular art of governing.

Their second thesis is that European integration implies a mutation in the logic of power in the sense that the questions of power and rule are reformulated in terms of the governance of social and economic processes. Their point is that European integration makes Europe knowable and governable as a space of social, economic and political processes.

The political aspects of the European integration become clearer if we examine shortly how it represents the ideas of ordoliberalism.[579] The market for orodoliberalists does not possess the capacity for self-regulation which classical liberals accord to it. They reject the idea of a strict separation of politics and law from the economy and stress that it is the principle of order we must pay attention to in the analysis of *Wirtschaftsordnung*. In other words, political and legal interventions are not seen as secondary to the market but as constitutive of it. Law is no longer a super-structural phenomenon but an essential part of it. All this becomes apparent in the case of cartels and monopolies.

[578] Walters and Haahr 2005, pp. 7–8.
[579] Tribe 1995.

Ordoliberalism suggests that economies do not evolve under their own dynamics but are formed through key political and legal decisions. The economic rationalization of social policy is very consistent with ordoliberal principles.[580]

7.6. Role of performatives and rules in STI policies: The fifth move

In order to be able to understand all the complexities hidden in STI policies we must take the fifth move and focus on the dilemma of concepts and models used in those policies. One of the key aspects of the rhetorical re-description is that it provides a toolbox by which we are able to understand that concepts and models in politics are temporal and situated. In reality, argumentation in STI policies is just the opposite. Its argumentation refers to causation and complex economic and cultural changes in our external context and introduces a variety of proofs and testimonies in pursuit of explicating and justifying those policies.

This implies that we have to analyze two major issues: how concepts and models are used as performatives and how they constitute an extensive reserve for politicisation and politicking – the two essential aspects of STI policies.

7.6.1. STI policies as an arena for performatives: New framework – New terminology – New policies

The role of scientific debates linked with STI policies can also be analyzed by following Latour's and Woolgar's credibility model in which the rhetorical perspective on science suggests that scientists construe and use arguments formulated in language in order to raise or lower the plausibility of statements as perceived by relevant audiences. For Latour and Woolgar scientific work is a form of writing, production of literary inscriptions such as computer data sheets, table and figures, curves and diagrams, working papers and published articles.

In their view the process of increasing "facticity" is the key element of science and thus science for them is "the process of construction of facts." It follows that justification is a matter of scientists exercising rhetorical persuasion in which the rhetoric of de-contextualization plays an important role.

As Mäki[581] remarks, Latour and Woolgar postulate that there is an institutionally homogenous rhetorical space in which justification takes place. In other words, like McCloskey they seem to postulate a sort of perfect market of scientific ideas but they do not clarify the institutional entry conditions as clearly as would be needed.

Mäki suggests that in science rhetorical persuasion has three levels: at the level 1 scientists attempt to buy their ideas about the domain of study (the level of selling empirical or theoretical claims). At the level 2 scientists attempt to sell the idea of this or that approach or method of studying the domain better (the level of selling methodological claims). At the level 3 scientists attempt to market themselves as competent and credible scholars in their field, worth being listened to and receiving resources for further research (the level of selling sociological claims). His conclusion is that if we understand science as a rhetorical process in which rhetorical conventions are understood as entry conditions, the social conditioning of science becomes stronger and more complex.

[580] Walters and Haahr 2005 p.51.
[581] Mäki 1993c.

It follows that there is a variety of "gate keeping" conditions and procedures tacitly accepted by the disciplinary profession that delimit the protagonists and the contents and styles of claims and that contain issues worthy of recognition and further consideration.

Another very interesting aspect of Mäki's analysis is his suggestion of the existence of a sort of private rhetoric, rhetoric directed to an internal audience. The idea is that a person is socialized into the culture of his field rhetorically tests his/hers ideas and arguments first privately in his mind before they are represented to an external audience. It seems thus plausible to think that there is an in-built conservatory tendency in that testing. Rhetorical conventions belong to the institutions of various disciplines constraining and enabling scholars' belief formation.

All these issues are present in debates linked with STI policies. The idea of those policies as argued earlier is to clarify and analyze the dynamics of STI policies by introducing new approaches for analyzing and understanding science and scientific knowledge. But those rhetorical accounts do not speak of politics at all or if they do, their analytic toolboxes are useless for a thorough analysis of the role of politics. The "political" is often a synonym for something very complex and unattainable, as if the attribute political seems to blur the context totally.

If the idea of the linear model of innovation has been a cornerstone of science and technology policies in the OECD, the new cornerstone of STI policies has been NIS, the concept of a national innovation system. The problem of NIS is that it has two severe limitations: lack of substance and statistics. However, NIS has proved to be very useful for participation in debates concerning technological gaps and competitiveness.[582]

Jääskeläinen[583] argues in his dissertation that the Ministry of Trade and Industry (MTI) used Porter's diamond and cluster models as if they were scientific. For policy makers Porter's models provided a set of scientific arguments to illustrate the changing economic and political changes in global and national environment. MTI used these tools to take the leading role of a strategic think tank in relation with other branches of administration. The new industrial policy connected the problem of the public sector with industrial policies. The public sector was now understood as a policy tool for constructing responsive infrastructural environments for national competitiveness. In a way the cluster framework became a new language of communication between the governmental administrators and other partners.

The interpretations of the Finnish policy makers can be summarised so that the welfare cluster case has been a lesson. This implies that although the scope of the intervention has been too ambitious and complex, it has been valuable. What makes policy makers think in that way?

If we examine the recent reports and publications related to STI policies, this kind of a perspective becomes intelligible. The premise of the NIS paradigm is to stress the meaning and significance of learning as a part of the turbulent economy and as a part of political governance. The point underlines repeatedly the problem of learning. The learning aspect opens up new horizons for policy making. Nobody is against learning because of its apolitical nature. This becomes obvious in numerous OECD and EU reports and publications.

[582] Godin 2007a; Freeman 1987.
[583] Jääskeläinen 2001, p.231.

Reijo Miettinen[584] has criticized the conceptions of learning that the innovation policy paradigm advocates. His point is that Lundvall attempts to differentiate the various types of learning (earning by doing, learning by interacting, learning by searching) by linking them to four types of knowledge (know-what, know-why, know-how and know-who) have been more or less black boxes. The most problematic point of Lundvall's theory is that learning activities cannot be studied with the traditional data and methods used in economics.

Reijo Miettinen[585] argues that the use and status of NIS can be seen as a sequence in which a theoretical concept taken from international discussions was transformed into the foundational term of domestic science and technology policies as well as of industrial policy. Its status was confirmed and legitimated by reference to the decisions of the Council itself, government bodies and ministries. NIS was understood as an object of planning, as a system whose structures and boundaries, efficiency and accountability will be systematically developed and evaluated.

The new language utilized in the implementation of STI policies has implied that it has impeded the discussion of political alternatives. But the discussion has been monotonous, voicing a kind of official worldview. The problem is, as Reijo Miettinen[586] has pointed out, that there is the alternative that no genuine social entity called a national innovation system exists. Another problem, as we have seen, is that the rationale embedded in the NIS framework involves only values and norms having links with national economic competition. All other values are excluded from the discussion.[587]

Godin has used the term buzzword in order to describe the role of political language in the OECD context.[588] After their introduction the most important buzzwords such as "knowledge-based economy", "productivity" have become an essential aspecta of OECD policies. These buzzwords have totally different backgrounds: the "knowledge-based economy" was introduced before there was any agreement of the nature of its statistical apparatus. The term was simply so persuasive that the OECD started to use it.

The other buzzword "productivity" is of a great interest. Since the early 1990s the OECD has used productivity as the main yard stick.[589] Godin argues that productivity was first seen as reproduction, then understood as output, then as efficiency, and then as outcome.

Godin's point is that the terms and concepts have been essential for the development of science and technology policies, and the NIS is a good example.[590]

The NIS work in the OECD was based on the new growth theory or the endogenous growth theory developed by such economists as Romer, Grossman, Helpman and Lipsey.[591] The endogenous growth theory is an attempt to overcome the deficiencies of neo-classical growth theory by building macro-economic models out of micro-economic foundations.

It highlights the importance of new technologies and human capital and, in particular, it stresses that policy measures can have an impact on the economy's long-run

[584] Miettinen 2002.
[585] Miettinen 2002, p. 67.
[586] Miettinen 2002, pp.76–77.
[587] Häyrinen-Alestalo 1999.
[588] Godin 2003.
[589] Godin 2006b; OECD 1992.
[590] Godin 2007a; Sharif 2006.
[591] OECD 1995, p. 3.

growth rate.. Subsidies on research and education are important because they increase the growth rate.

A point of departure of the endogenous growth theory is that the world is not defined by scarcity and limits of growth. Instead, it is a playground of nearly unbounded opportunity where ideas beget new products, new markets, and new possibilities to create wealth. One of Romer's key ideas is that ideas have a crucial role in driving growth. To promote economic growth is to encourage the development and diffusion of new ideas. The argument that ideas are important is based on the role of new technologies because they create increasing returns: new technologies begetting new products are generated through research. This implies that also services are important in regard with economic growth.[592]

Benoit Godin introduces three reasons for using concepts and frameworks in policy making. First, they are popular because they help us to identify relevant problems and issues. Second, they are valuable because they suggest mechanisms hidden in problems and introduce a variety of models to explain changes in our environment. Third, they have an essential role in recommendations and they may generate participation and activity as well as give us stories to be told.

The development of the Finnish innovation system has been developed in the way the internal thesis of STI policies suggests. The Finnish policy interventions have focused on the reforms in which the boundary between the basic and applied research and the reciprocal roles of the key institutes are re-defined. In 2006 the Finnish innovation system is as follows:[593]

> The national innovation system is an extensive entity comprising the producers and users of new information and knowledge and know-how and the various ways in which they interact. At the core of the innovation system are education, research and product development, and knowledge-intensive business and industry. Varied international cooperation is a feature running through the system. The producers of new knowledge include universities and polytechnics, research institutes and business enterprises. The users are mostly enterprises, private citizens, and decision-makers and authorities responsible for societal and economic development. The role of scientific information in societal and economic development has been constantly growing, which increases the significance of cooperation and networking both between the public and private sectors and within the sectors.

The aim of science, technology and innovation policies is to ensure a balanced development of the innovation system and strengthening cooperation within it. This means that cooperation with economic, industrial, labour, environmental and regional policies as well as social welfare and health care services are extremely important.

The Finnish system is based on the division of labour between the Science Policy system and the Technology and Innovation Policy System. The domain of science policy system is defined as follows:[594]

> Finnish science policy has been developed on a long term with a view to strengthening the national innovation system. The aim of science policy is to enhance knowledge and the level and international visibility of Finnish research in cooperation

[592] Romer 1990.
[593] STCP 13.9.2006; see Finnish Science and Technology Information Service.
[594] STCP 13.9.2006; see Finnish Science and Technology Information Service.

> with different stakeholders. With a view to promoting the international success of research, support is given to high-standard research and to research expected to make international breakthroughs with additional input.

The Government's aim is now to increase public R&D funding with aim of raising the GDP share to 4 %. This will be done by increasing public R&D funding through the Academy of Finland and through core university funding by highlighting the quality and impact of funding.[595]

> Technology and innovation policy measures seek to contribute to enhancing the competitiveness of Finnish industry and the well-being of society, with the aim of making Finland capable of providing companies with a top-flight innovation environment internationally, which also attracts foreign R&D investments. Thus, at the beginning of its term, Mr. Vanhanen's second government intends to prepare a National Innovation Strategy.

According to the strategy funding will be allocated to centres of strategic excellence in sectors that are pivotal to the development of the national economy, society and citizens' welfare. It means more emphasis on stronger business management skills, the development of service innovations and growth entrepreneurship. Innovations must be based on customer and consumer needs. In terms of the development of the innovation environment, it is important to support networking with leading countries and regions in technology and participation in standardisation activities at European and international levels.

7.6.2. STI policies as a forum of new governance and institutional re-engineering

Finland has been a pioneer in implementing the NIS framework and its policies have been so successful that Finland has become a model country. This is obvious and self-evident if we examine the reports reviewing the competitiveness of national economies and the performance of their innovation systems. The key question is whether this development is dependent on the implementation of the NIS framework should this be so, the subsequent question is: how?

A relevant question is also why did Finland and other advanced NIS countries advocate institutional reforms in their STI policies? Why are those reforms so important? This aspect of STI policies becomes more understandable as it is linked with discussions in evolutionary and institutional economics.

Nelson's and Sampat's[596] analysis of institutional economics admits that the right general definition of institutions is lacking. Their endeavour attempts to build institutions into growth theory. They claim that scholars studying economic growth are in considerable agreement regarding the "immediate" factors behind economic growth such as technological advance, investments in physical capital, and the growth of human capital. Most of those scholars also agree that institutions are an important factor and involved in economic growth.

Their conclusion is that effective economic performance depends on the mastery of relevant "social" technologies as well as on "physical" technologies. Social technologies

[595] STCP 13.9.2006; see Finnish Science and Technology Information Service.
[596] Nelson and Sampat 2001.

are embodied in organization forms, bodies of law, public policies, codes of good businesses and administrative practice, customs, and norms.

For Nelson and Sampat institution is like a paved road across a swamp; without a road crossing would be impossible, or at least much harder. The only way to achieve low transaction costs in activities is to develop institutionalized ways of carrying out the task.

Their major point is that prevailing social technologies strongly influence the way in which physical technologies evolve. It means that it is useful to think of physical and social technologies as co-evolving as a cultural process. The key development problem is to reform institutions and further encourage and to support the adoption of superior physical technologies that are in use elsewhere.

Nelson and Mazzoleni have elaborated on this theory later[597]. They have suggested that if the view that recent changes in the international economic environment and the trend that emerging technologies are increasingly dependent on scientific basis, is accepted, public research institutions (universities and public laboratories) are extremely important in the future. Their point is that learning from other countries' practices i.e. to catch-up with their practices, is the key for economic growth and competitiveness. All this discussion on institutions and their role in the economy has partly shifted onto rhetorical vocabularies used in STI policies.

Barry's analysis of governing technological societies provides a somewhat different outlook.[598] He stresses strongly that the interactivity embedded in European policies must be linked with changes in understanding scientific expertise. If the governance stressed earlier one disciplinary scientific expertise, today governance is organized differently. It stresses flexible times, creativity, guidance, and an intensive use and concealment of expertise. The imagination and expertise is worked with rather than contradicted by the authorities.

One temptation is to write the history of technology as simply adjunct to the history of political doctrines and ideas. The second temptation is to associate the grand transformations in politics and government with significant developments in the history of technology. Barry's suggestion to follow Foucault's footsteps is to underline a shift from political anatomy to political chemistry.

Barry's idea is to openly question the disciplinary division between the study of science and technology, and studies of contemporary politics. He develops three lines of argument as follows:[599]

The first is the geographical- political argument: there is no opposition between the universal application of scientific knowledge and technical instrumentation. The local specifics of politics must be taken into account.

The second argument is political and philosophical: there is no opposition between politics and science and there is no opposition between a science which is rational and objective and a politics guided by passion and interest. One cannot assume either an opposition between a science which is oriented towards instrumental control and a domain of politics oriented towards public debate. Barry insists that it is necessary to make a distinction between politics conceived as ways of codifying particular institutional and technical practices, and the political conceived as an index of contestation and experiment.

[597] Nelson and Mazzoleni 2007.
[598] Barry 2001.
[599] Barry 2001, pp. 200–201.

The third argument is about technology, invention and time: in a technological society technology is reckoned to be central to the invention of new political and cultural institutions. A technological society should not be understood as a stage in the evolution of society, nor as a particular mode of government, but rather as a particular form of orientation to the political present. Central to this orientation is the equation of invention in general with technical innovation.

