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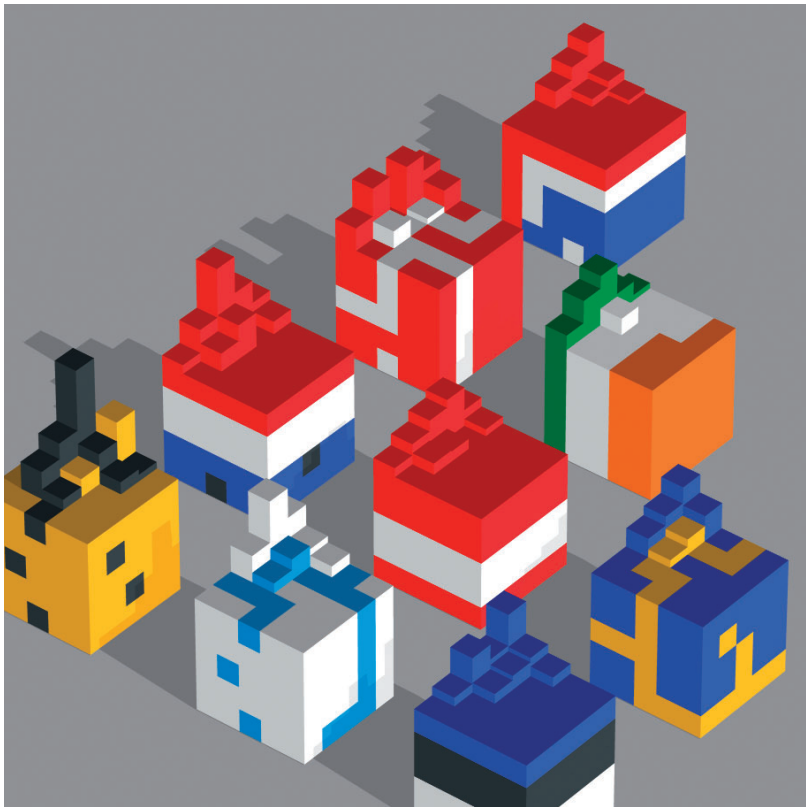
Tekes Review 236/2008



Tekes

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Foreword

VISION Era-Net is a collaborative network of nationally leading innovation policy agencies who seek to coordinate European research on innovation and technology, improve the utilization of research and evaluation intelligence in policy making, expand and advance European knowledge base on innovation environment, and identify common knowledge and development needs. The network includes 12 partners from 10 countries, and develops shared knowledge bases for innovation policy. Partners are committed to explore and prepare jointly cross national research mechanisms that address issues beyond national scope.

Nine of the VISION Era-Net partner countries – Austria, Denmark, Estonia, Finland, Flanders (Belgium), Ireland, The Netherlands, Norway, and Sweden – jointly selected thematic areas for research and funded research projects. One of the identified joint research themes was Innovation policy future governance. A research project on governance was initiated through an open call for tenders. Tekes, the Finnish Funding Agency for Technology and Innovation, coordinated the tendering process and the administration of the project during its implementation. All the partners participated in selecting the researchers and also actively in the work during its implementation. Gaia Consulting Oy (Finland) and Dialogic Interactie & Innovatie B.V. (The Netherlands) completed the study. This report summarizes the main results from the project. Further material can be found from the VISION Era-Net web-site.

The project had a strong emphasis on policy learning which meant that an active involvement of the partners and national experts was critical for the completion of the work. The partners participated in the design of the work, provided material, participated in the interviews and workshops, and provided their valuable comments during the course of the work. The work would not have been possible without this commitment.

All the funding partners and the researchers wish also to express their sincere thanks to all the experts in the partner countries who provided their valuable input through the survey, interviews and workshops.

On behalf of the consortium,

Tekes, the Finnish Funding Agency for Technology and Innovation

Content

1 Executive summary

Background

Governance refers to the systems and practices that governments use to set policy priorities and agenda, implement policies and obtain knowledge about their impacts and effectiveness. These governance systems and practices are in a permanent state of flux reflecting the changes in the political and societal systems that the policies interact with. Science, technology and innovation (STI) policy is not an exception. These policies are in the middle of a transition period. To support the policy learning related to the STI policy transition, VISION Era-Net[1] partners initiated a study to compare and analyze recent innovation policy governance developments in nine partner countries – Austria, Denmark, Estonia, Finland, Flanders, Ireland, Norway, Sweden and the Netherlands. The study aimed to identify the major challenges facing the governance of national innovation systems in Europe (and most notably in the participating VISION Era-Net countries) and exploring what factors create pressure for renewal, why this happens, and whether the national and regional policy responses vary. The study was completed between August 2007 and April 2008 by Gaia Consulting Oy (Finland) and Dialogic Innovation & Interaction B.V. (The Netherlands) in close co-operation with the VISION Era-Net partners.

Approach

Both the STI policy field and the governance of STI policies are rather complex areas supported by a variety of theoretical frameworks and approaches. This study used a framework where a differentiation was made between 1) *policies* and *instruments* that together give shape to the content of STI policies, 2) *governance* i.e. the combination of the institutional set up of the various elements of a national innovation system (NIS) (governance structure) and the way the policy process is shaped through the various elements of the policy process (governance processes) and 3) *issues* that create pressure for changes in governance (both generic and innovation specific).

To structure the discussion on the governance processes, the policy cycle framework which divides the processes roughly into agenda setting, design of the policies, implementation, evaluation and policy learning were used. The differentiation was also needed between historical assessment of past changes and future assessment using foresight methods. It also needs to be acknowledged that the windows for real changes in governance are limited and their actualisation processes are extremely complex. The 'garbage can model' was used to illustrate these complexities. It especially refers to windows of opportunities that open at certain points in time when problems, policy proposals and politics coupled and make more radical changes in governance structures and processes possible.

The evidence of past changes and views of future pressures were collected with over 60 in-depth interviews, survey and workshops that were organised in the partner countries. Nearly 30 case studies of typical changes in innovation governance were studied in detail as the basis for learning from the past major changes and their drivers in innovation governance. These case studies provided important insights into the context and content of national approaches to STI policies and most importantly lessons learned in innovation governance. The survey focused on identifying

1 More information on the VISION Era-Net can be found from the web-site www.visioneranet.org

the future issues creating pressure for changes. The analysis of both historical examples of changes in innovation governance and future governance challenges was completed through an interactive workshop in each participating country. These workshops ultimately enabled drawing common conclusions which were further discussed in a VISION Era-Net conference in Stockholm in April 2008.

An overview of future innovation policy governance challenges

Although the countries are at different phases with respect to the urgency for implementing new structures and processes, the STI policies in all of the countries are facing similar major future challenges. Implications of globalization create pressure for innovation policy renewal. Innovations are seen in all of the countries as key elements ensuring growth and national competitiveness and as solutions for future societal challenges such as ageing, environmental challenges, and climate change. At the same time, the content of the notion of "innovation" has broadened from technology to cover wider social, systemic, organizational and service innovations. The broadening content of the STI policies will present a major challenge as such as there are more stakeholders, issues, and problems to be solved. The broadening content of the STI policy means that there is an overarching need for increased integration and horizontal coordination.

Although the STI policy content is expected to experience a major renewal in the future in most of the countries, it is less evident that the institutional structures and processes would experience a similar renewal. From the history we know that the existing structures tend to be permanent and mostly very rigid reflecting the local contexts and being based on the informal processes having long historical background. New functions are introduced through new institutional structures which often further increase the complexity of the governance systems and increase the need for coordination. Major question is whether the existing sets of institutions and processes are at all capable to handle the new policy contents.

Based on the material produced in the study, the following five STI policy options or choices were identified to be the most relevant for future governance. One should note that these options are not black-and-white or right or wrong choices but more a continuum of issues among which there always needs to be found a right balance.

- **Broad vs. narrow STI policy.** Although there is a pressure towards broadening the content of STI policies, the countries can make clear choices to define the policy boundaries and further define the supporting governance structures and processes to support these choices. Also within the broad innovation policy one can (and one should) define the priorities clearly and be focused.
- **De-centralized vs. centralized governance structures.** Sectoral and centralized innovation policy based on the hierarchical departmental mode of governance seems to be more and more complemented with a de-centralised and network based modes of governance. These networks seem to emerge from the need to create new operations and also partly in order to by-pass existing structures. The network management will become challenging but on the other hand the future demands call for more bottom-up and open ways of working.
- **Policy planning vs. political plans.** Policy making will always be political. However, the degree to which the STI policy processes will become politicized is uncertain and partly also under control of politicians and policy makers themselves. A policy system that is dominated by political decision-making and combined with a less stable political context may result too much turbulence. A policy system that is overtaken by "rational" policy-makers can lead to organizational inertia or lack of wider societal support for STI policies. A right balance needs to be struck between "informal and more politicised" policy planning and more "formal and rational policy planning".
- **Experimentation vs. financial accountability.** There is a trend to strengthen the knowledge base for decision making. Future policy making calls both for improved impact assessments for policy actions as well as experimentation with new actions which would be care-

fully analyzed. Broadening STI policy definitely needs supporting experiments. At the same time, however, there is a strong trend calling for increased financial accountability and "value for money" evidence which may be at odds with new innovative and high risk taking STI policy experiments.

- **Agility vs. stability.** New challenges, need for policy experiments, and networked mode of operations require high agility, adaptability and flexibility from the governance system. At the same time the policy system needs to be relatively stable. Particularly, the stability of funding is the core element also for future STI policy. Also, the changes and their impacts take a long time to mature and thus "policy bouncing" is not a desirable characteristic. Seeking the balance between fast and agile functions and more stable functions is a challenge.

Key conclusions

1. **There is a current widespread development towards more horizontal, open and customized approaches to STI-policies but the countries are at the different phase and are struggling with implementing the policy. This offers an enormous opportunity to reflect on and review current innovation governance practices.** The link that is made between STI policies and wider societal challenges calls for a major revision of innovation governance. One important challenge is how and to what degree to include sectoral departments in broader, horizontal STI policies and anchor STI in non-innovation and non-research departments. A major trade-off is between including sectoral departments more explicitly in compiling a shared STI-agenda versus keeping a more narrowly defined departmental responsibility for the STI-agenda. Underlying these challenges is a shift from (scientific and/or economic) output to (societal) outcome. This also involves a major change in the role of government, namely from passive funding agency to an actively involved player.
2. **STI policies have developed into an established policy area with increases in STI budgets and the prominent position of STI on the political agenda. Expectations towards the results have increased. Existing governance systems are not able to handle or renew themselves quickly enough.** Due to the rising STI budgets and the political priority given to innovation the number and variety of actors involved in STI policy-making, implementation and evaluation and monitoring has increased. There is often a political urge to cash in on the budgetary increases (increased pressure on financial accountability). Since the established institutions are generally regarded as incapable of delivering results quickly enough, temporary 'bypasses' (e.g., interdepartmental structures, 'outboard motors', new ways of agenda-setting) are created to overcome traditional institutional inertia. Alas often these temporary instruments turn into semi-permanent institutions and become part of the governance problem itself. There are generally two ways out. The most radical yet painful measure is to go back to the basics and reform the original institutions. Next-best is to introduce more coordination and policy coherence in the system (thus including both the old and the new structures).
3. **Acknowledge that changes in innovation governance cannot be managed completely rational and that policy cultures differ markedly, but that there are at least two complementary modes in innovation governance. When making changes, the formal and most often hierarchical governance mode needs to be combined with an informal and network and often bottom-up governance mode.** The mix or balance between "informal and more politicised" policy planning and more "formal and rational policy planning" differs considerably between countries and in time. However, irrespective of the actual mix, the role of an "inner circle of STI officials" setting the agenda is quite big in most countries and is an important quality of the innovation governance system especially when there is a window of opportunity for

changes. A highly fragmented formal system keeps functioning due to a largely informal system of communication and information sharing. It is less clear whether the reverse relationship also holds. Too much focus on 'formal' top down planning might stifle the (mainly spontaneous) functioning of the 'informal' bottom up mode. However when horizontalisation is sought (see 1), top down steering might be especially needed to define clear (yet broad) boundaries and mandates for the agents. Thus it appears that both modes are complimentary and needed to make changes in innovation governance.

4. **Drafting and implementing a coherent (broadened) national STI strategy requires considerable strategic competence supported by the governance system, but this does not automatically imply a need for an overarching grand STI strategy.** Drawing up broadened national STI strategies and planning requires considerable strategic intelligence capability in STI policy-making as well as improved coordination among firstly the traditional (core) STI Ministries and secondly among these and the various sectoral Ministries. However, the need for a grand strategy is not always self-evident. Also without national strategies some countries have created bottom up inter-organisational capabilities and routines in drawing up in a typical sequence of bottom-initiatives and top down sanctioning and guidelines emergent STI strategies. In general, the contribution of (top down) selection is overrated and the contribution of (bottom up) variation underrated. A high degree of variation gives a lot of flexibility to the system, in contrast to the much more static top down approach. The crucial points seem to be whether there are (politically) entrepreneurial agents who are able to align the interests of the many stakeholders and to successfully escalate these joint interests to the political level.
5. **New innovation governance challenges (see 1) requires experiments with interagency and interdepartmental vehicles creating coordinated and coherent STI-policies which need to be steered on typical critical success factors.** Some of critical success factors for making these vehicles to a success include: (a) involve the right people with the needed qualities (experienced, and both knowledgeable on content and process); (b) fairly broad mandates and the possibility to act as a clearinghouse between the various actors involved (see 3); (c) early identification of cross departmental themes in order to keep the interdepartmental agenda filled. These are some of the critical success factors which must prevent that policy-makers switch back from the still young discipline of interdepartmental way of policy-making and -implementation to the traditional departmental or sectoral mode of policy-making and -implementation. The main trade-off to be made here is to invest in new types of interagency and interdepartmental forms of governance and the parallel need for institutional streamlining that is felt in most STI policy systems. A key ingredient for success seems to be the long-term presence of a rather stable informal group of experienced policy makers who trust each other well enough to transcend the (narrow) specific interests of the organizations they represent.
6. **There is an increased pressure to strengthen the knowledge base for policy making. New (innovative and possibly more risky) approaches towards innovation governance are an important and necessary part of this evidence based policy making. This is not at odds with accountability.** On the contrary, the experiments with interagency and most importantly interdepartmental vehicles (see 5) require thorough monitoring and evaluation strategies at the institutional, policy and eventually at the meta- or systems level. In most countries there is by now a well developed history of monitoring and evaluation at the programme and instrument level, but less so in systematically evaluating new governance structures. Some countries deliberately let a number of flowers blossom and foresee a meta- or systems evaluation in a few years time in an attempt to learn. The final goals of these experiments (defined in terms of outcome) should be very ambitious (in order to induce radical innovations) but should not be ap-

plied too soon during the implementation of the experiments. Also, too strict and straightforward financial accountability may kill innovativeness.

7. **Make use of the rhythm or intervals at which windows of opportunity for changes in innovation governance (institutions, processes) open up. Use the between time to roll out and implement.** Political entrepreneurship has often been very important for bringing about real change –political changes open up windows of opportunities and subsequently the "right people in right places" make things happen. The capability to act swiftly when a window of opportunity opens therefore is an important quality of a policy or innovation system. At the same time most actors in the innovation system value a predictable, robust and stable innovation environment, that is, stable boundary conditions. STI policy-makers have to make sure that the innovation system has the right levels of turbulence and agility while creating periods of stability and predictability as well. If turbulence is too high new structures and processes may lack the time to really prove themselves (see 6). One of the clear risks observed is that impatient politicians give new experiments and approaches not enough time, resulting in a cascade of half-heartedly experiments and new approaches.
8. **In order to derive a balanced innovation governance system create the right check and balances between advisory, policy design and policy implementation functions and built in enough self reflection and learning capabilities.** Stress factors in innovation governance are appearing where a sort of natural balance between advisory, policy design and policy implementation functions was lacking or where these different functions overlapped problematically. For example competing advisory structures, competing policy-making institutions or STI implementation agencies overtaking the policy-making functions are creating stress in the system that might be counterproductive. Therefore it is key to invest in regular evaluations, not only at the level of individual organisation and programs but at the systems or meta-level as well. Such systemic evaluations should be especially aimed to streamline the system and to weed out obsolete and/or redundant governance structures and processes (see 2).
9. **Look for innovative ways of stakeholder involvement when broadening STI policies. Broadening of STI policies or the development of horizontal STI policies asks for new ways of creating support with an increasing number of stakeholders (see 1).** Switching to a more interdepartmental mode of policy-making does not automatically mean involving outside stakeholders (which might be a prerequisite for more horizontal STI policies). In most countries this cannot be accomplished old style i.e. through systemic representation of all stakeholders. Working through representative ('politicized') bodies is increasingly seen as frustrating the very core of innovation (unusual solutions, new combinations) as this in most cases results in very slow decision-making and mostly watered down compromises. However the crux is not so much in the institutional set-up per se as in the careful selection of the individual representatives. In order to function as a vanguard rather than a rear guard the members should be able to operate relatively independently of their constituencies (e.g., bases on their individual merits) yet without loosing contact with them (see 5).
10. **Start the discussion on future innovation governance in time.** The more so as periods of change and relative stability seem to follow up on each other like a pendulum movement, some planning in making changes in innovation governance change can be done beforehand. This is needed as otherwise time or political pressure is too high to really think through the sort of changes in innovation governance that are feasible and needed. Discussing the outcome of this and similar studies on innovation governance multilaterally and in national capitals might help in getting the reflection of the innovation governance in time and when most needed.

2 Introduction

Governance refers to the systems and practices that governments use to set policy priorities and agenda, implement policies and obtain knowledge about their impacts and effectiveness. These governance systems and practices are in a permanent state of flux reflecting the changes in the political and societal systems that the policies interact with. Science, technology and innovation (STI) policy is not an exception. These policies are in the middle of a transition period. To support the policy learning related to the STI policy transition, VISION Era-Net[2] partners initiated a study to compare and analyze recent innovation policy governance developments in nine partner countries – Austria, Denmark, Estonia, Finland, Flanders, Ireland, Norway, Sweden and the Netherlands.

The VISION innovation governance study has aimed to identify the major challenges facing the governance of national innovation systems in Europe (and most notably in the participating VISION Era-Net Countries) and exploring what factors create pressure for renewal, why this happens, and whether the national and regional policy responses vary. Major pressure for renewal in innovation governance is at the moment stemming from the broadening and horizontalisation of STI policies which means that more ministries are involved, societal next to economic motivations for STI come in play, and new stakeholders enter the policy development. Ultimately, the study should help the participating countries to improve innovation policy learning on the topic of innovation governance.

The study was completed between August 2007 and April 2008 by Gaia Consulting Oy (Finland) and Dialogic Innovation & Interaction B.V. (The Netherlands) in a close co-operation with VISION Era-Net partners. The study was completed through the following steps.

1. There is a wealth of existing information on the formal innovation policy governance structures, actors and legal settings as well as on the STI policy objectives and priorities in different countries. This material was used in the beginning of the work to set up a framework (described in chapter 3) and to rely on the existing material during the course of the work.
2. To learn from past major changes in innovation governance and what drove these changes a sample of nearly 30 case studies – spread over 7 categories of typical changes in innovation governance – was performed. Both desk research and in-depth interviews provided detailed information on these historical cases, most of which were examples of changes in innovation governance that were initiated some years ago and still ongoing. These case studies provided important insights into the context and content of national approaches to STI policies and most importantly lessons learned in innovation governance (chapter 4).
3. To get new insight on the future anticipated generic and STI policies issues that create pressure for change and their possible implications for ultimately innovation governance a survey was conducted. This web-based survey was designed to get views on innovation gover-

2 More information on the VISION Era-Net can be found from the web-site www.visioneranet.org

nance future challenges also beyond the participating countries and was held among STI policy-makers and stakeholders directly involved in the design and implementation of STI policies (chapter 5).

4. The analysis of both historical examples of changes in innovation governance and future governance challenges was completed through an interactive workshop in each of the participating countries. These workshops followed a common structure and were aimed at feeding back, validating and discussing the forward and backward looking analyses mentioned under point 2 and 3 on the one hand and initiating a process of policy learning and triggering a discussion on future challenges in innovation governance in the particular country on the other hand. These workshops ultimately enabled drawing common conclusions which were further discussed in a VISION Era-Net conference in Stockholm April 2008 (chapter 6).

This report is a final summary of the major findings from the study. In addition to this report, the country specific material is available at the VISION Era-Net web-site.

