



Governance of Innovation Systems

VOLUME 1: SYNTHESIS REPORT

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Volume 1

SYNTHESIS REPORT



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Foreword

This publication is a synthesis of collaborative OECD work in the MONIT project (Monitoring and Implementing National Innovation Policies). It builds upon earlier OECD work on national innovation systems and extends the analysis to include a broad agenda of governance issues that governments face in further developing innovation policy. It analyses key trends and issues such as policy coherence and integration, co-ordination, stakeholder involvement and innovation policy learning. Its underlying proposition is that governments will need to adapt their institutions and innovation policy making in light of emerging pressures arising from more dynamic and more complex economic and social developments.

The report was prepared under the aegis of CSTP and its working party on Technology and Innovation Policy (TIP). It builds upon analytical work carried out in countries participating in the MONIT project. In addition to an analysis of governance of innovation systems, it includes summaries of studies of governance and co-ordination relating to policies for sustainable development and the information society. The author is Svend Otto Remøe, who co-ordinated the MONIT project together with Mari Hjelt, Pim den Hertog, Patries Boekholt and Wolfgang Polt; comments from the many members of the MONIT network as well as from TIP delegates and the CSTP are gratefully acknowledged.

Table of Contents

Executive Summary	7
<i>Chapter 1</i>	
Introduction	17
<i>Chapter 2</i>	
The Analytical Perspective	21
<i>Chapter 3</i>	
Innovation Policy Systems under Pressure	27
<i>Chapter 4</i>	
Practices in Governance: Trends and Issues	43
<i>Chapter 5</i>	
Implications for Policy: Towards National capabilities in Innovation Governance	67
 <i>Annex A</i>	
Participation	71
<i>Annex B</i>	
STI Performance of Participating Countries	72
<i>Annex C</i>	
Short List of Indicators	84
<i>Annex D</i>	
Long List of Indicators	86
<i>Annex E</i>	
Summary of the MONIT Sustainable Development Policy Case Study	89
<i>Annex F</i>	
Summary of the MONIT Information Society Policy Case Study	103
 Bibliography	 113

Executive Summary

New challenges

Innovation policy in OECD countries has mostly been seen as an extension of R&D policy. As such it has been linked to research and technological development. This remains the case, even though the systemic approach developed under the label “National Innovation Systems” (NIS) during the 1990s expanded this perspective to include interactive linkages in the innovation system.

However, innovation has become increasingly important for OECD economies owing to the influence of globalisation and structural change on economic performance. Innovation policy has therefore received greater attention as a generic policy area in which governments can promote an innovative, flexible adaptation of their economies. Innovation governance becomes the key challenge, and it requires developing the necessary institutional set-ups, procedures and practices for agenda setting and prioritisation, implementation and policy learning. The results of the MONIT project are in line with an emerging third generation of innovation policy that calls for more adaptive and flexible approaches to innovation policy.

OECD governments face a number of challenges for reformulating and governing their innovation policies. These include:

- Identifying path dependencies and inherent biases in priorities.
- Responding to new challenges with appropriate policy agendas.
- Learning about implicit priorities from broader policy or development models.

Tensions in policy systems

There are often deep tensions in policy systems that governments should be aware of and able to deal with. The increasing need for more coherent innovation policy agendas spanning ministerial boundaries and including many other policy areas will require reducing or at least addressing these tensions. Tensions recognised in the MONIT project typically make policy less coherent and less effective:

- *Competing rationales:* Individual policy domains, like R&D and industrial policy, have their own communities with their specific preferences, ideologies and educational backgrounds. As the status of these domains differs across countries, countries' policy systems have different dominant rationales.
- *Short-termism in resource allocation:* Budgetary practices often promote short-term thinking and in some cases undermine strategic, long-term policy making.
- *Strategic issues in new public management regimes:* New public management (NPM) has for several decades been a prevailing policy approach and has often led to significant efficiency gains. However, when priority is accorded to efficiency, strategic needs are typically neglected, and long-term co-ordinated political action may be more difficult.
- *Different views and understanding of innovation policy:* Different ministries typically have different rationales. In addition, they often have diverging views of innovation policy, its nature and its role.
- *Different imperatives for different policy areas:* Innovation policy typically obeys an economic growth imperative. There are no system limitations to the innovation-driven economy as defined in the NIS approach or in innovation policy as such. This is a serious challenge when innovation policy is supposed to be merged, co-ordinated or integrated with policies such as environmental policy. The latter, or its modern version, sustainable development policy, contains imperatives linked to system limitations, such as the carrying capacity of the globe's ecosystem.
- *Perceived division of labour between policy areas:* Coherent innovation policy may imply the take-up of innovation policy goals by other policy areas. This is often referred to as a multi-goal policy. While this is widely beneficial, policy makers may argue rightly that a given policy area will lose effectiveness.
- *Fragmentation and segmentation:* A general trend in many countries, in particular in the context of NPM, is increasing fragmentation and segmentation at time when policy responses require more co-ordinated action. NPM-based regimes typically lead to a flourishing of agencies, decentralisation and devolution. Changes often occur through new policies and institutions rather than major overhauls of the system, thus adding to the existing complexity and fragmentation.

- *Competition and personal ambition*: Tensions and contradictions in policy systems arise not only from structural factors, but also stem from individual policy makers' ambition, competition for status and scarce resources. This can lead to rivalry, turf wars and loss of coherence.

Adapting agenda-setting institutions and practices

Many countries have recently attempted to adapt their policy making to achieve better take-up of a more horizontal innovation policy with a view to greater coherence. Two broad tendencies emerge:

- Some governments have initiated broader *framework policies* to create a better and more comprehensive agenda for innovation policy. In some cases, these framework policies attempt to establish a new industrial policy that gives innovation policy a specific role. In other cases, they are more closely linked to a general policy for sustainable development. In both cases, there arises the issue of policy hierarchy and the determination of the rationale that is to serve as the lead principle. There also emerges a tension between policy paradigms so that framework policies collide with the embedded principles of autonomous, single policy ministries.
- Other governments have refocused on their *science, technology and innovation-related institutions*. Korea, for example, has elevated the Minister of Science and Technology to the level of deputy prime minister. Science and technology policy councils or various “innovation platforms” are being introduced or re-examined with a view to creating a broader and more focused innovation policy agenda. The experience of Finland is relevant here: its long-standing Science and Technology Policy Council has been of the utmost importance in creating a legitimate environment for STI priorities, but its consensus orientation makes it unable to deal effectively with the need to redirect innovation policy. It is all the more difficult as Finnish innovation policy has been defined and understood as technology policy.

Comprehensive “third generation” innovation policy assumes that governments will be able to release the potential for innovation that is embedded in other sectors or policy domains. In other words, it assumes that coherence may be achieved by ensuring cross-sectoral optimisation of the components of various sectors' innovation policy through co-ordination and integration.

Co-ordination practices

- Co-ordination is closely linked to agenda setting. When governments can formulate strategic, long-term policies and visions that set a clear and legitimate direction for priority setting, co-ordination is more effective. When they do not, more co-ordination has to take place through discrete, lower-level activities like communication tools, consultation and arbitration.
- As many governments assume that ministerial practices may not respond to rising pressures for co-ordination, a trend towards “agencification” has developed. Thus, governments retain the basic policy-making structure while inducing decentralisation, accountability and flexibility at the agency level. They believe co-ordination is most effective at the level of implementation, with agencies best equipped to develop co-ordinated action with innovators.

As governments attempt to respond to greater external and internal complexity and dynamism, policy co-ordination becomes the main means of achieving greater coherence. As the MONIT work reveals, there are difficulties:

- Co-ordination mechanisms may be static and short-term rather dynamic, particularly when there is significant institutional fragmentation and short-term considerations dominate agenda setting. Co-ordination may simply concern annual budget-related decisions and be decentralised to implementing institutions. This does not lead to long-term or strategic policy priorities.
- Designing co-ordination mechanisms takes time and financial support. A sense of urgency is necessary if efforts to co-ordinate policy are to affect policy governance. Without a sense of urgency, co-ordinating arrangements may fail and the system may build up resistance against subsequent attempts.
- Co-ordination across policy domains: People are more decisive than structures but structures support people. Well-functioning co-ordinating activities require personal leadership and commitment, and policy makers should ensure supportive structures for co-ordination activities that rely on persons.
- Because different mechanisms are typically needed at different levels, arrangements that function well at ministerial level may be less relevant for lower levels. The need for different mechanisms for different types of policy issues, brought out in the study of sustainable development,

seems to substantiate this. Moreover, successful co-ordination on one level sometimes reduces the need for investing in co-ordination on another.