Barry maintains that the concepts of networks, cyborgs, interactivity and deterritorialisation seem to speak of a world in which the boundaries of nation-states, persons and firms are blurred. His conclusion is that the political invention is linked closely with the new forms of circulations, scientific research and technological development which involve the generation of two kinds of loci. The production of scientific knowledge is associated with specific localized sites of calculation, observation, monitoring, technical practice and experiment. The sites of experiment may be many but the experiments are difficult to make. The sites may be temporary, unstable and subject to legal challenge or political contestation.

One of the most interesting sites is called the technological zones of circulation.[600] These sites come into being when technical devices, practices, artifacts and experimental materials are made comparable or connectable. They link together different sites of scientific and technical practice. In terms of political analysis, they are interesting as they provide an arena for the demonstration, testing and calibration of practices. Another aspect of these sites is that they provide a forum where it is possible to develop technical and regulatory standards and clarify the problems of intellectual property rights.

Andrew Feenberg[601] has in his analysis of the social dimensions of technology maintained that technology is an essential aspect in terms of the constitution of a functionalist world. His analysis combines two different views on technology: that of substantivists and that of constructivists. On the one hand, it is important to study what technology means, rather than to focus on what is does, and, on the other hand, it is important to analyze who makes technology, why and how.

Feenberg's point is to differentiate between four aspects in his analysis: the controversy between objectivation and, on the one hand, and the controversy between functionalization and realization, on the other hand. In terms of functionalization the process of objectification includes according to Feenberg de-contextualization (*isolation of the object from the natural world- tree is conceived as timber*) and reduction (*de-worlded things are stripped out of technically useless qualities – tree is reduced to roundness for a wheel*). The process of subjectivation includes autonomisation (*subject isolates as much as possible from the effects of its action on its object*) and positioning (*technical action controls its objects through their laws*).

In realizing the process of objectivation includes systematization (*isolated, de-contextualized technical objects are combined and re-embedded in the natural environment*) and mediation (*ethical and aesthetic mediations supply object with secondary qualities that embedded it in its new social context*), and the process of subjectivation includes vocation (*technical subject's add up to a craft, vocation*) and initiative (*capitalism led to sharp split between positioning and initiative, strategy and tactics and supports the use of devices and systems*). Feenberg's analysis can be presented as follows:

[600] Appadurai 1990.
[601] Feenberg 1999.

	Functionalization Primary instrumentalization	**Realization** Secondary instrumentalization
Objectification Nature to put to use	**De-contextualization** Take the object out of context	**Systematization** Combine various objects into others
	Reduction Reduce object to the usable parts	**Mediation** Ethical and aesthetic mediations embed object in social context
Subjectivation Person acting	**Autonomatization** Subject isolated from effects of its actions	**Vocation** Subject's acts add up to a vocation, reserve act of tools on their user
	Positioning Subject places self" advantageously to use natural laws or technology	**Initiative** Margin of maneuver" in system allows limited action, supports system

Figure 5. Four aspects of technology

Another perspective on political governance becomes transparent in the case of accountability, a grey zone of know-how and expertise between economics and new governance. Mary Morgan[602] argues that economics has always had two faces in the Western tradition: Adam Smith's tradition, the science of political economy, and John Stuart Mill's tradition, the art of economic governance. The former aims at describing the workings of the economy and revealing its governing laws, and the latter is concerned with using that knowledge to fashion economic policy. In the 20th century those two faces have often been contrasted as positive and normative economics.

Morgan stresses that the 20th century economics can be characterized as an engineering science, as a science of applications. The development of economics was closely linked with the idea that western economists were expected to formulate development paths and to design new economic institutions to foster market economies. Economists' task is to carry out technical assessment for economic decisions or to tinker with and to design new incentive structures for all kinds of everyday cases.

But these new economic technologies are not the only policy tools for designing and justifying interventions in the world. They are also scientific tools forged for theory development. As these tools are not independent of high theory, but they were rather supported by its development. Economics has become, in effect, a tool-based discipline, argues Morgan. These quantitative techniques have given economics the aura of scientific modernity.

The internal re-construction of the Finnish innovation system in this millennium has followed the guidelines of institutional re-engineering. The roles of key actors funded by such organisations as SITRA, TEKES, the Academy of Finland and other research institutes as well as the whole university system have been revised. All of them have adjusted their strategies and institutional settings in the pursuit of increasing the

[602] Morgan 2001.

efficiency of the Finnish innovation system. The point of this institutional re-engineering is to extend the boundaries of those institutions so that they are able to participate more fully in the construction of a more responsive innovation environment.

SITRA's new strategy published in 2004 is based on five fixed-period programmes, each of which consists of various projects and measures.[603] One of the most interesting is the Health Care programme.

The objectives of the Health Care programme are to improve the status of customers, to increase the profitability and effectiveness and to improve co-operation between the public and private sectors, to promote comprehensive use of new technologies and services, and to generate new business in Finnish and international markets.[604]

TEKES has also revised its strategy and changed its name, to the Finnish Funding Agency of Technology and Innovation. The bottom line of the new strategy is that the development of the Finnish industry and the service sector depends on technological means and innovation. They will renew the economy and increase added-value, productivity and exports because they create employment and enhance well-being. The new strategy lists in a manner following the OECD a variety of arguments emphasising the importance of innovations.[605]

> Finland's future will be founded on innovation and competence. Growth in productivity will be based on the renewal of the economy and society through new innovations and renewing practices. (…) The strength of the Finnish innovation environment lies in broad and confidential cooperation between enterprises, academia and other stakeholders both globally and locally.[606]

The new openings are the service business and service innovation theme and the public-private partnerships theme as well as the renewing innovation activity theme.[607]

Matti Vanhanen's both cabinets have paid a lot of attention to the Finnish university system by establishing Aalto University in 2008: Helsinki University of Technology, the University of Art and Design and Helsinki School of Economics are merged into a new university. In addition, the university legislation will be reformed in 2009, and then the Science and Technology Policy Council will become the Research and Innovation Council.

[603] The programme areas are Health Care, Food and Nutrition, Environment, Russia and India.
[604] The list of the ongoing projects illustrates what is the point of the Health Care programme: Health Fund, Internationalisation, Paperless Health Care, Multi-Centre Specialised Health Care, Seamless Services and Support Services.
[605] The new strategy enlists the following areas to be allocated in the future: Global value networks; Wellbeing and health; Interactive media; Service business and service innovations; Clean energy; and Scarce resources.
[606] TEKES 2008, p. 2.
[607] The ideas embedded in the welfare cluster are now continuing in a variety of technology programmes. See TEKES 2007 – SERVE – Innovative services 2006 -2010; TEKES 2008b – Innovations in social and health care 2008-2015.

8. NEW HORIZONS AND RE-INTERPRETATIONS

8.1. In a search of new horizons and interpretations: Preliminary remarks

The previous chapter highlighted the fact that in terms of rhetorical re-description STI policies can be "read" as a fabrication of arenas where new concepts and frameworks are utilized. STI policies themselves construct the preconditions of their acceptability by introducing theoretical proposals aiming at justifying the STE hybrid. This construction resembles a performance in which a series of theoretical suggestions are its substance.

The second conclusion argued previously is that theories do not survive unless they are related to practices. This is the political point of STI policies: the aim is to change the prevailing practices by proving the environments of those policies, by connecting theoretical aspects to a series of political interventions. This is why STI policies must be understood within the new political governance and its ethos and mentality.

This chapter completes the rhetorical analysis and its aim is to find new re-interpretations for STI policies. Such re-interpretation stresses the political aspects of those policies and is composed of three elements. I will use here the term re-interpretation spectrum.[608]

The first re-interpretation spectrum concentrates on the problem of the *scientification of politics* as discussed in the introduction. My first conclusion is that it is natural that in the case of STI policies the definition of science and, in particular, the distinction between basic and applied science is taken for granted. Second, it is also very apparent that scientific concepts and models play a fundamental role in STI policies. Third, those concepts and frameworks are employed as performatives in justifying those policies theoretically.

The second re-interpretation spectrum highlights the problem of the *politicisation of science* and its point is to stress strong insistences of institutional reforms in STI policies. My aim is to analyze how technology and the idea of institutional reforms are interlinked in STI policies. These two aspects of STI policies are often translated into the controversy between the *Natural* and the S*ocial.*

The third re-interpretation spectrum focuses on the problem of political theorizing embedded in STI policies. I wish to examine and analyze whether STI policies can be interpreted as a peculiar form of political theorizing: is it ideology, rhetoric or what? My claim in this study is that the ethos of STI policies is inherently linked with the controversy between the Natural and the Social, on the one hand, but, on the other hand, it is also inherently connected with another controversy between the *oikos* vs. the *polis.* Those three different sets of re-interpretations are arranged in this chapter as follows.

I will start by addressing the problem of cyborg sciences and stress the advantage of Mirowski's interpretation.[609] The key point is that the revival of the neoclassical theory and the birth of the cyborg sciences after the Second World War are intertwined with one another. My interpretation proceeds as follows.

[608] Palonen 2006 recommends the term because of its ambiguity as a metaphor.
[609] Mirowski 2002.

First, the birth of cyborg sciences is an important aspect of contemporary STI policies and its significance and meaning in particular are too often underestimated.

Second, the cyborg science argument is not enough because it does not help us to understand STI policies as a political intervention.

Therefore, the controversy of the Natural vs. the Social embedded in STI policies has to be interpreted by using the term of political theorizing. I point out political theorizing as an essential aspect of the political ethos embedded in STI policies and hence the controversy *oikos* vs. *polis* is inherently essential.

It follows that only by taking into account the linkage between those two controversies embedded in STI policies are we able to understand how rhetoric and STI policies are closely inter-linked.

8.2. STI policies and cyborg sciences: From simple mechanisms to complex emergences

> *"An economist by training thinks of himself as the guardian of rationality, as ascriber of rationality to others, and the prescriber of rationality to the social world. It is that role I will play."*[610]

Mirowski argues in his *More Heat than Llight*[611] that the progenitors of neoclassical economic theory copied the reigning physical theories in the 1870s. He stresses that economic theories resonate with the physics and other natural sciences of their time.

In particular, they resonate with the interrelations among the triad of body (anthropometrics), motion (physics) and value (economics). Mirowski argues that the reasonableness of classical political economy changed when the understanding of the underlying physics changed in the 1870s.

The concept of energy became coextensive with the entire range of physics – its conservation, its mathematical representation as field theory, dynamics, determinism, entropy, thermodynamics, relativity and quantum mechanism.[612] With proto-energetics, energy was conceived with the help of field formalism but not as a conserved substance. Value was no more associated with body substances such as labour. Neoclassical economics was based on a different physics than classical theory but its categories were still body, motion and value.

Mirowski argues that the neoclassical theory of the 20th century retained the 18th century physics in order to hold on to its unifying principle of utility maximization subject to constraint. His major point is that economics as a discipline has utilized the theoretical apparatuses of natural sciences advocating the idea of the relation between the social and the natural.

Mirowski connects the relation between the Natural and the Social with the rhetoric of economics. McCloskey argues in his *Rhetoric of Economics*[613] that rhetoric provided a way to understand arguments and debates among economists. The concept of cyborg science is linked with a number of new sciences generated in the immediate post-war period.[614] These sciences are often called "cybernetics".[615]

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[610] Arrow 1974, p. 16.
[611] Mirowski 1989, p. 3.
[612] Mirowski 1989, pp. 11–98.
[613] McCloskey 1985.
[614] Mirowski lists such disciplines as information theory, molecular biology, cognitive science, neuropsychology, computer science, artificial intelligence, operations research, systems ecology,

In economics the rise of the cyborg sciences has been contrasted with a number of issues. If the neoclassical economists stressed simplicity and interpreted their a priori laws as being temporally invariant, cyborg scientists tended to highlight diversity, complexity and change. They believed that order could be defined as relative to be background of noise and chaos out of which the order should temporally emerge as a process.

The cyborg scientists thus advocate that the traditional conception of the economic process must be revised. As Nicholas Georgescu-Roegen[616] points out in his *The Entropy Law and the Economic Process,* a common conception is that the economic process must be understood as a mechanical analogy. In this representation, the economic process neither induces any qualitative change nor is it affected by the qualitative change of environment into which it is anchored. It is an isolated, self-contained and ahistorical process, a circular flow between production and consumption with no outlets and no inlets. Although this conception has been strongly criticised it is still alive.

Many critics have maintained that there is a variety of economic phenomena that cannot be reduced to the locomotion metaphor and hence be explained by mechanism. One aspect of this criticism can be linked with the birth of a new branch of physics, thermodynamics, and the entropy law. But what is entropy is the question.

The first law of thermodynamics says simply that the total quantity of matter and energy is never altered. In other words, the first law of thermodynamics does not contradict with any of laws of mechanics. The only conclusion is that the change undergone by matter and energy must be qualitative.

For example, if we burn coal, the chemical energy of the coal is free; it is available to us for producing some mechanical work. In this process free energy loses this quality gradually. Ultimately, it always dissipates completely into the whole system where it becomes bound energy, energy that can no longer be used for the same purpose.

Entropy is an index of the relative amount of bound energy in an isolated structure, or in other words, of how energy is distributed in such a structure. High entropy refers to a structure in which most or all energy is bound, and low entropy to a structure in which the opposite is true. The curiosity is that the second law of thermodynamics is in contradiction with the principles of classical mechanics. This means that there is a continuous and irrevocable qualitative degradation of free into bound energy. In modern interpretation this means that there is a continuous turning of order into disorder. This is based on the observation that free energy conceives an ordered structure while bound energy is in a chaotic, disordered distribution.

Georgescu-Roegen[617] remarks that the whole idea of entropy has misled scientists to believe that if the entropic processes were not irrevocable it follows that there will always be scarcity ever. The other misconception is that there must be some form of energy with a self-perpetuating power (e.g. nuclear energy). Generally speaking, entropy is a mysterious notion.

This becomes evident in the case of life and living organisms. It is nowadays a commonly accepted fact that any life-bearing structure maintains itself in a quasi-steady state by sucking low entropy from the environment and transforming it into higher

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immunology, automata theory, chaotic dynamics and fractal geometry, computational mechanics, socio-biology, artificial life and game theory.

[615] Pickering 1995.

[616] Georgescu-Roegen 1971.

[617] Georgescu-Roegen 1971, p. 6.

entropy. This idea can be extended to economy as Georgescu-Roegen has attempted to show in his own analysis of the economic process.

Therefore, it is important to understand the link between the birth of cybernetics and the development of neoclassical economics. Mirowski[618] has interestingly distinguished between two different types of recent economics. There is the main style of economics, axiomatic, formal, atemporal and mechanical, and inclined to assert the perspective of Archimedes, and there is a tendency towards the cyborg sciences. Good examples of the first strand would be general equilibrium theory and econometrics.

If the neo-classical theory is an application of Newtonian physics, the development of mathematical economics after the Second World War was linked with an attempt to unify the study of human beings and intelligent machines through John von Neumann's general theory of automata.[619]

The birth of cybernetics was closely linked with the problem of the second law of thermodynamics or the problem of Maxwell's Demon, as it is sometimes called.[620] Although the Demon has been repeatedly announced as dead in physics, it has continued its life as a third choice between Darwin's evolution theory and the second law of thermodynamics. For many, the Demon came to stand for the triumph of Life over Death. It allowed life to prevail, to maintain homeostasis and growth in the face of entropic degradation. Molecular genetics, the theory of information, cybernetics and von Neumann's theory of automata are all theories that found their point of departure with the Demon. [621]

Something special happened as Evelyn Fox Keller[622] pointed out when the Demon was no more understood as "homunculus" it was understood as a "code". Mirowski characterizes this recent trend in economics by the term of cyborg science and refers to Donna Haraway[623] who has used the term to indicate that something profound has happened to biology as well as to social theory and cultural conceptions of gender.