3 Approach

3.1 Framework

Both the STI policy field and the governance of STI policies are rather complex areas supported by a variety of theoretical frameworks and approaches. In this study some theoretical components have been seen valuable when discussing innovation governance including:

- The innovation systems approach;
- The interaction between theory, practice and policy also described as the triple helix of Industry-University-Government relations or the co-evolution of innovation theory, innovation practice and innovation policy;
- The three stage approach in STI or innovation policies where especially the third stage approach puts a heavy demand on more widely defined innovation policies where non traditional players outside the STI-core come into play as well;
- The policy cycle framework which provide a way to describe in a structured way governance processes and actions dividing the processes roughly into agenda setting, design of the policies, implementation, evaluation and policy learning;
- The differentiation that is made (based on future and foresight studies) between common megatrends that are mostly similar for all countries and weak signals and/or country specific trends that may affect the need for future governance changes;
- We need to acknowledge that the windows for real changes in governance are limited and the processes how they take place are extremely complex. The well-known 'garbage can model' (Cohen, March and Olsen, 1972) is a useful starting point here, especially in its elaboration by Kingdon (1995)[3]. Public policy making could be considered as a set of processes, including the setting of the agenda and the specification of alternatives from which a choice is to be made. Two categories of factors might affect these two processes: the participants who are active (inside and outside the government), and the processes by which agenda items and alternatives come into prominence. Regarding the latter processes a distinction is made between problems, policies and politics. Each of the three processes can serve as an impetus or as a constraint. They are largely independent of one another, and each develops according to its own dynamics and rules. But at some critical junctures the three streams are joined, and the greatest policy changes grow out of that coupling of problems, policy proposals and politics. This coupling is most likely when policy windows (opportunities) are open (Kingdon, 1995, pp. 1-4) (see Figure 3.1).

To operationalise and combine these notions an analytical framework of future challenges affecting innovation policy governance was created and used throughout the study to structure the observations. An overview of the created framework is given in Figure 3.2. Differentiation was made between the following elements.

- *issues* that create pressure for changes (both general and innovation specific – the yellow boxes),
- *policies* and *instruments* that together give shape to the content of STI policies (what is innovation policy about – the blue boxes), and

3 Cohen, Michael D., James G. March, Johan P. Olsen (1972). A Garbage Can Model of Organizational Choice Administrative Science Quarterly, Vol. 17, No. 1, pp. 1-25; Kingdon, J. W. (1995). Agendas, alternatives, and public policies (2nd edition), New York: Longman.

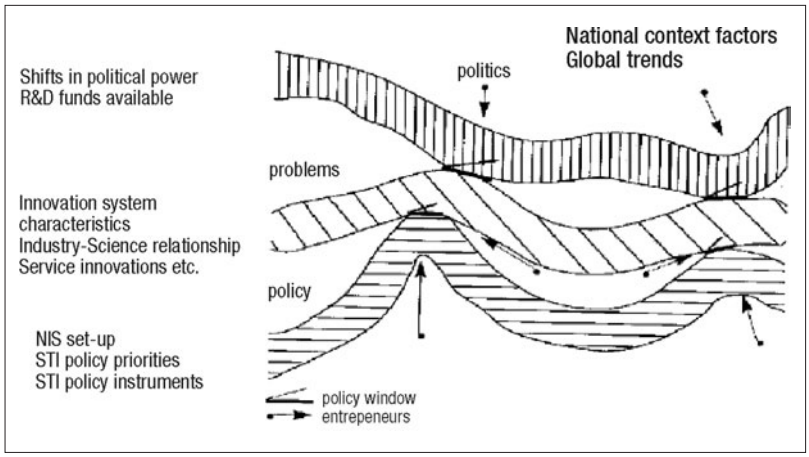


Figure 3.1. Illustration of the garbage can model. (Source: Van de Graaf and Hoppe, 1996:198)

- *governance* i.e. the combination of the institutional set up of the various elements of a NIS (governance structure) and the way the policy process is shaped through the various elements of the policy process (governance processes – the purple boxes).

The split between content and governance may appear – and often is - arbitrary since these two dimensions affect each other both ways. However, this split was made and kept in mind throughout the study to prevent the focusing solely on mapping and analysing the content of

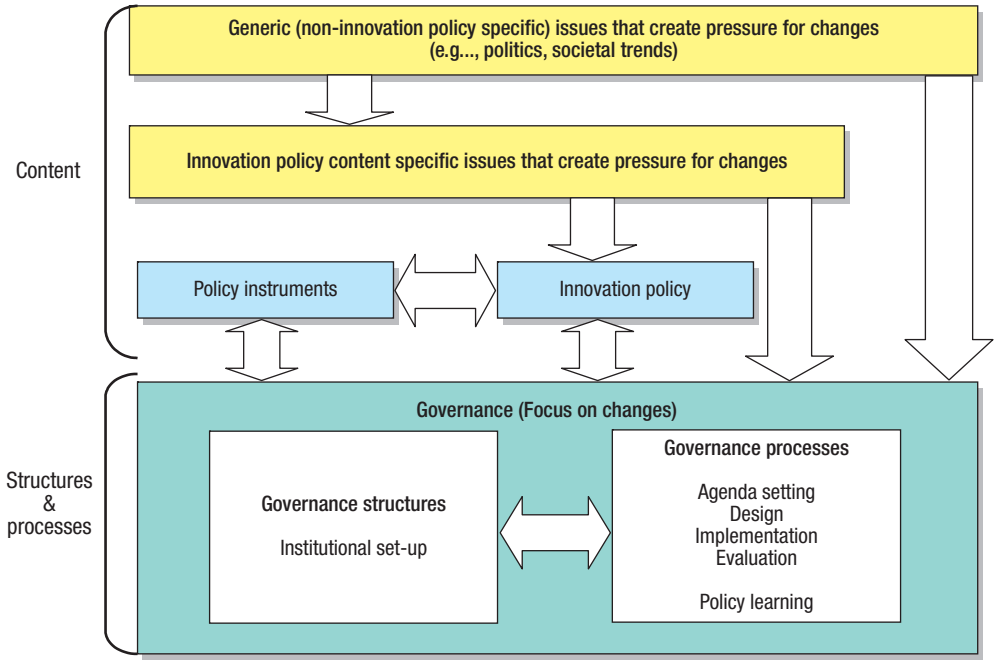


Figure 3.2. Conceptual framework and typology for analysis.

STI policies or comparing policy instruments. To separate these different elements supported the understanding on ***how a particular change in governance comes into being and the sort of trade-offs made***. What type of issues made that changes in governance were seen as necessary in the past? What might drive changes in governance in the next ten years? What sort of changes in governance will this most likely be? In order to address these issues in a systemic manner, one needs to draw a line between the parts that are affected and parts that are a cause for a phenomenon. The presented typology is simplistic but it provides a practical way to structure the information collection and provides a basis for comparisons. One further note on the typology is that it easily creates a static view on phenomena that are highly dynamic. The dynamic nature of the changes was taken into account by emphasizing the garbage can model (see Figure 3.1) as a mental model for the analysis throughout the work.

Further notes explaining the typology are provided below.

Issues

- A generic title of "issues" was selected for themes that could be named as well as "challenges", "trends", or "drivers". Generally these are issues or items that can be described to be something having implications for governance but not being governance structures or processes as such. During the course of work and with the case studies there was a constant discussion whether a specific issue is actually a part of the governance processes or a factor outside in a situation where also a notion of governance is ambiguous. An example is whether typical policy culture related context factors are part of governance structures or more broadly a characteristic or a framework condition of the STI policy. However, these cases and discussions were an important part of the work in increasing the understanding of the change dynamics.
- The issues identified and listed are the essential ingredients for testing the garbage can model. Issues represent different "problems" and "politics" as well as other factors that each follow their own dynamics but that at some point in time meet and create a window of opportunity for a change. It is not relevant in the study to list all the possible issues in the world, but to identify those that actually were or will be relevant in creating a pressure for changing innovation policy governance.
- The issues are further divided into categories of a) generic issues and b) innovation policy specific issues. The latter are the 'usual suspects' for most STI policy-makers, the first are the more generic and broader societal changes that typically emerge from foresight or future studies and in general are harder to directly translate in innovation policy-making and instruments.
- Generic issues influence innovation policy and its instrumentation but also innovation governance. Globalisation or for that matter ageing might give rise to new policies and instruments, but may also require new ways of agenda-setting, implementing policies or even the creation of completely new institutions. Generic issues are a very large and incoherent set. Tentatively these were structured to issues that are general megatrends, issues describing general political-economic-societal landscape in a country (the often addressed contextual factors affecting governance and national innovation systems) and to issues that are actually trends in governance (i.e., governance as such is a clearly defined structure or process, but a trend affecting governance might be, e.g., a trend of eGovernment or the increasing emphasis in policy processes on accountability).
- STI policy specific issues shape the policy content and instruments - typically the sort of "innovation problems" that are seen as central in modern innovation policies (e.g., the need for growth seeking SMEs or commercialisation of results from public research). In a similar fashion as generic issues these more specific STI or innovation policy issues may ask for new policies and instruments or more structural changes in innovation governance.

Policies and instruments

- These include innovation policies as for example formulated in governmental white papers and the more concrete operationalisation of the policy as concrete policy roles, policy programmes and instruments. In a way the two are not only shaped by mega trends and innovation specific issues that feature high on the policy agenda , but also by institutional set up and the design of governance processes (including the degree to which policy learning takes place). Thus the part is interlinked with the governance issues.
- The study aimed to avoid a mechanical listing of instruments and descriptions of innovation policy content as such in each country. The innovation policy content and instruments are needed to be taken into account in their role of affecting governance.

Governance

- The governance is divided into a more static institutional set up of a country or NIS – where we take the more broad definition of institution – and more dynamic governance processes as exemplified by the way the various stages of the policy cycle are shaped (using the policy cycle framework).

3.2 Methodology

The study was divided into parts focusing on collecting the experiences from the past and getting insight from the future. This approach is illustrated in Figure 3.3 emphasizing the following questions:

- What were the drivers for changes in STI governance in the past? As drivers for these changes underlying innovation policy issues and generic non-innovation related issues were identified. The information collection was done through the **survey** mentioned earlier, some more generic questions included in the **in depth interviews** for the case studies as well as through analysing **written material**.
- What might be future changes in governance given a selected set of issues in innovation policy as well as some more generic issues or drivers?

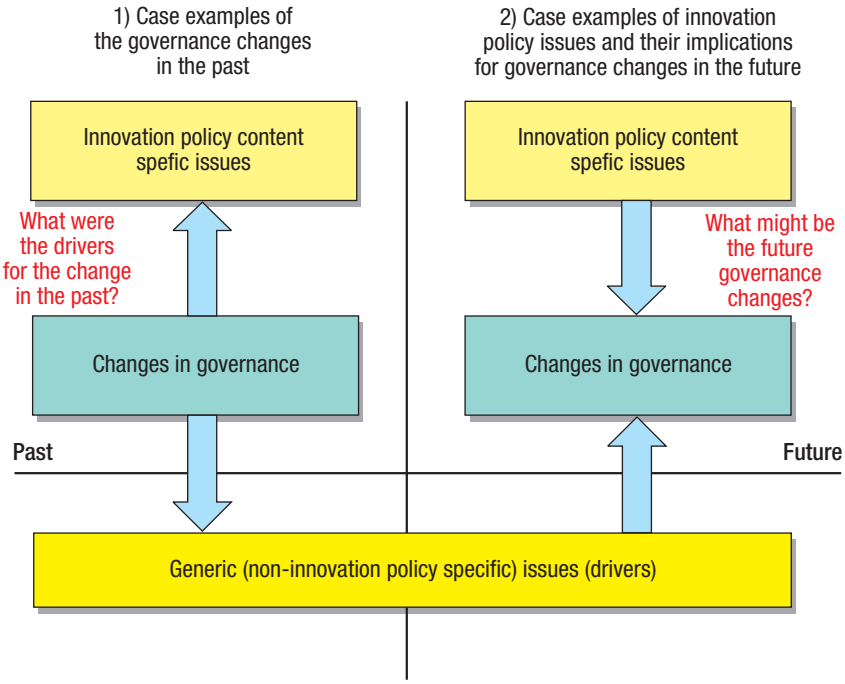


Figure 3.3. Past and future oriented parts of the study.

The major future issues affecting the governance and their implications were studied by conducting a **survey**, using material from **in-depth interviews** and in **workshops** organised in most of the partner countries.

3.2.1 Case studies on the past governance changes

Based on the desk research and discussions with the partner countries altogether 27 governance changes in the past were identified for the national analyses. The specific cases were used for making the discussion concrete and to be able to go into details of dynamics behind each change. One should note that the cases were proposed and defined by the VISION Era-Net partner representatives and the reasons for selecting the cases varied across the countries. For some countries, the cases represent the changes assessed to be the major ones and for some countries, the cases are changes of which there is less information available and are thus of interest to be included in the research work. The research team emphasised the variety so that the research material would cover different types of changes including also different phases of the policy cycle. Thus, one should not draw any analysis conclusions from the set as such. Particularly, one should note that the set of cases does not represent an overview of the most important governance changes over the countries.

The selected cases are briefly described by country in Annex A. However, the individual case results are not the primary focus of the work and therefore not described in detail in this report. The focus is on the commonalities and differences between the cases and the sort of lessons learned regarding innovation governance across the cases. This overall analysis is presented in this report (chapter 4) and here a reflection is included on the seven types of changes in governance changes discerned as well (see table 3.1 below). More detailed analyses of these cases are included in the country specific workshop materials and the national reports which are available from the VISION Era-Net web-site.

The cases were classified in an indicative manner to seven different categories. The categories are described in the following. The distribution of the selected cases for each country by these categories is provided in Table 3.1. One should note that each case may include aspects of different types of changes and that the cases in each country are also often linked to each other in complex ways and thus this typology is only an approximate guideline for structuring the analysis (i.e., to analyse whether the drivers causing a change are similar for different cases or whether the drivers depend on the type of the change). These categories might also prove beneficial for cross-country policy learning as those interested in a particular type of governance change looking for reference countries where experience is available with this particular type of change. Here one should note that only a limited number of cases were covered for each country. Thus, in all of the countries there are similar changes from all of the categories although not covered in this study. One should also note that there are some cross-cutting themes and changes that are relevant for almost each one of the categories (e.g., principal-agent relationship).

1. **Introduction of large R&D programmes** which sometimes means that considerable investment budgets become available and quite often new (permanent but also temporary structures) come into being. This fact that sometimes considerable additional budgets come available in large irregular chunks and the fact that these type of investment programmes have increasingly so an interdepartmental character affects various governance processes and raises questions as to how to best implement and accommodate these type of (temporary or semi-structural) ripples in the innovation system.
2. **Ministerial restructuring.** In quite a number of countries major changes in governance has to do with the way key players such as the ministries of economic affairs and science and education (and in some cases also other ministries such as employment) relate to each other. In quite a few countries a 'Super Ministry for Education, Science and Innovation' has been

established to overcome traditional controversies between the various specialist departments. Clearly these type of restructuring affect all type of innovation governance processes.

3. **Top policy level councils or advisory groups**. In a number of countries top level advisory councils have been established to draft the future national STI or innovation agenda and sometimes play a more extensive role in 'shaking up the innovation system'. Given the wide disparities between these councils in terms of positioning and status (permanent vs. temporary e.g.), the type of members that are part of these structures and their mandates, the way these structures are run as well as their (actual) impact one should be wary about straight comparisons. Nevertheless valuable generic lessons can be learned for example from the way in which these structures affect the agenda-setting processes.
4. **Coordination bodies.** Especially in more complex innovation systems where various councils and organizations operate next to each other with similar or only slightly different assignments the need for coordination bodies – both within the realm of one department, but increasingly so interdepartmental one - arises. This is for example related to implementation issues (how many organisations can you afford to deal with knowledge transfer or commercialisation of the knowledge of higher education institutes?), but equally to appropriate policy advisory structures and the need for interdepartmental coordination bodies when STI policies are broadening.
5. **Regional innovation policy structures**. In almost all countries there seems to be a revival of regional innovation policies. These new style regional policies (backing winners and working on strong parts of the economy) are markedly different from old style regional policies that were more geared towards supporting weak part of regional economies. Apart from a more clear link between regional development and STI policies, regional innovation policies new style do increasingly integrate with wider policies aimed at providing the best framework conditions for regional innovation and competitiveness. These types of new style regional policies may have repercussions on governance structures.
6. **Re-structuring and role of implementation agency.** In most of the countries the role of the implementation agencies has changed dramatically over the years and these types of changes were on a tentative list for the case studies for most of the countries. Often these changes also include aspects of analysing principal – agent relationships (bringing prac-

Table 3.1. The distribution of the selected case studies by countries and by types of changes.

		Austria	Denmark	Estonia	Flaanders	Finland	Ireland	The Netherlands	Norway	Sweden
1	Large R&D programs			●		●		●	●	●
2	Ministerial restructuring	●			●	●				●
3	Top policy level councils	●	●	●	●		●	●		●
4	Coordination bodies			●			●			
5	Regional innovation policy structures					●		●	●	●
6	Re-structuring and role of implementation agency	●		●					●	
7	Changes in research system				●	●				

tical experience closer to the act of policy-making, building more strategic policy intelligence into the implementation bodies etc.).

7. **Changes in research system.** Many countries are in the middle of a process of re-structuring university and research system structures. Governance of research systems is almost a sub-discipline within the wider family of innovation governance of innovation systems. Changing university financing, creating new classes of intermediary research institutes or adding the task of knowledge valorisation to the tasks of education and research of universities are seen as tough governance issues in most countries. These types of larger systemic changes were selected for case studies in few of the countries.

3.2.2 In-depth interviews in each partner country

In each country in-depth interviews were completed that aimed to 1) collect evidence of past drivers that affected the innovation policy governance by using the selected case studies as examples to concretize the discussion, and 2) collect views of anticipated future challenges that will affect innovation policy governance as well as to discuss the general contextual factors in each country. Although the cases were used in the discussions, the interviewees indicated also experiences from other governance changes in their country and provided other views of the historical development in the country. The interview protocol is presented in Annex B.

The interviewees were identified jointly with the country partners. They were mainly selected based on their long-term and visionary knowledge of STI policy in the country. This introduces a systematic bias to the material because the experiences and views of the interviewees tend to focus on agenda setting and policy planning parts of the policy cycles rather than on the practical implementation issues. To balance this, some of the interviewees were also selected based on their knowledge of a specific case study. Altogether 61 interviews were completed. The number of interviewees varied across the countries from 2 to over 10. Particularly the Danish material is rather thin since only two interviews were completed.

3.2.3 Web-based survey

The main objective of the survey was to get the first opinions from each country of relevant future issues that will affect innovation policy governance. These may be issues that are linked to the development of STI policy or more generic issues stemming from politics or socio-economic environment. Survey as a tool cannot provide a deep understanding of the causes and implications of the different issues and was only a quick method to get relatively simple opinions from a larger group of people.

The survey was targeted to persons who are knowledgeable on STI policies and policy-making and would consider themselves as innovation policy makers, planners or implementators, and have an interest towards innovation policy governance (referred to as "policy makers"). Although governance is shortly defined in the survey, the consistency of the answers is more reliable if the respondents have some understanding of the terminology. The survey was targeted to people who represent, e.g., the following bodies:

- Representatives of policy advisory councils
- Ministerial level innovation policy planners
- Implementation agency representatives who have responsibility, e.g., on instrument planning, evaluation and foresight
- Innovation policy related programme leaders.

An interesting observation was that the understanding of both "innovation policy" and "policy maker" is understood differently across the countries and the survey target groups as well as the distributions of respondents by organisation varied across the countries. These differences partly reflect the varying STI policy contexts in the countries. For example, the researchers and private sector representatives may have an important role in policy making as members in different advisory bodies but their role as "true" policy makers depend on the country context.

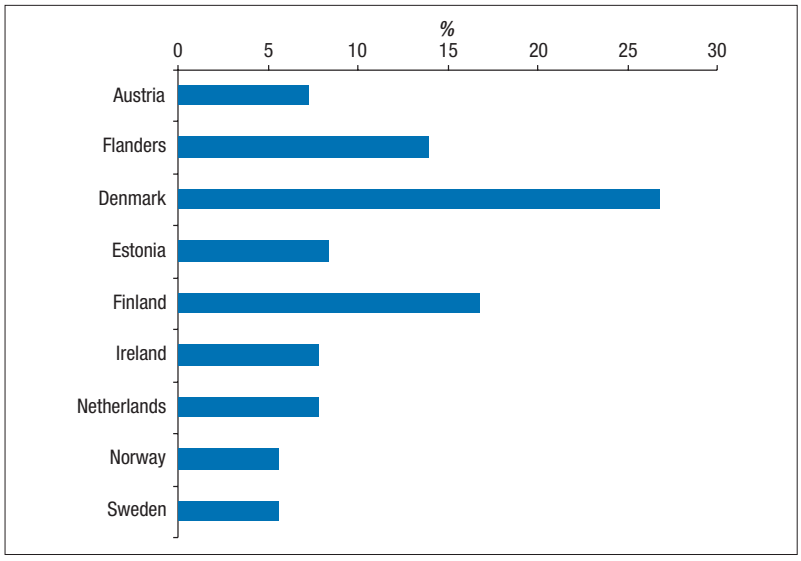


Figure 3.4. Distribution ofsurvey respondents by country of origin.

Partner countries provided list of names and in addition to this the survey was implemented on the internet as an open survey, i.e., the link to the survey starting page could be distributed by e-mails and it was also open in the VISION Era-Net web-sites. This means that the precise response rate is not known. The survey was open between mid-December 2007 and February 2008.