- As for the innovation system, it is necessary to identify strong and weak links. With appropriate analysis of co-ordination failures, targeted co-ordination arrangements may be easier to design and implement.

Policy integration

A comprehensive innovation policy spanning ministerial boundaries must have coherence, and policies should be mutually supportive. Governments should therefore attempt to ensure that policies and their instruments are aligned and reinforce each other. However, certain issues embedded in policy or governance systems may make this integration difficult:

- Lack of understanding of innovation policy in other policy domains undermines communication in the co-ordination process.
- Strong traditions, in particular in the science policy domain, create segmented “belief systems”.
- Different “schools of thought”, *e.g.* neo-classical economics and innovation research, may block integration of innovation and economic policy.
- Dynamic coupling of problems, policy proposals and politics resulting in policy often takes place in the context of specific windows of opportunity.
- Specific sectoral policies may be defined in ways that define others as rivals.
- Strong political leadership is necessary to create common visions and a legitimate basis for joint agendas.
- Stakeholders differ. S&T policy focuses on economic competitiveness and its most relevant stakeholders are the business and research communities. Their preferences and judgements may be different from those of stakeholders in other areas.
- Drivers of policy formulation differ. For example, environment and sustainable development policies are traditionally driven by international agreements and global problems, whereas innovation policy in most countries is very much driven by national concerns. S&T policies traditionally aim at increasing national competitiveness and

wealth, whereas sustainable development policy is concerned with improving international governance for tackling global problems. It follows that S&T policy needs to be more alert to international developments and sustainable development policies will have to tackle national challenges.

- Policy measures differ. Sustainable development and environmental policies mainly use regulatory and fiscal measures, often based on international agreements, with strict, set targets and rules regarding actions. In addition, they often rely on standards, voluntary agreements and information sharing. In contrast, the main innovation policy measure is resource allocation for R&D, and regulatory and fiscal instruments have a much smaller role.
- Resources for actions differ. Political power is ultimately linked to control of money. Typically, sustainable development and environmental policies have very few resources for actions, while S&T policies control the state budget for R&D allocations. This difference may hamper efforts to design joint actions that require some reallocation of resources.

The governance of innovation is knowledge-intensive. Achieving a coherent cross-sectoral innovation policy will require organising the production and use of policy-relevant knowledge and integrating it in decision-making processes. Hence, policy learning is a key element of innovation governance.

However, learning often receives less priority than it deserves. This is well illustrated by Austrian survey data showing that 90% of respondents thought that evaluations basically served as *ex post* legitimisation of programmes. Policy learning is too often limited to *ex post* evaluations or seen as an activity at the end of a policy cycle. To ensure co-ordination and integration and achieve better governance, policy learning needs to be built into the whole cycle of policy making.

This is particularly important when innovation policy is seen as horizontal, *i.e.* when it crossing over into and is integrated with other policy domains. A challenge is to generate and distribute knowledge that helps develop joint understanding across policy cultures and rationales. While *horizontal coherence* ensures a strategic, integrated focus on innovation across boundaries and may be supported by cross-sectoral analysis and co-ordinated reporting systems, *vertical coherence* ensures follow-up of sector- or ministerial action plans. Comprehensive innovation policy has much to gain from organising information and learning systems that help policy makers develop an integrated focus on innovation.

The MONIT project delivers a strong message about the need to give priority to policy learning and to develop a governance system that stimulates and uses knowledge. Policy making should be less deliberate (traditional, bureaucratic) and less downstream-oriented. It should rely less on hierarchical control and information systems. The learning-oriented governance system should rely more on flexible, decentralised management practices, open learning and flexibility. A high degree of self-organisation under a broader strategic objective would support such governance.

Building more intelligence into policy making

Evaluation and learning practices vary in the MONIT countries, but some important lessons emerge from the material:

- Policy learning takes place mostly *ex ante* through mechanisms like White Papers and less through *ex post* evaluation and follow-up of programmes and institutional reforms.
- Most countries have organisational mechanisms that can enhance learning if exploited properly. Task forces, teamwork, etc., should be institutionalised to support a more learning-intensive governance style.
- Some countries engage in international learning beyond the usual exchange mechanisms, *e.g.* in international bodies like OECD. For example, the Netherlands commissioned a consulting group to conduct a comparative international study of innovation governance in several countries.
- It is increasingly necessary to conduct more systemic evaluations of innovation policies to gain a better understanding of their interactions and impacts.
- With more weight given to new public management in many countries, the agency level should be well equipped with strategic and intelligence functions to better co-ordinate governance levels.
- Fragmented governance structures often represent a loss of strategic capacity, and governments should pay more attention to improving mutual understanding of innovation-related issues across ministries.
- Institutions for knowledge production and policy analysis are often linked to specific ministries and domains. This may reinforce a segmented culture and make it more difficult to produce coherent, policy-relevant knowledge.

- Implementation of monitoring and reporting systems that improves the joint knowledge base for innovation governance may boost intelligence and policy learning.
- Structural challenges will often require governance processes that envision transitions in trajectories and infrastructures over a longer time span.

Conclusions and implications

The MONIT results illustrate a number of dilemmas and their implications for innovation policy governance in OECD countries. Developments like globalisation, a more innovation-driven economy, structural change, ageing of populations, tight fiscal constraints, etc., drive governments to make long-term changes in their innovation systems and socio-institutional changes in governance and policy-making:

- Significant tensions between disparate cultures, priorities and constituencies show that traditional governance structures are under pressure. Governments must manage these tensions with the aim of creating a legitimate basis for coherent agenda setting.
- History counts and creates strong inertia for governance. Governments need to renew governance and institutions, and these adjustments are difficult to induce as corporatist and other influences participate in prioritisation.
- Many countries feel the need to develop long-term strategies for growth and change, but may lack the institutional resources and mechanisms to do so. Perceived challenges are all too often not met owing to inherent short-termism.

The material presented in this report points to a number of issues that need to be addressed by third-generation innovation policy. These issues point to some important government capabilities:

Balancing imperatives: Although innovation policy is generally compatible with most other policy areas, some do not have the same growth imperative as innovation policy. For example, social and environmental policy and, more generally, policy for sustainable development have different or even opposing objectives and imperatives. The increasing debate on climate change and carrying capacity makes it necessary for government to promote a growth model that limits negative environmental and social pressures.

Creating visions that communicate: Political leadership has a strong integrative potential. Visions play an important role, as they communicate rationales, objectives and preferences, and as such create a legitimate basis for priorities that may be difficult to argue for or justify. Effective visions also facilitate co-ordination between ministries and agencies through joint understanding of the goal of common efforts.

Developing appropriate knowledge bases: The innovation system approach argues strongly for networking and collaboration between agents in the system, as does the third-generation innovation system with its focus on broader, more comprehensive agendas. To overcome inertia, governments should examine the appropriateness of the knowledge base and the extent to which it is segmented and slows the development of integrated approaches.

Developing a strategic, horizontal approach: Many countries lack a strategic focus, while others have established institutions such as science and technology policy councils. The MONIT material indicates that even these may be too narrow as they often concentrate on core science, technology and innovation policies. A strategic, horizontal approach should include and develop the innovation policy potential in other ministerial domains and ensure a co-ordinated division of labour between them.

Integrating learning in governance practices: To achieve horizontal as well as vertical coherence, governments need to ensure the availability of strongly supportive knowledge. This points to managing an appropriate knowledge base and using it for policy purposes, but the MONIT material also implies that governance and co-ordination modes might be improved to promote learning throughout the system. In particular, governments should develop the means to introduce what this report calls inherent policy making, which combines learning with decentralisation and increased self-organisation.

Develop and implement action plans with monitoring and reporting systems: Third-generation innovation policy cannot be properly implemented without precise targets and intelligent follow-up. Governments should increase their capacity to develop actions plans based on horizontal, strategic approaches and translate these into concrete measures to be taken by each ministry or agency. This will enhance vertical coherence, with monitoring and indicator systems ensuring sound reporting of empirical facts to the strategic apex.

Designing agencies: As most governments have introduced new public management practices, the design of agencies and their interface with their principals (ministries) have become crucial. Governments should design agencies so as to create an effective division of labour between the two

layers. While governments should retain long-term policy competence, they should give agencies sufficient flexibility to ensure coherent and timely implementation of policies and programmes. In particular, micro-management of agencies is counterproductive if the goal is to achieve coherent governance.