The central idea of cyborg sciences depends on the existence of the computer as a paradigm object for everything. There is no cyborg science without reference to the "computer"; the computer straddles the divide between the animate and the inanimate, the living and the lifelike, the biological and the inert, and the Natural and the Social.

This breaching of the ramparts between the Natural and the Social, the Human and the Inhuman, is a second characteristic of the cyborg sciences. In other words, after the Second World War a cyborg intervention agglomerates the heterogeneous assemblage of humans and machines, intention and teleology and - Nature has taken on board many features conventionally attributed to Society.[624]

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[618] Mirowski 2002.

[619] The list of these important persons is impressive but among the most important ones are such scientists as Norbert Wiener and his theory of cybernetics, Claude Shannon and his information theory, Alan Turing and his "Turing Machine".

[620] Because heat was re-conceptualized as molecular motion, the British physicist James Maxwell who believed that the second law could be reversed suggested that there is a homunculus stationed at a door portioning off a cooler from a warmer gas. Because the cooler gas was composed of faster and slower molecules, the Demon could wait till one of the fastest molecules was headed toward the door, quickly whip it open, let the molecule pass to the warmer gas, and then close it with even more precise alacrity to prevent to return migration of faster molecules. In this manner the Demon could make heat flow from a cooler to a hotter body and violate the second law.

[621] Mirowski 2002, p. 46–48.

[622] Keller 1995.

[623] Haraway 1991.

[624] Miroski 2002, p. 13.

The third characteristic of cyborg sciences is that as the distinction between the Natural and the Social weakens, the sharp distinction between "reality" and simulacra becomes less taken for granted and harder to discern.[625] The computer has an important role in this because the computer blurs the boundaries between the "self-evident" categories of experiment, instrument and theory.[626]

The fourth hallmark of cyborg sciences is that they are rooted in the heritage of the distinctive notions of order and disorder in the tradition of physical thermodynamics. Questions dealing with the nature of disorder, the meaning of randomness, and the directionality of the arrow of time are important, and the cyborg sciences make ample use of the formalisms of phenomenological thermodynamics as a reservoir of inspiration.

The fifth feature of the cyborg sciences is that such terms such as "information", "memory" and "computation" become for the first time physical concepts to be used in the natural sciences. In his information theory Claude Shannon had to divorce information from any connotations of meaning or semantics and associated it with "choice" from a pre-existent menu of symbols.[627]

The sixth characteristic of the cyborg sciences is that their birth was a part of conscious political interventions. It was a product of planned coordination by teams with structured objectives, expensive discipline-flouting instrumentation, and explicitly retailed rationales for the clientele.

The origins of the cyborg revolution are naturally many but one of the most important manifestos dealing with the development of economics was Friedrich Hayek's paper "The Use of Knowledge in Society" in which he insists: "*What is the problem which we try to solve when we try to construct a rational economic order? On certain familiar assumptions the answer is simple enough. If we possess all the relevant information,* if *we can start out from a given system of preferences, and* if *command complete knowledge of available means, the problem which remains is purely one of logic.(…) The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form but solely as dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. The economic problem of society is thus not merely a problem of how to allocate "given" resources (...); it is a problem of utilization of knowledge which is not given to anyone in its totality."*[628]

This quote must be understood within Hayek's attack against "scientism". *The Road to Serfdom* appeared in 1944, and Hayek did not want to belong to a circle whose ambitious aim was to extend the "scientific method" to social theory and planning. He told later that although he had difficulties to fully understand von Neumann's mathematical ideas he was very astonished how easily von Neumann understood his point. They shared the similar problem but their angles were different.[629]

Hayek's linkage to cyborg sciences is that he was one of the first economists who realized that complexity must be added to the agenda of economics. His legacy is, above all, that he understood that if we extend the market metaphor we may notice that brains and markets has a lot of common. The irony is that Hayek was not well aware of the developments in logic and the mathematical sciences and was rather hostile to statistics. In effect, he renounced the formal theory of the abstract logical automation as well as

[625] Baudrillard 1994.
[626] Galison 1997, pp. 44–45.
[627] Mirowski 2002, p. 16.
[628] Hayek 1945.
[629] Hayek 1982.

the pragmatic technics of simulation. This view is totally different from the theories of John von Neumann and Herbert A. Simon.[630]

But as Mirowski[631] remarks, the problem is that research has neglected three aspects of the reorientation: the political reorientation of economic discourse, the cultivation of a new scientific patron, to assimilate and tame some new conceptual developments emanating out of the cyborg sciences.[632]

One of the key points of the reorientation was the idea of linear programming in which the market was a vast program aiming to develop the language of programming. This constituted a bridge where the logicians, the engineers, and the operation researchers could discuss the matter together. It linked the military, the cyborg science and economics. It was also a historical cusp where the terms "software" and "hardware" were separated.[633]

It is also possible to think that this was the cusp when the whole idea of economists as "software engineers" was born. Economists could now focus on the algorithms needed for the manipulation of efficiency targets or shadow prices and leave all institutional, historical and political issues to "hard-ware" engineers.[634]

The core of the new agenda was that the economic agent was an information processor who behaved like a little econometrician. Another aspect of this new agenda was that all problems of processing encountered by the agent had to be specified as problems of imperfections of information, not as problems of cognitive computational limitations.

The cyborg scientists, having a strong military ethos, thought that the computer must be seen as a tool in decision making under uncertainty in the fluid and ill-defined war situation. The other scholars thought that uncertainty was a minor problem of inductive inference. In other words, the military forces wanted to enhance centralization, communication and control and supported the cyborg sciences for those reasons. [635]

The key figure is perhaps Kenneth Arrow who in his Social Choice and Individual Values introduced his "Possibility theorem". "If we exclude the possibility of interpersonal comparisons of utility, then the only methods of passing from individual tastes to social preferences which will be satisfactory and will be defined for a wide range of sets of individual orderings are either imposed or dictatorial… the doctrine of voters' sovereignty is incompatible with that of collective rationality" [636]

The core of Arrow's much criticised theorem is to construct the link between the mechanical market and the centralized plan. One line of criticism was that Arrow simplifies the whole idea of politics. "Voting, from this point of view, is not a device

[630] Mitowski 2002, pp. 239–240.
[631] Mirowski 2002, p. 242.
[632] Mirowski and Hands argue that the key players were a few selected research units organized for military purposes such as SRG (Statistical Research Group of the Applied Mathematics Panel at Columbia), the RAND Corporation of Santa Monica, and the RAD Lab at MIT in Cambridge. In other words, military patronage was crucial in defining the shape of post-war economics. See Hands et al 1998.
[633] Ceruzzi 1989, p. 249.
[634] Mirowski 2002, p. 261.
[635] The relationship between the Cowles scholars and cyborg science scholars was full of ambivalence and confrontations. But it is obvious that most Cowles scholars were infatuated with the vision of institution-free economics and they discovered in operations research a new virtual reality where war was seen as a problem in logic, politics was seen as a problem in logic, machines were seen as the best embodiment of logic. In statistics they thought that they have found a way of conjuring order out of chaos. Mirowski 2002, p. 285.
[636] Arrow 1951, pp. 59–60; Arrow 1984.

whereby each individual expresses his personal interests, but rather where each individual gives his opinion of the general will." [637]

In other words, the theorem had nothing substantial to say about information-processing, feed-back control aspects, democratic politics or market organization. According to the theorem voting is a degraded and undependable mechanism of the expression of rationality. In effect, Arrow's impossibility theorem launched a new discussion on rational choice and it has been very influential in social and political sciences.

Arrow's theorem was full of controversies and inconsistencies and, in particular, a lot of critique was linked with the problems of game theory. The main reason for the critique was that John von Neumann's theory was not compatible with the Walrasian mechanical equilibrium model.

The publication of John Nash's equilibrium theory was an answer to many problems. The core of Nash's complicated theory can be put as follows. Von Neumann's theory was searching for an alternative grounding for the certainty provided by mathematics and its terminus and his real interest was not on the game theory but on the theory of automata. Nash saw it differently. The act of axiomatization was the paradigm of making everything "fit" into the scheme of rationality. Another aspect of Nash's equilibrium theory was that strategy is to be bound with the process of formulating speculative models of the expectations of the opponent: strategy was a subset of statistical interference.

In terms of this study it is relevant to focus on Herbert Simon who has pioneered most of the themes embedded in the cyborg sciences. He was the first person who realized that the invention of the computer was the key for economics. He also took a political concern over planning and transmuted it into a uniform psychological environment for decision making. He also realized that the computer was the perfect tool for simulation.[638]

The problem of artificial intelligence and the computer was one of the key problems for Simon; how could computers be utilized in decision making and simulation? The other thematic Simon was involved in was the problem of bounded rationality. The concept of the boundedness of rationality was derived from the rejection of the neoclassical mathematization of economics, but it was also a reaction against game theory and von Neumann's theory of automata. While von Neumann did not believe in analogies between the digital computer and the brain, Simon insisted that there are some analogies between computer software and the hierarchies of bureaucratic administration.

The perfect rationality of neoclassical economics could not describe the behaviour of real human agents. It requires that agents know far more than any real agents are ever able to know and it also requires that they have perfect knowledge of the available choices and all relevant information so that the optional choice can be computed and executed. Simon thought that real human agents have neither the information nor the computational capability to make such perfect rational choices. In contrast to this economic man, Simon introduces the administrative man who makes choices in an environment of limited information and limited computational capacity.

[637] Arrow 1951, p. 85.
[638] Mirowski 2002, p. 453.

Apparently, the concepts Simon developed in bounded rationality served as a springboard to his interpretation of artificial intelligence. His bounded rationality program embodied ideas for programming a computer how to think.[639]

It is important to be aware that Neumann was a proponent of the logical possibilities for innovative reasoning opened up by the computer and his inspiration was closely linked with Alan Turing's notion of the Turing machine. In contrast to them, Simon thought that the formal logic never describes how humans think. His conception was that a machine can simulate the behaviour of human problem solvers in well-specified situations and his aim was to articulate "theories of the middle range". In other words, Simon believed that it is possible to simulate human behaviour over a significant range of tasks but these simulations do not pretend to model the whole mind and its control structure.[640] He must be understood as a simulator rather than as an advocator of a particular model of rationality.

Simon's point is that all systems are divided into lower level modules that deal with high-frequency changes in the environment, middle-management modules that deal with moderate frequency types of coordination between tasks, and a few modules that deal with low frequency changes in the overall homeostatic behaviour of the system. In his theory of hierarchy Simon argues that it is only necessary to describe the middle layer of modules since they are the only system dynamics accessible to observation from outside the system. The very high frequency base modules appear to be inert while the lowest frequency modules are never fully law-governed.[641] Later, Simon expanded his theories to biology and attempted to find a novel alliance with evolutionary biology in order to underwrite the general theory of a computational approach to the origins of order. Irony is that Simon's program of simulacra is very much dependent on von Neumann's theory of automata.[642]

In his famous lectures *The Sciences of the Artificial* Simon[643] has distinguished the artificial from the natural as follows: 1) Artificial things are synthesized (though not always or usually with full forethought) by man, 2) Artificial things may imitate appearances in natural things while lacking, in one or many respects, the reality of the latter, 3) Artificial things can be characterized in terms of functions, goals, and adaptation, 4) Artificial things are often discussed, particularly when they are being designed, in terms of imperatives as well as descriptives.

Simon's aim is to conflate the contrast between the pre-given/constructed with another distinction, the non-teleological/goal-directed, and to show that the natural sciences have fundamental difficulties to handle with the second term of these distinctions. "The central task of a natural science is to make the wonderful commonplace: to show that complexity, correctly viewed is only a mask for simplicity; to find pattern hidden in apparent chaos."[644]

Simon's importance is that he started with a problem in economic methodology with an aim of finding a scientifically satisfactory theory of economic rationality. His search led him first to the theory of bounded rationality and then into cognitive science and AI.

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[639] Sent 1997.
[640] Simon 1991.
[641] Simon 1973.
[642] Mirowski 2002, p.468.
[643] Simon 1982, p.8.
[644] Simon 1982, p.3.

8.3. Horizon I: The natural vs. the social controversy: An essential rhetorical resource of STI policies

The birth of cyborg sciences has generated a lot of debates related to difficult philosophical issues in ontology and epistemology but they have also been a springboard for a variety of methodological debates and controversies in economics in particular. Those philosophical debates are hidden in the the Natural vs. the Social controversy, and it can be argued that the dilemma is a kind of metaphysical core of STI policies where we may differentiate between four positions.

First, those who represent the first position believe that the Natural and the Social are identical. Those who believe that the Social can be reduced to the natural represent the first subgroup, extreme reductionism; those who believe that identity is linked with laws belong to the second subgroup; the representatives of the third subgroup believe that epistemic methods are identical; those who think that the identity is based on metaphorical structure belong to the fourth subgroup.

Second, those who think that the Natural and the Social are disjunct, but individually law-like, represent the second position. The disjunction is based on the belief that the Natural and the Social have different epistemic or ontological status or that the Natural and the Social have totally different purposes.

Third, those who think that the Natural is objectively stable, whereas the Social is patterned on it but not stable, represent the third position. This position is very common in Durkheim's sociology.

Fourth, those who believe that the Natural and the Social are both unstable and hence jointly constructed as mutually supportive are the representatives of the final position. The differences between the representatives are linked with their belief of how they understand the origins of the construction. They might believe that the construction is associated to interests, that it is an outcome of practices, or that it is a matter of will.

Mirowski has outlined a very useful taxonomy of reactions to the controversy between the Natural and the Social and shows how different the approaches might be. The names refer to scientists representing the various positions[645]:

[645] Mirowski 1994

1 The Natural and the Social are identical in

a. in every respect (extreme reductionism)
b. laws (Churchland)
c. epistemic methods (Glymour, Cartwright)
d. metaphorical structure (Schumpeter)

2. The Natural and the Social are disjunct, but individually law-like due to

a. epistemic status (Windelband, Rickert, Weber, Kuhn)
b. ontological status rooted in psychology (Dilthey, Taylor)
c. purposes (Habermas, Dreyfus)

3. The Natural is objectively stable, whereas the Social is patterned on it but not stable, implying

a. sociology of collective knowledge (Durkheim, Mannheim)
b. sociology as epistemology (Douglas, Bloor, Shapin)

4. The Natural and the Social are both unstable and hence jointly constructed as mutually supportive

a. out of interest (Latour, Haraway, ANT)
b. out of practices (modern pragmatists, Hacking, Rouse)
c. out of will (Nietzsche, Foucault)

Figure 6. Four different approaches to the Natural and the Social

Mirowski has also argued that in economics there exists a close correlation between Cartesian epistemology and the structure of neo-classical economics whereas institutionalist economics can be "read" from the pragmatic programme.[646]

Mäki[647] has recently analyzed the peculiarities embedded in economics and used the concept of economic imperialism introduced by George Stigler in 1984. In his thinking the concept denotes the imperialism of the discipline of economics in the academic world and he defines three notions. The notion of imperialism of standing (the prestige and academic power associated to scientific disciplines and research fields) that of imperialism of style (the standards and techniques of inquiry), and that of imperialism of scope.

The issue of scope was a popular subject for economists in the 19th century. It can be defined in terms of problems, facts, or phenomena. Mäki proposes that the scope of theory T can be defined in terms of explanation and expansion and implies three different constraints: the ontological constraint, the pragmatic constraint and the epistemological constraint.[648] In his view Economic Imperialism is based on the hubris of economics in which the point is to advocate the idea that economics has a constitutive role for other social sciences.