The survey was structured around two set of questions. First, a fixed list of future STI policy issues was given (the list is provided in Chapter 5, Table 5.1) and the respondents were asked to assess their **importance** in a country as well as provide additions on issues that will be high on the STI policy agenda. Second, the same list of issues was used and the respondents were asked to assess the **impact** the issues have on the STI policy governance and provide additions on these specific governance impacts. The survey questions are presented in Annex C.

181 respondents completed the online survey. In terms of **geographic origin**, Danish and Finnish people are *overrepresented* in the sample (see Figure 3.4). This might lead to a bias since both Danish and Finnish respondents have slightly aberrant scores on the importance (relatively low for Denmark, relatively high for Finland) and impact (relatively high for both Denmark and Finland) they attribute to innovation policy issues.

Distribution of respondents by type of organization is provided in Figure 3.5. Regional agencies, private sector organisations and trade associations are slightly underrepresented in the sample but one should note that in most countries they were not the primary target group for the survey as policy makers. Nearly all of the trade association respondents are found in Denmark whereas Belgium has a relatively high share of private research institutes. One should note that many of these respondents may be members of advisory councils or other bodies responsible for the policy planning and thus represent the survey target group.

Distribution of respondents by the role of their organization is provided in Figure 3.6 following the stages of policy cycle. In terms of organisational roles, the shares are more or less equally distributed among the most important roles (policy making, funding, research).

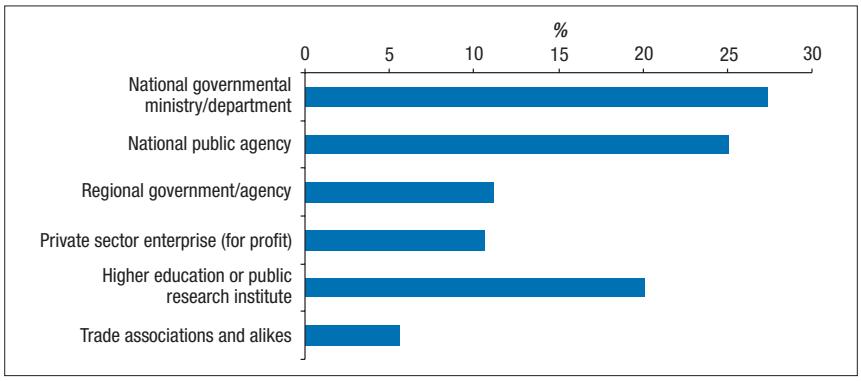


Figure 3.5. Distribution of respondents by type of organisation.

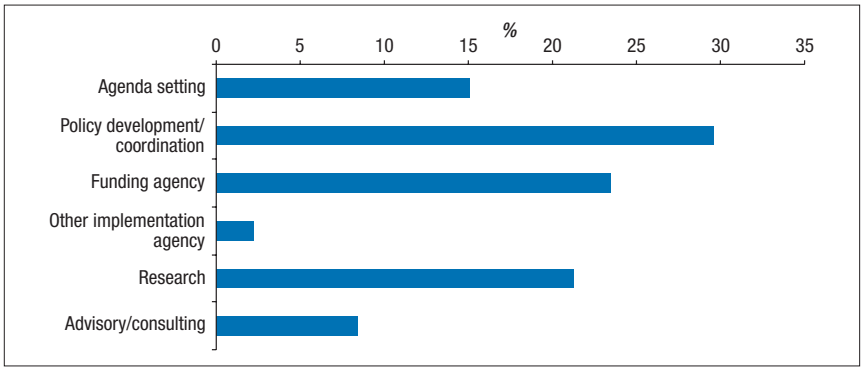


Figure 3.6. Distribution of respondents by role of organisation.

3.2.4 Policy learning workshops

All the material from the previous steps was taken and a first analysis – both at the country level and a cross country analysis – was produced to provide some background material for country workshops. At the end these workshops were organized in 7 countries (Ireland 6.3.2008, Norway 11.3.2008 (a group interview), Finland 12.3.2008, Austria 14.3.2008, Flanders 11.3.2008, the Netherlands 18.3.2008 (an extended meeting in a smaller group) and Estonia 19.3.2008). There were between 4 and 23 participants in each workshop and the workshops followed the same structure:

- Introduction of the study, framework, objectives of the workshop
- Historical perspective on the governance changes and the drivers
  - Presentation of the case study results
  - Discussion on the lessons learned based on the history
- Future innovation policy and innovation governance challenges
  - Presentation of the survey results (overall and country specific issues)
  - Discussion on the general drivers, future innovation policy issues & innovation governance issues (country specific)
- Responding to the innovation policy challenges
  - Presentation of general governance changes and trade-offs
  - Discussion on future governance changes (What are the anticipated changes, threats and opportunities? What should be done to be prepared?).

4 Historical perspective on the STI policy governance changes

4.1 Introduction

This chapter summarizes the main observations of the study concerning the past changes and lessons learned from those. The observations are based first of all on the material resulting from the interviews. The case studies results based on the interviews were reported back to the individual participating countries – as part of an extensive partly country specific sheet presentation used as an input for the workshops / extensive meetings and were discussed and validated in those countries where we had these workshops. This sheet presentation was then adapted and the key outcome of these occasions were added. Together these make up the national reports. This final report does not provide results at the case-level, but first reports observations across the seven categories discerned (section 4.2) and then provides overall cross country observations based on the rich set of case studies and interview material (section 4.3). This set obviously can neither reflect the nitty gritty of the individual case studies and the many interesting insights gained as to how changes in innovation governance comes about, nor can it reflect the sometimes very specific national policy context in which they are positioned.

4.2 Observations derived from the case studies per innovation governance category

The case studies were not selected for providing a comprehensive overview of the governance systems in each one of the countries or for providing a list of the most important changes. They were used for concretizing the discussion on the past changes and they were also selected for spanning the analysis over different types of changes. Some overall conclusions for each type of the changes can, however, be made. These category specific observations are summarized in Table 4.1.

The interviewees were asked also next to these case specific observations about their opinions of the most important governance changes that have taken place in the country in the past. Most often the interviewees highlighted the establishment of top policy level councils, interdepartmental structures or the establishment/re-structuring of the implementation agencies as the most important changes that have taken place in the governance systems during last decades. Generally the changes in the policy planning and agenda setting functions were assessed to be more important and far-reaching changes than the changes at the implementation processes. In most of the participating countries investments in STI policy planning and strategic intelligence have been considerable. This is rational and evident, but emphasizes the pre-assumption of the rational policy planning culture proceeding "top-down" from the agenda setting to policy planning, instrument design and implementation. From the country material one can also find examples of individual specific instruments that have had a large and unintended impact. One should also note that the interviewees mostly themselves represented those responsible for the policy planning and agenda setting and this represent a possible bias in the interview material.

Table 4.1. Summary of the key observations by each category of case studies.

Large R&D programs • The case studies within this category differ greatly from each other across the countries • Most often design is based on bottom-up "rational policy planning" – international examples and evaluations do play a role for inspiration, but the actual governance structures are mostly country-specific (reflecting, e.g., the existing R&D funding practices) • In some cases there have been weak links to a coherent innovation policy strategy (lot of fragmentation) – a need to spend the additional money outside the established system • A programme is an instrument for introducing "new" thinking that can be removed/re-shaped if needed – a change as such is an objective for a change • Danger: funding "bonanza" and need to increase R&D spending (Lisbon agenda) may lead to emphasis on quantity over quality. However, the elements of competition and the "backing the winners" thinking have become more evident in the R&D programs.
Ministerial restructuring • Drivers have mainly been generic governance culture/tradition factors (new governance thinking, new public management), efficiency arguments or changes in general politics rather than STI policy driven changes. • Most countries work on improving the coordination between the "axis" of STI policy-making i.e. "Education & Sciences" and "Enterprise (and "Economics)", but only few countries (Flanders, Denmark) have chosen for a Superministry. • Success/real impact of restructuring depends very much on the degree to which the informal structure (opening up of inside group etc.) is being changed and the degree to which a fine balance is struck between the advisory role, the policy-making role and the implementation role in the overall STI governance system. • Especially the creation of a Superministry is a drastic change in governance. Most countries still opt for and experiment with "lighter" forms of interdepartmental coordination Interdepartmental means in most countries "Enterprise" (and "Economics") and "Education & Sciences", wider involvement of especially sectoral departments is proving to be difficult.
Top policy level councils (incl. ad hoc working groups) • Globalization challenges and implications from that have been the major drivers for the creation of top policy level councils. • Ad hoc working groups are generally seen – if not used too frequent – as useful, but the success primarily depends on its members (competencies, policy experience) not on the institutional set-up. • Difficulties of interdepartmental coordination are often underestimated by especially ad hoc working groups (and therefore sometimes part of the advice given by them is hard to implement). • Proliferation of (permanent) advisory structures and bodies has led (or will lead to) in some countries to a call for more transparent, simple and effective policy advice structure. • Mandate is important – councils should really stand above all parties involved (e.g., role of the Prime Minister in the councils is crucial) • Interfacing between these councils and working groups and the civil servants at the various departments involved in STI-policy-making is the key for a successful follow-up of the advice given. • Selection of members is a key factor. Statue should be person-based, free to speak (i.e. members not as representatives of stakeholder organizations) but with a broader view and policy experience.
Coordination bodies • There is a pressure to increase coordination when the STI policy field (and NIS) becomes fragmented and complex. • Real danger is that the new coordination bodies may further increase rather than reduce complexity (so there is even further need for coordination). Establishment of yet another body might be an excuse to postpone decisions to radically reduce complexity. • Interagency/interdepartmental vehicles need high quality civil servants that are able to run these type of bodies (and these people are generally in short supply). • Interdepartmental mode does not automatically mean involving outside stakeholders (which might be a prerequisite for more horizontal STI policies).

Table 4.1. continues...

Regional innovation policy structures

- The cases differ and they have covered both regional programmes and/or structural changes in funding mechanisms. One should also note the differences in the concept of "region" as such. Cross-border regions such as the Baltic Sea co-operation might be of increased relevance in the future.
- Seeking the "policy balance" between STI and regional development policy has affected these changes. Regional development policy has been a major driver for most of the past changes, but regional policy and STI has now become much closer linked.
- Combination of bottom up and top down steering is more visible in these cases than in other ones (more dialogue, room for local initiatives, but at the same time more complexities and bottom-up processes).
- Switch to backing the winners paradigm is evident in regional cases and this is mostly due to a combination of factors (the pressure for creating truly competitive regions, similar switch elsewhere in Europe, EU regional funding schemes, policy-makers looking for a new philosophy, and political will at a moment in time).

Re-structuring and role of implementation agency

- If central policy steering is weakly developed, operational and even strategic policy-making occurs largely through the agencies.
- Principal-agent problem: relevant to some countries and much linked to policy culture, in some countries agents are taking over almost or are at least quite powerful.
- The observed improved co-operation between departments/pillars of "enterprise" and "education" is often also reflected at the agency level and in the division of tasks.
- Core challenge is to combine a clear strategic direction with a hands-off approach. This means that the boundaries and mandates should be clearly defined but that within these limits agencies should enjoy a high degree of freedom (the opposite would be to have fuzzy mandates combined with micro management on operational issues).

Changes in research system

- Increased funding and higher shares of competitive funding have been important drivers for changes in research system.
- Increased global competition also in science (e.g., focus on scientific excellence, competition for staff) is a clear driver for attempts to seek for new structures in research.
- Increased role of "third mission" and accountability (use of public money). This change occurs against the backdrop of the long history of autonomy of academia.
- Division into Science and Technology policies is still very close to the surface and interdepartmental/horizontal policy coordination will remain as a major challenge.
- Research systems are often highly fragmented system with a lack of tradition in strategic coordination. This is the downside of a bottom-up system with entrepreneurial agents. Although highly flexible, such system often lacks strategic intelligence at the systems level. Hence there is no balance to the inherently myopic behavior of the individual agents.
- The research system and its governance is seen as a specific subsystem within the overall STI governance. Key issue is to link the traditional rather autonomous world of academia to wider STI-policies.

4.3 Cross country observations derived from the case studies

The observations derived from the case studies are structured into the categories following the framework presented earlier in section 3.1 (see Figure 3.2).

4.3.1 Generic issues affecting the past governance changes

The study aimed to cover relatively short historical perspective and included mostly case studies from the past 10 years, including cases that are still underway or just started. Naturally, the cases always have a longer history and in many cases the changes had developed over decades before the window of opportunity had opened up. Also, in addition to the selected cases the interviewees were asked what they thought as the most important governance changes in their country and these were often changes that took place even earlier. A generic observation is that individual changes are always part of a chain of events that link to each other and span over decades. Thus, it is generally a challenge to isolate single factors or issues creating pressure for changes. There are many issues together that create a pressure for change. Generic issues affecting the changes tend to be rather broad megatrends.

Clearly the most evident generic issue that had affected the governance changes was the increased awareness of the implications of globalization during the last decade. During the 2000's there has been increased understanding that the global competition will increase and both the science and business reactions to these challenges will change. STI policies need to react. Examples of the types of direct governance and policy instrument changes linked to the increased global competition are the recent on-going structural changes of the research system enabling research to respond to the international competition challenge.

Similar to the generic globalization issue is the increased rise of major societal challenges to become part of the STI policy discussion. These issues include, for example, ageing, environment/energy/climate change, and immigration/integration challenges. These topics have affected particularly the work of different advisory bodies and policy councils.

Rise of the service economy and emerging digital economy are both generic themes that have affected STI policy discussion. These themes, and particularly the service innovations, have been at the top of the STI discussion agenda in many of the countries during the last years, but they have not yet had clear implications or changes in the governance when looking back. "The need to support service businesses" or similar statements were actually hardly mentioned in any of the 27 case studies as a major issue that would have created a pressure for a change in the past. The situation looks different for the future and this is further elaborated in chapter 5 on future challenges.

The EU policies and EU funds coming available after joining the EU have often been in the background of many of the changes. Lisbon strategy and ERA are greatly influential in the STI policy field and other instruments such as framework programmes and European Technology Platforms have concrete implications also at the national level. In many of the case studies one background element has also been the increased importance of the regional dimension and the aim to keep regions viable and competitive. This has led to changes in regional policy structure and funding mechanisms (e.g. Norwegian regional structural change, Dutch Peaks in the Delta programme) and to instruments supporting creation of innovative regions (e.g. R&D programmes in Finland and Sweden). In those countries that have relatively recently joined the EU, the availability of EU structural funds has had a big impact on the governance changes (e.g. Austria, Estonia, Finland and Ireland). The EU funds have not perhaps been the major driver causing the change, but their availability has opened up a window of opportunities and their

management has forced to create practical solutions and have affected governance changes. An example of this is the Enterprise Estonian EAS through which now are allocated the EU structural funds to Estonia after joining the EU in 2004. EAS was able to create and have the implementation processes to meet the EU requirements and this vas a very important driver for governance changes.

Generally one can see a trend that the regional development policy (sometimes including export policies and wider framework policies) and STI policy fields have become much closer at the regional level. This can often be traced back to the EU funding schemes. The EU has launched a sort of a backing the winners paradigm which has proved to be very influential. The case example from Sweden (VINNVÄXT programme) is a good example of changes which are assessed to be very successful in this paradigm shift. A similar paradigm switch can be noted for the Netherlands (Peaks in the Delta programme), although it is still too early to tell how successful this switch will be. Partly the on-going Finnish Strategic Centers of Excellence program is reflecting this paradigm shift but the success is still to be seen as the change is on-going. In Austria, the entrance to the EU and the availability of STI funding outside the established national funding institutions has been one of the major drivers to open up the rather conservative universities. Eventually, it has led to a major overhaul of the same established national funding institutions.

An overall observation from the material is that generic issues have not played a big role as creating a pressure for changes compared to other issues which are more directly linked to the STI policy content, instruments and processes. This is partly supporting the conclusion that the innovation policy governance is more driven by the existing structures and processes rather than driven by the problems to be solved. However, the most evident exception is the shift in a couple of countries (e.g. Flanders, the Netherlands, Finland) to include wider societal innovation challenges as part of the STI policy-making.

4.3.2 Innovation policy content issues affecting the past governance changes

Generally STI issues, and particularly innovation, have been featuring high on the political agenda in the partner countries. Also, there has been abundant availability of STI funding. Overall the budgets of STI policies have increased in the partner countries, but at the same time there is an increased budget austerity. Partner countries clearly share a view of seeking for innovation driven growth. Increased general attention on innovation, need for broadening innovation concept, and availability of additional funding have created a momentum for changes. These changes also require careful attention and balance seeking between national, regional, and European STI policies. A prime example of this balance seeking is Flanders where the regional government functions as an interface between the local agents and the EU level.

Specific innovation policy issues that came up in the interviews as the major issues behind the past changes in the case studies were the following:

- Low labour productivity growth
- Shortage of knowledge workers
- Lack of innovation in public sector
- Lack of innovative entrepreneurship.

There has been an increased awareness in most countries that real choices need to be made regarding national STI specializations in scientific excellence (feeding the discussion on the balance between generic – specific STI policies). This development is clearly visible in Ireland, Flanders and in the Netherlands and also very much a topic for discussions over the last years in Finland and in Norway. An example on this can be found also in Austria, where the bottom-up excellence initiative IST Austria has stirred up heated debates. The founding fathers of the institute have explicitly put it forward as an example for wider adoption. However, it is just unclear whether it is really a harbinger for ‘real choices’ (which would signify an end of the traditional egalitarian model) or remains an isolated effort.

4.3.3 Innovation policy & instruments affecting the past governance changes

The drivers described in the two subsections above affect the actual mix of STI policies and instruments in individual countries. We should not overstate the changes here, as we observed that although there might be quite some policy discussion going on, this does not necessarily affect the steady mix of policies and programmes. On the contrary, we observed in a number of countries that although policy debates are sometimes heated, the discussions are mostly focusing on a few items and most of the existing budgets are distributed through a quite stable set of instruments. This is also caused by the fact that in most countries budgets for STI-policies have been on the rise for quite a number of years already. We present some overall observations on the development of STI policy and instruments in general, before diving into the governance issues in the next subsection.

Innovation policy and instruments related key observations

- STI policies have matured – but are still relatively young policy fields. Countries are also at the different phase in the development of STI policies (i.e., in the move from 1st to 2nd and 3rd generation of STI policy).
- There is an overall trend towards broadening of STI policies to include wider societal challenges, but the concrete instrument level changes are still rather thin.
- Rise of STI on most political agenda's over the last decade and increases in budgets in most of the countries create a pressure for change.
- Most important STI policy context factors in the countries affecting the past governance changes are linked to the stakeholder involvement and traditions of STI policy-making (i.e. the role of an 'inner circle of STI officials' and the balance between political decision-making and formal policy planning).

Over the last decades the STI policy has developed into a more mature and established policy domain in all of the partner countries – but is still relatively young domain in all of the countries. The partner countries are also partly at different phases. Overall one can see in the partner countries and as a driver behind many of the case studies the trend towards broadening STI policy that will also include wider societal challenges. This development towards the "3rd generation" STI policy is visible in the work of different agenda setting and coordinating bodies as well as in the policy documents. However, none of countries participating in this study has implemented the broad STI policy throughout all the policy processes and its implications as a driver for **past** governance changes have remained rather thin. The role of broad STI policy for **future** changes is, on the other hand, assessed to be very high.

At the same time with the maturation of the STI policies, the rise of STI on political agenda's has helped to make changes also in governance. An example of this could be the recent Finnish ministerial re-structuring which was prepared over decades but the actual window of opportunity opened up now and the STI policy got a very high role within the new ministry. Some countries, on the other hand, struggle with getting the STI policy still higher on the political agenda (e.g., Estonia, Sweden). Increases in STI budgets have had important implications for the institutional landscape enabling and requiring new organizations and new instruments, as well as setting new ambition level for operations. Over the last decades one can observe an increased fragmentation and complexity of the STI policy system which has many governance implications.

As is well known, the country specific context factors describing the long term STI policy traditions and cultural factors in the country are very important in explaining some of the observations. The borderline whether these factors are parts of the governance structures or features of STI policies is often vague. Here, however, we list some of the most important observed "unintended" context factors related to national STI policies

having major implications on governance structures and processes based on the case study material.

- The role of an "inner circle of STI officials" setting the agenda is quite big in most countries and to a certain extent an important quality of the innovation governance system as well. Even when the STI policy gets broader and horizontal, the group of core people involved tends to be rather small. This might be a feature special for a young policy domain – "the same people who created the policy field and who have been involved from the very beginning are still active".
- Countries differ in their traditions of balancing "informal policy planning" and "rational policy planning". Some administrations tend to be more political where others believe more in rational policy planning, although in practice the politics is often more important than one is ready to admit. Over time, countries may balance the two differently as well depending for example on the personal interest and power of an individual new minister or the quality of the policy-making apparatus at a certain point in time.
- Countries also differ with respect to the industry involvement in the STI policy discussion. This is very important context factor and gives also an indication of the relative power of STI policies in political discussion. If the industry, and particularly the big companies, as a major stakeholder is weakly involved, then also STI policy tends to be weak.