Improving evaluation and learning: Evaluation practices in MONIT countries are mostly piecemeal and far less geared towards informing policy than they might be. In general, governments should create a solid basis for evaluation and learning and make them part of the policy-making process. This includes evaluation of broader reforms, as knowledge about their impact on innovation is useful for feedback and policy formulation. A more holistic approach to evaluation and learning can enhance feedback in the governance system and lead to more effective policy.

Developing pragmatic public-private sector interfaces: Over the years, the interface between the public and the private sector has shifted from strong interventions by the state (up until the early 1980s) to much weaker ones under new public management. While sound macroeconomic policies and framework conditions are a must in modern innovation policy, there is great potential for more pragmatic interfaces. These could include balanced stakeholder mechanisms as well as cluster policies that offer a greater potential for packaging a number of policy areas in a given cluster. Effective interfaces are needed to leverage longer-term priorities and manage transitions in structures and infrastructures.

Chapter 1

Introduction

OECD countries will increasingly need a new framework for formulating and implementing innovation policies. Such a framework builds upon the National Innovation Systems approach, but needs to take into account how governments can expand innovation policy to make it a broader, and strategic, policy domain.

The MONIT project

The OECD project on National Innovation Systems (NIS) was initiated in 1995. Under the working party on Technology and Innovation Policy (TIP), it explored ways in which to redirect innovation policy in OECD countries, taking into account new insights into the innovation process emerging at the time from innovation research. While many accepted that the linear model of innovation did not capture the realities of the innovation process, public policy was generally still founded upon the linear model and its implications for policy. Hence, the OECD NIS project was an important collaborative mechanism for generating new data based on an interactive model of innovation and for developing a set of recommendations for public policy.

Formally, the OECD NIS project ended in 2001. It had, over the years, produced results that fed into other OECD work and had generated several publications on industrial clusters, networks, human mobility as well as synthesis reports addressing the renewal of innovation policy. However, the final study (OECD, 2002) raised a critical question that became the starting point for a new TIP activity: If the developed economies are moving towards a more innovation-oriented and dynamic model, should the policy-making modes of national governments remain largely the same? More precisely, given the needed changes in the content of policy, how can or should governments change their structures and processes to better accommodate the dynamism of their environments?

To explore these issues, the OECD and its working party for Technology and Innovation Policy (TIP) endorsed in 2002 a new collaborative study called MONIT (monitoring and implementing national

innovation policies) to be carried out, like the NIS project, by voluntary research activities conducted by countries willing to participate in various focus groups.

The purpose of this publication is to identify new models of institutional arrangements and practices for collaboration and co-operation. To implement the NIS approach, governments need to reconsider their traditional practices based on the linear model. To deal with the complexity and interactions of the new environment, governments and their agencies need to develop new means of co-operation and communication in order to design policies that take into account the interests of many stakeholders and institutional groups. This report therefore examines member countries' recent efforts to create these new institutional arrangements and to find ways to cut across institutional boundaries, ensure effective policy learning and build collective capabilities for policy coherence.

Dynamic economies require adaptive governance

Over the past decades, innovation policy has received increasing attention. This is a policy area that has changed markedly as understanding of the linkages between economic development, innovation and technological change has increased. Because of the greater interrelatedness of innovation systems, innovation policy is no longer simply the purview of science and technology (S&T) institutions but creates a more generic policy agenda requiring broader, cross-ministerial attention. Some of the factors relevant to the greater complexity of innovation policy are presented below.

First, understanding of the innovation process has changed, and the role of innovation, technology and knowledge with it. Broadly speaking, innovation policy has undergone three stages. The first generation of innovation policy saw innovation as a linear process from basic research via applied research and development (R&D) to market introduction of the resulting products or technologies. Then, as empirical studies of the innovation process showed, for example, that firms interacted with various external organisations and relied heavily on their own value chains for innovation-related knowledge and information, the view of the innovation process shifted to what is currently known as the interactive or systemic model of innovation. The second generation of innovation policy was based on this national innovation systems (NIS) approach and was basically developed through the 1990s (OECD 1999, 2002).

More recent OECD work (2002) pointed to a broader perspective on innovation policy in which structural change and broader adaptation play a central role. It raised the question: What then is the role of government? A

more dynamic innovation policy appears to imply a need to broaden the focus from the original S&T platform to a more generic policy area in which a number of ministries participate. In this third generation of innovation policy, co-ordinated, strategic actions are needed to induce a coherent policy framework for dynamic innovators and structural change.

Second, related trends compound the need for a broader governmental role in innovation. Innovation is not a purely technological phenomenon, it involves both technological and non-technological changes that bear on economic and social development. Innovation may be organisational, institutional, design-related or involve other significant changes having economic value. Innovators are affected by incentive systems and regulations that have various sources and rationales, and interfaces between government and the private sector are evolving and gaining in importance. For example, public-private partnerships and regional collaborative structures are changing governance patterns in many countries. Some governments are also arguing for better integration of innovation and economic policy, as well as other policy areas, making innovation and change a key concern of policy makers. This evolution also implies a greater need for new approaches to steering or managing the innovation system as a whole and for reducing costs to innovators and the economy arising from incoherent or ineffective policies. Policy makers in other areas may want to use innovation policy as a tool for achieving their own objectives, for example when environmental or sustainable development policies are seen as conflicting with an innovation policy geared towards economic growth. It is important to see how seemingly conflicting policies may be integrated or achieve a more effective interface.

The third generation of innovation policy

The aim of the MONIT project was to generate a body of policy-relevant knowledge to help governments in OECD countries address important governance issues. The first two generations of innovation policy were linked to science and technology as the source of innovation. Innovation policy as such has typically not been a specific policy area, and, as will become evident in the following discussion, will have difficulty in achieving a “place in the sun”, *i.e.* recognised and defended by a dedicated ministry.

Still, today’s global, innovation-driven economy, as well as broad social and environmental concerns related to growth, welfare distribution, etc., require governments to find new ways to promote a policy environment that is conducive to greater dynamism and change. The third generation of innovation policy (Lengrand *et al.*, 2002) involves a broader focus in which

innovation is stimulated across a number of governmental or policy areas. It builds upon its horizontal role by providing a strategic framework across ministerial and institutional boundaries to ensure innovation and adaptation within the context of sustainable social and economic development. While innovation is typically viewed in terms of economic growth, a horizontal innovation policy will need to balance this imperative against other, sometimes conflicting, imperatives in policy areas such as social and environmental policy. Hence, OECD countries will need a new framework for innovation policy in which broad and partly conflicting issues may be raised and dealt with. The present study is based on the assumption that such a framework must address both the content of policy and the integration, co-ordination or balancing of policies, as well as the policy-making processes that need to be in place to create such a framework. This is discussed in Chapter 2.

Project organisation and outputs

The Nordic countries were the driving force behind the MONIT project, and Norway volunteered to take the role of lead country, with overall responsibility to co-ordinate and steer the project. It was then decided to broaden the lead role to ensure collaborative management of the project, and Finland, Austria and Netherlands became co-leaders. In all, 13 countries participated (see Annex A).

The project was initiated at a time when many governments were increasingly concerned about the efficacy of their governance modes. Some were engaged in institutional reforms or were launching strategic documents and policy initiatives to help correct what were often perceived as obstacles to better policy governance. Hence, some countries participating in the MONIT project linked it to their ongoing reforms and initiatives. The MONIT project has to some extent produced helpful material for those national policy learning processes.

The MONIT project was organised in two core activities or work packages. First, the main issues of innovation governance were studied and served as the main basis of the analysis. Second, case studies were undertaken of relevant policy areas, notably sustainable development, information society, transport and regional affairs. The output from these work packages is published as OECD proceedings (OECD, 2005a; 2005b, respectively).

Chapter 2

The Analytical Perspective

OECD countries require greater policy coherence. To achieve this, new forms of governance must be developed in which “horizontalisation” encompasses a broad range of policy areas, as well as mechanisms for co-ordination and policy learning. This chapter describes the analytical perspective taken in this report and includes an evolutionary perspective on policy-making systems.

Critical issues for adaptive policy systems

A key point of departure is the vantage point of firms, as policies and their incentives, disincentives and regulatory effects interact to create their policy environment, which includes both core science, technology and innovation (STI) policy areas like R&D and other, often more peripheral policy areas that have consequences for a firm’s innovation. Governments typically know too little about these interactions or how to correct or accommodate policies to produce, if possible, a coherent whole.