[646] In other words, the first generation of institutionalist economics from Veblen and to John R. Commons utilized the philosophical resources developed by William James, John Dewey and C. S. Peirce. This divide is still present in economics today. See Mirowski 1990.
[647] Mäki 2002c; Mäki 2002b; Stigler 1984.
[648] Mäki 2009.

8.3.1. Rationality embedded in cyborg sciences: Controversy 1

Wilhelm Tenbruck[649] argues that throughout his writings Weber was stuck withone fundamental problem: What is rationality? In his famous theory of rationalisation Weber argued that the rise of capitalism in western societies must be understood in terms of rationalisation in four domains (Weber 1978): 1) market behaviour: as a process toward objective quantitative methodologies and pure calculations provided that there is law and stable institutional context, 2) law:as an accelerant process of legalizing the society there must be systems of norms, rules and law as a framework for making among other things instrumental contracts and so forth, 3) bureaucracy: the transformation of administration toward machine like predictive apparatus as a rival of arranging substantial communal frameworks , 4) vocational ethics (*Berufsethik*): where the internal asceticism and forms of life are connected in the way that it becomes the generator of market, law and bureaucracy.

One alternative to clarify Weber's sometimes very ambigious usage of the concept of rationality is to distinguish between three different usages[650]: The first usage refers to the capacity to control the world through calculation which means "scientific-technological rationalism". The second usage refers to the systematization of meaning patterns, the cultured man's "inner compulsion" to understand the world and take a consistent and unified stance to it known as "metaphysical- ethical rationalism". The third usage, "pratical rationalism", refers to the achievement of a methodological way of life as the consequence of the institutionalization of configurations of meaning and interest.

The standard interpretation is that Weber conceived of sociology as a comprehensive science of social action. For Weber, a bureacratic coordination of human action is the distinctive mark of modern social structures and an ideal type. Bureaucracies are goal-oriented organizations designed on the basis of rational principles in order to efficiently attain their goals. Weber believed in the multi-causality of social phenomenon, but the system character of human societies makes predictions impossible. Predictions become possible only if we focus our concern on a limited number of social forces. Weber is often seen as an alternative to Marx, but his criticism of Marx was focused more on the Marx's emphasis on economy; social and cultural aspects have more complex links to economy, the links are not explicit and determinate.

Cybernetics, as well as the whole tradition of systems theory, can be seen within this Weberian rationality. Cybernetics apparently advocates a particular form of rationality and has a strong functionalist tone. This functionalism is embedded in the rational-choice theory, one of the key arguments related to *homo economicus*. The basis of *homo economicus* is laid on the concept of rationality.

Traditionally, one distinguishes two different views of rationality: normative and descriptive rationality. Normative rationality relates to how one ought to behave, and the latter view simply pertains to how one behaves. The normative view allows us to explain behavior by showing that it was rational: the person in question had goals and beliefs that made it appropriate for her to behave in the way she did.

The descriptive view to rationality is less applicable to explanation but if we assume that a person is rational, the descriptive view guides us to investigate her goals and beliefs

[649] Tenbruck 1980.
[650] Schluchter 1979.

what the person presents for her behavior.[651] Postulating rationality implies that we should focus on means-end relationships and beliefs underlying observed behavior.

Rational behavior is often divided into two categories: thin and thick rationality. Thin rationality means that actors possess consistent preference rankings and make their choices according to those rankings. Thick rationality expands thin rationality by adding requirements that pertain to the nature of goals pursued. A person is rational if she acts as thin rationality assumes, her behavior is directed toward reasonable goals, her means are reasonable with respect to the ends she is pursuing, and her expectations regarding her environment are reasonable.

Rationality often implies that it is action with purpose. It should imply consistent preferences and aim at utility maximization. If actors have no consistent preferences, utility maximization makes no sense. This is the moment where Herbert A. Simon's bounded rationality and Kenneth Arrow's Impossibility Theorem enters the discussion. In other words, if an economic agent's rationality is bounded, it follows that they have to make decisions under uncertainty. The key question is how to characterize rational decisions.

However, if rational action is purposive it means that in the absence of goals we are unable to distinguish between rational and non-rational decisions. The definition of thin rationality implies that actions are rational if they lead to the preferred outcome. It is possible to distinguish three types of decision making in rational choice theory.

First, making choices under certainty means that rational actions are such actions that are consistent with preferences which in turn are complete and transitive. Connectedness and transitivity mean that we are able to construct alternatives from the worst to the best. Second, making choices under risk refers to a situation in which actors do not know what their actions' outcomes are. Third, decision making under uncertainty when one has a quite good idea of what shoul happen if various conditioning events occur, but when one has only a vague estimate of the likelihood of those events. [652]According to rational choice theory, rational decisions are rational if the action is accordance with the preferences.

But this kind of picture of the economic man is problematic. Philip Pettit[653] has suggested that there are two sorts of assumptions that economists make about the minds of agents with whom they are concerned. The content-centered assumptions are such things that the agents desire, which things they prefer and with what intensity. The process-centered assumptions are about the ways in which these desires are present in action.

Durkheim argues that in the explanations of social phenomena we must seek separately the efficient cause which produces them and the function they fulfill. "*The determination of function is . . . necessary for the complete explanation of the phenomena. . . . To explain a social fact it is not enough to show the cause on which it depends; we must also, at least in most cases, show its function in the establishment of social order.*"[654] His point is that "function" is better than "end" because social phenomena do not exist for the useful results they produce.

The problem is that for most functional explanations in social science there is no obvious mechanism to cite and thus the explanation is apparently baseless.[655] The

[651] Harsanyi 1986.
[652] Nurmi 2006, pp. 22–33.
[653] Pettit 2001.
[654] Durkheim 1966, p. 95.
[655] Elster 1979.

problem of functionalism in social sciences is simply that it is not clear what mechanism is supposed to operate in the black box. And those black boxes are in most cases empty, argues Pettit.

By the same token, rational-choice theory is an attempt to use economic models of explanation in areas which go beyond what is traditionally seen as economic. Rational-choice theorists try to explain the agent's behavior by postulating the contents of the black box in the head of *homo economicus*.[656] In short, they make two different assumptions. First, they make process-centered assumptions about the way in which desires of preference are issued in action and, second, they make content-centered assumptions about the sorts of things that the agents desire. But what is the mind of *homo economics* like? The general assumption is that their desires lead to action via their beliefs about the options available, that is, their decisions and actions are subjectionally rational. action.

8.3.2. Epistemology embedded in cyborg sciences: Controversy 2

Philosophically the cyborg sciences imply an interesting approach to the problem of emergence as William Wimsatt[657] has argued. Richard Levins[658]made a distinction between "aggregate", "composed", and "evolved" systems Wimsatt thinks that the relevant explanations are causal but need not be deductive or involve laws. Emergence is for him one broader kind of pattern of relationships between a system property, relationship and the organisation, and properties of the parts, but here accounts of the concept often diverge.

But how is the distinction between the Natural and the Social linked with STI policies? The linkage becomes tangible if we look at recent discussions among economists related to the economics of science (ESK)[659]. D. Wade Hands[660] has suggested that there are three different approaches to the economics of science: philosophers applying various aspects of economic theory to science′, economists studying science with an eye toward the growth knowledge, the non-mainstream economists studying science.

If the mainstream versions of ESK are often linked with mainstream economics and mainstream philosophy, Hands has suggested a list of alternative versions of ESK as follows: Evolutionary economics of ESK, Institutionalist ESK, Hayekian ESK, Bounded rationality ESK and Economic sociology and ESK.[661]

In order to be able to illustrate how dilemmas of epistemology are embedded in those versions I will concentrate on two different accounts of epistemology. My point is to illustrate that the controversy about the Natural and the Social is one of the most important controversies in the philosophy of science linked with the social sciences.

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[656] Pettit argues that sometimes this is plausible and refers to Nelson & Winter 1982.
[657] Wimsatt 2006.
[658] Levins 1970.
[659] ESK= The economics of scientific knowledge.
[660] Hands 2001, p. 365.
[661] The nonmainstream economics can be classified into three categories: a) the Marxists literature including Mannheim, Bernal, and different versions of social epistemology, b) the social exchange models literature including for example various gift giving models (Mauss), c) the economic condition necessary for the growth of scientific community literature including a variety of analyses related to the history of economy.

An interesting link with this discussion is produced by Philip Kitcher. Kitcher's[662] point of departure is Alvin Goldman's approach known reliabilism. According to Goldman reliability is the ability to produce a high ratio of true to false beliefs. There is no single standard for passing the reliabialist criterion; very high ratios are desirable but <.5 is probably sufficient.[663] For Goldman reliably produced beliefs are justified beliefs, and knowledge is thus a reliably produced true belief. A belief-producing process is reliable if it produces a high ratio of true beliefs, and a reliable belief-producing process is one that is justified.

Kitcher's point is that what counts as a "justification", the standards of reliability, must be based on social standards. Reliability of the social process affects the beliefs of individuals. For Kitcher the most important thing is the distribution of reliable beliefs within the community.

It means that we have to encourage such social processes and supporting institutions that increase the ratio of reliable beliefs to total beliefs within the population. Social epistemology is for Kitcher a study in epistemic industrial organization. The aim of his normative philosophical project is to discover what kind of arrangement of our cognitive institutions is most conducive to epistemic efficiency.

For Kitcher, it is not so important whether scientists do not follow the methodological rules or norms. His point is not the cognitive uniformity but rather one of diversity. This implies that economics is a particularly suitable discipline to explain how individuals acting as sullied self-interested agents could bring about a division of cognitive labor. Kitcher is not arguing for the complete laissez-faire mentality. Rather, he seems to argue, that it is possible to have unintended optimality as described in mainstream economics.

If the methodological debates in economics have focused on the problem of fact and fiction, the recent discussion in SSK tradition provides a totally different view. The traditional epistemology stresses that epistemology must be psychologistic: "Epistemology should be *psychologistic.* Whether or not people are rational in their beliefs depends not simply on what beliefs they hold or how the propositions they believe are logically connected, but also on how their beliefs are psychologically connected." [664] Epistemology with non-psychological basis is out of question.

One of the most fascinating theoretical proposals within the SSK context is Kusch's programme of communitarian epistemology in which knowledge is recognized as a social status. The programme of communitarian epistemology helps us understand why concepts and frameworks are so important in STI policies.

According to Kusch, the aim of communitarian epistemology is to understand rather than change epistemic communities. It follows that Kusch's programme differs from social epistemology in many ways. "Social epistemology", as a reform, is manifested in Kusch ´s judgment as two different forms: the "science policy programme" and the "complementary programme". The former seeks to determine ways of making science more democratic and accountable to the public. Its aim is to increase our ability to choose between the developments of different kinds of knowledge. Its deliberate assumption is that if we are able to influence the collective production of scientific knowledge, then we are able to manipulate the social organization of scientific communities. This is not the goal of communitarism.

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[662] Kitcher 1993.
[663] Goldman 1986, p. 105.
[664] Kitcher 1993, p. 184.

The complementary programme aims at remedying the shortcomings of traditional individualistic epistemology. The communitarian epistemology is more radical: it insists that the individualistic tradition is wrong as to the category of the isolated individual knower itself. There is no such knower for the communitarian.

It is also important to be aware that Kusch regards scientific knowledge and ordinary forms of language as far as the "socialness" of knowledge is concerned equal.

A point of departure for Kusch is to resurrect the idea of testimony. Traditional epistemology thought of testimony as a mechanism for the transmission of knowledge from one individual to another. According to the individualistic view, testimony is nothing but the transmission of a complete item of knowledge from one individual to another. From the communitarian view point testimony is not just a means of transmission of complete items of knowledge from and to an individual.[665]

Kusch[666] uses the term testimony in a way that is roughly synonymous with communication or learning from communication. His theoretical aims are very ambitious. If Michael Welbourne[667] focuses more on the object of knowledge (e.g. how the pooling of evidence enables teams to know more about the world) and if John Hardwig[668] concentrates more on the subject of knowledge (e.g. how testimony constitutes knowers with specific commitments and entitlements) Kusch attempts to bring both sides, the subject and the object, under one theoretical roof. His aim is to show that the communicative generation of new communal subjects of knowledge is due to the same type of process that also generates objects of knowledge. Testimony is linked to the generation of the social status "knowledge" in general, and the imposition of that status in particular circumstances.

Kusch`s major claim is that an performative testimony is important but overlooked category of testimony, and that it is a necessary condition for the existence of constative testimony: performative beliefs generate their referents, empirical beliefs not. Or to put it in other words, performative beliefs are important because they make empirical beliefs possible.

Most theories of realism and anti-realism make global claims about the nature of reality, and reflect on how it relates to our concepts and representations. In Susan Haack´s "innocent realism" (1998) the core thesis is that the world, the one, real world, is largely independent of us. The second thesis says that our descriptions of the world are true if and only if they accord with the way the world is. The third thesis concerns the relationship between different descriptions of the world. There can be more than one but different true descriptions must be compatible. The theory rejects the idea that the world is "the totality of mind-independent objects". According to Haack many true descriptions of the world make no reference to human existence. The sixth thesis insists that we can make "direct" contact with the world. Conceptualisation does not make our contact with the world "indirect".

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[665] Testimony is a generative of knowledge in the sense that it constitutes epistemic communities and epistemic agents, social statuses and institutions, taxonomies, and the category of knowledge itself. Understood in a very narrow sense, testimony has its place in the legal context and in its widest sense testimony stands for our epistemic interdependence. Traditional epistemology refers to the four sources of knowledge (testimony, perception, memory and reason). Perception covers both outer perception of the physical world and inner perception. Reason includes intuition as well as deductive and inductive inference. Perception, memory and reason are taken to be faculties of the individual mind. When traditional philosophy speaks of testimony it refers to knowledge gained from other's indicative say-so.

[666] Kusch 2002, p. 18.

[667] Welbourne 1993.

[668] Hardwig 1985.

Kusch's analysis[669] on the rational constraints upon empirical beliefs is interesting. Kusch focuses on rules and norms by which empirical beliefs are justified and become communal beliefs. In his formulation we have to make a difference between rules and norms. Rules are explicitly formulated standards or prescriptions, norms are standards and prescriptions that are not stated and that figure implicitly in our practices. It is usually difficult to put a norm into words. Most of our "epistemic prescriptions" are norms, not rules. Rules presuppose norms. Kusch asks: how do we know norms and "what" do we know in knowing them? His answer is that we know them by exemplars: these are the cases of actions and beliefs that are taken to fulfil the norms. The communal performative belief constituting a norm is a belief in the exemplary role of a number of cases.

Kusch insists that in science, as Kuhn suggested, scientists try to convince their peers by assimilating their solution into a recognized paradigmatic solution; implicit norms are more important than explicitly stated rules. In everyday life we have model solutions. Justifying a belief involves showing that the relationship between the belief and our evidence is similar or analogous to one of communally endorsed exemplars for types of justification.

It means that the justification is in principle contestable. In addition, justification is relative both in terms of exemplars and in terms of a given community. It is also relative to the judgments of similarity that link the pair to one or more of these exemplars. Justification is never algorithmic; it is impossible to write it down. It is important to note what follows: the norms of justification are as much results of acts of justification as they are determinants of acts of justification. Communal performative belief constituting a given norm changes with each interaction. In summary, Kusch defends the communitarian approach and finitism as follows[670]:

First, he does not side with Haack and Searle because they represent the idea of one true description of the world. According to finitism, terms are applied step by step to new cases and the application is guided by interests. There are no exemplars that are sacrosanct and the correctness of the application is determined by interactions within a community. Language is too fluid, too contextual and too social for the conception of a "final" true description to make such sense.