Generally, the STI policy priorities, content and instruments are very much linked to the governance observations. Over the following chapters the governance implications of these are further elaborated.

4.3.4 Innovation governance: generic issues

As described in the used framework, the governance is looked from the point of view of structures and processes (see Fig 3.2 in chapter 3). In many cases, the distinction between these two cannot be made. In this section the main generic observations from the past interlinking governance structure and processes are described. After this the following sections summarize the observations that are focusing either on the institutional set-up or on the processes.

Generic governance issues

- Waves of changes are followed by more stable periods of implementation – partner countries are currently in a different phase. Some urge for stability, some for change. On top of that, some countries have a more dynamic working culture than other countries anyway.
- Generic observed driver is a need for change as such! – A change may be a survival strategy or a way to increase power.
- Most logical line: outside pressure leads to policy preparation after which the issue is (passively or actively) picked up by politicians and translated by policy-makers into policies. However, if stakeholders are not involved they might use their (representative) power to frustrate policy/politics processes and If policymakers/politicians are not taken seriously they might use their (budgetary) power to frustrate policy processes.
- Political entrepreneurship (making eager use of windows of opportunity) has often been very important – political changes open up windows of opportunities and the "right people in right places" make things happen.
- New structures & processes (e.g., policy experiments) need a lot of time to prove their successes. One risk is the impatience of politicians. The role of (bad) luck should not be underestimated.
- The traditional departmental governance mode is still dominating the STI policy processes. Interdepartmental ways of working is still young and under (time) pressure there is a tendency to fall back to the old departmental mode.
- Poor coordination between the central axis in STI policy i.e. "Education & Sciences" and "Enterprise" (still) is at the heart of most new experiments in interdepartmental STI policy governance.
- Interdepartmental working mode does not automatically mean involving new stakeholders (which might be a prerequisite for more horizontal STI policies).

As was a pre-assumption, the dynamics of changes are very complex and windows of opportunities are narrow. In almost all the cases one can trace back a history of a policy preparation phase that can be even decades long. An exception here is Estonia which has much shorter STI policy history than other countries in the study. Once the window of opportunity opens up, the change is implemented relatively quickly. Waves of changes are followed by longer and more stable periods of implementation. The countries follow this dynamics at a different pace.

Generic observed driver is a need for change as such. Once there has been a long period of stability, the changes are needed and several simultaneous changes tend to occur at the same time. Most partner countries have experienced quite a lot of turbulence during the last years. Changes may be needed in order to survive and to respond to the market needs or purely they are used to increase power in the political system (e.g. formation of top level policy councils, re-structuring and formation of ministries and other organizations).

One important observation is that the changes in governance - new structures and processes - need a lot of time to prove their successes. One risk is the impatience of politicians. There is an increased pressure to demonstrate the positive impacts and results quickly whereas in reality it takes years to adapt to the change and to assess the impacts. Also, one can not underestimate the role of accidental choices, dominant political culture, powerful individuals and even sheer luck or bad luck. Among the case studies there were some successes and changes that appear to have been unplanned. Also the role of the external factors such as entering EU, EU politics and changes in national economics should be accounted. The countries, however, always adopt to these changes and factors in their own ways.

Most logical line of the dynamics of change is that there is first an outside pressure to solve a specific issue which is then followed by a long and interactive policy preparation phase. At some point the issue is picked up by politicians and translated by policy-makers into policies. Political entrepreneurship (making eager use of windows of opportunity) has often been very important – political changes open up windows of opportunities and the "right people in right places" make things happen. It seems to be very difficult to predict the timing when the political window of opportunity opens up and is often linked to the results of elections and shifts in power balance between political parties as well as a general and shared feeling that change is absolutely necessary, triggered by a dominant driving force (such as globalization currently) combined with an economic downturn or some crises (such as closing down of local industries or clear signs that a country is loosing competitive strength on the international market). From the case studies one can see that if the various stakeholders have not been involved in the preparation, they might use their power to frustrate policy and politics processes and the changes are delayed or remain only rhetoric changes. If politicians are not taken seriously they might use their power to frustrate policy processes and block a change which is already well prepared. Over the case studies one can also see a difference between rhetoric and the actual policy mix.

At the end the true success of the change often boils down to money issues. If there are great plans and good will, but no resource allocation or link to have power over funding allocation decisions, the change remains most often rhetoric.

Overall, the traditional departmental governance mode is still dominating the STI policy processes in the light of the case studies. Interdepartmental ways of working are still very young and the departmental mode of working is still close to the surface. In case of any problems, the processes tend easily to fall back to the old ways of working. Despite of the discussion of wider horizontal STI policy making, aim to improve coordination between "Education & Sciences" and "Enterprise" departments is still at the heart of most the new experiments in interdepartmental STI policy governance.

One interesting observation from the past changes and case studies is that the interdepartmental working mode does not automatically mean involving "new" stakeholders (which might be a prerequisite for more horizontal STI policies). In some countries interdepartmental working mode

of policy-makers was shaped as an answer to the plea for broadened STI policies. One would have expected then automatically broader stakeholder involvement to have enough support for the new policies, but this is not automatically the case. Despite of the broader and new interdepartmental structures and processes, the stakeholder involvement results in representatives of the usual suspects sitting in committees.

4.3.5 Innovation governance: institutional issues

Institutions

- Institutional turbulence (which comes in waves) has been quite high in most of the countries.
- Increases in STI budgets have had important implications for the institutional landscape enabling and requiring new organisations and in setting new ambitions, etc.
- Development of the STI policy domain and the associated growing complexity of NIS has led to a call for less fragmentation and more transparency & streamlining and/or a growing need for more coordination & coherence in government.
- Need for checks & balances: interdepartmental policy-making body, an advisory body and an intelligent implementation body.
- Working through representative ('politicized') bodies is increasingly seen as frustrating the very core of innovation (preference for unusual solutions). However the crux is not so much in the institutional set-up per se of the bodies as in the careful selection of the individual representatives.
- Principal agent problem is relevant to some countries and much linked to policy culture, in some countries agents are almost taking over or are at least quite powerful.

As noted earlier, institutional turbulence (which comes in waves) has been quite high in most of the countries. Examples of major changes with large implications on the governance are the establishment of the Innovation Platform in the Netherlands, ministerial re-structuring in Finland, new structures (and new policy formulation) in Estonia, the creation of the Superministry dealing with the Economy, Science and Innovation in Flanders, the various new interdepartmental structures created in Ireland, and the major consolidation of funding agencies in Austria. One driver for these changes has been the increase in STI budgets which enable and also require new organizations and the need to set new higher ambitions.

Development of the STI policy domain and the associated growing complexity of NIS have led to both 1) a growing need for more coordination and coherence in government and 2) call for less fragmentation and more transparency and streamlining.

The growing complexity has also created needs for bypassing the traditional policy processes (interdepartmental structures, outboard motors, new type of stakeholder involvement). In addition to the traditional departmental governance mode one can see that in some countries the networked governance mode – within the boundaries and mandates created by the top down mode - that works on a more informal basis has become relatively more important (Austria and Flanders are clear cases, but also in most of the other countries the formal system is complemented by more informal network type of governance). There is a constant balance seeking between "political planning" and "formal policy planning".

The increased complexity and broader content require more checks and balances. The interdepartmental policy-making body, an advisory body, and an intelligent implementation body are needed alike. In some countries it has also become quite crowded in the policy-setting phase as the countries have heavily invested in STI policy intelligence (parallel lines exist). In Ireland there are now for example three advisory structures which can be seen as contributing to the strategic intelligence i.e. the Advisory Science Council, the Chief Scientific Adviser and Forfas. Similarly in Flanders the advisory council on science and technology is given a more proactive role and forward-looking role whereas the newly created Superministry EWI also invests in a strategic intelligence capacity and the powerful Agency responsible for implementing innovation schemes in practice also has an important strategic intelli-

gence capabilities. Also in Finland there are on-going discussions on different advisory structures and new interdepartmental council for sectoral research has been formed.

Working through representative ('politicized') bodies is increasingly seen as frustrating the very core of innovation which calls for unusual new solutions. The flexibility and pragmatic efficient informal working culture is seen to be at danger if there are complex parallel formal governance processes. However, the crux is not so much in the institutional set-up per se of the bodies as in the careful selection of the individual representatives. The main success factor is most often the competencies and experience of the key people involved.

This increased need for strategic intelligence functions may also lead to a principal-agent problem. In some countries agents are almost taking over or are at least quite powerful in cases where they have the major responsibility over the strategic intelligence functions.

4.3.6 Innovation governance: processes

Processes (overall)

- Balance between (top down) "rational policy planning" and (bottom up) "informal politicized policy planning" differs considerably between countries.
- Capability of the policy makers to act swiftly when a window of opportunity opens is an important quality of a policy system.
- The role of an "inner circle of STI" setting the agenda is quite big in most countries. A highly fragmented formal system keeps functioning due to a largely informal system communication and information sharing.
- It is less clear whether the reverse relationship also holds. Too much focus on 'formal' top down planning might stifle the (mainly spontaneous) functioning of the 'informal' bottom up mode. However when horizontalization is sought top down steering might be especially needed to define clear (yet broad) boundaries and mandates for the agents.

As noted earlier in describing the relevant context factors in the countries, the balance between the traditions of (top down) "formal policy planning" and (bottom up) "political planning" differs considerably between countries. The key success factor in either case is the capability of the policy makers to act swiftly when a window of opportunity opens and to be prepared. The capability for quick actions can be developed in both formal processes and in informal mode of working. In success cases, the policy makers are able to quickly build up bottom-up networks of stakeholders and then escalate to top political level. In most of the cases considered to be successful, one can trace back a relatively long preparation phase which makes the implementation rather straightforward once the opportunity for a change opens up. To be prepared requires better knowledge base and strategic intelligence processes.

The role of an "inner circle of STI" in setting the agenda is quite big in most of the partner countries. Even when the STI policies are expanding and incorporating new issues, the key persons remain the same. In most countries the STI policy system is rather fragmented if one considers also the regional innovation policy structures and broad innovation policy dimensions. A highly fragmented formal system keeps functioning due to a largely informal system of communication and information sharing.

It is less clear whether the reverse relationship also holds, i.e., the informal processes would require formal processes in order to function well. Too much focus on 'formal' top down planning might stifle the (mainly spontaneous) functioning of the 'informal' bottom up mode. However, when horizontalization is sought top down steering might be especially needed to define clear (yet broad) boundaries and mandates for the agents.

Processes (agenda-setting)

- Interdepartmental committees only work if they have a fairly broad mandate and may act as a clearinghouse between the various actors involved.

- Crucial for survival of interdepartmental bodies is the early identification of cross departmental themes (e.g. a Science strategy), otherwise departments might switch back to their sectoral mode.
- Drafting and implementation of a coherent national strategy requires considerable strategic competence.
- In some countries it has become quite crowded in the policy-setting phase as they have heavily invested in STI policy intelligence (parallel lines exist).

The most important past processes at the agenda-setting level having also strong implications on future challenges has been the attempts to strengthen interdepartmental processes. This is a very novel area and there still remain many lessons to be learned.

Interdepartmental committees only work if they have a fairly broad mandate and may act as a clearinghouse between the various actors involved i.e. a place where not only ideas and proposals are exchanged, but where also the power is available to make decisions. A clear example is the working on the Interdepartmental Committee on STI in Ireland, which not only functions as the official pre-digestion room for the Cabinet subcommittee on STI, but has a fairly broad mandate (the 2006-2013 Science strategy) to really make proposals and decisions regarding its implementation. In the Netherlands the innovation platform has a broad mandate and may step forward with proposals. These are still proposals, but as the platform consists of 3 ministers (i.e. including the prime-minister) as well as 15 other heavyweights these proposals are difficult to ignore, at least for the departments addressed (the proposals do also address universities and knowledge institutes as well as industry). The Danish Globalisation Council was a clear success in raising an open discussion and debate on the challenges of the country. The volume of participation from various sectors was very good. Overall, the wide participation (including e.g. trade unions and associations) in the agenda setting has activated and motivated different actors.

Crucial for the survival of interdepartmental bodies is that they are able to early identify cross departmental themes (e.g. a Science strategy) and work with these. If there is a lack of clear joint themes the departments might switch back to their sectoral mode. This has been evident in Ireland for example where the formulation of a government multi-annual Science Strategy was a clear interdepartmental theme as well as the Irish participation in FP7. In the Netherlands a recently created interdepartmental programme directorate for knowledge and innovation clearly takes the development of a strategy for societal innovation programmes as a theme where clearly the input of various (also sectoral) departments is needed. In Finland there is an on-going process to define joint research themes for sectoral research based on a large interdepartmental working process.

Drafting and implementation of a coherent national strategy requires considerable strategic competence. Especially the (concrete down to earth) implementation of a (abstract, lofty) strategy poses a major challenge. It also requires a rare combination of free-thinking and sensitivity for established regular political and administrative processes. A mixture of people in the strategy board who represent both opposites might be needed. When one side dominates, the strategy might either stay too close to every political life or rather too far detached from it. The latter reason might for instance explain the minor impact of the strategies drafted by the Austrian strategy board RFT.

Processes (design & implementation)

- Interagency or interdepartmental vehicles need high quality civil servants that are able to run these type of committees.
- A weakness of the de-centralised network mode of governance is that there the distribution of responsibilities is rather diffuse which is an impediment to implementation.

Processes (evaluation & policy learning)

- Cross country experiences are widely used, but not directly copied as political and policy culture as well as governance traditions are highly national and specific and hard to transplant (and change).
- There is an increased pressure towards evidence-based policy-making leading to strengthened evaluation, research and accountability functions. This is not at odds with more innovative (more risk full) STI policymaking but may in contrary support this.

Interagency or interdepartmental vehicles need very high quality civil servants that are able to run these types of committees as well as clear leadership. One of the key qualities need to be that for example chairpersons of these vehicles do not push their own departmental agenda and to be open-minded enough to make sure that there are wins for all participating parties. Other qualities include the ability to keep the interdepartmental agenda filled with strategic content rather than administrative issues and to make sure the interdepartmental group can celebrate some successes or quick wins.

A weakness of the de-centralised network mode of governance is that the distribution of responsibilities is rather diffuse. This is an impediment to implementation for everyone seems to be responsible for something, but no one has the final responsibility.

Overall, one can see a trend over the years towards creating a strengthened knowledge base for policy making – aim towards evidence based policy making. The evidence based policy making is a loose term which broadly calls for a high quality decision making based on high quality information. Here we look the material collected from the case studies from three perspectives linked to the evidence based policy making: evaluations, research and accountability.

Evaluations seem to play a very important role over the case studies. Over the last decade the evaluation culture within STI policy has strengthened. Particularly large "system" level evaluations and international evaluations such as for example OECD country evaluations have had an important role to initiate or support the discussion on the changes that eventually take place (examples of concrete cases can be found, e.g., from Finland and Norway). Also cross country experiences are widely used, but not directly copied as political and policy culture as well as governance traditions are highly national and specific and hard to transplant. For example, in designing the Finnish new strategic centers of excellence –instrument, the concrete examples of alternative models from different countries were collected before drafting a suggestion for a Finnish model. Another similar example is Swedish VINNVÄXT programme which used a lot of examples and experiences from other countries during the planning phase and all the Estonian cases where the examples from other countries are widely used. Evaluations and international examples are used when the changes are designed and implemented, but very rarely they are triggering the change. One can also observe a tendency to copy the content and ideas, but the governance is a "typical country feature" which is not attempted to be copied. One can also see a tendency to use only those evaluations or parts of the results that are also otherwise appropriate for the current situation. A pragmatic best practice was discussed in the Estonian workshop where it was stated that if something is not interesting to politicians then one could proceed by doing evaluations to increase the attention, but if an issue is already on the political agenda, then one should just proceed with implementation.

Research refers here to a more profound theoretical and extensive knowledge gathering activities than evaluations. The innovation theories and their evolution have greatly affected the STI policy discussion over the years. One interesting observation is that many of the key policy makers responsible for the policy planning have an innovation researcher background themselves. In most of the countries one can see a trend that the influence of 'innovation policy specialists' has clearly risen since the mid 90's. Policy makers are now highly professional and up-to-date on the latest innovation literature. It remains to be seen what the impact of this 'professionalisation' might have been but it is reasonable to assume that it has 'de-politized' the debates within the inner circle of policy makers and has made it easier to overcome political contrasts (discussions more based on 'rational' arguments than on political motives). On the other hand, the highly theoretical work may be at odds with pragmatic policy needs and one has to acknowledge that often research is used for backing-up the policy actions.

Accountability requirements have increased and governance has to react to the demands of transparency and impact assessment. This is partly due to the higher status STI policies have now on the political agenda and partly also due to the increased budget allocations which raise a question of the efficient and effective use of money. One example of the requirements on better accountability has been the so called "third mission" of universities which has greatly affected the ongoing research system changes. Another example is in the Netherlands the newly created category of large customized specific innovation programmes developed jointly between industry and knowledge institutes that have rather strict monitoring and evaluation regimes. Strict accountability requirements may also slow down the implementation and is possibly at odds with more risk full innovation and innovation policymaking. Some countries deliberately let a number of flowers blossom.

5 Future STI policy and STI policy governance challenges

5.1 Survey quantitative results on the future STI policy issues and impact on governance

The focus of the survey was on future policy issues, i.e., on the *content* of STI policy. Changes in these issues might eventually lead to changes in the *governance* of STI policy (see the analytical framework presented in section 3.1). The other two parts of the project – the country case studies and workshops – were primarily geared towards governance.

The survey was structured around 19 given STI policy issues listed in Table 5.1. These issues were identified based on the desk study and tentative interviews in each participating country. Respondents were asked to rank a set of 19 innovation policy issues that were already given in the survey, both in terms of **strategic importance** and in terms of **impact on governance** *for their specific countr*y on a five point scale (1 = Not important, … , 5 = Very important or 1= no effects, …. , 5 = very effective). Respondents could also add open responses and indicate further issues creating pressure for renewal in the future.

Table 5.1. List of future STI policy issues used in the survey.

No	Issue
1	Science and education competitiveness (scientific excellence)
2	Science and education system that meets industry needs (skills and knowledge)
3	Working life development(e.g, life long learning)
4	Service innovations
5	Growth seeking SME's ('gazelles')
6	Renewal of traditional business clusters
7	Creation of new business clusters
8	Commercialization of scientific results
9	Labor mobility
10	Cross-border innovation
11	Venture capital market & financial mobility
12	Innovation activities within non-profit sectors
13	Innovation activities within sectoral policy domains (e.g., agriculture, transport, communications etc.)
14	Coordination of sectoral innovation activities (horizontal innovation policy)
15	Regional innovation policy
16	Demand driven/customer oriented policy
17	Public procurement (e.g., government as launching customer)
18	Private sector R&D investments
19	Public sector R&D investments

Table 5.2. Perceived importance and perceived impact from innovation policy issues, ranked by IMPORTANCE (rank, average score), with significant inter-country differences.

Issue	IMPORTANCE		IMPACT	
Science and education system meets industry needs	1 (4,50)		1 (4,04)	
Science and education competitiveness	2 (4,47)		3 (4,02)	FL<DK
Private sector R&D investments	3 (4,37)		7 (3,68)	NL<IE
Public sector R&D investments	4 (4,25)		2 (4,02)	
Service innovations	5 (4,17)		15 (3,49)	AT<FI, NL<FL/D/FI
Commercialization of scientific results	6 (4,16)		4 (3,96)	AT<FL/DK/IE
Creation of new business clusters	7 (4,09)		10 (3,63)	
Growth seeking SME's ('gazelles')	8 (4,08)	DK<FI	13 (3,54)	AT, NL<DK
Cross-border innovation	9 (4,07)	AT, NL<FL	11 (3,56)	
Demand driven/customer oriented policy	10 (4,07)	AT<FL/FI	6 (3,74)	NL<FL/D
Venture capital market & financial mobility	11 (3,98)		14 (3,54)	
Horizontal innovation policy	12 (3,96)		5 (3,75)	
Working life development (e.g, life long learning)	13 (3,94)		18 (3,28)	
Labor mobility	14 (3,78)		16 (3,42)	
Renewal of traditional business clusters	15 (3,73)	AT<EE/FI, DK<FI	19 (3,23)	AT<FL/EE/FI/NO
Innovation activities within sectoral policy domains	16 (3,71)		12 (3,55)	
Public procurement	17 (3,66)		8 (3,66)	
Innovation activities within non-profit sectors	18 (3,59)		17 (3,28)	
Regional innovation policy	19 (3,49)	EE<FL	9 (3,65)	EE<FL/DK/SE, NL<FL

Table 5.3. Innovation policy issues with a bias towards Importance or Impact.

ID	Importance > Impact	ID	Impact > Importance
18	Private sector R&D investments	19	Public sector R&D investments
4	Service innovations	8	Commercialization of scientific results
3	Working life development	15	Regional innovation policy
6	Renewal of traditional business clusters	17	Public procurement

Overall the given scores on importance (IMPORTANCE) on the issues in STI policy field were rather stable, and the scores on impact on governance (IMPACT) showed somewhat more variance.[4] Overall, the differences were relatively small. In Table 5.2, the average scores for the two variables have been given, ranked by the scores on IMPORTANCE. Indicated in the table is also

4 Average score for IMPORTANCE was 4,00 with an average n of 176 and a standard deviation of 0,87, against an average for IMPACT of 3,63 with an average n of 161 and a standard deviation of 1,06.