Seen from this perspective, governments should seek to produce such an outcome. However, they may be unable to do so, or may do so late and not very effectively. Owing to the typically sector-based division of labour between ministries, the extent to which governments are able to overcome divisions and create what the MONIT project has termed horizontalisation will vary.

Horizontalization

Horizontal interactions are combined with vertical ones. Vertical interactions depict relationships between different layers of government bodies, for example, between ministries and agencies or between ministries and regional administrations. They are typically very important for policy implementation, but lead to different governance structures. Recent developments in governance underline this: new public management (NPM) has been adopted to varying degrees throughout the industrialised world,

leading to greater decentralisation. Still, the concept of a horizontal innovation policy is essential as it accentuates the need to co-ordinate and govern many policy domains to achieve better innovation policy. Horizontalization involves both a broadening of goals beyond core STI policy and a multi-sectoral approach (Table 2.1).

Horizontalization is not a goal in itself, but the degree to which innovation policy is guided by a comprehensive national strategy in which contributions from the various sectors are linked to achieve policy coherence. The link between horizontalization and arrangements for co-ordination and governance is crucial.

Table 2.1. A taxonomy of innovation policy

Goals	Sectoral innovation policy	Multi-sectoral innovation policy
Innovation policy, <i>i.e.</i> aimed primarily at innovating industries and economic growth	Innovation policy in a limited sense (basically technology and industrial policies)	Integrated STI policies
Innovation policy in a wider sense, <i>i.e.</i> aimed at economic growth and quality of life	Innovation policies in other sectoral domains, <i>e.g.</i> innovation policies in health, innovation policies in the environment	Horizontal/comprehensive/integrated or coherent/ systemic innovation policies

Source: Pim den Hertog, Dialogic, Netherlands.

Policy coherence

Various internal and external tensions and pressures lead governments to pay greater attention to policy coherence. Dynamism and complexity are key elements and the result of globalisation, technological change, trade and restructuring of economic activities, and greater dependence on knowledge and innovation for economic development. In this context, policy coherence should not be understood as characterised by a state of equilibrium but rather by policies and institutions attuned to the changing requirements of the activities and sectors they are supposed to influence.

Coherence is important for many reasons:¹

- Coherent policies are more likely to be effective and more readily applied in a consistent and equitable way.

1. From a discussion paper for the Centre of Government Network: “Government Coherence: The Role of the Centre, OECD, PUMA.

- Governments are increasingly faced with complex and difficult issues, which may affect different areas of society differently.
- Policies frequently have a range of objectives which cannot easily be reconciled and may be in conflict.
- Owing to greater accountability and challenge, through parliaments, civil society and the media, lack of coherence becomes readily apparent and results in uncertainty and loss of confidence.

The concept has basically three dimensions:

- Horizontal coherence ensures that individual, or sectoral, policies, build on each other and minimise inconsistencies in the case of (seemingly) conflicting goals.
- Vertical coherence ensures that public outputs are consistent with the original intentions of policy makers.
- Temporal coherence ensures that today's policies continue to be effective in the future by limiting potential incoherence and providing guidance for change.

The importance of coherence is best seen from the point of view of the innovating firm. If a firm is to innovate successfully, the system in which it operates should *in aggregate* facilitate innovation. It is the total of its interfaces with government agencies and policies that affects its innovative capacity, and the net effect of diverse, and at times disparate, policy actions constitutes a government's actual "innovation policy". It is, for example, of little use that innovation agencies support an effort at innovation, if other government agencies create obstacles by passing laws, implementing standards or developing procedures that are incompatible with specific innovation efforts.

Governance

Governance concerns the systems and practices that governments use to set priorities and agendas, implement policies and obtain knowledge about their impacts and effectiveness. The concept has received renewed attention in the context of changing patterns of governing and policy making. Governance implies a "change in the meaning of government, referring to new processes of governing; or a changed condition of ordered rule; or the new method by which society is governed" (Rhodes, 1996, pp. 652-653).

Stoker (1998) suggests that governance refers "to the development of governing styles in which boundaries between and within public and private

sectors have become blurred”. He further offers five propositions related to governance which are also at the heart of the MONIT project:

- Governance refers to a set of institutions and actors that are drawn from but also outside government.
- Governance identifies the blurring of boundaries and responsibilities for tackling social and economic issues.
- Governance identifies the power dependency involved in relationships between institutions involved in collective action.
- Governance is about autonomous self-governing networks of actors.
- Governance recognises a capacity to get things done that does not rest on the power of government to command or use its authority. It sees government as able to use new tools and techniques to steer and guide.

Governance is an interactive process involving various forms of partnerships, collaboration, competition and negotiation. It implicitly addresses the issue of accountability, lack of transparency and representation may create weaknesses.

Governance is linked to policy making, represented by a process-oriented model which is referred to in the MONIT context as the policy cycle. It concerns the ways in which the policy cycle is managed and influenced. The policy cycle is defined in terms of three broad stages: agenda setting and prioritisation; implementation; evaluation and learning.

For analytical purposes, the study of governance with respect to innovation reflects the key stages of the policy cycle. As formulated, these stages may suggest a policy-making process similar to that of the linear model of innovation. However, this not the case, as the processes are interlinked and should be viewed as elements of an interactive model. Co-ordination, integration and communication in policy systems cut across these stages or elements. Here, the stages illustrate the key elements in the governance of innovation policy (or any other policy), and the aim of MONIT and of this study is to identify the strengths and failures of the systems that influence the policy-making process in order to provide effective governance.

Governance capabilities are thus defined as the ability (Ohler *et al.*, 2005):

- To recognise system characteristics (strengths, weaknesses, problems, development potential).
- To define the focus and the topics for political action (agenda setting).

- To make diverse players co-ordinate their activities in and beyond their policy field (horizontalisation).
- To implement these policies.
- To learn from previous experience (*e.g.* from evaluation results).
- To make adjustments over the complete policy cycle.

Governance includes both formal and informal practices, and the policy cycle is governed or otherwise influenced by:

- Traditions and culture.
- Policy co-ordination as formal practices for aligning disparate policies along the policy cycle.
- Institutional adaptation.
- Horizontalisation, as the process of bridging and integrating innovation policy across ministerial boundaries.
- Stakeholder involvement.
- Learning, intelligence and accountability.

Policy making: an evolutionary view

The approach to innovation systems taken in recent years (second generation) has been fairly eclectic, adjusting to the need for practical knowledge. Still, some theoretical foundations have been more important than others. Systems theory and evolutionary economics have been useful tools and will continue to be so in developing third-generation innovation policy. However, as will be argued below, the current focus on policy systems implies an expanded, although still pragmatic, approach.

The MONIT project builds on the assumption that national and global economies are becoming more dynamic, innovation- and knowledge-driven, and complex. It also assumes that governments need to respond, but in a new manner. They need to be able to develop new capabilities if they are to deliver coherent policies for a changing world. What are these capabilities? What are their determinants? What are the sources of inertia and counterforces that will limit socio-institutional change?

It may be useful to distinguish between two broad approaches to policy making. First, policy making may be seen as arranging exchanges. It views people as individuals whose behaviour can be explained by their preferences or interests. Collective policy-making is seen as bargaining behaviour, and

policies as negotiated outcomes. A key implication is that adjustments in policies and governance will be smooth and quick, depending on the interests, resources and powers of the individuals involved (*e.g.* March and Olsen, 1996).

In the second approach, which is the one taken here, “social choices are shaped, mediated and channelled by institutional arrangements” (Powell and DiMaggio, 1991, p. 2). Behaviours and structures change slowly because they are institutionalised. People in different institutions have different preferences, and individual choice cannot be understood without reference to the cultural and historical framework (March and Olsen, 1995). Institutionalisation is understood as a “phenomenological process by which certain social relationships and actions come to be taken for granted” and a state of affairs in which shared understanding defines “what has meaning and what actions are possible” (Zucker, 1983, p. 2; 1987). Cognitive and cultural explanations are needed to gain a full understanding of institutions and how they behave. Institutions are products of interpretations of their environment, and even assume traits and characteristics that arise from these interpretations (Meyer and Rowan, 1977; see also Røste, 2004).