Second, Kusch is against innocent realism because it is committed to truth as correspondence. The idea of the world as the sum, or totality, of facts is in his view incoherent.

Third, Kusch wants to reject with his communitarian program the idea that relativity and underdetermination play a role only when choosing between different conceptual schemes, but not when it comes to choices within conceptual schemes.

Fourth, he is against Hilary Putnam's "internal realism" because he rejects the role of community in his internal realism. It follows that Putnam is inclined to favour the axiomatic and "meaning- determinist" line. It is a way to block relativism. The question that remains both in Goodman ´s and Putnam ´s case is how the worlds of science and art are collectively constructed.

Fifth, he argues that if we reject the idea that conceptual schemes are like timeless axiomatic systems, it becomes more difficult to speak of their incompatibility. If a conceptual scheme develops over time, then its relation to other conceptual schemes

[669] Kusch 2002, pp. 150–7.
[670] Kusch 2002, pp. 244–248.

must be subjected to change. It means that we have to take a third conceptual scheme to judge that two conceptual schemes are incompatible.

Sixth, if we reject conceptual schemes as monolithic and determinate systems of meanings, it does not imply that we have to give up conceptual relativity. We argue only that the present use of any classification is always determined by contingent local interests and goals, and that the future path of any classification is open.

Seventh, Kusch highlights that communitarianism and meaning-finitism are not forms of idealism or anti-realism in general. General statements of idealism, anti-realism are equally meaningless as are general statements of realism. Both of them try to speak about everything out there; this is incoherent.

Eighth, he wants to remind how terms like "reality" and "world" are used in everyday life. Ordinary language talks of worlds in the plural, the realist's singular (the one world) owes its initial intelligibility to religion and the dream of physical reductionism. Finally, Kusch insists that in meaning finitism it is not a deep philosophical issue to talk of one world or many worlds.

8.4. The political genealogy of STI policies: The echoes of the Cold War

If we return to the history of science and technology policies and carefully re-analyze Vannevar Bush's report and the political climate around the Cold War, it is obvious that economics plays a crucial role. The debate during the World War II was about whether the state has an obligation to support the sciences in general.

There were two big questions related to economics. Was economics truly a science? Was there persuasive evidence that economics yielded sufficient social benefits to justify its public subsidy? Bush's report to President Truman must be seen in this context. The discussion focused on whether the social sciences in general were "mature" enough, whether they employed the true scientific method, whether they were capable of conducting both basic and applied research, whether their research topics were too political, and whether it was possible to conceive of a coherent research program for each discipline.[671]

When the NSF (National Science Foundation) was created in 1950 the social sciences were not included until 1956. In other words, economics was put by the NSF on trial for over a decade. It is worth to note that business leaders saw the role of economics as one of a facilitator: the alliance between "Keynesian" economists helped to secure sensible public policies that would respect and strengthen the free enterprise system.

One dimension of this trial period was the development of operation research (OR). Operation research broke up to the British and American variants of science funding and management.

The British version evolved later into the left-wing sociology of science, whereas the American version was immersed into Mertonian sociology of science and the neoclassical economics of technical change. Both of them were subservient to the extensive infrastructure of science management run by the military and later units such as NSF and NIH (National Institutes of Health).

Mirowski argues that the reason is OR.[672] Cold War's "double truth" was that, on the one hand, those who were outside research communities were assured that scientists

[671] Goodwin 1998; Larsen 1992.
[672] Mirowski 2002, pp.177–190.

were the freest of the free spirits and that scientific inquiry could never be planned or dictated and, on the other hand, those who were inside research communities focused on reprocessing physical mathematical models into social science doctrine in pursuit of justifying interventions in the funding and organisation of science. His conclusion is that in the UK philosophers of science and the idea of context-free scientific method were seen as "the enemy", whereas in the USA philosophers of science were not seen as "the enemy". Vice versa, many were actively opted into the development of OR and decision theory.

It is apparent that natural scientists, and primarily physicists, were responsible for the creation, conduct, and codification of OR in the World War II. They were more familiar with probability and statistics in the 1940s than social scientists.

Another aspect of OR is that it was bound up with struggles over the modality of the funding of scientific research and the ability of the paymasters to dictate the types of research pursued. Operation research can be seen as an attempt to find a generic "scientific method" to be deployed in advising clients. It is also evident that the whole idea of OR was closely accompanied with RAND.

One very essential aspect of OR is that it presaged a multidisciplinary approach to the understanding of social processes and it contributed positive reactions to technological change. It was a major instrument for the stabilization of the American orthodoxy in economics.[673]

The irony is that originally Bush opposed the idea because it would threaten and undermine the role of the university in science. *"OR was a tool for military managers to enhance rational decision making in integrating civilian scientific and technological resources. Managerial and political ends were primary."*[674]

The outcome was a mix of game theory, symbolic logic, communication theory, linear and dynamic programming, queuing theory, simulation techniques, cost-benefit analysis, time series and cross-section statistical estimation, and network analysis.

Sometimes OR is defined as a part of mathematics but in the terms of mathematics it embodied nothing novel. But the siginificance of OR becomes evident if we conceive it as a process of triangulation between the natural sciences, economics and the nascent field of science policy were interlinked and where the computer was its major rallying point. "*Physicists wanted to be paid by the military but not be* in *the military; physicists wanted to do social research for the military, but not* be *social scientists; physicists wanted to tell others what to do, but not be* responsible *for the commands given."*[675]

OR was important because it provided a platform where the post-war relationship between the natural scientists and the state was forged. It also provided a site where neoclassical economics became integrated into the newfound scientific approach to government, corporate government, and the conceptualization of society as a cybernetic entity. In addition, OR had a profound effect on the intellectual contents of such academic disciplines such as economics, psychology, and computer science.

The history of OR in Britain is often associated with the struggle between two groups. The other group, often understood as the British version of OR, was the social planning of science movement. One of the leading figures was J. D. Bernal who advocated the idea of social planning and government funding. The other group was "Society for the Freedom of Science" movement and its key figures were Michael

[673] Mirowski 2002, p. 93.
[674] Collins and Kusch 1998, p. 175.
[675] Mirowski 2002, p. 182.

Polanyi and Friedrich von Hayek whose aim was to protect science from corruption through government planning.

One of Steve Fuller's key findings in his analysis on Kuhn[676] is that Kuhn's followers in science studies never speak about the larger political and economic scene that sustains Big Science and that they have never utilized the empirical and explanatory resources of the political sciences and economics. Ironically, as Fuller describes, the reception of *The Structure of Scientific Revolutions* was totally different from its author's expectations.

One of the key reasons for explicating and clarifying all these complex theoretical issues linked with post-war economics is that these controversies and disputes played a crucial role in the birth of the whole idea of science policy. These debates are still present in today's STI policies and most of them are taken for granted as the preconditions of those policies.

I will argue that the justification of STE hybrid is the core of those policies and that economists have had a leading role in the process. All those discussions and debates linked with the cyborg sciences are present in STI policies. The ethos is the same: science and technology are vital to economic growth.

The most important point of STI policies is that those policies change the social structures of science as well. As Mario Biagioli[677] and James Boyle[678] argue, the traditional conception of scientific authorship has changed radically in recent years. In effect, there is a tendency to be conflated more and more in the legal and economic spheres. It means that the traditional idea of copyright cannot be applied to science in a simple and straightforward manner.

The traditional dichotomy in science policy concerns the distinction between basic science and applied science. It implies that there is a clear division of labour between scientists and engineers. In the era of STI policies this division is blurred.

The third aspect of new scientific authorship is that scientists have lost their individuality and submerged their contributions within some larger communal whole. Most scientific work in the natural sciences is made in a group as seen in the fact most articles and papers are published by a group of scientists and scholars.

Biagioli and Boyle conclude that the new legislation of patents and copyrights will transform the way in which scientific work is currently conducted. Simultaneously, the traditional structures and contexts of universities are also transforming as well.[679]

If the Second World War and the Cold War era were catalysts for the birth of science policy in the United States, and its implementation consciously blurred the boundaries between science and ideology, STI policies represent the new cycle of this complex process.

8.5. Horizon II: The oikos and the polis controversy embedded in STI policies

It is worth noting that the Greek *polis* was opposed to the *oikos*, and *politikos* was referring to the *polis* and *polites* as the counter-concept of *despotikos*, an attribute referring to *the oikos*.[680] A *polites* was a full citizen, as opposed to children, slaves,

[676] Fuller 2002.
[677] Biagioli 2000.
[678] Boyle 1996.
[679] Mirowski 1994, p. 132.
[680] Palonen 2006, p. 33; Meier et al 1989.

foreigners, women and others. The *political* had an oppositional tone against the despotic order. *Politikos* referred to the *arkhé politiké,i.e.* to a polity and to the community of citizens. The distinction between the scientific and artistic disciplines of politics also has its origins in Greece.

In this chapter I will argue that the classical controversy between the *oikos* and the *polis* is embedded in STI policies. This means that STI policies can never be separated from the problem of politics. The controversy has been labelled as economisation, marketisation, monetisation, and commodification.

In order to be able to justify my *oikos/polis* argument I will introduce two different approaches to understand the controversy embedded in STI policies. The first of them is called the *ideology of innovation* and the second of them is called the *rhetoric of innovation*. The first alternative highlights the role of public policies in STI policies and stresses the linkage between neo-liberalism and the new political governance in STI policies (the *RIP perspective*). The second alternative stresses the role of rhetoric in STI policies and focuses on the linkage between the rhetoric and scientific knowledge in STI policies (the *RIS perspective)*. These two alternatives can be seen as complementary rather than exclusionary interpretations.

8.5.1. Ideology of innovation and the politics of governance and legitimation: Controversy 3 "Ideas are weapons"

Freedom is perhaps the most controversial concept in 20th century politics, although in the Western world it is often taken for granted. Weber, who in his bureaucratization analysis was very pessimistic, saw the politics of representative democracy as an expression of freedom. Weber's idea was based on freedom-as-contingency, not in terms of hazards but in terms of the omnipresence of *Chancen.* In political thought the Weberian moment refers to turning the analysis of *Chancen* into a means of rendering intelligible human actions.[681] But what is freedom ultimately?

In principle, there are three different families of views about freedom.[682] The first family is republican. Freedom refers to a certain set of political arrangements; to be a free person is to be a citizen of a free political community. A free political community is not subject to rule by foreigners and the citizens play an active role in government. The opposite of freedom is despotism.

The second family is often called liberal. Freedom is a property of individuals and consists in the absence of constraint or interference by others. A person is free to the extent that he or she is able to do things as he or she wishes and is not blocked or hindered from carrying out activities by other people. Whereas for the republican freedom is realized through a certain kind of politics, for the liberal freedom begins where politics ends. Many members of the liberal family have a variety of beliefs about the proper role of government, but they all share the view that freedom is a matter of the scope or the extent of government rather than of its form or character.

The members of the third family may be called idealistic in the sense that they stress the internal forces that determine how a person acts. A person is free when he is autonomous. The struggle for freedom is not linked with external environment, but it is linked with a person's inner restrictions preventing him from realizing his own true

[681] Palonen 2003b, p. 96.
[682] Miller 1991.

nature. The idealist identifies certain conditions as necessary for his freedom and this links freedom and politics in his thinking.

A famous attempt to clarify the concept of freedom was made by Isaiah Berlin.[683] For Berlin there are two different forms of liberty: negative liberty and positive liberty. Negative liberty is the absence of obstacles, barriers or constraints. But Berlin does not explicitly say what counts as interference or constraint. Positive liberty is the possibility of acting in a way that one can take control of one's life and realize one's fundamental purposes. Whereas negative liberty is usually attributed to individual agents, positive liberty is sometimes attributed to collectives or individuals as members of given collectives. For example, Hayek and Mill are often seen as defenders of negative liberty.

Freedom for Berlin is a form of self-mastery. A person is free when he controls his own life, rather than being an instrument of someone else's will. Berlin's distinction was not his own but it was based on a long philosophical tradition usually linked with Kant and many others. Those two perspectives have often been seen as a complementary pair in political philosophy.

Quentin Skinner[684] has stressed that the concept of freedom is very difficult and misused very frequently. His sarcastic point is that freedom is too important issue to be left to liberals only.

Laclau's and Mouffe's theory of discourse

Laclau and Mouffe[685] hold that the openness of the social is the very condition for formulating democratic projects in general, although it is based on contingent forms of reason and ethics hitherto restrained by the rationalist dictatorship of Enlightment.

The theoretical propositions of Laclau and Mouffe are consciously context-dependent, historical and non-objective.[686] There has been a strong tendency within Marxism to assert that the political is determined by something that is not in itself political but rather social and, in the last instance, economic. This tendency – the disappearance of politics - often referred to essentialism is connected within Marxism with two versions of economism: e*piphenonalism* and *reductionism*.[687] The general idea of the first is that the form and function of the legal, political and ideological superstructure is determined by the economic base.

Laclau and Mouffe have tried to go further from structural reductionism by taking as their starting point the problem of the economic sphere. Within Marxism it seems to have two different meanings referring to material production (theory of historical materialism) and referring to capitalist commodity production (theory of the capitalist mode of production). It serves as a kind of theoretical platform for the development of a neo-Gramscian theory of discourse advocated by Laclau and Mouffe. In practice, they have replaced the traditional Marxist notion of the economy with a theory of the discursive construction of the economic.

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[683] Berlin 1969.
[684] Skinner has maintained that Berlin's distinction is problematic and he has stressed that the idea of liberty owes a lot to Machiavelli, Hobbes and neo-Roman theorists but he mainly accepts Berlin's distinction. He has also criticized Rawls and other contemporary liberals. See Skinner 1998.
[685] Laclau 1990.
[686] As Jacob Torfing puts it, the intellectual development of Laclau and Mouffe's discourse theory can be described in terms of movement from the Gramsci-inspired critique of structural Marxism via a neo-Gramscian theory of discourse to a new type of postmodern theorizing. See Torfing 1999, p. 13.
[687] Mouffe 1990.

Their theory of discourse focuses on the political construction of identity. They stress three crucial factors in the analysis of concrete discourses; the relations of difference and equivalence, the workings of different kinds of overdetermination, and the unifying effects of nodal points.

The first factor refers to the trend to emphasize equivalence over difference although the relation between difference and equivalence is undecidable. The second factor refers to Freud's idea of overdetermination - it occurs at the symbolic level and takes the form of either condensation or displacement. The third factor is based on the idea that every discourse attempts to dominate the field of discursivity by expanding signifying chains. The privileged discourse points that partially fix meanings to the floating signifier are called nodal points.[688]

The nature of nodal points such as "nation", "party" and so forth is that although they are empty signifiers – they are floating within the field of discursivity- they are useful in terms of discourse because it is possible to fix their meaning and link them with a chain of paradigmatic chain of equivalence.

Laclau and Mouffe[689] argue that if we question the transcendence of the economy it leads us to the concept of discourse. The notion of discourse is of a central importance to their theory and Laclau and Mouffe link this notion to the problem of meaning. They argue that discourse must be defined as a decentred structure in which meaning is constantly negotiated and constructed. Thus, in their theory the concept of discourse[690] designates the constitution of a signifying order that is not reducible to its linguistic nor extra-linguistic aspects.

Another aspect of Laclau's and Mouffe's theory is their analysis of hegemony. They argue that the starting point of any analysis of political subjectivity is difference. Identity is a result of the hegemonization of a field of differential subject positions – it is not an embodiment of a pre-given, paradigmatic interest under which many other interests and identities can be subsumed.