Table 5.4. Average scores for IMPORTANCE and IMPACT per country.

	IMPORTANCE		IMPACT	
	avr	*st.dev*	*avr*	*st.dev*
Overall	**4,00**	**0,27**	**3,63**	**0,25**
Austria	3,59	0,37	3,17	0,49
Flanders	4,11	0,27	3,68	0,35
Denmark	4,00	0,32	3,77	0,33
Estonia	4,03	0,38	3,53	0,34
Finland	4,12	0,34	3,69	0,27
Ireland	4,06	0,41	3,73	0,41
Netherlands	3,82	0,36	3,23	0,43
Norway	3,87	0,34	3,56	0,43
Sweden	4,23	0,25	4,05	0,31

whether there are countries that score significantly lower than other countries on that particular item.[5]

Classical innovation policy issues (#1, #2, #19) still top the ranking. Several of the issues that are lower on the list (#16, #10) are however several times mentioned again in the open category when the respondents were again asked to list further issues creating pressure for governance through open ended answers. This indicated that some respondents consider these issues as really important but not yet being part of the everyday policy discussion. The issues ranking highest on the IMPORTANCE were also receiving a relatively high ranking on IMPACT.

Obviously, the IMPORTANCE and IMPACT on governance are directly related – all individual items on the two scales show significant correlations ($R^2 = 0,44$). There are, nevertheless, several items that were either found to be *relatively* important (compared to their perceived impact) and the other way around. These differences are summarized in Table 5.3. For example, the issue of private sector R&D investments (#18) has high IMPORTANCE ranking, but its IMPACT on governance is lower. Another example is the service innovations (#4) issue which gets a high IMPORTANCE rank, but on average its IMPACT on governance is low with larger country variations. A possible explanation for the cases where the importance is higher than impact is that these issues are typically new policy challenges (#3, #4) and that respondents do not yet know how to assess their impact on governance – thus the difference is a reflection of uncertainty. Another partial explanation may be that the issue (#18) is regarded as important yet outside the scope (direct sphere of influence) of the respondents. The other way around are those issues that are traditionally within the scope of policy makers (#17, #19). The high perceived impact of #8 and #15 might reflect an extra bonus on new instruments. In other words, these issues are currently 'en vogue' in innovation policy circles.

Differences between the countries are highlighted in Table 5.4 and in Annex D there are individual country by country results of the survey.

5 This has been done in two steps. First, the partial regression coefficients have been calculated for each item. For those issues where the coefficients showed significant differences (<0.05) the scores between each pair of countries have been calculated. For example, on item 16 ('demand driven policy') Austrian respondents attribute significantly less importance than Flemish and Finnish respondents. On the same item, Dutch respondents score significantly lower than Flemish and Danish respondents.

Table 5.5. Statistically significant in-between differences for types of organisation.

ID		IMPORTANCE
5	Growth seeking SME's ('gazelles')	Trade associations<Ministries/ National public agencies
16	Demand driven/customer oriented policy	Ministries/National public agencies/Private sector enterprises < Regional government agencies
15	Regional innovation policy	Higher education and Public research insitutes < Ministries

Table 5.6. Average scores for IMPORTANCE and IMPACT per type of organisation.

	IMPORTANCE		IMPACT	
	avr	*st.dev*	*avr*	*st.dev*
Overall	**4,00**	**0,27**	**3,63**	**0,25**
National governmental ministry/department	4,10	0,29	3,70	0,28
National public agency	4,10	0,28	3,70	0,27
Regional government/agency	4,05	0,28	3,66	0,30
Private sector enterprise (for profit)	4,07	0,31	3,79	0,28
Higher education or public research institute	3,92	0,31	3,51	0,34
Trade associations and alikes	3,85	0,58	3,66	0,50

Overall, the respondents from Austria have a general tendency to score lower on both importance and impact, Dutch respondents score especially lower on impact (that is, they perceive a significant number of innovation policy issues are important but just think that these issues will not have much impact on governance in their country). Due to the small n, these differences are not statistically significant.[6]

A similar overview can be made for the types of organisation. On three items, significant in-between differences between some types were found on IMPORTANCE, but the overall differences between the types are again rather small and statistically insignificant. An interesting observation was that the regional government agencies considered the demand driven / customer oriented STI policy to be a more important future issue than central government (see Table 5.5).

5.2 Discussion on the future policy content issues

In addition to the survey, the future STI policy content issues creating pressure for governance were discussed in the interviews and in the workshops. This chapter elaborates the future issues on STI policy content based mainly on the evidence provided in the responses to the open questions in the survey with additional remarks emerging from the other discussions.

A great number of additional policy issues were added by the respondents in the survey next to the issues listed in Table 5.1. These issues have been classified following the structural framework, that is, following the chain from general issues to innovation policy issues, the innovation policy itself and finally the translation of that policy into policy instruments. In the Annex D, detailed

6 With an average n of less than 20 respondents per country, at a 95% confidence interval differences between the average score should be at least 1,3 (on a five point scale) to yield statistical significance.

overviews of the policy issues (and governance issues) are given for each individual country. In this chapter the focus of the analysis is instead on the comparison between the countries. The survey results are indicative and should be read as issues rised by a fairly small group of respondents, especially if analysed at the national level (see annex D). One should also note that these results were presented and discussed in the workshops which provided an additional validity test for their accuracy.

General policy issues

Globalisation (global movement of capital, labour and R&D/knowledge) appears as a theme in nearly every country both in the survey, in workshop discussions and in the interviews, albeit in different shapes and forms and as a very wide generic topic. The competition of metropoles on a global scale is several times mentioned separately in the survey, as is the development of large multinational firms into networks of independent yet coupled units. Some countries which have experienced recent closures and/or mergers and takeovers of major firms which are typically seen as national symbols, have worries whether especially the more traditional industrial fabric (most importantly indigeneous SMEs) will be able to meet the globalisation challenge and can make the move towards an innovation-driven growth model. The globalisation issue is also clearly linked to the global competition for attracting knowledge workers, i.e., the international battle for talent. Some differences were observed in the discussions whether the countries see the globalization challenges as great opportunities or as a threat to which one has to adapt.

Several countries perceive an economic downturn at the short run. Meanwhile, they want to maintain and/or improve the welfare state. Consequently there is a general pressure to raise productivity in the public sector (e.g., in health care). The latter issue is also linked to improving innovation in the public sector. In general, there is striving for a leaner and meaner government. A number of countries have introduced programmes for new public management in an attempt to not only make government more effective, but to raise productivity as well. Estonia is an exceptional case in that sense that they have now more money due to joining EU and they have to build their public service structures. Thus, there has been a period in the country to build up the public services and the major issue has not been to spend less money. However, in the past also in Estonian cases the lean government has been a very important driver for governance changes and most likely will come back as an issue also on the future.

Three big societal issues mentioned in almost every country in the survey and also across the interviews and workshop discussions are **environment** (usually with a reference to climate change and energy issues, in Ireland also to waste management), **aging** (with references to health care or diminishing labour force), and **immigration/integration**. The societal issues tend to be opposed to business interests (thus a shift is foreseen from narrow economic to broader societal goals). In most countries, however, societal challenges are regarded in STI policy discussion as future business opportunities rather than negative trends. For example in Flanders, the Netherlands, Finland, Denmark, and Norway this positive attitude of an attempt to create win-win situations is evident. The Norwegian respondents particularly mention the support of energy-related clusters to support the conversion from oil industry to renewable resources. In Finnish workshop, the participant particularly highlighted the global responsibility issues and the role of development aid as a major future opportunity for STI policy making. Also in Estonian workshop the societal opportunities were added on the list of future drivers although they were not that much highlighted in the Estonian survey responses.

Idiosyncratic issues highlighted in the survey are in most cases related to the particular political situation in a country. Thus in Austria, the seemingly permanent deadlock due to the 'grand coalition' is mentioned, in Flanders the survival of the federal state, in the Netherlands the rise of in-

come inequality, and in Sweden the privatisation of the public sector.

Innovation policy

There is a wide range of reoccurring innovation policy themes in the survey that the respondents highlighted in their open answers and that are clustered around five topics. These were also issues highlighted in most of the countries in the interview material and in the workshops.

1. The major part of the open responses in survey clusters around universities: scientific excellence (in general, but Danish survey responses for example specifically mentioned excellence in social sciences and humanities as a base for knowledge intensive services), interdisciplinarity, valorization, financing, decreasing inflow of science students, lack of critical mass in research.
2. Another cluster of the issues refers to the private sector: lack of knowledge intensive human resources, a conservative industry (Denmark, Ireland), IPR, and the lack of R&D in SME's, need for 'competent capita' (Norway).
3. Another recurrent theme was the changing role of the government from merely a passive funding agency to an active player in the field of innovation. This shift is mirrored in an expansion of the portfolio of innovation policy instruments, e,g, public procurement, public-private partnerships, government as a launching customer are mentioned in nearly all countries.
4. A fourth part of comments relates to open innovation/user-driven innovation, which requires new steering models for managing universities and knowledge institutes for example. The latter case for example refers either to intra-university relationships (Austria), inter- university relationships (the Netherlands), or to both (Finland).
5. Particularly from the interviews and from the workshop discussions emerges the worry over the shift from an industry to a service-based economy. This is a challenging topic that provoked a lot of discussions whereas there are not yet so many concrete changes and policy actions.

Typical national issues mentioned in the survey are the lack of international competitiveness of scientists (Estonia), the shift from technology follower to technology leader (Austria), inflexible organisation of universities (Austria), general lack of entrepreneurship (Netherlands), the long-term sustainability of research (Netherlands, to a lesser extent Sweden), and the quality and geographic distribution of the educational system (Norway). Somewhat less widely spread issues in the survey responses are the (classical) notions of business clusters (high in open answers only for Estonia and Finland), regional innovation policy, industry-science relationships (a typical issue, but clearly highlighted in Flanders), and ICT as a driver of innovation (Denmark and Estonia – the smart ID card). These latter topics might be issues that are still important across the countries and were also included on the list of given issues, but were only seen worth of highlighting separately only for these countries.

Innovation policy instruments

Based on the overall analysis material, the classical instrument of STI funding seems to have moved somewhat to the background. Instead a more active role of the government is expressed in new roles and instruments such as public private partnerships, public procurement, the government as a launching or lead customer, or as the instigator of strategic research (mission-oriented research).

Other instruments put more emphasis on the role of the government in creating the right conditions for innovation by users (boosting the public image of innovation, supporting user-driven platforms – or a more top-down approach in the Estonian case: managing networks of lead users) or by firms (tax measures such as tax reliefs). A final set of often mentioned instruments refers to the European level (EU patent legislation, position within EU research – ERAnet's and JTI's).

5.3 Discussion on the future governance issues

At the end of the survey the respondents were also asked to elaborate their thoughts on the implications of the future issues on the governance or more broadly describe the anticipated governance changes in the countries. In this chapter an overview of these results is given with some notions of related discussions in the interviews and workshops.

Governance structures

There are four major developments or trends which are mentioned in many countries both in the survey and also highlighted in the interviews and workshops.

- The first is the re-organisation and/or better coordination between the core STI Ministries, mostly the axis in broadened, more integrated STI policies i.e. Ministries of Education and Sciences on the one hand and Trade and Industry or Economic Affairs on the other hand. Sweden is an exception in its survey responses as it explicitly mentions a leading role for the Prime Minister and the Minister of Finance. Also, the Estonian workshop discussions highlighted the need for an increased role of Prime Minister's office in STI policy coordination and this issue has come up also in the Finnish discussions.
- A second trend refers to the coordination of a broader set of Ministries, that is, cross-sectoral "horizontal" coordination. With a trend to increasingly add societal goals to STI policies, innovation in sectoral domains such as healthcare, education, environment, traffic and transport (where innovation is a means rather than a goal in itself) the issue is raised how to best make sure interdepartmental innovation governance is shaped.
- The streamlining of instruments, initiatives and institutions is also often mentioned reflecting the perceived increased complexity of the broader future STI policy. Quite a number of the innovation systems included in this study have increased in terms of actors and schemes. Apart from a development towards adding coordination mechanisms a trend towards reducing complexity can be signalled as well. Some countries have already started reducing complexity (for example in the Netherlands), have signalled the issue (such as in Flanders) others expect that meta-evaluations will be performed in a few years time after which a streamlining action is foreseen (for example in Ireland, Finland, Norway).
- A final set of measures refers to the relationship between the Ministries and the implementation agencies. In Austria, an improvement of the relationship between these two types of actors is foreseen. In the Netherlands a transfer of responsibilities from the first to the latter category is explicitly mentioned, with a more proactive role for the agencies.

Next to these general notions there are a great number of country specific measures mentioned in the survey. In Flanders, the transfer of tasks from the federal to the regional level plays a central role. On the contrary, in Norway the restructuring is aimed at the balancing of the trends towards regionalisation (possible leading to fragmentation) and globalisation (possible leading to concentration).

In Denmark, a couple of measures are mentioned in the survey that stand out of the other measures, such as the restructuring of the NIS to better cater the needs of knowledge intensive service sectors (although there are implicit hints in this direction in other countries as well and the topic has been discussed in the workshops without explicit solutions of how this should be done), the introduction of new regulation and funding schemes (most other countries stress the reduction of the existing number of initiatives – see above), and the improvement of the incentive structure of public research to contribute to innovation in the private sector.

Governance processes

The survey responses and other material tend to stress the governance processes related to the agenda setting and policy planning. This is partly due to the selection of respondents for the survey

and interviews emphasizing the views of policy makers rather than those responsible for the implementation.

The most important recurrent theme for the future in all of the material is the call for a broader yet better integrated approach to innovation support and its implications for the policy process. The broadening of innovation policy refers to user-driven innovation/'open innovation', more emphasis on service innovation (including the recognition of social and organisational innovations) and including more explicitly societal challenges in STI policies (such as climate change and aging) are perceived as the most important drivers for innovation. Although these issues are seen as major future opportunities, there are very little precise visions of the practical tools to be implemented.

The broadening of innovation policies refers generally to a more systemic innovation management system (covering research, education and innovation) and consists of several connected sub themes. First, the formulation of national R&D strategies with clear focus/priority setting (R&D specialisation) and a clear positioning within the global innovation landscape (and at an intermediate level, within the EU) requires good strategic vision building processes. It is highlighted that such a strategy should be especially embodied in theme/mission oriented research. The funding of those research programs should be strongly result-oriented (e.g., involving performance contracts and/or indicator-based budgeting). In terms of skills and knowledge, the drafting and implementation of such a coherent national strategy requires considerable strategic competence. At the governance side, it requires (greatly) improved coordination between the traditional Ministries (research, education, economic affairs) and between the various sectors involved (health, social affairs etc.). It also asks for a shift in the role of the government, e.g. from a merely passive funding agency to an actively involved player (e.g., via PPP constructions, procurement/government as lead user and so on).

Several countries give a specific interpretation to the generic process described above. In Denmark survey responses, the broadening of the innovation concept is further elaborated as the integration of research driven and user driven innovation via employee driven innovation. Survey responses in Flanders (and to a lesser extent in Finland) emphasize an outward looking approach. In terms of steering, Finnish respondents foresee a shift from a top-down hands-off approach (which is still being stressed in Austria) to a more iterative process. In the Netherlands, in contrast, a shift from top down to bottom up governance is mentioned. More in general some countries seem to struggle with the balance between more hierarchical modes of policy planning and more networked type of governance.

Austria puts in its survey responses much emphasis on the involvement of the social partners in innovation policy. Estonia wants to leapfrog from a first generation linear view on innovation to a third generation systemic view. At the same time, comments are being made on the lack of interest in innovation by politicians. In Sweden, a public debate on critical mass in public research/scientific excellence/autonomy of researchers is promoted. The issue as such is not at odds with the view in other countries but the focus on the public debate is rather unique.

6 Future challenges and governance options

6.1 Overview of the future challenges

Although the countries are at different phases with respect to the urgency for implementing new structures and processes, the STI policies in all of the countries are facing similar major future challenges. Innovations are seen in all of the countries as key elements ensuring growth and national competitiveness and as solutions for future societal challenges. At the same time, the content of the notion of "innovation" has broadened from technology to cover wider social, systemic, organizational and service innovations. The broadening content of the STI policies will present a major challenge as such as there are more stakeholders, issues and problems to be solved. The broadening content of the STI policy means that there is an overarching need for increased integration and horizontal coordination (see an example of a line of reasoning leading to this in Figure 6.1).

Although the STI policy content is expected to experience a major renewal in the future in most of the countries, it is less evident that the institutional structures and processes would experience a similar renewal. From the history we know that the existing structures tend to be permanent and mostly very rigid reflecting the local contexts and being based on the informal processes having long historical background. New functions are introduced through new institutional structures which often further increase the complexity of the governance systems and increase the need for coordination. Major question is whether the ex-

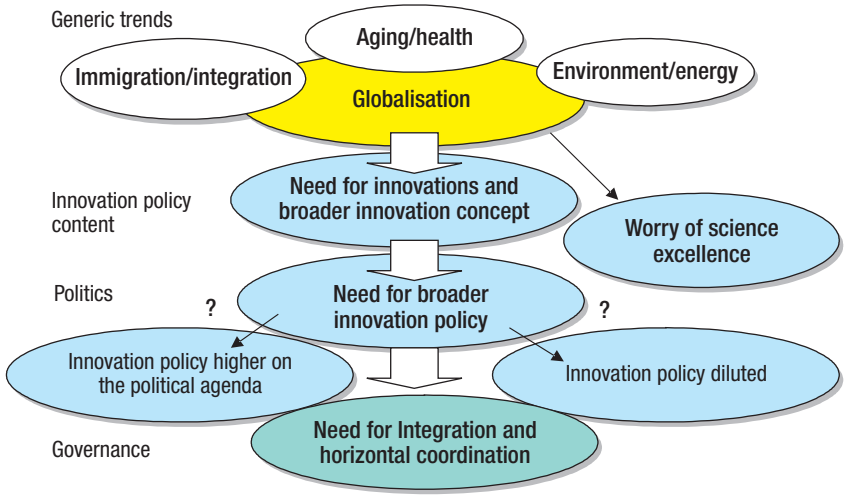


Figure 6.1. An overview of the recurring logical chain creating pressure for future governance changes.

isting sets of institutions and processes are at all capable to handle the new policy contents.

Based on the material produced in the study, the following five STI policy options or choices were identified to be the most relevant for future governance (see Figure 6.2). One should note that these options are not black-and-white or right or wrong choices but more a continuum of issues among which there always needs to be found a right balance.

- **Broad vs. narrow STI policy.** Although there is a pressure towards broadening the content of STI policies, the countries can make clear choices to define the policy boundaries and further define the supporting governance structures and processes to support these choices. Countries can still in the future focus on traditional S&T policy which is also supported by the existing structures. Also within the broad innovation policy one can (and one should) define the priorities clearly and be focused.
- **De-centralized vs. centralized governance structures**. Sectoral and centralized innovation policy based on the hierarchical departmental mode of governance seems to be more and more complemented with a de-centralised and network based modes of governance. These networks seem to emerge from the need to create new operations and also partly in order to by-pass existing structures. The network management will become challenging but on the other hand the future demands call for more bottom-up and open ways of working.
- **Policy planning vs. political plans.** Policy making will always be political. However, the degree to which the STI policy processes will become politicized is uncertain and partly also under control of politicians and policy makers themselves. A policy system that is dominated by political decision-making and surely if this is combined with a less stable political context, may results in constant changes in initiatives and lack of stability. A policy system that is overtaken by "rational" policy-makers can

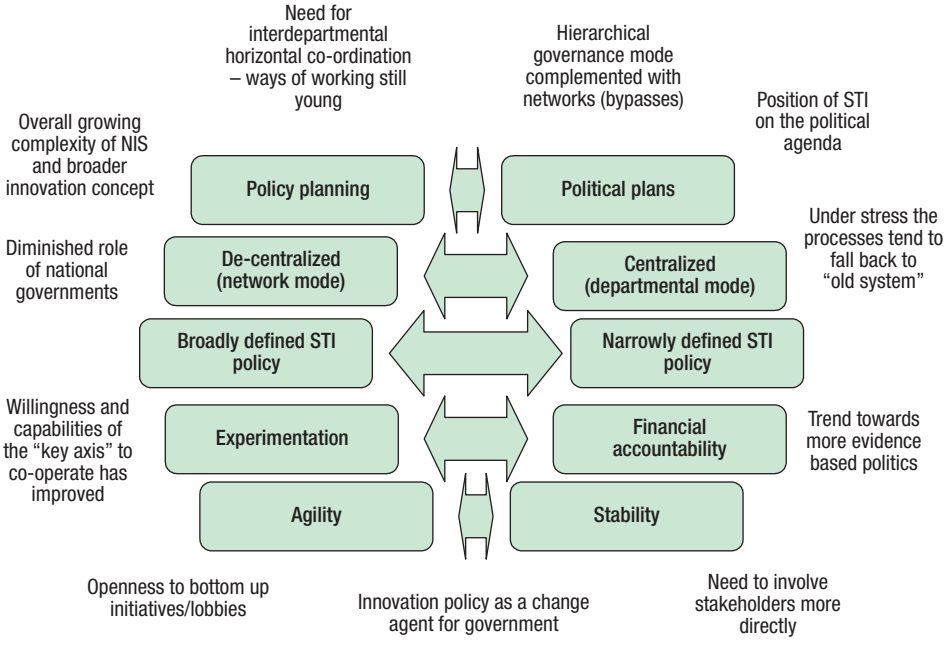


Figure 6.2. Major future pressures affecting innovation policy governance.

lead to organizational inertia or lack of wider societal support for STI policies and to policy priorities that are not necessarily supported by society. It is obvious that here a right balance needs to be struck between "informal and more politicised policy planning" and more "formal and rational policy planning".