Hence, the MONIT project builds on two perspectives, as formulated by March and Olsen (1996):

- Policy making is “driven less by anticipation of its uncertain consequences and preferences ... than by a logic of appropriateness reflected in a structure of rules and conceptions of identities”.
- Policy making implies “matching institutions, behaviours, and contexts in ways that take time and have multiple, path-dependent equilibria, thus ... susceptible to timely interventions to affect the meander of history and to deliberate efforts to improve institutional adaptability”.

The research discussed here focuses on the dynamics and inertia of formal and informal institutions, and on social and cultural processes that affect the creation and reinterpretation of these institutions.

Chapter 3

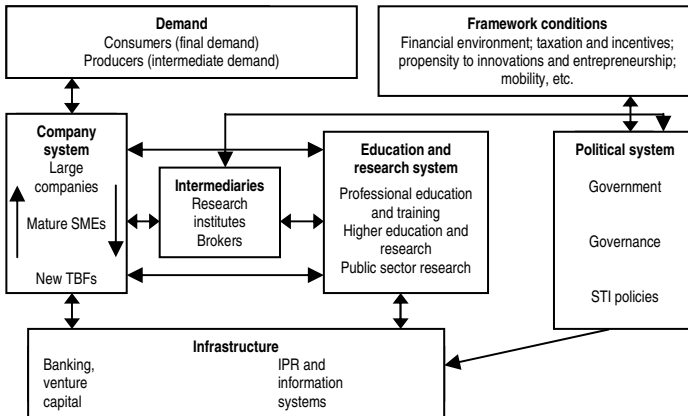
Innovation Policy Systems under Pressure

This chapter explores some important challenges facing innovation systems and their supporting policy systems. These vary depending on each country’s recent history, economic specialisation and recent public policy responses.

Introduction

As is evident from Figure 3.1, which depicts a standard model of a national innovation system (NIS), influencing it is a complex endeavour and requires attention to issues outside the realm of core science, technology and innovation (STI) policy. Studies of innovation systems and innovation policy have typically omitted an in-depth examination of the institutions that formulate these policies. MONIT has attempted to make the policy system as such endogenous to the understanding of innovation systems, with governance as the focus.

Figure 3.1. A generic national innovation system

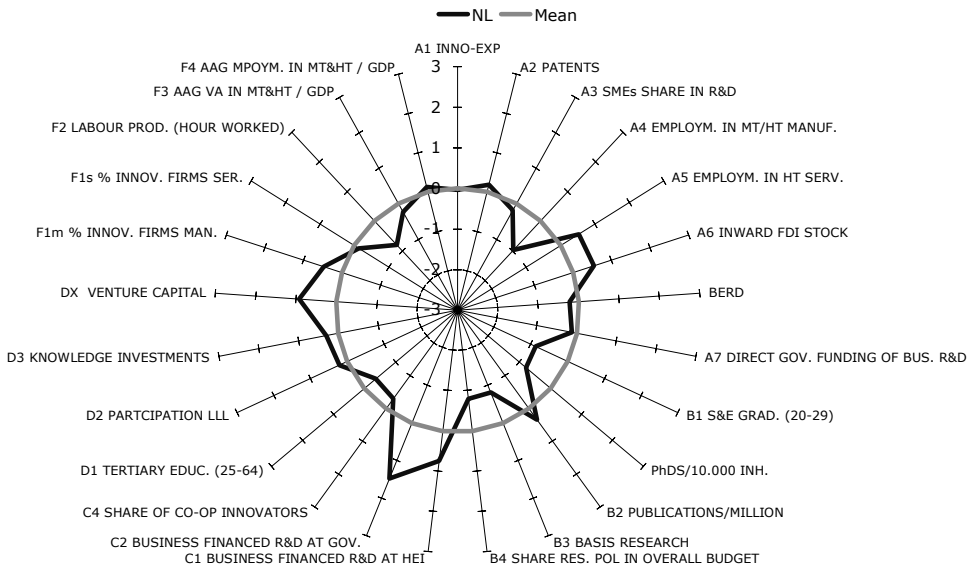


Source: Arnold and Kuhlman (2001).

National biases in innovation systems

Cross-country benchmarking of innovation indicators has proved useful in many studies, helping governments to compare their countries' performance to that of others. For example, the OECD's *Science, Technology and Industry Scoreboard* represents a comprehensive attempt to provide comparable indicators of relevance to policy makers.

Figure 3.2. Biases in the Dutch innovation system



The MONIT project attempts to provide a different set of indicators. For each participating country, a comparable STI diagram was prepared to illustrate its performance relative to that of others, in a way that would invite critical scrutiny of explicit and implicit biases and preferences in the system. In other words, the main purpose was to leverage national learning about key priorities and help increase dialogue and learning. Annex B contains these diagrams, Annex C gives a list of the indicators used, and Annex D includes all available indicators, grouping in sections A-E the key elements of a national innovation system, as illustrated in Figure 3.1, while section F covers overall economic performance. For illustration, Figure 3.2 shows the

results for the Netherlands.² The circle represents the average score of all countries (normalised), while the line represents the subject country's score on given indicators.

Table 3.1 summarises the results. In brief, countries vary considerably, with significant differences in economic structure and policy priorities. Further, as data from the national studies show, these profiles tend to persist over time. A striking feature is the apparent missing link between indicators in A-E and the overall performance indicators in F. This suggests that priorities and biases in the STI policy system are weakly linked to general economic performance or policies.

Table 3.1. General assessment of STI performance profiles¹

Country	Assessment
Austria	<i>Strong:</i> Employment in medium/high technology manufacturing, innovative firms in manufacturing and services, value added in medium/high technology manufacturing <i>Weak:</i> All others except government funding of business R&D <i>Profile:</i> Innovative industrial system
Belgium	<i>Strong:</i> SME share in R&D, employment in medium/high technology manufacturing and high technology services, inward FDI, government funding of business R&D, business-funded R&D at institutions of higher education, tertiary education, venture capital <i>Weak:</i> Innovation expenditures, science and engineering graduates, PhDs, business-funded R&D at government labs, participation in lifelong learning, share of innovative firms in manufacturing and services, productivity, value added and high technology share <i>Profile:</i> International linkage and private funding system, weak economic performance
Greece	<i>Strong:</i> Science and engineering graduates, high share of medium/high technology in GDP <i>Weak:</i> All others <i>Profile:</i> Overall weak performance, strong in science and engineering education (some missing data)
Finland	<i>Strong:</i> Most indicators, except overall economic performance <i>Weak:</i> Inward FDI, share of innovative firms in manufacturing and services <i>Profile:</i> Strong system with a paradox of a less innovative company system
Ireland	<i>Strong:</i> Employment in medium/high technology manufacturing and services, inward FDI, science and engineering graduates, share innovative firms in services and manufacturing, labour productivity and value added <i>Weak:</i> Patents, business expenditure on R&D, government funding of business R&D, publications, basic research, share of R&D in overall budget, business-funded R&D at labs and institutions of higher education, tertiary education, participation in lifelong learning, knowledge investments <i>Profile:</i> Strong company system, good overall performance, weak knowledge system
Japan	<i>Strong:</i> Patents, employment in medium/high technology manufacturing, business expenditure on R&D, share of R&D in overall budget, tertiary education, participation in lifelong learning, knowledge investments, venture capital <i>Weak:</i> SME share in R&D, employment in services, inward FDI, direct government funding of R&D, PhDs, publications, business R&D at institutions of higher education and labs, share of co-operative innovators, value added in medium/high technology relative to GDP, employment in medium/high technology relative to GDP <i>Profile:</i> Strong industrial system and knowledge investments, weak on system performance

2. Rens Vandeberg and Pim den Hertog, Dialogic, Netherlands, provided MONIT with these diagrams for most of the participating countries.

Table 3.1. General assessment of STI performance profiles¹ (cont'd.)