Hegemonic practices of articulation constitute discourse and the irreducible play of signification within discourse provides condition of possibility for hegemonic practices. Hegemony and discourse are mutually conditioned in the sense that hegemonic practice shapes and reshapes discourse, which in turn provides the conditions of possibility for hegemonic articulation. That process is conditioned by social antagonisms.[691] These antagonisms establish the boundaries of the discursive formation of society. Their claim – very Wittgensteinian indeed – is that it is impossible to give a clear definition of social antagonism – it can be symbolized only.

The third interesting aspect of Laclau's and Mouffe's theory is their strong criticism against idealist constructivism and descriptivism. However, it is possible to argue that their theory is a version of realist constructivism; it is also materialistic and an enterprise to go beyond descriptivism and anti-descriptivism[692]. The descriptivist account of the relation between the object and its discursively constructed form stresses the meaning of the words that we use to refer to the external world of objects. Every word has a meaning which is defined by a cluster of descriptive features. The word refers to all those objects in reality that have the properties designated by the cluster of descriptions.

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[688] This is Lacan's concept (Fr. *points de capition).*
[689] Laclau 1988.
[690] Laclau and Mouffe 1987.
[691] Torfing 1999, p.43.
[692] Torfing 1999 45.

If a descriptivist is interested in the immanent and intentional contents of a word, the anti-descriptivist account regards the external causal link as decisive, the way a word has been transmitted from one subject to another in a chain of tradition. But as Žižek[693] argues those two opposing views miss the same crucial point- the radical contingency of naming. If Searle[694] has defended the descriptivist account against Kripke,[695] Žižek in his Lacanian approach emphasizes the role of contingency in the discursive formation of society.

The fourth aspect of Laclau's and Mouffe's discourse theory is its account of the political. In order to understand their point we have to clarify Derrida's idea of undecidability. "un*decidabilty is always a determinate oscillation between possibilities (for example, of meaning, but also of acts). These possibilities are themselves highly determined in strictly defined situations (for example, discursive- syntactical or rhetorical- but also political, ethical, etc.) They are pragmatically determined.*[696]

This undecidablity calls for a decision which must necessarily pass through the ordeal of the undeciablity, while taking into account the rules of its structural context. According to Derrida the problem is that the western metaphysical tradition by privileging unity over dispersion, necessity over contingency, presence over absence and so forth prevents us from recognizing the structural undecidability of the world. But how could the formation of that undecidability be revealed? Derrida's answer is deconstruction. Deconstruction is not a demolition, not an analysis, not a critique, not a method nor an operation.[697] In itself deconstruction is nothing in the sense that all attempts to predicate it are doomed to failure.

The structural undecidability becomes transparent in ethical and political decisions. Politics can be defined as taking constitutive decisions in an undecidable terrain. Decisions have a non-algorithmic character and become dependent on the creation of consensus for a certain option among a range of alternative options.[698] The creation of consensus for a certain option cannot be reduced to the process of identifying the common denominator.

The process can be described rather as a process of coming to agreement through persuasion. Persuasion has nothing to do with showing somebody's beliefs to be inconsistent with certain absolute criteria of rationality. Persuasion has nothing to do with causing somebody to change his beliefs by systematically breaking down their resistance. Persuasion takes the form of an attempt to make somebody give up one set of beliefs in favour of another by offering the re-description of the world which, on a pragmatic basis, presents a new set of beliefs as more suitable, amore ppropriate or more likely.[699]

In politics, the link between the re-description of the world and persuasion is very evident. Politics can be defined as a simultaneously constitutive and subversive dimension of the social fabric.[700] It leads to an assertion of the primacy of politics over the social.[701] Politics cannot be understood as deriving from something else which is not

[693] Žižek 1989, p.92.
[694] Searle 1984.
[695] Kripke 1980.
[696] Derrida 1988, p. 148.
[697] Derrida 1988, pp. 1–5.
[698] Torfing 1999, p. 67.
[699] Rorty 1989, pp. 3–22.
[700] Torfing 1999,p. 69.
[701] Laclau 1990, p. 33.

political in itself. Politics cannot be confined to a particular institutional region of the social; it constitutes an all-pervading dimension of the social fabric.

This kind of interpretation of the political is very close to the woprks of such classics as Machiavelli and Hobbes. Machiavelli saw political power as operating within the social and conceived as a plethora of practices and forms of organisations. Hobbes located the political outside the social and conceived it in terms of the sovereign power of the state.

Laclau and Mouffe want to advocate a radical plural democracy in which they want to go beyond liberalism and communitarism. The history of the contingent articulation of liberalism and democracy is a process of intensive political struggles which has taken the form of the democratization of the liberal state. Democracy is a historical process in which the competition between different political elites for the votes of the masses has been central.[702] In our political and ideological world there is a clear conflict between the traditional liberal appraisal of pluralism, individualism and freedom and the democratic principles of unity, community and equality. Mouffe[703] argues that it is important to discard the dangerous dream of consensus and accept the permanence of conflicts and antagonisms.

The liberal notion of democratic citizenship tends to privilege rights over obligations: the citizen is conceived as a bearer of universal rights that are protected by the law enforced by the state. Liberalism reduces democratic citizenship to a question of the legal status of the individual and sees social cooperation as a means of enhancing our productive capacities and increasing each person's individual prosperity. There is no common good: each individual should be able to define and seek his or her own conception of the good. It also conceives the individual, rather than the citizen as active.

As Rawls[704] in his proposal for a theory of justice suggests, the definition of citizenship is the legally ensured capacity of each person to form, revise and rationally pursue his or her conception of the good. Citizens are individuals who use their civil, political and social rights to pursue their own interests within constraints imposed by the exigency to respect the rights of others. Democratic citizenship is defined in terms of liberal democratic rights and these rights are guaranteed by a rational agreement between free and equal individuals who are ignorant, at the moment of agreement, of everything that could be prejudicial to their impartiality. Because the rights of democratic citizens are rooted in this rational agreement, the right has naturally priority over any conception of the common good.

This kind of position has strongly been attacked by communitarians and also by Mouffe.[705] Mouffe argues that the liberal tradition has stripped politics of its ethical components but if we attempt to reconnect politics and morals we should not aim to subordinate politics to moral values specified by the common good. Rather, we should emphasize the role of grammar of conduct – the interaction of rights and obligations in our conception of democratic citizenship.

[702] Bowles and Gintis 1986.
[703] Mouffe 1990.
[704] Rawls 1971.
[705] Mouffe 1993.

For Freeden[706] the study of ideology is not a specialized study of certain doctrines, but a particular approach to the study of political thinking as such. It regards political thinking as a ubiquitous and normal aspect of social life and insists that political theory must encompass these phenomena. His point is that politics consists centrally of the area of collective social life that involves decision-making, the ranking of policy options, the regulation of dissent, the mobilization of support for those activities, and the construction of political visions.

Freeden enlists three postulates. First, thinking about politics significantly relates to political issues. Second, thinking about politics relates importantly to the political thinking actually taking place within political entities. Third, inasmuch politics is a social and not merely an individual activity, so is political thinking and thus it must be examined as a series of collective conducting loosely patterned thought-practices.

Freeden argues that in the study of ideologies we have to keep in mind three issues. First, ideologies are themselves political thought-practices and as such have distinct features. Second, ideologies contain a specific category of thought- practice, namely pertaining to understanding the relationship between theory and practice. Third, each of the major ideologies displays different interpretations of the relationship between theory and practice.

Practice refers to the performance of and participation in an identifiable regular action and thought, one replicated as well as shaped by other such practitioners. Many acts do not constitute practices and some practice-cum-regularities of thinking do not constitute acts. On the macro level ideologies are special type of thinking about politics, and on the micro-level they are sets of specific thought-practices whose content and morphology differ from one ideological family to another.

Freeden illustrates his theory by using political decision making as an example. A decision involves that a choice is made among options, and political decision making involves making such choices as shaped by a collectivity. The concept of choice implicitly refers to the notion of pluralism, which means that there is more than one option to be chosen. This means that in the context of political decision making there is more than one voice, and as an act it is a matter of ranking between those voices. Decisions are "closures" that permit policies to be formulated or justified against a multiple path background.

If we accept this, argues Freeden, we will regard political thinking in a political community as an explicit or implicit competition over the control of political language. That control is aimed at through the most crucial feature of the ideological act: the deconstestation of the essentially contestable, through which a decision is made that it is both possible and justified. Within the internal logic of politics this is a heuristic necessity and also a practical one: decisions must be taken and they need to be either legitimated or enforced. The control over language is an attempt to monopolize the meanings that concepts carry. To achieve such control is the basic feature of political thinking.

Not only are political concepts related to ambiguity and indeterminacy, but they are also linked with inclusiveness. Inclusiveness relates to the point where competing appraisals of arguments cannot knock out each other. It is tied to the impossibility of reaching an end point in an argumentative chain, yet those points are conditioned by

[706] Freeden 2005.

moral paradigms, conventions of argument, demands of efficacy, or other cultural practices. In other words, the political theorist needs to theorize about the kind of thinking that goes into the act of decontestation. Decontestative thinking is central to political theory, Freeden insists.[707]

Therefore, it is important to analyze three forms of decontestation. The first is the attempt to attach precise allocations of meanings to determinate concepts, and the second is the stipulative ascription of meaning to a term. The second form may be underpinned by rhetoric. In the third form of decontestation, insimulated decontestaton, the semblance of decontestations created by ambiguity and vagueness. In sum, we may say that ambiguous and vague expressions of political thinking are intentional and importantly functional forms of political thought. But how do they structure political discourses?

Freeden follows in his task Skinner's observation that "acts are also texts" and stresses that political theorist must be sensitive to the fluctuating interchange of conceptual structures with the world of practices. Such underpinning in indeterminacy does not signify a flaw in our conception of the world but singles out the very locus of human choice. Indeterminacy is not synonymous with chaos or extreme relativism. Methodologically it underpins the pluralism that guarantees that neither political theory nor ideology will ever die.

In analyzing political language and thinking it is important to understand that we deal with an instance of complex holistic relationships with three features. First, any concept is a means to any other concept. Second, some conceptions of a concept may also intersect with a part of another concept. Third, the configuration of concepts has been constructed so as to constitutea collectively desirable, or attractive, set of human and social circumstance.[708]

Freeden[709] has stressed that the boundaries of old ideological families are nowadays very unspecific. In his analysis he differentiates two new mutations that he calls globalism and welfarism. Globalism aspires to be a new holism in a double sense. First, it is an offspring of the macro system previously referred to philosophically as universalism and politically internationalism. Second, it assumes the form of integrated and encompassing ideological positions through which major political questions are addressed. Freeden does not want to give globalism or globalization the status of ideology.

Manfred Steger [710]has criticized Freeden with six claims: 1) globalization is about the liberalization and global integration of markets, 2) globalization is inevitable and irreversible, 3) nobody is in charge of globalization, 4) globalization benefits everyone (… in the long run), 5) globalization furthers the spread of democracy in the world, 6) globalization requires a global war on terror. His point is that with regard to semantics these six claims absorb and rearrange a concept into a hybrid meaning structure of genuine novelty. Their political role consists of preserving and enhancing asymmetrical power structures that benefit particular social groups.

Heikki Patomäki[711] has in his recent book on neo-liberalism in Finland argued that the constituents of contemporary neo-liberalism are many but the key values of their program are the same: the premise of private property, the premise of freedom i.e.

[707] Freeden 2005.
[708] Freeden 1996, pp.145–147.
[709] Freeden 2003.
[710] Steger 2005.
[711] Patomäki 2007.

individuals have the right to decide what to do with their property and the premise of competition in the market. One of his theses is that neo-liberalism is above all a doctrine implemented in current public policy reforms rather than an economic theory as such. According to Patomäki another aspect of neo-liberalism is that it openly utilizes a variety of neo-classical theories in economics rather than political philosophies advocated by Hayek and Friedman.

Interpreting neoliberalism as a version of political governance, Patomäki argues as does Jessop, that the real target of its reforms is to unlock the Keynesian mechanisms embedded in modern nation-states in order to adapt them for the new global economy. In sum, Patomäki and Jessop seem to argue that it is precisely neo-liberalism and its ideology that characterize globalization.

8.5.2. Rhetoric of innovation and the politics of concepts and justification: Controversy 4 "In the beginning was the word"

STI policies might be understood as an ideology as discussed above, but it is also possible to interpret it as a particular form of rhetoric rather than as a particular form of ideology. The key point of this study is to examine why rhetoric plays so important role in STI policies. Therefore we have to examine shortly what sophists really argued.

One of the curiosities linked with sophists is that there is a lot of misunderstanding in regard with their thinking. Their criticism is often understood the first movement of enlightenment who used human rationality to criticise myths and authorities. But this kind of characterization utilizes the idea of defining ancient Greece as the childhood of western culture or *Homo sapiens*. If anything, sophists were criticising truth's dependence on culture.

Barbara Cassin argues that we must focus carefully on the quarrel between the sophists and Plato and Aristotle.[712] The core of Cassin's argumentation is her critical stance to the status quo of philosophy and her somewhat radical conclusion is that sophists have played perhaps the most important role in the development of modernity.[713]

Cassin argues that the real other of philosophy has been represented by sophists, a group of outcasts. One of the reasons for their exclusion was that they tried to advocate the idea that the expression "to speak to" must be taken into account as well as the expression "to speak of". Rhetoric, as Cassin[714] stresses, makes sophists interesting because one of the key issues they highlighted was the controversy related to the concepts of *logos* and time.

The controversies can be reduced to the contrast between time and space, *topos* and *kairos*. The controversy is present in the contrast between the spatial order and temporal "opportunism". Cassin maintains that traditional distinctions such as philosophy, linguistics, literature and so forth are only strategies of naming, as sophists advocated. Cassin considers the Sophistic tradition as a way of thinking, as a fascinating alternative to philosophy, and her point is to show that philosophy is not a neutral store of thinking but rather a style of thinking.

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[712] Cassin 2000. See also Palonen 1997.

[713] She justifies her argument by referring to the epicentre of the history of philosophy: the problem of the regulation of language. Ordinary philosophy musters up all its forces, at all levels and by all means, to reinforce this regulation ethically and Cassin gives a long list of names including Plato, Aristotle, Kant, Heidegger, the representatives of analytic philosophy, Habermas, Foucault and even Perelman.

[714] Cassin 2000. See also Palonen 1997.

After Plato, philosophers have not put up with politics and the majority of philosophers has tended to reject politics as a dirty game, or they have tried to reduce politics to philosophy. Cassin introduces two different forms of rhetoric: the rhetoric of space and the rhetoric of time or the tradition of "ontology" thinking (philosophers) and the tradition of "logology" thinking (sophists).

While the rhetoric of space, the discourse (*le dicours*) attempts to tame temporality and submit it to spatiality: its organising principle of representations is *topos*, the rhetoric of time attempts to organise representations as spontaneity rather than as a closed totality, and its organising principle of representation is *kairos*.

For sophists rhetoric is a vast performance which, by means of praise and counsel, produces the consensus required for the social bond. This consensus is minimal because for sophists consensus is not a requirement of a uniform unity: they do not require that everyone thinks in the same way (homonoia), but only that everyone speaks (homologia) and lends their ear.

For the sophists one of the key notions was the notion of *kairos* to which many later thinkers such as Machiavelli (*occasione*), Weber (*Chance),* Schmitt (*Ausnamezustand)* and Benjamin (*Geistesgegenwart)* return. As a term it has many connotations and refers to chance, crisis, breaks or solution, and it can be understood both as a contrast to *topos* and also as a contrast to *skopos* – a way of thinking in which aims are taken for granted.