- **Experimentation vs. financial accountability.** There is a strong trend for evidence based policy making which aims to strengthen the knowledge base for improved decision making. Evidence based policy making calls both for improved impact assessments for policy actions as well as experimentation with new actions which would be carefully analyzed. Broadening STI policy definitely needs supporting experiments. At the same time, however, there is a strong trend calling for increased financial accountability and "value for money" evidence which may be at odds with new innovative and high risk taking STI policy experiments.
- **Agility vs. stability.** New challenges, need for policy experiments, and networked mode of operations require high agility, adaptability and flexibility from the governance system. At the same time the policy system needs to be relatively stable. Particularly, the stability of funding is the core element also for future STI policy. Also, the changes and their impacts take a long time to mature and thus "policy bouncing" is not a desirable characteristic. The balance seeking between fast and agile functions and more stable functions is a challenge.

All countries will and are being affected by the mega-trends towards globalisation and broadening – albeit (at least at the moment) not in similar degrees. They all must find a proper balance on each of the five policy options. In the light of the substantial differences we found between national innovation governance styles, the particular choices made will (and should still) be different for each country. At the same time, the system as a whole should also be in balance. Since the policy options are not independent – they might reinforce or weaken choices made elsewhere in the system – eventually just a few overall strategies might remain that really work.

6.2 Key conclusions

The combination of case studies and the in depth interviews for these, survey, national workshops and analysis within the project team lead to a rich set of observations, trends and insights into national STI policy processes and innovation governance structures (institutions and processes). These have been reported and fed back in national reports and at a more aggregated level in chapters 4, 5 and 6 of this report. In an attempt to formulate the top level type of lessons learned in this project the project team would like to flag the following 10 lessons learned/recommendations.

1. **There is a current widespread development towards more horizontal, open and customized approaches to STI-policies but the countries are at the different phase and are struggling with implementing the policy. This offers an enormous opportunity to reflect on and review current innovation governance practices.** The clear link that is especially made between STI policies and wider societal challenges (i.e. how can science and innovation contribute to solving pressing societal issues) calls for a major revision of innovation governance. One important challenge is how and to what degree include sectoral departments in broader, horizontal STI policies and anchor STI in non-innovation and non-research departments. A major trade-off is between including sectoral departments more explicitly in drawing up a shared STI-agenda versus keeping a more narrowly defined departmental responsibility for the STI-agenda. Underlying these challenges is a shift from (scientific and/or economic) output to (societal) outcome. This also involves a major change in the role of government, namely from passive funding agency to an actively involved player.
2. **STI policies have developed into an established policy area with increases in STI budgets and the prominent position of STI on the political agenda. Expectations towards the results have increased. Existing governance systems are not able to handle or renew themselves quickly enough and this poses a major challenge.** Due to the rising

STI budgets and the political priority given to innovation the number and variety of actors involved in STI policy-making, implementation and evaluation and monitoring has increased. One important reason is that there is often a political urge to cash in on the budgetary increases (increased pressure on financial accountability). Since the established institutions are generally regarded as incapable of delivering results quickly enough, temporary 'bypasses' (e.g., interdepartmental structures, 'outboard motors', new ways of agenda-setting) are created to overcome traditional institutional inertia. Alas often these temporary instruments turn into semi-permanent institutions and become part of the governance problem itself. There are generally two ways out. The most radical yet painful measure is to go back to the basics and reform the original institutions. The next best measure is to introduce more coordination and policy coherence in the system as a whole (thus including both the old and the new structures).

3. **Acknowledge that changes in innovation governance cannot be managed completely rational and that policy cultures differ markedly, but that there are at least two complementary modes in innovation governance. When making changes, the formal and most often hierarchical governance mode needs to be combined with an informal and network and often bottom-up governance mode.** The mix or balance between "informal and more politicised policy planning" and more "formal and rational policy planning" differs considerably between countries and in time. However, irrespective of the actual mix, the role of an "inner circle of STI officials" setting the agenda is quite big in most countries and to an important quality of the innovation governance system especially when there is a window of opportunity for changes. A highly fragmented formal system keeps functioning due to a largely informal system of communication and information sharing. It is less clear whether the reverse relationship also holds. Too much focus on 'formal' top down planning might stifle the (mainly spontaneous) functioning of the 'informal' bottom up mode. However when horizontalisation is sought (see 1), top down steering might be especially needed to define clear (yet broad) boundaries and mandates for the agents. Thus, it appears that both modes are complimentary and needed to make changes in innovation governance. Often a quite complex symbiotic relationship might exist. It is therefore a delicate matter to strike the right balance between the two modes of governance, especially whether to rely more on rational policy planning or on informal network approach.
4. **Drafting and implementing a coherent (broadened) national STI strategy requires considerable strategic competence supported by the governance system, but this does not automatically imply a need for an overarching grand STI strategy.** Drawing up broadened national STI strategies and planning requires considerable strategic intelligence capability in STI policy-making as well as improved coordination among firstly the traditional (core) STI Ministries and secondly among these and the various sectoral Ministries. However, the need for a grand strategy is not always self evident as the sheer absence of this in some countries have created bottom up inter-organisational capabilities and routines in drawing up in a typical sequence of bottom-initiatives and top down sanctioning and guidelines emergent STI strategies. In general, the contribution of (top down) selection is overrated and the contribution of (bottom up) variation underrated. A high degree of variation (e.g., leaving room for a multitude of 'local hotspots of innovativeness') gives a lot of flexibility to the system, in contrast to the much more static top down approach. The crucial points seem to be whether there are (politically) entrepreneurial agents who are able to align the interests of the many stakeholders and to successfully escalate these joint interests to the political level.
5. **New innovation governance challenges (see 1) asks for experiments with interagency and interdepartmental vehicles creating coordinated and coherent STI-policies which need to be steered on typical critical success factors.** Some of critical success factors for mak-

ing these vehicles to a success include: (a) involve the right people with the needed qualities (experienced, and both knowledgeable on content and process, "five leg sheeps"); (b) fairly broad mandates and the possibility to act as a clearinghouse between the various actors involved (see 3); (c) early identification of cross departmental themes in order to keep the interdepartmental agenda filled. These are some of the critical success factors which must prevent that policy-makers switch back from the still young discipline of interdepartmental way of policy-making and -implementation to the traditional departmental or sectoral mode of policy-making and -implementation (including characteristics of traditional turf wars and silo-ed government in stead of a joined-up government). The main trade-off to be made here is to invest in new types of interagency and interdepartmental forms of governance and the parallel need for institutional streamlining that is felt in most STI policy systems. A key ingredient for all three points seems to be the long-term presence of a rather stable informal group of experienced policy makers who trust each other well enough to transcend the (narrow) specific interests of the organizations they represent.

6. **There is an increased pressure to strengthen knowledge base for policy making. New (innovative and possibly more risk full) approaches towards innovation governance are an important and necessary part of this evidence based policy making. This is not at odds with accountability.** On the contrary, the experiments with interagency and most importantly interdepartmental vehicles (see 5) ask for thorough monitoring and evaluation strategies at the institutional, policy and eventually at the meta- or systems level. In most countries there is by now a well developed history of monitoring and evaluation at the programme and instrument level, but less so in systematically evaluating new governance structures. Some countries deliberately let a number of flowers blossom and foresee a meta- or systems evaluation in a few years time in an attempt to learn, but also to keep the overall system streamlined and not overtly complex. In other words the final goals of these experiments (defined in terms of outcome) should be set very ambitious (in order to induce radical innovations) but should not be applied too soon during the implementation of the experiments. Also, too strict and straightforward financial accountability may kill innovativeness.
7. **Make use of the rhythm or intervals at which windows of opportunity for changes in innovation governance (institutions, processes) open up and make in between time to roll out and implement.** When serious pressure from STI stakeholders (industry, HEIs, NGOs, etcetera) builds up to address certain issues (topical or a need to review or change structures and policy processes e.g. the need for reducing complexity) and this coincides with the political will and power as well as the preparedness and will of the STI policy system to make these changes momentum or a window is created for bringing about real change. Political entrepreneurship (making eager use of windows of opportunity) has often been very important – political changes open up windows of opportunities and subsequently the "right people in right places" make things happen (this esp. refers to the ability of agents to escalate bottom up initiatives, see 4). The capability to act swiftly when a window of opportunity opens therefore is an important quality of a policy or innovation system. At the same time most actors in the innovation system value a predictable, robust and stable innovation environment, that is, stable boundary conditions. STI policy-makers have to make sure that the innovation system has the right levels of turbulence and agility (without being tempted to make changes for the sake of changes or for playing political games) while creating periods of stability and predictability as well. Although some might argue that innovation by definition should lead to a permanent state of institutional uneasiness and change, alternating between change and consolidation and really testing whether changes made work out well is also needed. At any moment of time there should be at least some parts of the system that are kept constant (e.g., in funding structures). If turbulence is too high new structures and processes may lack

the time to really get off the ground and prove themselves (see 6). One of the clear risks observed is that impatient politicians give new experiments and approaches not enough time, resulting in a cascade of half-heartedly experiments and new approaches (and a cynical policy apparatus).

8. **In order to derive at a balanced innovation governance system create the right check and balances between advisory, policy design and policy implementation functions and built in enough self reflection and learning capabilities.** In the country analyses performed it appeared that stress factors in innovation governance are appearing where a sort of natural balance between advisory, policy design and policy implementation functions was lacking or where these different functions overlapped problematically. For example competing advisory structures, competing policy-making institutions or STI implementation agencies overtaking the policy-making functions almost completely are creating stress in the system that might be counterproductive. Therefore it is key to invest in regular evaluations, not only at the level of individual organisation and programs but at the systems or meta-level as well. Such systemic evaluations should be especially aimed to streamline the system and to weed out obsolete and/or redundant governance structures and processes (see 2).
9. **Look for innovative ways of stakeholder involvement when broadening STI policies. Broadening of STI policies or the development of horizontal STI policies asks for new ways of creating support with an increasing number of stakeholders (see 1).** Switching to a more interdepartmental mode of policy-making does not automatically mean involving outside stakeholders (which might be a prerequisite for more horizontal STI policies). In most countries this cannot be accomplished old style i.e. through systemic representation of all stakeholders. Working through representative ('politicized') bodies is increasingly seen as frustrating the very core of innovation (unusual solutions, new combinations) as this in most cases results in very slow decision-making and mostly watered down compromises. However the crux is not so much in the institutional set-up per se as in the careful selection of the individual representatives. If for example members of advisory councils are chosen for what they represent more than for their ability to act as change agents, changes in innovation governance will most likely be slow and superficial. In order to function as a vanguard rather than a rear guard the members should be able to operate relatively independently of their constituencies (e.g., bases on their individual merits) yet without loosing contact with them (see 5).
10. **Start the discussion on future innovation governance in time.** The more so as periods of change and relative stability seem to follow up on each other like a pendulum movement (cf. the infamous 'seven-year itch'), some planning in making changes in innovation governance change can be done beforehand. This is needed as otherwise time or political pressure is too high to really think through the sort of changes in innovation governance that are feasible and needed. Discussing the outcome of this and similar studies on innovation governance multilaterally (like in the Era-Net context) and in national capitals might help in getting the reflection of the innovation governance most needed on track in time.

Annex A

Case study descriptions

COUNTRY	MAJOR GOVERNANCE CHANGE IN THE RECENT PAST
Austria	• The establishment of the Rat für Forschung und Technologieentwicklung. RFT also has considerable special funds at its own proposal • The establishment of AWS and of FFG and their links to the various ministries • Re-structuring of the Ministry of Education, Science and Culture
Denmark	• Globalisation council
Estonia	• Reform of the R&D policy council at the beginning of 2002 • Enterprise Estonia re-structuring (2003) consolidated the structure into a matrix organization • Estonian Development Fund was established in 2007
Finland	• "Regional competence center" (OSKE) – funding programme which has been running since 1994. In 2006, the programme was renewed for the period 2007 – 2013 including now also broader cluster programmes created by networks of the competence centers. • "Strategic centers of excellence" (SHOK) –funding programme which is built around networking and joint ventures between industry and research • Creation of the new ministry of "employment and industry" (TEM) by combining Ministry of Trade and Industry, Ministry of Labor and regional development part of Ministry of Interior (2007) • Re-structuring sectoral research and universities
Flanders	• Administrative reform to create ministry on the economy, science and innovation (2006) • Transformation of the VRWB (Advisory Council on Science policy) into a Strategic Council on Science and innovation • Directive on good governance applied to strategic research centres such as VITO, IMEC, VIB
Ireland	• Technology Ireland (aimed at interagency coordination) • Interdepartmental committee of senior officials on STI • Use of (temporary) strategy/review groups such as the Enterprise Strategy Group or the Services Strategy Group
Netherlands	• Decision to introduce Innovation Programmes approach • ICES-KIS/BSIK (cooperation between industry and the knowledge infrastructure) • New Regional Policy. Focus on excellence – six regions in the NL • Establishment of Innovation Platform in 2003 and renewal in 2007

COUNTRY	MAJOR GOVERNANCE CHANGE IN THE RECENT PAST
Norway	• Large R&D programmes (NCE (Norweagian Centers of Expertise), ARENA and VRI (measures for regional R&D&I)) • The role of RCN (focusing on principal/agent perspective) • Changes in regional innovation policy structures (on-going changes due to the changes in regional structuring) (in the recent white paper it is proposed to decentralize important function in the innovation and R&D area)
• Sweden	• The formation, development and impact of the Globalization council chaired by our minister of Minister for Higher Education and Research • Establishment of Ministry of Industry, Employment and Communications (already at 1999, but might offer a good base for a comparison with similar cases in other countries) • VINNVÄXT programme

Annex B

Interview protocol

The past changes in the innovation policy governance

- What in your opinion have been the major changes in the innovation policy governance in your country over the last 10 years?
- What in your opinion have been the main general drivers for these changes in the past?
- Next the interview will focus on the country specific case(s) and go through the following questions for each case:
  - What in your opinion where the main events and drivers that led to this change? How did the politics, policy and other issues created a window of opportunity?
  - At the time, what was new in terms of governance in the change? To what degree were similar initiatives abroad looked at as a reference?
  - How did the change affect different governance processes? (i.e., agenda setting, implementation…)
  - How did the change developed over time?
  - Was the change successful? Why yes or Why no? What or who made it a success or failure?
  - What lessons can be learned from this particular case study?

The future changes in innovation policy governance

- When you think of the future (about next 10 years), what you consider to be the most pressing innovation policy concerns in your country?
- Do you think that those concerns will have an effect on innovation policy governance?
- If yes, what types of effects? Effects on structures? Effects on processes on agenda setting, design, implementation, evaluation, policy learning?
- What are other future trends that in your opinion will affect innovation policy governance? In what ways?

Annex C

Survey questions

1. **Country**
2. **Name** [not obligatory]
3. **Organisation** [not obligatory]
4. **What is the type of your organisation?**
   National Government Ministry/department
   National public agency
   Regional government/agency
   Private sector enterprise (for profit)
   Higher education or public research institute
   Other
5. **What is the main role of the unit (or organisation) you represent?**
   Agenda setting
   Policy development or policy coordination
   Funding agency
   Other implementation agency
   Research
   Advisory/consulting
   Other

6. In the table below **some innovation policy issues** have been listed. **How important do you think each of these issues will be for the innovation policy in the future (about next 10 years) in your country?** (1 = Not important, … , 5 = Very important)

No	Issue	1	2	3	4	5	Cannot say
1	Science and education competitiveness (scientific excellence)						
2	Science and education system that meets industry needs (skills and knowledge)						
3	Working life development(e.g, life long learning)						
4	Service innovations						
5	Growth seeking SME's ('gazelles')						
6	Renewal of traditional business clusters						
7	Creation of new business clusters						
8	Commercialization of scientific results						
9	Labor mobility						
10	Cross-border innovation						
11	Venture capital market & financial mobility						
12	Innovation activities within non-profit sectors						
13	Innovation activities within sectoral policy domains (e.g., agriculture, transport, communications etc.)						
14	Coordination of sectoral innovation activities (horizontal innovation policy)						
15	Regional innovation policy						
16	Demand driven/customer oriented policy						
17	Public procurement (e.g., government as launching customer)						
18	Private sector R&D investments						
19	Public sector R&D investments						

7. Are there any other innovation policy issues that you regard as very important in the future?

I	
II	
III	
IV	
V	

8. To what extent do you think these same innovation policy issues **will affect the *governance* of innovation policy** in your country? (1 = No effects…, 5 = Very affective)

Governance refers both to the *structure* of the national innovation system (institutional set-up) and the *processes* within the system (agenda setting, policy design, policy implementation, evaluation etceteras).

No	Issue	1	2	3	4	5	Cannot say
1	Science and education competitiveness (scientific excellence)						
2	Science and education system that meets industry needs (skills and knowledge)						
3	Working life development(e.g, life long learning)						
4	Service innovations						
5	Growth seeking SME's ('gazelles')						
6	Renewal of traditional business clusters						
7	Creation of new business clusters						
8	Commercialization of scientific results						
9	Labor mobility						
10	Cross-border innovation						
11	Venture capital market & financial mobility						
12	Innovation activities within non-profit sectors						
13	Innovation activities within sectoral policy domains (e.g., agriculture, transport, communications etc.)						
14	Coordination of sectoral innovation activities (horizontal innovation policy)						
15	Regional innovation policy						
16	Demand driven/customer oriented policy						
17	Public procurement (e.g., government as launching customer)						
18	Private sector R&D investments						
19	Public sector R&D investments						

9. What in your opinion are other general issues that will create a lot of pressure for changes in the innovation policy governance in the future?

I	

Related to research environment?

I	

Related to business environment?

I	

Related to public sector?

I	

Related more generally to society?

I	

10. Could you please elaborate of the major changes that might take place in the governance of innovation policy in your country?

I	

Annex D

Country specific survey results

Country	Respondents
Austria	13
Belgium (Flanders)	25
Denmark	48
Estonia	15
Finland	31
Ireland	14
The Netherlands	15
Norway	10
Sweden	10

181 respondents

Main questions:

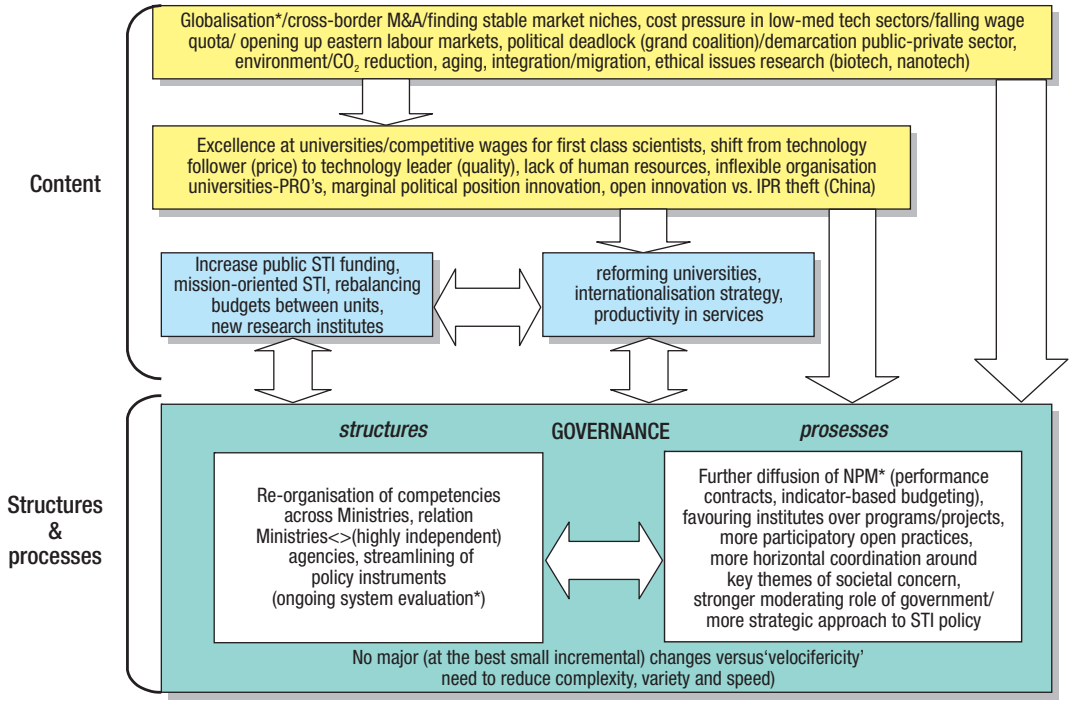
- **Importance** of selected issues for future STI policy
- **Impact** of the selected issues on STI policy governance
- Open ended elaboration of future challenges and the governance changes.