Country	Assessment
Korea	<i>Strong:</i> High R&D/GDP, business expenditure on R&D, share of R&D in overall budget, tertiary education, high rate of engineering majors, production technology <i>Weak:</i> University and basic science, venture capital, SME share in R&D, inward FDI <i>Profile:</i> Reformed NIS, strengthening regional innovation system, under-utilisation of engineering graduates.
Netherlands	<i>Strong:</i> Patents, employment in high-technology services, inward FDI, publication, business-financed R&D in labs and institutions of higher education, venture capital <i>Weak:</i> Employment in medium/high technology manufacturing, science and engineering graduates, PhDs, basic research, share of research in overall budget, tertiary education, share of innovators with co-operation, labour productivity <i>Profile:</i> Big firms, strong private funding system for innovation
New Zealand	<i>Strong:</i> Publications, basic research, business-funded R&D at labs, tertiary education, share of innovative firms in manufacturing and services <i>Weak:</i> Patents, business expenditure on R&D, direct government funding of business R&D, share of R&D in overall budget, business-funded R&D at institutions of higher education, venture capital, labour productivity, value added in medium/high technology relative to GDP <i>Profile:</i> Innovative company system, variable inputs
Norway	<i>Strong:</i> Share of SMEs in R&D, employment in medium/high technology services, direct government funding of R&D, PhDs, publications, share of R&D in overall budget, share of co-operative innovators, tertiary education, labour productivity (oil rent-based) <i>Weak:</i> Innovation expenditures, patents, employment in medium/high technology manufacturing, inward FDI, business expenditure on R&D, science and engineering graduates, basic research, share of innovative firms in manufacturing and services, value added and employment in medium/high technology relative to GDP <i>Profile:</i> Overall good economic performance in weaker company system, service- and government-oriented
Switzerland	<i>Strong:</i> Innovation expenditures, patents, employment in medium/high technology manufacturing and services, direct government funding of business R&D, tertiary education, participation in lifelong learning <i>Weak:</i> Basic research, business-funded R&D at institutions of higher education <i>Profile:</i> Strong company system and government in knowledge investments (missing data)
Sweden	<i>Strong:</i> Innovation expenditures, employment in medium/high technology manufacturing and services, business expenditure on R&D, direct government funding of R&D, PhDs, publication, basic research, business-funded R&D at institutions of higher education, share of co-operative innovators, tertiary education, participation in lifelong learning, knowledge investments, venture capital <i>Weak:</i> SME share in R&D, business-funded R&D in labs, share of innovative firms in services, labour productivity, employment in medium/high technology relative to GDP <i>Profile:</i> Overall strong inputs with weaker performance, strong knowledge system

1. Australia not included due to missing data.

Path dependency and development models

An underlying theme in these findings is that history counts. A common problem for many governments is that they use yesterday's institutions to meet tomorrow's problems. Typically, a country's institutional set-up had its "defining moment", when economic expansion was coupled with long periods of stability. In evolutionary terms, this creates ideal conditions for

path dependency, for example in terms of design of ministries and agencies, cultural traits, competencies of civil servants and stakeholder participation and influence.

One example may illustrate this general point. Like many other countries, Sweden experienced solid economic expansion in the late 1800s. At the time, many manufacturing firms were established that later became the backbone of the Swedish industrial structure (Alfa Laval, ASEA, etc.). The entrepreneurially based economy consolidated between the First and Second World Wars and expanded again in the post-war boom period.

“Strong infrastructure investments by the government also led to close relations, sometimes including joint long-term research and development, between Swedish public utilities and manufacturing firms. Such “development pairs” included the Swedish Power Authority and ASEA, Swedish Rail and ASEA, and Swedish Telecom and Ericsson. Indeed, such interaction between public sector users and private industry accounts for a major share of the impressive growth of large firms and private R&D spending in Sweden. There was also a strong belief that only large firms had the capacity to invest in R&D.” (Granat Thorslund *et al.*, 2005).

Today, the “Swedish paradox” (high investments in R&D do not result in greater economic growth and innovation) presents a major challenge. To resolve it, it appears necessary to address traditions like the role of big business, the concentration of R&D spending, and the efficacy of the innovation system in terms of distributed growth of start-ups and SMEs.

In many countries, funding traditions and strongholds in the science or university system create inertia which new agendas and priorities must overcome. In the face of organisational or institutional inflexibility, it is often more effective to create new structures than to try to adapt existing organisations or structures. Well-managed older players join and partly shape the new initiatives to avoid being abolished. The persistence and ability of institutions to survive are well illustrated by the Dutch R&D organisation TNO (see Box 3.1).

Austria has a strong tradition of framing science policy for universities and giving generous basic funding; as a result, the university sector is difficult to govern from outside (Jörg, 2005). Figure 3.3 shows the persistence of funding regimes in selected countries. Many other countries have experienced similar, or even stronger, lock-ins due to their own “defining moments”. The strong expansion and economic success of Asian countries like Japan and Korea in the post-war boom were based on specific governance regimes and a strong reliance on the “linear model” (Hong, 2005; Ichikawa, 2005). Ireland has reached the point at which its recent

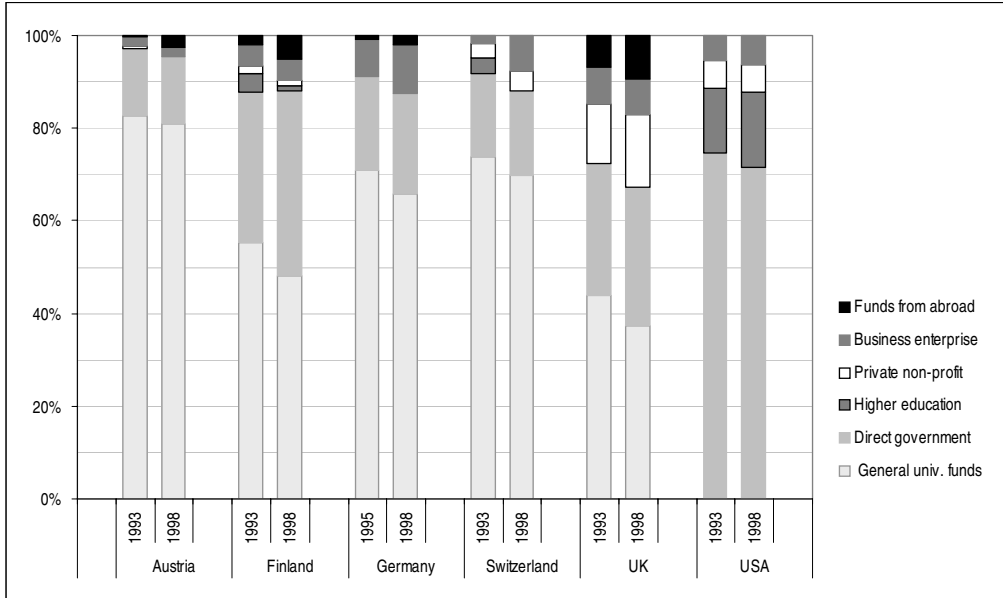
successful development model and its institutions (low cost, pool of young, educated workers, hidden reserves of labour) are out of step with the needs of the global, knowledge-based economy. The shift in focus from employment to innovation requires the renewal of governance and innovation systems (Hilliard and Green, 2005). Many countries' recognition that new times require new solutions is leading to significant changes.

Box 3.1. The adaptability of TNO

Why is TNO such a stable element in the Dutch innovation landscape?

- The Netherlands has a long-standing tradition of institutionalised non-university public research. First aimed at firms without R&D capabilities, it has recently also aimed at innovative firms that might benefit from additional R&D. Since the early 20th century, government has been in favour of a publicly funded applied science research organisation.
- TNO was established by law as an independent organisation with a rather broad remit. This not only gave it room to manoeuvre, but also protected it at times from sudden government intervention.
- Owing to its size and broad goal, TNO has the institutional and financial flexibility to adapt its operations, create new research activities and abolish outdated ones. In combination with its well-developed ability to adapt – including the use of external criticism as a lever to bring about changes internally (as in the case of its co-financing scheme) – TNO has also worked actively to develop a more structured process of agenda-setting and to follow the more recent trend towards accountability. At the same time, TNO was never subjected until recently to an external evaluation; at most its position within the wider knowledge infrastructure was questioned.
- TNO is acquainted with the world of science and innovation policy making, invests in contacts with government and participates in numerous programmes, new network activities, and large research programmes and has managed to enter into partnerships or co-operate not only with universities, but also with potential new competitors in the (semi-) public knowledge infrastructure.
- TNO's relationship with government is quite complex. On the one hand, it is partly dependent on government for its base and target funding. On the other, it performs some public tasks and also sometimes helps government to streamline parts of the knowledge infrastructure. In the last decade, TNO took over five small and larger knowledge institutes. A further factor of complexity is that the TNO and government do not have a single clearly defined relationship, but many, as government has not managed to develop a truly co-ordinated TNO strategy. This explains why various governance regimes co-exist and why the existence of TNO has never seriously been questioned.

Figure 3.3. Sources of higher education expenditure on R&D (HERD), 1993¹ and 1998



1. Germany: 1995; Switzerland: average 1992/94.

Source: OECD; Jörg (2005).