One of the best-known attempts to understand the logic of political language is Koselleck's temporalization thesis[715]. Koselleck's claim is that there is an ever-increasing abyss between the concepts of *Erfahrungsraum* and *Erwartunghorizont.* Past experience is increasingly less able to serve as a basis for future expectations; the break with the continuous space of experience is the most important aspect in the temporalization of politics. Another aspect of his thesis is the relative denaturalisation of the temporal experience, as manifested in the technologies of transportation and travel. But he is sceptical of the possibilities of new technology to establish a new *Spielraum* of action. The third dimension of temporalization concerns the metaphorical reinterpretation of spatial concepts into temporal ones.[716]

It is important to note that Cassin's temporality thesis is different from Koselleck's idea of *Sattelzeit.* If Koselleck's thesis is that the temporalization of concepts is possible only through metaphors because time is not observational, Cassin thinks that sophistic thinking is a critique of spatiality in favour of temporality rather than a metaphoric transformation from spatial concepts to temporal concepts.

One may argue that Weber' s political and social theory plays a central role in the following issues: the concept of rationalization, the spheres of values, and the idea of freedom of the individual cultural being. The last theme is of a great interest because, as Palonen[717] points out Weber never wrote a concise exposition of his understanding of the concept, which is very coherent taking into account his nominalistic and perspectivistic approach. One often noticed aspect of Weber's political and social theory is his refusal to use the concept of "society". This is also vunderstandable because for Weber "society" is a political concept. It is politics that determines the boundaries and membership of "societies".[718]

If we return to Palonen's analysis on the polit vocabulary in which he difines four basic nouns polity, policy, politicization, and politicking - we are provided with new

[715] Koselleck 1985.
[716] Palonen 2006, p. 18.
[717] Palonen 1999.
[718] Greven 2004.

resources to analyze STI policies as a rhetorical endeavour and a form of political theorizing.[719] In Palonen's view the dilemma of political theory is the concept of politics as such. In the classical interpretation "polity" is understood as a spatial framework for politics: it is there that policies and politicking takes place. In this classical interpretation politicization is understood as the extension of this "framework". The non-classical interpretation regards politicization as the constitutive speech act of politics and polity as a contingent complex of specific historical politicization.

The difference between the sphere and activity concepts of politics concerns the thematization and significance of politicking while polity as metaphorical space is common for both interpretations. The problem is that thinking spherically is an obstacle in the search of alternatives to the existing polity.[720]

Palonen has suggested in his attempt to conceptualize politics by the idea of politics-as-activity that in order to be able to withdraw the politics-as-sphere conceptualization we have to conceptualize politics as the scarcity of time into three clusters. Interestingly, he implicitly utilizes the conceptualizations used in economics; now the core of that complexity is time. In the first cluster we deal with the lack of time (a struggle against time), in the second cluster we deal with the distribution of scarce time (a struggle of time), and in the third cluster we struggle with time (a struggle with time).

While it is easy to reject Palonen's attempt to re-conceptualize the concept of politics, I strongly disagree with such attempts. In my view Palonen is not only clarifying the problems of politics; rather, his actual aim is to genuinely find novel horizons to the dilemma of rationality and its universality in politics.

Palonen introduces us a different approach to the dilemma of political theorizing by explicating how political practices trigger problems for the political theorist. He has differentiated four genres of political theorizing: statements, justifications, explications and descriptions of performance.

STI policies as a corollary of statements

The genre of statements refers to the question ***what.*** This means the adoption of a stand either for or against a position in a given controversy. A statement expresses a position for or against a proposal; it also contains definite formulations specifying the stand and marking the difference between the proposal and the opposing view.

It is worth noting that political agents have the last word in the formulation of statements, although experts, advisers and theorists may have a role in the invention of alternative formulations or in pointing out distinct political potential. If we adopt this to STI policies, it applies to them surprisingly well. The history of science and technology policies illustrates that the controversy of the Natural and the Social has been the core of those policies. In other words, the dilemma of rationality and the dilemma of epistemology have been key statements that those policies depend on: all debates linked with science and technology policies return to those dilemmas.

In terms of this study it is obvious that STI policies can be seen as an arena in which this statement is discussed and will be discussed in the future. My conclusion is that STI policies can be seen as a corollary of statements linked with the controversy between the Natural and the Social or to put it in Weberian terms, the dilemma of *Kulturmensch.* Weber's clarifies it as followsas he says that the condition for human sciences "*lies not in*

[719] Palonen 1993.
[720] Palonen 2006, p. 292.

our finding a certain culture or any "culture" in general to be valueable but rather in the fact that we are cultural beings, endowed with the capacity and the will to take a deliberate attitude towards the world and to lend it significance."[721]

STI policies as acts of justification

By the notion of the justification of a standpoint Palonen refers to the question ***why.*** It does not mean that politicians merely assign their advisers or think-tanks the task of a finding legitimation for a standpoint they have already taken. He refers to Skinner as follows. *"Thus the problem facing with an agent who wishes to legitimate what he is doing at the same as gaining what he wants to cannot simply be the instrumental problem of tailoring his normative language in order to fit his projects. It must in part be the problem of tailoring his projects in order to fit the available normative language."*[722]

This is the key problem of political theorizing in terms of legitimation. Any action in order to obtain acceptance and support must be politically significant. It must have a justification and it must be modified in order to be accepted. Or to put it in other words, political theorist is obliged to understand the situation and the language of the political agents in their own theorizing. Political agents are obliged to recognize political theorizing as a relevant part of their activity. The what question cannot be treated independently but it is related to the why question.

In this study I have argued that STI policies must be understood as a complementary process in which theory and practice are interrelated with each other. This can be reduced to a maxim: without practice there would be no theory and without theory they would be no practice. This means that in STI polices the horizontal thesis is extremely important. It links the theoretical debates with political government and its practices. I have explicitly argued that the boundary between justification and legitimation becomes blurred and unspecific and rhetorical expertise is increasingly demanded to explicate this boundary.

STI policies as series of explication

The third genre is that of explication. A programmatic text is never self-sufficient but requires commentaries, interpretations, elaborations, demarcations, and so on. Palonen argues that the aim of explication is to make a statement transparent. In order to make a point it is important to clarify ***how*** the previous views must be linked with a new statement.

In this study one of the issues has been to explicate that STI policies must be understood as a complex political process if we want to to find a credible justification to the STE hybrid. In order to be plausible enough, STI policies can seen as a form of action in which "epistemic bipolarity" forms its core. In other words, STI policies can be seen as a sort of testimony in which commentaries, interpretations, elaborations and demarcations linked with the STE hybrid are welcomed. This means that STI policies are in a state of continuous suspense. In STI policies the genuine aim is naturally to make statements transparent. This implies that there are a lot of contradictions and controversies embedded in STI policies in relation to theories and practices.

[721] Weber 1949, p.81.
[722] Skinner 1978, pp. xii-xiii.

In this study I have argued that STI policies can be seen as an ongoing political process, and that those policies can be linked with other fundamental changes in politics in general. To put this differently, is to say that there is a lot of path-dependency and one-dimensionality, but also that there are many alternatives and choices embedded in STI policies, and this opens doors for rhetoric.

STI policies as politics of performances

The fourth level of political theorizing refers to the performances of politicians. It is concerned with the question of how persons act when they act politically. How do politicians take their stand or justify or explicate a certain standpoint?

In his analysis of Skinner's perspective on political theorizing, Palonen reminds that a re-description of what is meant by theorizing is an implicit aspect of the perspective. It requires a dismissal of the venerable demand that theory or knowledge should concern only what is considered the universal, timeless, invariant or law-like. The conventional modes of theorizing lack the tools inherent in the discussion of what is though to be singular, temporal, momentary, local and historical or contingent. Skinner's wants to direct our attention to the search for tools to aid in understanding of how politicians deal with contingent events.

Palonen highlights that the politician is an ideal type of person who is able to assess the contribution of controversy to the improvement of our understanding of the activity of politics. Politicians can illustrate the limits of the experts' and specialists' knowledge, and also point out its irrelevance when experts fail to imagine the alternatives or a partisan way of presenting them.

In terms of STI policies this is very true because it is almost impossible to act as a politician or policy maker without using the vocabularies developed in STI policies. I have argued that STI policies must be understood as a political process that is full of paradoxes. One of those paradoxes is that there are only few politicians who are genuinely interested in science and technology policies. Another paradox is that the public discussion on science and research, as well as on technology and technological innovations, has occurred in very limited circumstances in spite of all efforts linked with the public understanding of science. The new breakthroughs in natural sciences such as nanotechnology, artificial intelligence and biotechnology dominate the discussion. These two paradoxes are often linked with the dilemmas of expertise and expert knowledge in contemporary politics and STI policies, in particular.

In this study I have shown that most of STI policies occur behind the curtains and a diverse group of researchers, experts, civil servants and naturally some alert politicians have roles of their own. But all those representatives of STI expert groups at national level as well as in international level are in the midst of politics. They are politicking and they are politicizing, although some of these persons themselves might disagree.

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9. DISCUSSION AND CONCLUSION

9.1. Rhetoric as a method

> "We *have politics because we have no grounds, no reliable standpoints – in other words, responsibility and rights, the answers and the claims we make as foundations disintegrate, are constitutive of politics."* [723]

In this chapter I will focus on some critical points that this kind of study obviously involves. First, I will clarify two critical momentums of this study: rhetoric as a method and my position as a scholar. Second, I will discuss the problem of interdisciplinarity which is one of the key elements in this study. This study can be seen as an example of STS studies where the research interest is on the political aspects of science and technology. Third, I will conclude this chapter by returning to the problem of political theorizing. My conclusion is that STI policies reflect the trend of the displacement of politics as it is often called.

In other words, STI polices are closely linked with the problem of regulatory state in which the key issue is the legitimacy of political authority. As a particular form of policy STI policies reflect several problems linked with legitimacy and democracy in liberal democracies. My radical conclusion is that STI policies are one of the key forums in which the very essential debates and negotiations related to the concept of politics become manifest rhetorically, and this makes STI policies very political.

Boundaries of rhetoric as a tool

> *"Politics, ideology, and power matter more than metaphysics to most advocates of construction analyses of social and cultural phenomena. Talk of construction tends to undermine the authority of knowledge and categorization. It challenges complacent assumptions about the inevitability of what we have found out or our present ways of doing things."* [724]

Collingwood's distinction between absolute and relative presuppositions has been a sort of compass utilized in this study. His original idea was to avoid the traditional metaphysics understood as an ontological inquiry and to develop a new metaphysics. In order to be able to do so Collingwood differentiates between three distinct meanings of the term "cause". In the historical sciences (sciences which deal with the mind) *"that which is caused the free and deliberate act of a conscious and responsible agent, and causing him to do it means affording him a motive for so doing."*[725] Collingwood calls this sense I of the term cause.

The sense II of the term is used in the practical sciences of nature, such as engineering and medicine, where, "that which is caused is an event in nature and its cause is an event opr state of things by producing or preventing which can produce or prevent that whose cause it is said to be." [726]

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[723] Keenan 1997, p. 3.
[724] Hacking 1999, p. 58.
[725] Collingwood 1940, p. 285. James Conolly gives a nice overview on Collingwood's philosophy. See Conolly 2006.
[726] Collingwood 1940, pp. 296–297.

The sense III of the term is employed in the theoretical sciences of nature where *"that which is caused is an event or state of things and its cause is another event or state of things such that (a) if the cause happens or exists, the effect must happen or exist even if no further conditions are fulfilled (b) the effect cannot happen or exist unless the cause happens or exists"*[727]

The main difference between sense I and senses II and III is that whereas the practical sciences of nature explain the occurrence of events by appealing to empirical regularities, the historical sciences explain actions by ascribing reasons to agents. The natural sciences are concerned with empirical or external relations between events and the historical sciences are concerned with internal, non-empirical relations between actions and the motives/beliefs they express.

Collingwood's point is to draw attention to three different types of explanation rather than to distinguish between explanations that have ontological or existential import and explanations which do not and which are consequently epiphenomenal (rationalizations). One of the key themes of this study has been to examine how those three different kinds of explanations are embedded in STI policies.

According to Collingwood, neither the proposition "mind exists" nor the proposition "matter exists" are metaphysical propositions because they do not assert the existence of metaphysical kinds (matter and mind). They are methodological assumptions that govern the study of mind and matter.

In effect, I have argued that in the terms of STI policies the internal new order must have a justified and credible warrant by which to understand and explain the formations of the STE- hybrid in our contemporary world. This internal thesis, as I have called it, constitutes the theoretical dilemma of STI policies.

My second thesis, the external thesis, is that the internal thesis is not enough. In other words, it is impossible to understand the totality of STI policies without taking into account its strong links to changes in the nature of political government. One of the most fundamental changes is linked with the idea of transition from the ethos of political government to the ethos of politicial governance. This constitutes a practical dilemma of STI policies.

In order to be able to investigate the rhetoric embedded in STI policies I have introduced two complementary rhetorical perspectives: the RIS perspective and the RIP perspective. By utilizing those two perspectives my aim has been to characterize the rhetorical nature of those policies. My claim is that those policies can be seen as a series of scientific arguments (i.e. as a process of scientification of politics) seeking to find theoretical and practical explanations for those policies.

Those pretentions can be labelled as the immaterial and material conditionals of these policies. The first immaterial conditional is composed of a political process in which the construction of new epistemologies in forms of models and concepts seek to warrant these policies. The construction process is dependent on the theoretical suggestions (the import of concepts and frameworks) that are advocated by STI policies and that can be understood as performative acts.

The second material conditional is linked with the other developments in contemporary political governance where the point is to renovate and reorganize the public sector or, to put it more generally, to change the traditional conception of the nation-state and also other issues related to democracy and decision making. In other words, the practical aim of STI policies is to legitimate those policies by triggering a

[727] Collingwood 1940, pp. 296–297.

series of political interventions (i.e. as a process of political interventions) in which the aim is to change the existing institutional setting of political government. This political aim becomes apparent in a variety of interventions advocating the need to change the socio-cultural practices embedded in them. The construction of these conditionals is linked with the idea of learning (i.e. the advocacy of necessity of institutional reforms) and its ethos in which the meaning of experiments in modern policy making is seen as a necessary condition for STI policies.

But how do I see myself as a scholar within this context? Paul Ricoeur and his conception of action, time and narratives give an interesting answer to this. Ricoeur [728] has in his studies stressed that intelligible action is the proper object of social sciences. But the most interesting aspect of Ricoeur's thinking is his conception of time.

Ricoueur[729] differentiates between phenomenological time and cosmological time. The order of past-present-future within phenomenological time presupposes the succession characteristic of cosmological time. Ricouer argues that any philosophical model for understanding human existence must employ a composite temporal framework.

The only suitable candidate is the narrative model to represent the human world of action. Narratives draw together disparate and discordant elements to form the concordant unity of a plot that has a temporal span. All the elements that a narrative unites are contingencies; they could have been chosen differently.

To Ricouer narrative has three stages of interpretation that he calls Mimesis1, Mimesis2 and Mimesis3. Mimesis1 can be seen as action itself, as an arrangement of objective events, or as a construction of plot for the present time-space framework. It is very apparent that these interpretations have totally different accounts of what is the state of affairs. Mimesis2 introduces another stratum of interpretation, a more general account of what is the state of affairs by introducing a model, a narrative or a theory explaining Mimesis1.

For Ricouer, Mimesis2 is always linked with the dilemma of time and temporality; it means re-organization of time by introducing new interpretations, testimonies and critique. The action in Mimesis2 never fulfils the criteria of scientific in the positivistic sense. Mimesis2 always involves interpretative, moral and political element.

Mimesis3 refers to the moment when Mimesis2 is shifted to Mimesis1. What happens in Mimesis3 is that the scholar's narrative dissolves into actors' practices either by shaping actors' interpretations or by re-organizing their action.