Major future innovation policy issues: Austria versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Austria*	*Overall*	*Austria*
Science and education system meets industry needs	**1 (4,50)**	1 (4,23)	**1 (4,04)**	3 (3,77)
Science and education competitiveness	**2 (4,47)**	2 (4,23)	**3 (4,02)**	1 (4,15)
Private sector R&D investments	**3 (4,37)**	6 (3,77)	**7 (3,68)**	11 (3)
Public sector R&D investments	**4 (4,25)**	7 (3,77)	**2 (4,02)**	4 (3,62)
Service innovations	**5 (4,17)**	4 (3,85)	**15 (3,49)**	15 (2,85)
Commercialization of scientific results	**6 (4,16)**	8 (3,69)	**4 (3,96)**	10 (3,15)
Creation of new business clusters	**7 (4,09)**	12 (3,46)	**10 (3,63)**	12 (3)
Growth seeking SME's ('gazelles')	**8 (4,08)**	9 (3,69)	**13 (3,54)**	16 (2,85)
Cross-border innovation	**9 (4,07)**	10 (3,62)	**11 (3,56)**	13 (3)
Demand driven/customer oriented policy	**10 (4,07)**	14 (3,31)	**6 (3,74)**	7 (3,38)
Venture capital market & financial mobility	**11 (3,98)**	3 (4,08)	**14 (3,54)**	8 (3,23)
Horizontal innovation policy	**12 (3,96)**	11 (3,54)	**5 (3,75)**	2 (3,85)
Working life development (e.g, life long learning)	**13 (3,94)**	15 (3,31)	**18 (3,28)**	18 (2,38)
Labor mobility	**14 (3,78)**	5 (3,85)	**16 (3,42)**	14 (3)
Renewal of traditional business clusters	**15 (3,73)**	18 (3,00)	**19 (3,23)**	19 (2,31)
Innovation activities within sectoral policy domains	**16 (3,71)**	17 (3,15)	**12 (3,55)**	9 (3,23)
Public procurement	**17 (3,66)**	13 (3,38)	**8 (3,66)**	5 (3,46)
Innovation activities within non-profit sectors	**18 (3,59)**	19 (3,00)	**17 (3,28)**	17 (2,46)
Regional innovation policy	**19 (3,49)**	16 (3,31)	**9 (3,65)**	6 (3,46)
Avr	**4,00**	3,59	**3,63**	3,17
st.dev	**0,27**	0,35	**0,25**	0,49

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Austria: survey open responses

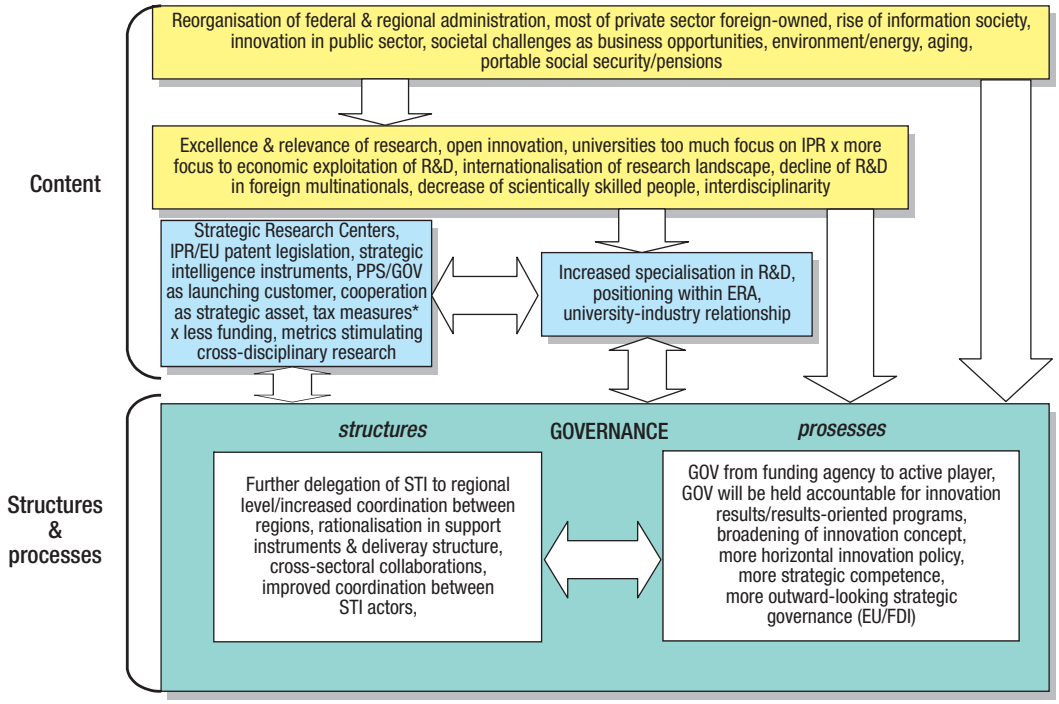


Major future innovation policy issues: Flanders versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Belgium*	*Overall*	*Belgium*
Science and education system meets industry needs	**1 (4,50)**	2 (4,44)	**1 (4,04)**	11 (3,57)
Science and education competitiveness	**2 (4,47)**	5 (4,36)	**3 (4,02)**	12 (3,5)
Private sector R&D investments	**3 (4,37)**	6 (4,24)	**7 (3,68)**	10 (3,64)
Public sector R&D investments	**4 (4,25)**	7 (4,24)	**2 (4,02)**	5 (4,05)
Service innovations	**5 (4,17)**	8 (4,24)	**15 (3,49)**	8 (3,68)
Commercialization of scientific results	**6 (4,16)**	3 (4,40)	**4 (3,96)**	2 (4,14)
Creation of new business clusters	**7 (4,09)**	11 (4,12)	**10 (3,63)**	14 (3,41)
Growth seeking SME's ('gazelles')	**8 (4,08)**	10 (4,16)	**13 (3,54)**	15 (3,41)
Cross-border innovation	**9 (4,07)**	1 (4,52)	**11 (3,56)**	6 (4,05)
Demand driven/customer oriented policy	**10 (4,07)**	4 (4,40)	**6 (3,74)**	3 (4,14)
Venture capital market & financial mobility	**11 (3,98)**	15 (3,84)	**14 (3,54)**	18 (3,23)
Horizontal innovation policy	**12 (3,96)**	9 (4,2)	**5 (3,75)**	7 (3,86)
Working life development (e.g, life long learning)	**13 (3,94)**	17 (3,80)	**18 (3,28)**	13 (3,45)
Labor mobility	**14 (3,78)**	13 (3,96)	**16 (3,42)**	19 (3,09)
Renewal of traditional business clusters	**15 (3,73)**	16 (3,84)	**19 (3,23)**	16 (3,36)
Innovation activities within sectoral policy domains	**16 (3,71)**	19 (3,64)	**12 (3,55)**	17 (3,32)
Public procurement	**17 (3,66)**	14 (3,96)	**8 (3,66)**	4 (4,14)
Innovation activities within non-profit sectors	**18 (3,59)**	18 (3,68)	**17 (3,28)**	9 (3,68)
Regional innovation policy	**19 (3,49)**	12 (4,04)	**9 (3,65)**	1 (4,23)
Avr	**4,00**	4,11	**3,63**	3,68
st.dev	**0,27**	0,25	**0,25**	0,35

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Flanders: survey open responses

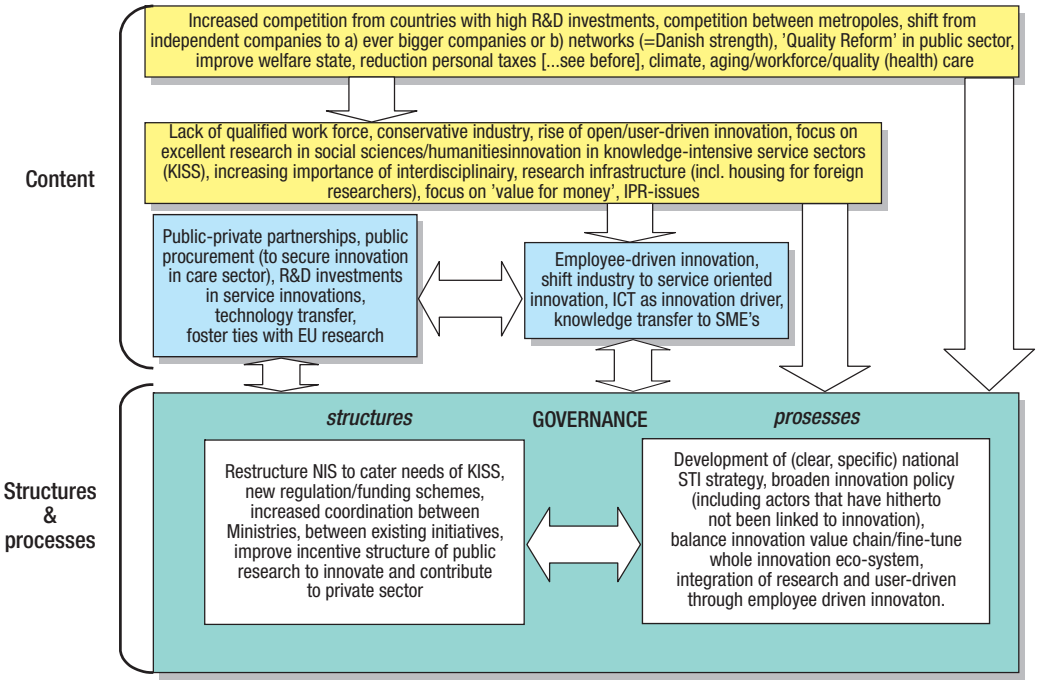


Major future innovation policy issues: Denmark versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Denmark*	*Overall*	*Denmark*
Science and education system meets industry needs	**1 (4,50)**	3 (4,42)	**1 (4,04)**	3 (4,16)
Science and education competitiveness	**2 (4,47)**	1 (4,65)	**3 (4,02)**	1 (4,36)
Private sector R&D investments	**3 (4,37)**	5 (4,33)	**7 (3,68)**	10 (3,84)
Public sector R&D investments	**4 (4,25)**	2 (4,48)	**2 (4,02)**	4 (4,14)
Service innovations	**5 (4,17)**	8 (4,02)	**15 (3,49)**	16 (3,44)
Commercialization of scientific results	**6 (4,16)**	4 (4,35)	**4 (3,96)**	2 (4,24)
Creation of new business clusters	**7 (4,09)**	7 (4,06)	**10 (3,63)**	11 (3,69)
Growth seeking SME's ('gazelles')	**8 (4,08)**	13 (3,88)	**13 (3,54)**	6 (4,00)
Cross-border innovation	**9 (4,07)**	11 (3,96)	**11 (3,56)**	14 (3,60)
Demand driven/customer oriented polic	**10 (4,07)**	6 (4,08)	**6 (3,74)**	5 (4,00)
Venture capital market & financial mobility	**11 (3,98)**	9 (4,00)	**14 (3,54)**	9 (3,84)
Horizontal innovation policy	**12 (3,96)**	10 (4,00)	**5 (3,75)**	15 (3,56)
Working life development (e.g, life long learning)	**13 (3,94)**	12 (3,94)	**18 (3,28)**	18 (3,31)
Labor mobility	**14 (3,78)**	14 (3,85)	**16 (3,42)**	12 (3,64)
Renewal of traditional business clusters	**15 (3,73)**	19 (3,46)	**19 (3,23)**	19 (3,18)
Innovation activities within sectoral policy domains	**16 (3,71)**	15 (3,83)	**12 (3,55)**	8 (3,84)
Public procurement	**17 (3,66)**	18 (3,52)	**8 (3,66)**	13 (3,61)
Innovation activities within non-profit sectors	**18 (3,59)**	16 (3,65)	**17 (3,28)**	17 (3,36)
Regional innovation policy	**19 (3,49)**	17 (3,58)	**9 (3,65)**	7 (3,88)
Avr	**4,00**	4,00	**3,63**	3,77
st.dev	**0,27**	0,31	**0,25**	0,33

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Denmark: survey open responses

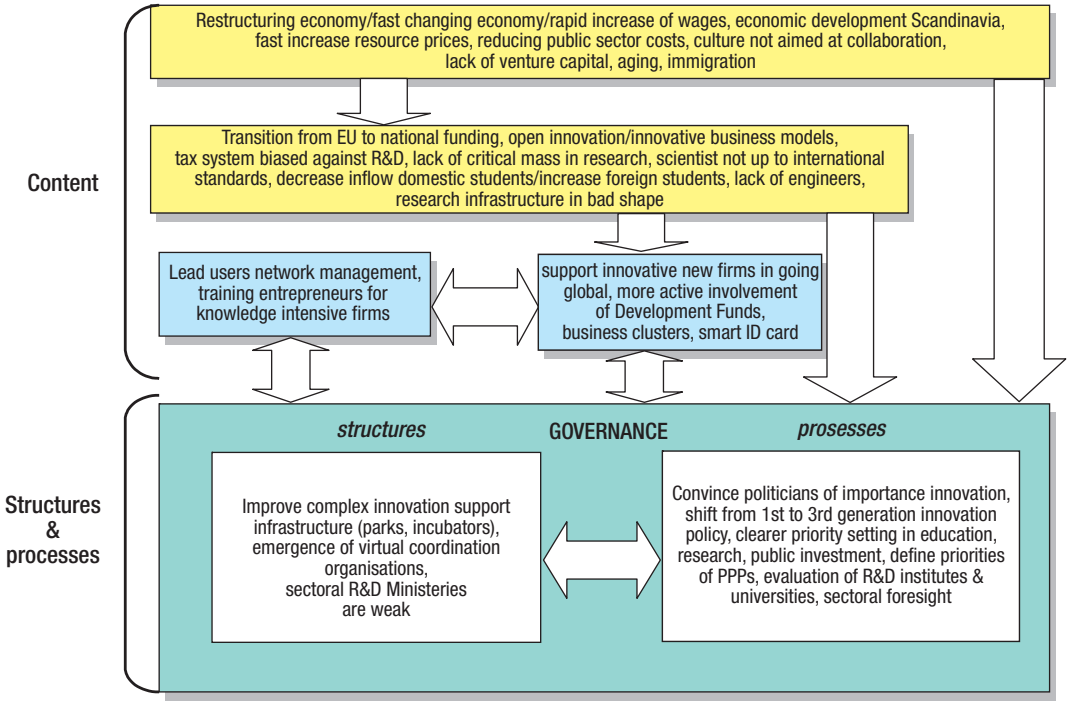


Major future innovation policy issues: Estonia versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Estonia*	*Overall*	*Estonia*
Science and education system meets industry needs	**1 (4,50)**	1 (4,80)	**1 (4,04)**	4 (3,86)
Science and education competitiveness	**2 (4,47)**	2 (4,53)	**3 (4,02)**	2 (3,93)
Private sector R&D investments	**3 (4,37)**	3 (4,53)	**7 (3,68)**	3 (3,93)
Public sector R&D investments	**4 (4,25)**	10 (4,13)	**2 (4,02)**	1 (3,93)
Service innovations	**5 (4,17)**	5 (4,33)	**15 (3,49)**	10 (3,57)
Commercialization of scientific results	**6 (4,16)**	13 (3,87)	**4 (3,96)**	12 (3,50)
Creation of new business clusters	**7 (4,09)**	8 (4,20)	**10 (3,63)**	9 (3,57)
Growth seeking SME's ('gazelles')	**8 (4,08)**	4 (4,40)	**13 (3,54)**	6 (3,79)
Cross-border innovation	**9 (4,07)**	6 (4,33)	**11 (3,56)**	14 (3,36)
Demand driven/customer oriented policy	**10 (4,07)**	12 (3,93)	**6 (3,74)**	8 (3,57)
Venture capital market & financial mobility	**11 (3,98)**	7 (4,27)	**14 (3,54)**	16 (3,21)
Horizontal innovation policy	**12 (3,96)**	15 (3,67)	**5 (3,75)**	7 (3,79)
Working life development (e.g, life long learning)	**13 (3,94)**	11 (4,13)	**18 (3,28)**	18 (2,93)
Labor mobility	**14 (3,78)**	17 (3,60)	**16 (3,42)**	5 (3,79)
Renewal of traditional business clusters	**15 (3,73)**	9 (4,20)	**19 (3,23)**	11 (3,57)
Innovation activities within sectoral policy domains	**16 (3,71)**	14 (3,80)	**12 (3,55)**	13 (3,50)
Public procurement	**17 (3,66)**	16 (3,67)	**8 (3,66)**	15 (3,29)
Innovation activities within non-profit sectors	**18 (3,59)**	18 (3,33)	**17 (3,28)**	17 (3,14)
Regional innovation policy	**19 (3,49)**	19 (2,80)	**9 (3,65)**	19 (2,79)
Avr	**4,00**	4,03	**3,63**	3,53
st.dev	**0,27**	0,38	**0,25**	0,34

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Estonia: survey open responses

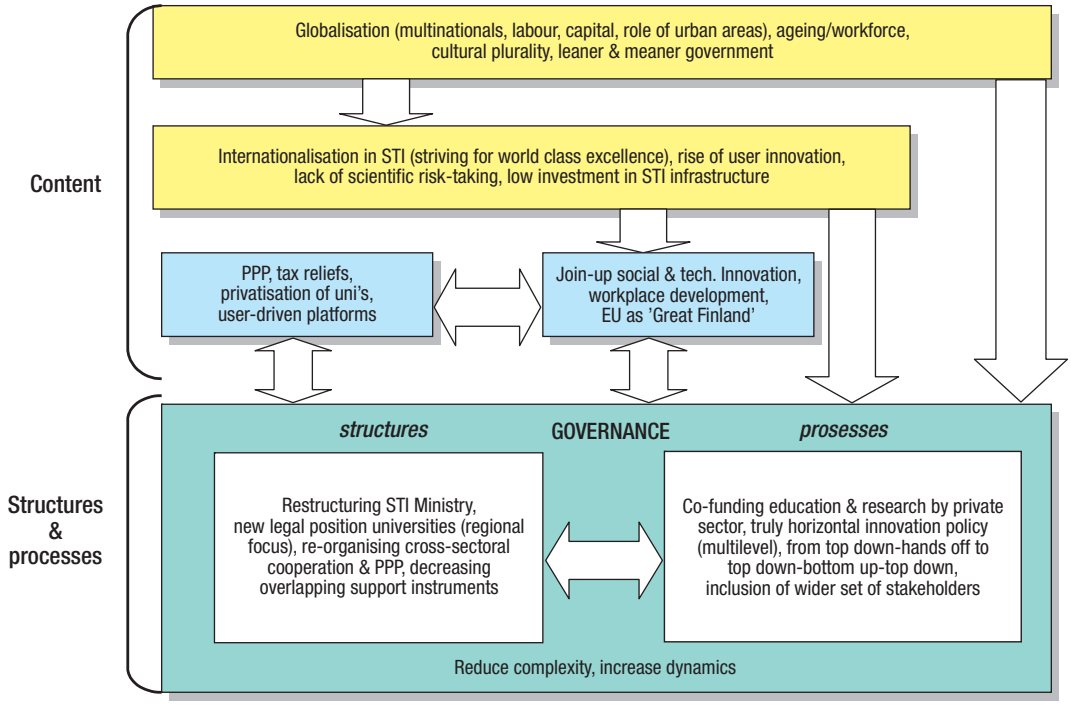


Major future innovation policy issues: Finland versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Finland*	*Overall*	*Finland*
Science and education system meets industry needs	**1 (4,50)**	2 (4,47)	**1 (4,04)**	4 (4,04)
Science and education competitiveness	**2 (4,47)**	3 (4,47)	**3 (4,02)**	5 (3,82)
Private sector R&D investments	**3 (4,37)**	1 (4,6)	**7 (3,68)**	12 (3,54)
Public sector R&D investments	**4 (4,25)**	10 (4,23)	**2 (4,02)**	2 (4,07)
Service innovations	**5 (4,17)**	4 (4,47)	**15 (3,49)**	3 (4,07)
Commercialization of scientific results	**6 (4,16)**	14 (4)	**4 (3,96)**	7 (3,75)
Creation of new business clusters	**7 (4,09)**	6 (4,37)	**10 (3,63)**	6 (3,82)
Growth seeking SME's ('gazelles')	**8 (4,08)**	7 (4,37)	**13 (3,54)**	11 (3,56)
Cross-border innovation	**9 (4,07)**	8 (4,3)	**11 (3,56)**	15 (3,54)
Demand driven/customer oriented policy	**10 (4,07)**	5 (4,4)	**6 (3,74)**	9 (3,68)
Venture capital market & financial mobility	**11 (3,98)**	12 (4,13)	**14 (3,54)**	10 (3,68)
Horizontal innovation policy	**12 (3,96)**	13 (4,13)	**5 (3,75)**	1 (4,25)
Working life development (e.g, life long learning)	**13 (3,94)**	9 (4,3)	**18 (3,28)**	17 (3,44)
Labor mobility	**14 (3,78)**	15 (3,67)	**16 (3,42)**	13 (3,54)
Renewal of traditional business clusters	**15 (3,73)**	11 (4,23)	**19 (3,23)**	18 (3,36)
Innovation activities within sectoral policy domains	**16 (3,71)**	18 (3,5)	**12 (3,55)**	16 (3,46)
Public procurement	**17 (3,66)**	17 (3,53)	**8 (3,66)**	14 (3,54)
Innovation activities within non-profit sectors	**18 (3,59)**	16 (3,67)	**17 (3,28)**	19 (3,22)
Regional innovation policy	**19 (3,49)**	19 (3,43)	**9 (3,65)**	8 (3,75)
Avr	**4,00**	4,12	**3,63**	3,69
st.dev	**0,27**	0,34	**0,25**	0,27