Tensions in policy systems

These deeply rooted characteristics are often linked to more evident rifts and frictions. Further, a government can hardly be viewed as a single (rational) actor, pursuing clear objectives with full information and clear and consistent preferences. Rather, governments, and their policy systems, face great uncertainty with less than optimal information and with in-built contradictions and tensions. For a coherent innovation policy, this is an important point of departure. Such tensions are illustrated in the case of Norway (Remøe, 2005):

- There are deep tensions within the Ministry of Trade and Industry, basically between the division for economic policy, whose foundation is the neo-classical approach to economic policy, and the division for R&D and innovation, whose perspective is more in line with the innovation systems approach and evolutionary economics.

- There are tensions between the Ministry of Trade and Industry and the Ministry of Local Government and Regional Development, in particular in terms of state vs. regional perspectives.
- The Ministry of Science and Education takes an ownership role towards R&D policy and somewhat resists co-ordination. This has led to a lack of integration between R&D policy and innovation policy.

Empirical evidence from the MONIT project points to further important tensions and contradictions that need to be addressed to achieve more coherent innovation policy:

- *Competing rationales*: Individual policy domains, like R&D and industrial policy, have their own communities with their specific preferences, ideologies and educational backgrounds. As the status of these domains may differ across countries, countries' policy systems will have different dominant rationales. Further, broader developments, such as new public management (NPM) in economic theory and policy, often increase the dominance of one rationale *vis-à-vis* others. For example, the prevailing (neo-classical) economic policy thinking leads to a dominance of measures to support individual firms even though the NIS approach has long been on the agenda. This is evident in Norway and the Netherlands; in the latter, the Ministry of Economic Affairs was overhauled to better support the NIS policy approach. Ireland provides an interesting illustration:

“While the Department of Enterprise, Trade and Employment is committed to the implementation of the Lisbon strategy [the EU template for developing a knowledge-based economy], the Department of Finance is equally firmly committed to the goals of the Stability and Growth Pact and the associated Broad Economic Policy Guidelines (BEPG) in keeping tight control of public finances and debt.” (Hilliard and Green, 2005)

- *Short-termism in resource allocation*: Budgetary practices in many countries promote short-term thinking and in some cases undermine strategic, long-term policy making. Investments in R&D and human capital are typically treated as annual expenditures, even though they represent investments with long-term payback times. In Norway, the earlier tradition of long-term budget programming has been dropped, and short-termism has become even more severe owing to the increasing role played by the revised budget, which is presented every year in June. Although this has led to some new practices, *e.g.* new types of funding sources (see below), the budgetary mechanism may not support longer-

term resource allocations in the absence of mandatory policy, as in the case of many welfare programmes.

- *Strategic tensions in NPM regimes:* New public management has been a prevailing approach to policy for several decades and has in many cases led to significant efficiency gains. However, priority for efficiency typically neglects strategic needs, making long-term co-ordinated political action more difficult. This is evident in New Zealand: from 1984 to the early 1990s, New Zealand's public sector underwent massive structural, organisational and management changes. At the central government level these included (Williams, 2005):
 - The corporatisation and subsequent privatisation of state trading activities.
 - The introduction of a new financial management regime.
 - Major changes to the machinery of government.
 - A new system of appointing and remunerating senior public servants.
 - Substantial cuts in various government programmes.
 - Significant changes to public sector industrial relations practices.
 - A growing emphasis on biculturalism and employment equity.
 - A much greater concern with accountability and performance assessment.

Differing views and understanding of innovation policy: Different ministries typically have different rationales and often diverging views of innovation policy, its definition and its role. This is well illustrated in Austria, where transport and innovation have been brought under the same ministerial leadership. However, this organisational proximity does not eliminate problems such as: lack of stable core competencies, which leads to insecurity when dealing with others on related topics; threat of loss of responsibilities by the divisions; scepticism, often based on misunderstanding, of what the other one does; different time scales, disciplines and approaches to change.

The differences in perceptions between the two divisions are evident:

“The Transport Division tends towards the view that the Innovation Division is responsible for innovation in the transport

sector and that this does not concern broader transport policy issues. They see the boundaries between transport policy and transport technologies as clearly demarcated and separated from each other. The Innovation Division does not limit its own remit merely to the development of transport technologies and interprets its agenda as also encompassing organisational aspects related to the implementation of new technologies.” (Whitelegg, 2005)

- *Different imperatives for different policy areas:* Innovation policy is typically placed in an economic growth perspective. There are no system limitations to the innovation-driven economy as defined in the NIS approach or in innovation policy as such. This is a serious challenge when innovation policy is supposed to be merged, co-ordinated or integrated with policies such as environmental policy. The latter, in its modern version of policies for sustainable development, contains imperatives linked to system limitations, *e.g.* the carrying capacity of the Earth’s ecosystem. Such differences are also mirrored in the instruments typically employed in the respective policy areas. While innovation policy includes a great variety of incentives and regulations for growth and dynamism, instruments for sustainable development are typically regulations that place limitations on human or economic behaviour. Such differences increase tensions among policy areas.
- *Division of labour between policy areas:* A coherent innovation policy may imply the take-up of innovation policy goals by other policy areas. This is often referred to as a multi-goal policy. While this can be widely beneficial, policy makers may rightly argue that a given policy area will lose its effectiveness. This is discussed in the case of Norway’s tax credits for R&D investments (SkatteFUNN) (Kaloudis, 2004), where it has been argued that the tax system should not be allowed to have such functions, as the tax system itself becomes “hollowed out”. Implicitly, this is a case of tensions between direct and indirect measures in countries that introduce tax credit systems.
- *Fragmentation and segmentation:* A general trend, in particular in the context of NPM in many countries, is increasing fragmentation as well as segmentation at a time when policy responses require more co-ordinated action. NPM-based regimes typically lead to a flourishing of agencies, decentralisation and devolution. Changes often occur through additions to policies and institutions rather than major overhauls of the system, and hence add to the complexity and fragmentation already in place. Korea has a complicated set of laws and regulations for science, technology and innovation. This may reflect the government’s active

role and leadership, but, at the same time, it may indicate duplication and authoritative intervention.

- *Competition and personal ambitions:* Tensions and contradictions in policy systems arise not only from structural factors, they also stem from policy makers' ambition and competition for status and scarce resources, leading to rivalry, turf wars and loss of coherence.
- *Significant changes in policy paradigms:* Success may also lead to inertia and stagnation. Korea and Japan are examples of countries that were very successful in the 1960s, 1970s and part of the 1980s, relying heavily on the “linear model” of innovation to promote technology and economic growth. For example, the Korean system “was relatively successful in mobilising resources in the past. Recently the system has been severely criticised as inefficient for the new era of the knowledge-based economy, where innovation is the most important factor” (Hong, 2005). However, changes do occur, with significant implications for policy priorities. In Finland, major changes took place during the crisis of the early 1990s, but built upon institutions and practices already present. The consensus-based, co-operative pattern of decision making in the Finnish system led to a new strategic approach for technology and innovation policy, based on premises different from those of the former welfare state (Hayrinen-Alestalo and Pelkonen, 2005).
- *External pressures:* Governments and innovation systems may be exposed to external pressures and priorities, resulting in governance practices and competencies that are not in tune with these pressures. Greece has for example experienced significant external pressure and influence from the EU and its framework programme for R&D and regional policies (Tsipouri and Papadaku, 2005).

Such tensions are abundant, and may contribute to loss of efficacy and relevance of policies and institutions. This becomes even more an issue as various policy areas must be aligned and adjusted to formulate strategic approaches, and as governments need to learn more about how policies interact to create effective environments for innovators.