Ricouer's point is that Mimesis2 and Mimesis3 are present in all our actions in the sense that historical interpretations are inherently in motion. In other words, he simply highlights the special character of historical study process as an idea: this can be seen to be the purpose of interdisciplinary research as well. In sum, this study is an attempt to construct Mimesis2, a rhetorical narrative for STI policies, and hopefully it provides some new horizons to interpret those policies.

Dilemma of interdisciplinarity

As Julia Klein[730] claims interdiscilinarity is a problematic concept because there is a general uncertainty of the meaning of the term. What is a discipline is also an important

[728] Ricoeur 1991, pp.146–147.
[729] Ricouer 1988, p. 109.
[730] Klein 1990, pp. 12–13.

question. In the most general sense, discipline refers to systematic instruction given to a disciple.[731]

Michel Foucault[732] uses the term *épistémè* in his analysis of the knowledge/power systems and utilizes the term as a strategic apparatus which permits the separate statements which are possible, justified and acceptable within the field of scientificity but which may not to be characterized as "scientific".

The idea of academic discipline refers to a body of knowledge a sphere of knowledge underpinned by some institutional and organizational practices. This implies that we have both a set of old academic disciplines such as physics, chemistry, and mathematics and some middle-ranged disciplines such as social psychology, social economy and so forth, disciplines with a more or less clear position and status among other academic disciplines. In addition to these we have a variety of groupings that aim at the status of discipline. All disciplines have naturally histories of their own and these histories usually have external origins rather than internal.[733]

In terms of interdisciplinarity this study owes a lot to STS tradition, one of those recent academic endeavours advocating the idea of interdisciplinarity. Its aim has been to entice scholars from various disciplines to study topics and issues related to science and technology by using novel approaches. The STS tradition tangles in this sense with gender studies and cultural studies which have similar aspirations.

The idea of interdisciplinarity has proved to be ambivalent. It has been stigmatized by a number of attributes such as non-science or non-scientific. The origins of the critique can be traced back to institutional and organizational issues, the lack of intellectual interaction, methodological issues, the diversity of basic theoretical convictions and metaphysical issues.[734]

In this study interdisciplinarity means an epistemological and methodological challenge. In retrospect, I clearly acknowledge that I have encountered problems of interdisciplinarity in different situations. I am also aware of the fact that my personal attraction for "transgression" leaves room for critique. Regardless of these problems, I believe that inquisitiveness and intellectual curiosity are the real hallmarks that a scholar in political sciences must have, but I openly admit that the outcomes and results constitute the criteria with which these hallmarks are ultimately evaluated and assessed.

9.2. Conclusion: STI policies and politics

STI policies and displacement of politics

This is a thoroughly political study and therefore based on inter-disciplinary approach. Bonnie Honig[735] has distinguished two types of political theorists. Her point is to stabilize two positions from which she defines and negotiates the issue of the displacement of politics. Her severe concern is that politics is displaced from our

[731] The origin of the word is Latin *disciplina*, "instruction", from the root *discere* "to learn", and from which *disciples,* "pupil" also derives. See Pickett, J. et al. (eds) (2000) "Discipline", American Heritage Dictionary of the English Language, Boston: Houghton Mifflin.
[732] Foucault 1980, p. 197.
[733] Cohen 1985.
[734] In Finland, the TINT (Trends and Tensions in Intellectual Integration) research project financed by the Academy of Finland is a good example of this discussion.
[735] Honig 1993, pp. 1–5.

contemporary western democracies in a curious ways and she tries to understand that displacement.

The first type of theorists Honig calls *virtue* theorists who "*confine politics to the juridical, administrative, or regulative tasks of stabilizing moral and political subjects, building consensus, maintaining agreements, or consolidating communities and identities. They assume that the task of political theory is to resolve institutional questions, to get political rights, over, and done with, to free modern subjects and their sets of arrangements of political conflict and instability.*" Among *virtue* theorists she locates such theorists as Kant, Rawls and Sandel.

The second type of theorists is called *virtù* theorists who "*see politics as disruptive practice that resists the consolidations and closures of administrative and juridical settlement for the sake of the perpetuity of political contest."*

These two approaches represent totally different accounts of politics. If *virtue* theorists want to eliminate dissonance, resistance, conflict and struggle from politics, *virtù* theorists see them as its constituents. *Virtù* theorists such as Skinner, Arendt or Weber are not interested in maintaining of order, system or society. Rather, they seek possibilities and alternatives and stress non-linearity and disruption rather than linearity and functionality.

The problem of politics and the political was also Carl Schmitt's motive in his classic *The Concept of the Political.* Its main argument was that political questions are never mere technical issues to be solved by experts. One of the main reasons for our current inability to envisage the problems in our societies is that we are not able to see them in a political way. Political questions always involve decisions which require us to make choices between conflicting alternatives. Schmitt emphasizes that the hegemony of liberalism, which includes individualism and rationalism, has a major role in the displacement of politics and maintains that there is a liberal critique of politics rather than a mere liberal policy.

Schmitt's insight is that the political identities consist a sort of friend/enemy or us/them relation.[736] For Schmitt the political world is not a universe but a pluriverse. As Chantal Mouffe[737] remarks, the deeply entrenched conviction in Western democracies that they are embodiments of the best regimes and they have the civilizing mission to universalize it must be critically employed. Political concepts, argues Mouffe, must be understood in terms of pluriverse. *"…it depends on who interprets, defines, uses them [political concepts]; who concretely decides what peace is, what disarmement, what intervention, what public order and security are. One of the most important manifestations of humanity's legal and spiritual life is the fact that whoever has true power is able to determine the content of concepts and words. Caesar dominus et supra grammaticam. Caesar is also lord over grammar.*" [738]

If we analyze STI policies by utilizing those theoretical suggestions we will find a variety of possibilities to understand those policies. If we line up with the *virtue* theorist's perspective we can naturally highlight the juridical, governmental and administrative aspects of STI policies. In this case our interest focuses on how stabilization, consensus, contracts and solid identities are linked with those policies.

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[736] Schmitt 1976.
[737] Mouffe 2000, p. 83–86.
[738] See Schmitt (1988) Völerrechtiliche Formen des modernen Imperialismus, in Positionen und Begriffe, Berlin : Duncker & Humboldt, p. 202. A quote in Mouffe 2000, p. 87.

But if we take the *virtú* theorist's perspective our view to STI policies is totally different. We must focus on activity, practices, disruptions, dissonance, resistance, conflicts and controversies embedded in STI policies.

My thesis is that by linking these perspectives we are able to comprehend how strong the bond between politics and STI policies is in the end. Then we are able to realize the bond between STI policies and rhetoric. I am not arguing that STI policies must be reduced to politics. Rather, I argue that it is impossible to grasp the problem of STI policies without taking into account the problematic concept of politics. In this sense STI policies help us to understand how important conceptual change is in our contemporary understanding of politics and how these policies are linked with current changes.

If we prefer *the virtue* theorist's perspective the problems of STI policies are ultimately a theoretical challenge in which the STE-hybrid construction plays a major role. Its logic is based on the top-down account of politics. As seen in this perspective the problem of STI policies is to find a plausible theoretical justification for these policies so that policy makers are able to re-organize the political governance, its internal administration and its institutional settings to correspond better to new demands. This re-organization is a complex political process in which theoretical knowledge is translated into a variety of political strategies, visions, and political interventions. In this legitimation process theoretical knowledge is related to empirical data by utilizing different, mainly statistical, methodologies.

If we prefer *the virtú* theorist's perspective we take a totally different and more critical stand to the problems of STI policies. Our concern is more on practices and the bottom-up account of politics because our focus is on how to create spaces for possibilities. Arendt has seen *virtú* as an excellence of political founding; it has a unique capacity to found new regimes, generate political power, and to set up the institutional conditions for its maintance and regeneration. According to her, virtuosic action subverts the rise of the social, and *virtú* has a role to play the transvaluation of values.

This study has utilized Finland as an example of STI policies. The key issue from this part is whether Finland deserves the characterisation of the Finnish model. What makes the Finnish case so exceptional and special?

Antti Pelkonen[739] argues in his dissertation on the changing aspects of Finland's science and technology policies on the basis of Bob Jessop's and Neil Brenner's analyses[740] that changes in the Finnish science and technology policies reflect Finland's strong emphasis on technological upgrading. This has implied two issues: the breakthrough of the innovation paradigm in science and technology policies and the growing pressure of commercialisation in university research.

Pelkonen's conclusion is that his empirical case study on the Helsinki region supports the core arguments of the competition state thesis. Finland has clearly shifted towards the competitive state where market orientation and commercialisation have a strong role in public policies.

The basis of the Finnish science and technology policies has been the corporatist tradition and the Finnish consensus tradition. As Kuitunen and Lähteenmäki[741] stress in the study of the Finnish technology policy, it is a small clique of civil servants and experts who have constructed and modified the Finnish science and technology policies.

[739] Pelkonen 2008.
[740] Brenner 1999; Brenner 1998.
[741] Kuitunen and Lähteenmäki- Smith 2006.

My own conclusion follows this and my critical argument can be reduced to the following. Previously, I have argued that Finland has a variety of national peculiarities in politics and in various cultural policy practices which play an important role in implementing STI policies in Finland. I claim that these cultural and historical peculiarities fit the ethos of STI policies because they appear to provide a lot of flexibility and inventiveness for Finland's policy making. In fact, STI policies emphasise only narrow definitions of politics.

This ambiguity becomes apparent if we reflect the very fundamental signifiers of liberal democracies such as democratic representation. Political authority is regarded to be legitimate when it fulfils three criteria: legal validity (when political authority is created and conforms to a set of established rules), moral justification (when these rules are based on principles and beliefs widely accepted by the society), and consent (when the actions of ruling authority are confirmed by the consent and public support of the government).[742]

We can pose the question how legitimate the Finnish implementation of STI policies has been in terms of these three criteria. It is obvious that in the future those problems will be far more complex. As the member of the EU Finland will be even more dependent on the rules and legal procedures the European integration necessitates.

European integration is often criticised and claimed to be the Trojan horse of neo-liberalism and technocracy in the sense that it understanding of sovereignty and democracy has many weaknesses and deficits when they are applied as principles of the rule of nation-states.

Majone[743] argues that the EU is a regulatory state although it itself does not have the status of the state. One of the Majone's key points is that the EU policy making system is concerned with regulation rather than on redistribution. Where redistribution concerns prevail, legitimacy is ensured only by majoritarian means. With reference to democratic mechanisms the EU policy making system is imperfect. The Finnish model of implementing STI policies shares much with this European policy making model.

The EU highlights economic, social and legal regulation. It means that European institutions are legitimate in terms of pure efficiency considerations. Majone insists that European legislation is regulatory and technocratic and that the absence of political controls often ensures efficiency in the system of policy making. For him the European model of legitimacy is the non-majoritarian model of legitimacy.

In such non-majoritarian systems legitimacy and policy making rely primarily on performance criteria. It follows that the public good is realized if professionals are in charge because they are not subjected to the biases and distortions of electoral politics.[744] "*… technocratic legitimacy is but one variant of a much more general type of legitimacy, recurrent through history, which claims the right to rule by virtue of access to some special knowledge, whether this be a society's traditional wisdom (traditional rule), divine revelation (theocracy)', moral insight (philosopher kings), the future course of history (Marxism-Leninism), or specific knowledge (technocracy)*"[745] In all these cases the power holders claim that privileged knowledge is good for society; ordinary people have no access.In such cases legitimacy is equated with efficiency and performance.

My conclusion is that STI policies must not be seen only the fruits of neo-liberal ideology but rather as an emergent form of new political governance in which rhetoric

[742] Bentham 1999, pp.15–20.
[743] Majone 1997.
[744] Malone 1996.
[745] Beetham and Richardson 1998, p. 17.

has a very special role. It is also clear that STI policies favour regulatory aspects rather than redistribution aspects. In fact, it is the political core of STI policies: to encourage displacement from the welfare/redistribution issues to the innovation/regulatory issues.

It is important to acknowledge that in the case of STI policies we do not deal with issues that havesignificance in one particular policy sector only. Rather, these are issues with global meaning. The themes and issues linked with STI policies are relevant in relation to our western contemporary economy-driven cultural values, the core of our *Weltanschauung* as such.

STI policies seem to be an important arena in our contemporary society where the negotiation on the boundaries between the political and the anti-political sphere takes place. STI policies seem to constitute the basis on which memberships in and alliances with communities and states can be established. These policies have a crucial role in organizing the rules and reforms linked with new political governance and its cultural practices.

It is obvious that the ethos of Vannevar Bush's report, the role of science as a precondition for economic growth and development, is still alive. [746] It follows that in terms of polity, STI policies have a peculiar role in the sense that they clearly engender a variety of controversies and confrontations related to the concept of politics itself.

My point is that the complex issues related to STI policies are not purely policy issues. The impacts and influencies of STI policies are more radical and more profound.

First, in terms of polity the question is which issues are traditionally understood as being defined as political issues. STI policies are inherently linked with the disputes and controversies concerning the end of ideology and the end of history. Mouffe argues in her analysis that our contemporary world is rather characterized by the end of politics rather than by the end of history. Political argumentation has disappeared and it has been replaced by moral, economic or legislative discussion, and argumentation. [747] It is easy to see that the argumentation related to STI policies involves a lot of similar discussion.

Second, in terms of politicking the definition of political action in STI policies seem to blur those traditional definitions if we understand politicking as a borderline concept in the debates related to politics. In other words, the rhetoric linked with STI policies openly advocates that its political aim is to increase varieties of actors as well as to find new platforms and agendas for these policies by a series of interventions aiming at the redefinition of the traditional boundaries between the public sector, the private sector and the civil society. This testimonial dimension of STI policies can be seen as the core of those policies.

Third, in terms of policy STI policies represent a distinctive style of politicking in which the aim is to coordinate and regulate actors' activity. While the first target of those policies is to renovate the traditional science and technology policy as through a series of internal reforms, the second target of STI policies is to reach hegemony among other policy sectors.

Fourth, all these issues are present if we examine the dilemma of politicization linked with STI policies. The power of STI policies is its huge capacity to produce *ad infinitum* new vocabularies and concepts in contemporary politics. The first aspect of this rhetorical mangle can be called the mangle of conceptualization that is based on the

[746] Mirowski 2002, p. 517.
[747] Mouffe 2002; Mouffe 2005.

controversy between the Natural and the Social. The second aspect of this rhetorical mangle is linked with the controversy between the *oikos* and the *polis*.

In effect, it would be fallacious to think that STI policies have nothing to do with rhetoric and, in particular, it would be equally fallacious to think that STI policies have nothing to do with politics.

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APPENDIX

Comparing Keys and Locks- Will Welfare Cluster Become a New Door to Innovation Policy? Study report published in 2005 by MTI Financed Studies

STUDY QUESTIONS

1) How do you define the concept of welfare cluster?
2) How and when was the welfare cluster born? What was its history and origins?
3) How were the key actors in advocating the idea of the welfare cluster? What was your own role and contribution?
4) What was the content of the welfare cluster and how do you understood its central contribution?
5) Were there other choices and what made the welfare cluster so essential?
6) What makes the welfare cluster so important and what kinds of arguments were used in pursuit of legitimating it?
7) What were the proper goals and aims of the welfare cluster? Was there any political debate concerning the intervention?
8) Who were the most important parties in it? What made those parties so valuable?
9) How do you assess the results of the welfare cluster?
10) What will be the role of the welfare cluster in the future?
11) Which reports and documents are the most important ones in your thinking?
12) What else must be taken into account in the case of the welfare cluster?

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