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Finland: survey open responses

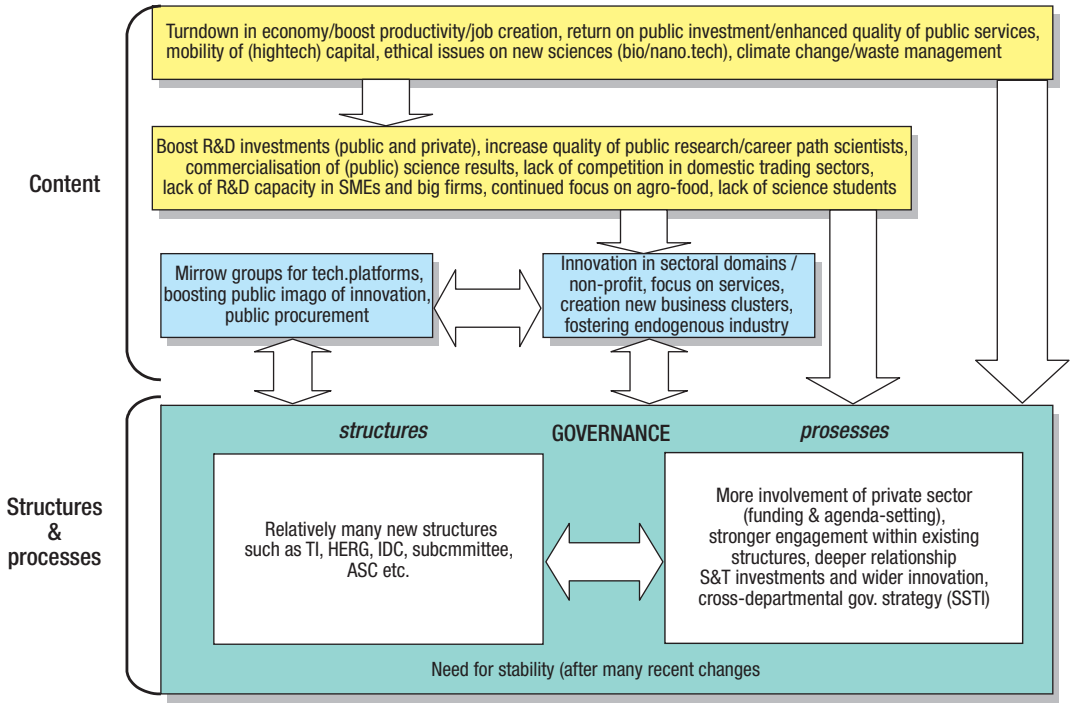


Major future innovation policy issues: Ireland versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Ireland*	*Overall*	*Ireland*
Science and education system meets industry needs	1 (4,46)	1 (4,79)	3 (3,73)	4 (4,21)
Science and education competitiveness	2 (4,43)	2 (4,71)	1 (3,76)	5 (4,14)
Private sector R&D investments	3 (4,33)	3 (4,71)	7 (3,41)	2 (4,36)
Public sector R&D investments	4 (4,22)	4 (4,57)	2 (3,74)	3 (4,36)
Service innovations	5 (4,13)	8 (4,21)	15 (3,26)	14 (3,43)
Commercialization of scientific results	6 (4,12)	7 (4,29)	4 (3,69)	1 (4,36)
Creation of new business clusters	7 (4,06)	9 (4,14)	8 (3,39)	6 (4,07)
Cross-border innovation	8 (4,05)	14 (3,79)	11 (3,32)	10 (3,57)
Demand driven/customer oriented policy	9 (4,04)	12 (3,93)	5 (3,48)	7 (3,86)
Growth seeking SME's ('gazelles')	10 (4,04)	6 (4,29)	14 (3,29)	15 (3,43)
Venture capital market & financial mobility	11 (3,94)	11 (4,00)	13 (3,3)	11 (3,57)
Horizontal innovation policy	12 (3,92)	10 (4,07)	6 (3,47)	9 (3,71)
Working life development (e.g, life long learning)	13 (3,92)	13 (3,86)	17 (3,03)	13 (3,43)
Labor mobility	14 (3,75)	16 (3,64)	16 (3,19)	19 (3,14)
Renewal of traditional business clusters	15 (3,69)	17 (3,50)	19 (3,02)	12 (3,50)
Innovation activities within sectoral policy domains	16 (3,68)	5 (4,36)	12 (3,32)	8 (3,79)
Public procurement	17 (3,62)	18 (3,43)	9 (3,39)	16 (3,43)
Innovation activities within non-profit sectors	18 (3,55)	15 (3,79)	18 (3,03)	18 (3,21)
Regional innovation policy	19 (3,47)	19 (3,07)	10 (3,38)	17 (3,29)
Average	(3,97)	(4,06)	(3,38)	(3,73)

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Ireland: survey open responses

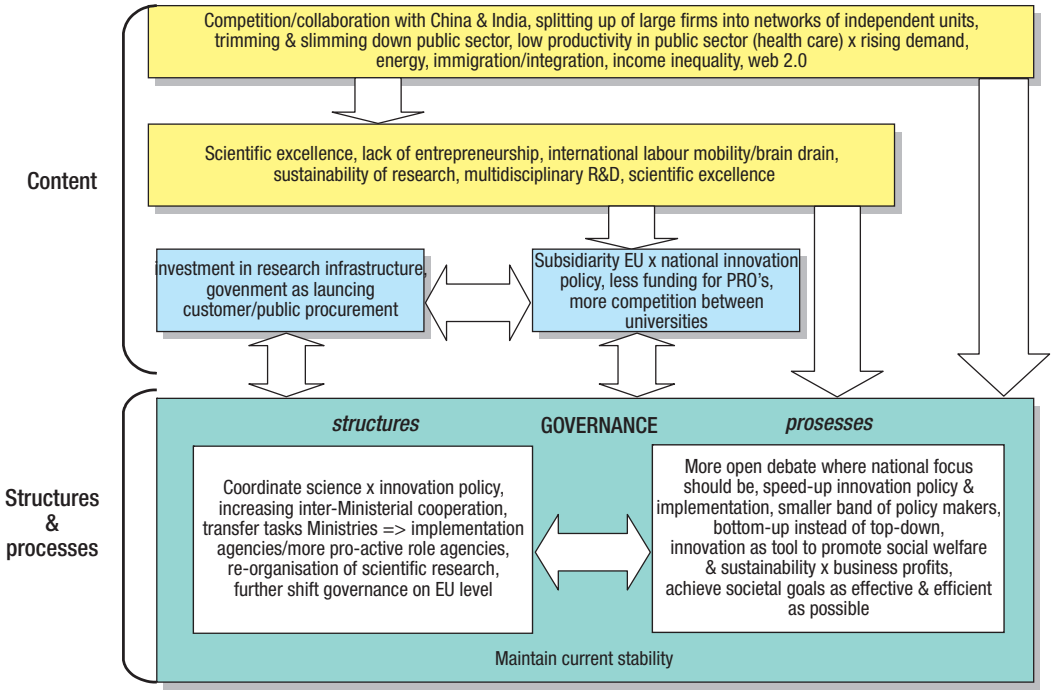


Major future innovation policy issues: Netherlands versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Netherlands*	*Overall*	*Netherlands*
Science and education system meets industry needs	**1 (4,50)**	1 (4,64)	**1 (4,04)**	1 (4,29)
Science and education competitiveness	**2 (4,47)**	4 (4,14)	**3 (4,02)**	2 (3,93)
Private sector R&D investments	**3 (4,37)**	2 (4,50)	**7 (3,68)**	14 (2,93)
Public sector R&D investments	**4 (4,25)**	9 (3,79)	**2 (4,02)**	5 (3,36)
Service innovations	**5 (4,17)**	7 (3,93)	**15 (3,49)**	19 (2,43)
Commercialization of scientific results	**6 (4,16)**	5 (4,07)	**4 (3,96)**	3 (3,71)
Creation of new business clusters	**7 (4,09)**	8 (3,79)	**10 (3,63)**	8 (3,29)
Cross-border innovation	**8 (4,08)**	3 (4,21)	**13 (3,54)**	11 (3,00)
Demand driven/customer oriented policy	**9 (4,07)**	10 (3,64)	**11 (3,56)**	16 (2,93)
Growth seeking SME's ('gazelles')	**10 (4,07)**	15 (3,57)	**6 (3,74)**	15 (2,93)
Venture capital market & financial mobility	**11 (3,98)**	14 (3,57)	**14 (3,54)**	18 (2,86)
Horizontal innovation policy	**12 (3,96)**	18 (3,29)	**5 (3,75)**	10 (3,21)
Working life development (e.g, life long learning)	**13 (3,94)**	6 (4,00)	**18 (3,28)**	7 (3,36)
Labor mobility	**14 (3,78)**	13 (3,64)	**16 (3,42)**	6 (3,36)
Renewal of traditional business clusters	**15 (3,73)**	11 (3,64)	**19 (3,23)**	17 (2,86)
Innovation activities within sectoral policy domains	**16 (3,71)**	16 (3,57)	**12 (3,55)**	12 (3,00)
Public procurement	**17 (3,66)**	12 (3,64)	**8 (3,66)**	4 (3,57)
Innovation activities within non-profit sectors	**18 (3,59)**	17 (3,57)	**17 (3,28)**	9 (3,29)
Regional innovation policy	**19 (3,49)**	19 (3,29)	**9 (3,65)**	13 (3,00)
Avr	**4,00**	3,82	**3,63**	3,23
st.dev	**0,27**	0,36	**0,25**	0,43

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Netherlands: survey open responses

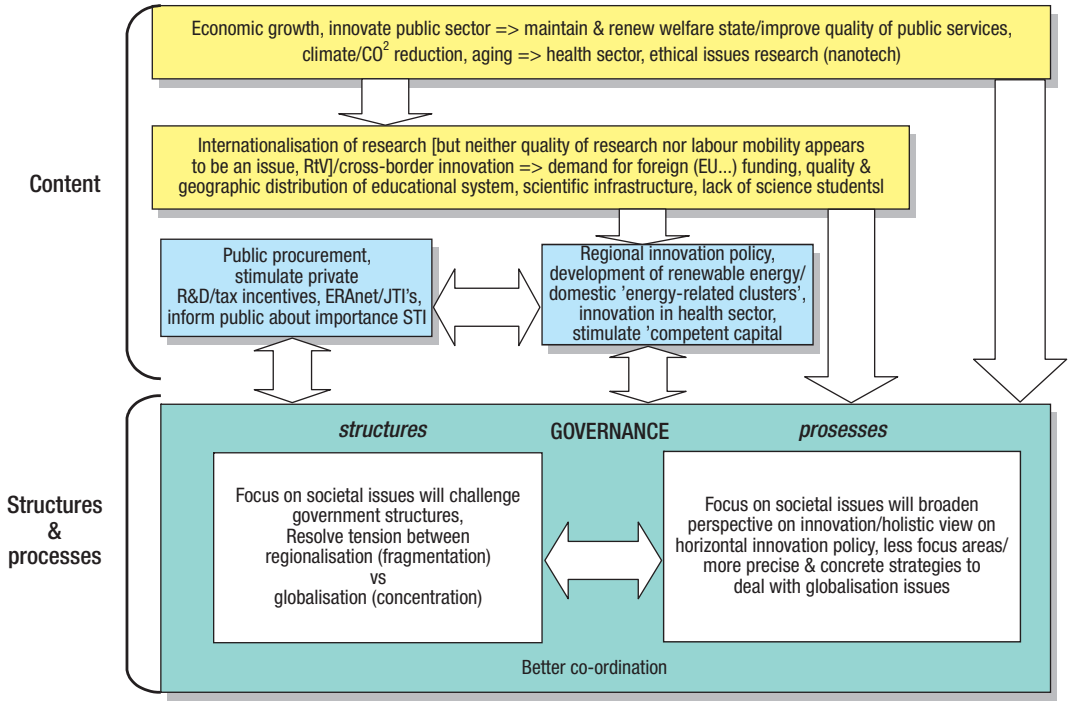


Major future innovation policy issues: Norway versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Norway*	*Overall*	*Norway*
Science and education system meets industry needs	**1 (4,50)**	1 (4,40)	**1 (4,04)**	1 (4,22)
Science and education competitiveness	**2 (4,47)**	7 (4,00)	**3 (4,02)**	7 (3,67)
Private sector R&D investments	**3 (4,37)**	2 (4,30)	**7 (3,68)**	3 (4,00)
Public sector R&D investments	**4 (4,25)**	9 (3,90)	**2 (4,02)**	5 (3,89)
Service innovations	**5 (4,17)**	5 (4,10)	**15 (3,49)**	8 (3,67)
Commercialization of scientific results	**6 (4,16)**	13 (3,70)	**4 (3,96)**	4 (4,00)
Creation of new business clusters	**7 (4,09)**	8 (4,00)	**10 (3,63)**	6 (3,78)
Growth seeking SME's ('gazelles')	**8 (4,08)**	15 (3,60)	**13 (3,54)**	19 (2,78)
Cross-border innovation	**9 (4,07)**	11 (3,80)	**11 (3,56)**	10 (3,56)
Demand driven/customer oriented polic	**10 (4,07)**	6 (4,10)	**6 (3,74)**	16 (3,11)
Venture capital market & financial mobility	**11 (3,98)**	12 (3,80)	**14 (3,54)**	9 (3,67)
Horizontal innovation policy	**12 (3,96)**	3 (4,30)	**5 (3,75)**	11 (3,56)
Working life development (e.g, life long learning)	**13 (3,94)**	10 (3,90)	**18 (3,28)**	14 (3,33)
Labor mobility	**14 (3,78)**	18 (3,30)	**16 (3,42)**	17 (2,89)
Renewal of traditional business clusters	**15 (3,73)**	14 (3,70)	**19 (3,23)**	12 (3,56)
Innovation activities within sectoral policy domains	**16 (3,71)**	16 (3,60)	**12 (3,55)**	13 (3,56)
Public procurement	**17 (3,66)**	4 (4,30)	**8 (3,66)**	2 (4,22)
Innovation activities within non-profit sectors	**18 (3,59)**	19 (3,20)	**17 (3,28)**	18 (2,89)
Regional innovation policy	**19 (3,49)**	17 (3,50)	**9 (3,65)**	15 (3,22)
Avr	**4,00**	3,87	**3,63**	3,56
st.dev	**0,27**	0,31	**0,25**	0,43

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Norway: survey open responses

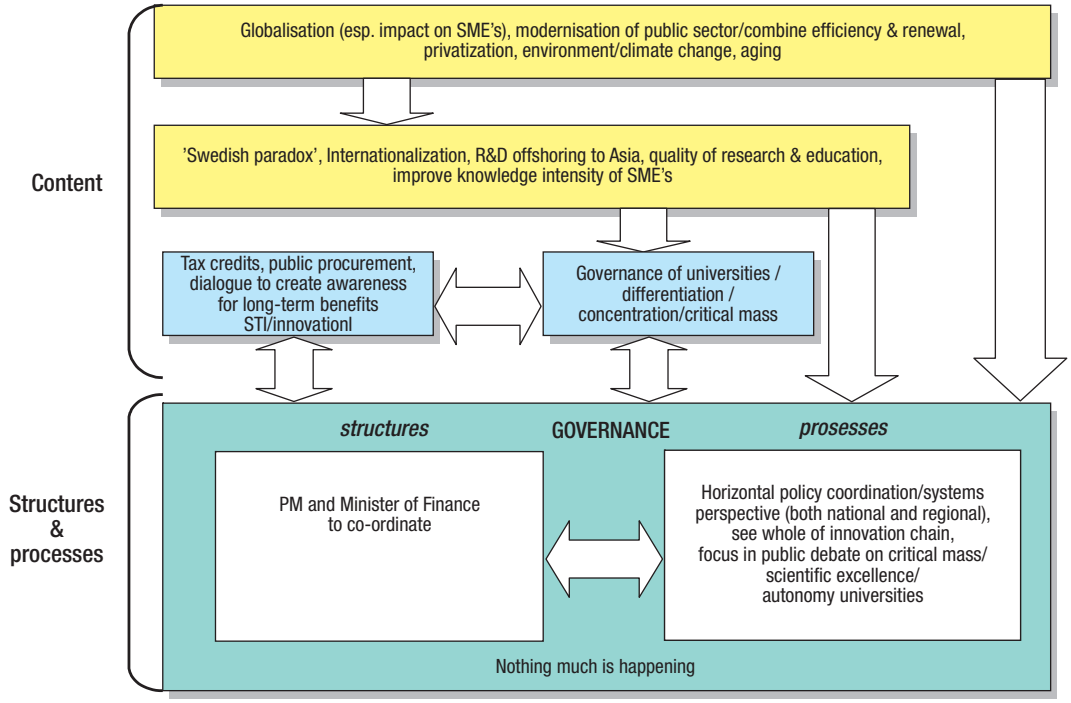


Major future innovation policy issues: Sweden versus overall results

	IMPORTANCE		IMPACT	
	Overall	*Sweden*	*Overall*	*Sweden*
Science and education system meets industry needs	**1 (4,50)**	3 (4,50)	**1 (4,04)**	1 (4,56)
Science and education competitiveness	**2 (4,47)**	1 (4,70)	**3 (4,02)**	2 (4,44)
Private sector R&D investments	**3 (4,37)**	10 (4,20)	**7 (3,68)**	3 (4,44)
Public sector R&D investments	**4 (4,25)**	2 (4,60)	**2 (4,02)**	4 (4,44)
Service innovations	**5 (4,17)**	7 (4,30)	**15 (3,49)**	5 (4,33)
Commercialization of scientific results	**6 (4,16)**	4 (4,50)	**4 (3,96)**	6 (4,33)
Creation of new business clusters	**7 (4,09)**	6 (4,40)	**10 (3,63)**	7 (4,22)
Cross-border innovation	**8 (4,08)**	15 (4,00)	**13 (3,54)**	8 (4,11)
Demand driven/customer oriented policy	**9 (4,07)**	8 (4,30)	**11 (3,56)**	9 (4,00)
Growth seeking SME's ('gazelles')	**10 (4,07)**	9 (4,30)	**6 (3,74)**	10 (4,00)
Venture capital market & financial mobility	**11 (3,98)**	14 (4,00)	**14 (3,54)**	11 (3,89)
Horizontal innovation policy	**12 (3,96)**	12 (4,10)	**5 (3,75)**	12 (3,89)
Working life development (e.g, life long learning)	**13 (3,94)**	17 (3,90)	**18 (3,28)**	13 (3,89)
Labor mobility	**14 (3,78)**	5 (4,40)	**16 (3,42)**	14 (3,89)
Renewal of traditional business clusters	**15 (3,73)**	19 (3,90)	**19 (3,23)**	15 (3,89)
Innovation activities within sectoral policy domains	**16 (3,71)**	18 (3,90)	**12 (3,55)**	16 (3,89)
Public procurement	**17 (3,66)**	13 (4,10)	**8 (3,66)**	17 (3,78)
Innovation activities within non-profit sectors	**18 (3,59)**	11 (4,20)	**17 (3,28)**	18 (3,56)
Regional innovation policy	**19 (3,49)**	16 (4,00)	**9 (3,65)**	19 (3,44)
Avr	**4,00**	4,23	**3,63**	4,05
st.dev	**0,27**	0,24	**0,25**	0,31

lower than average
much lower than average
higher than average
much higher than average

Major future innovation policy & governance issues in Sweden: survey open responses



Annex E

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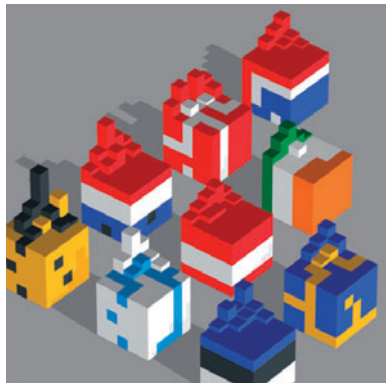

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