Interactions in policy systems

The firm as a nexus of policy influence

The innovating firm is the primary focus of innovation policy. Policy support for individual firms is still a key component of innovation policy in OECD countries. However, the innovative behaviour of firms, their industries or clusters, depends to a great extent on the impact of a multitude

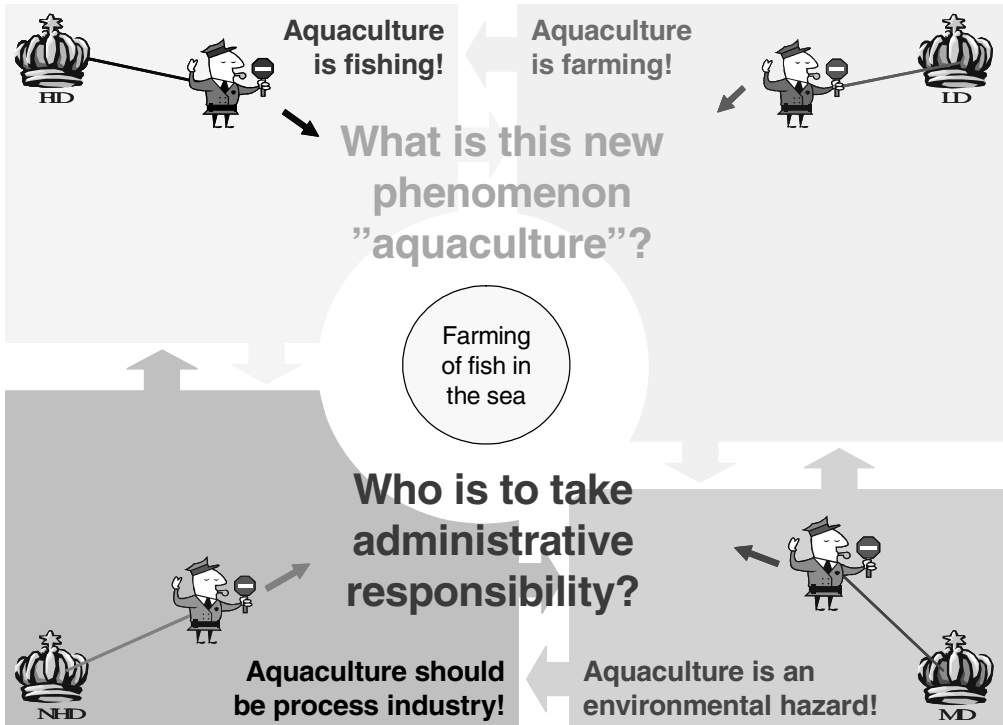
of policy areas. Indeed, the firm may be seen as the nexus of more or less well co-ordinated policies that interact at firm level to create a system of incentives and disincentives.

This situation prevails in all countries, and full coherence is scarcely possible. However, governments may greatly improve the efficacy of the policy system through better understanding of the interaction of various policy areas. The Norwegian fish farming industry illustrates how various policies influence and implicitly create an innovation policy context for firms in that industry (Figure 3.4). Over time, the four ministries involved took widely different, un-co-ordinated positions on this growing industry. Each ministry also represented a sector-specific knowledge infrastructure. Throughout various stages, innovation and dynamism were hindered by seriously flawed policy intervention and poor policy learning.

Governments need to be more attuned to the clustering of policies and the need to carefully assess how various policy areas influence, directly or indirectly, the development and dynamism of a sector or cluster. The fish farming example confirms the importance of more effective governance and policy co-ordination if innovation policy is to gain a broader role and be better integrated in complementary policy areas.

Systemic imbalances and policy imperatives

Tensions and interactions in policy systems may be more substantive in nature. Although an innovation policy promoting economic growth is assumed to increase general welfare in a society, it may include or lead to distributional effects that run contrary to a country's traditional value system. For example, innovation policy may stimulate growth in certain industries, *e.g.* to develop a knowledge-based economy, but at the same time leave or reinforce significant structural problems involving high levels of unemployment (Hayrinen-Alestalo and Pelkonen, 2005). Partial disequilibria like the "new economy" boom in the late 1990s left significant distributional problems when it ended. Imbalances in financial markets may be an indicator of deeper social and structural imbalances.

Figure 3.4. Fish farming as the nexus of sectoral policies


HD: Ministry of Fisheries.

LD: Ministry of Agriculture.

NHD: Ministry of Trade and Industry.

MD: Ministry of Environmental Affairs.

Source: Ørstavik (2004).

Such tensions become more evident when assessing a growth-oriented innovation policy in light of environmental concerns. At the outset, these two concerns may seem to oppose each other, and actors in each policy area may indeed have opposing perspectives. Yet, growth may be decoupled from environmental degradation and even include a supportive function for sustainable development:

“The de-coupling of *non*-sustainable patterns of social change in this context necessarily implies a search for re-coupling *for* sustainable development. Environmental protective measures must be promoted in a way that triggers modified and even new value added-activities and economic growth patterns. This can be achieved through

incremental changes in existing patterns of consumption and production, but can also involve a need for more radical discontinuous change. Moving from a de-coupling orientation towards re-coupling for sustainable development requires highly creative architectural innovations in both technical and non-technical governance systems.” (Lafferty *et al.*, 2005)

Such concerns bring out the issue of policy hierarchies: To what extent should one policy take preference over another? If the carrying capacity of the Earth is of existential importance, should not environmental standards take priority over economic growth? Or if the general quality of life and welfare of a society is of greatest importance, should not innovation be subsumed under such wider concerns?

Perceiving challenges

The challenges perceived by policy makers in the participating countries vary considerably. This is due in part to the different challenges they face. Differences in the policy-making community’s awareness of these challenges may also be important. In many countries there is increasing awareness of the need to address the apparent lack of effectiveness and adaptability of policy systems owing to changes in economic conditions and innovation processes over the past years. For example:

- The Netherlands conducted some high-level policy analyses during 2001-02, which highlighted a number of challenges for the Dutch economy and innovation system and created a legitimate basis for a broad revision of its policy approach. One, entitled “Pillars under the Knowledge Economy”, points to the importance of the capability to adapt, institutional reform and well-functioning markets (Boekholt and den Hertog, 2005).
- In New Zealand, a major effort to address policy challenges was initiated after the change in government in 1999 and explicitly addressed the need to rethink the role of government in phasing out a strict NPM regime (Williams, 2005).
- In Sweden, a White Paper on research policy, *Research and Renewal* (2000), includes new perspectives on a more comprehensive innovation policy.
- In Norway, the government recently initiated a process to help define a comprehensive innovation policy which so far has helped to raise awareness (Remøe, 2005).

Despite major differences in topics addressed by governments and other stakeholders, the MONIT material draws attention to some important common challenges:

- Sluggish growth and regional imbalances.
- Future revenue gaps, creating an intergenerational challenge for economic policy.
- Lack of consensus concerning innovation policy and its role in the wider policy portfolio.
- Segmented or fragmented governance structures, leading to a lack of integration or co-ordination, for example between innovation and industrial policy.
- Generation of innovation from the science base, implying a better system for commercialisation of knowledge.
- The linking of final and intermediate demand to innovation policy and challenging innovation policy as basically supply-oriented.
- Renewal of innovation systems and economies through business start-ups.
- Human resources, giving the education system a prominent role in innovation policy.
- Simplifying the legal framework and other framework conditions.
- Internationalisation of R&D and innovation.
- The appropriateness of the innovation infrastructure.

Summing up, countries like the Netherlands invest substantially in comprehensive analysis in order to give legitimacy to public action that is subsequently to be implemented. In general, there is ample evidence that the link between perceived challenges and comprehensive policy responses needs to be based on consensus and appropriate understanding of the respective countries' long-term challenges. Chapter 4 explores this issue in more detail.

Emerging issues

The material discussed in this chapter illustrates the core idea of the MONIT project. Policy priorities are often deeply rooted in political-economic systems and often go unchallenged. This may lead to policy lock-

in situations with biases in priorities and allocations that may cause governments to forego options for structural accommodation.

Policy making is dominated by heavily institutionalised processes, often influenced by more or less deep rifts and tensions between and even within government agencies and units. Further, while there is a tradition of relying on a model of “single goal policies” under efficiency norms, this tradition may be inappropriate when there is a need to define and launch policy agendas that cut across ministries’ missions and perceived mandates. Hence, the traditional bureaucratic set-up based on specialisation and efficiency norms can result in inertia and inflexibility when cross-cutting or horizontal issues require a different model.

This situation will require governments to reflect on and redefine mission statements, competence, knowledge bases, and the very *raison d’être* of policy making. On a more practical level, governments need to be able: *i*) to detect and formulate consistent policy agendas for innovation-driven development; and *ii*) to set in motion processes and structures that ensure the implementation of these agendas. Chapter 4 will explore a number of problems and options governments typically face in this area.

Chapter 4

Practices in Governance: Trends and Issues

This chapter explores the emerging trends and issues in innovation policy governance in member countries. For simplicity, it uses the basic policy cycle discussed in Chapter 2. Given the exploratory nature of the MONIT project, this chapter aims to illustrate and substantiate a number of concerns and issues of importance. There are few ready-made solutions that can be applied across member countries, although lessons from current and emerging practices should help all OECD countries to address these issues.

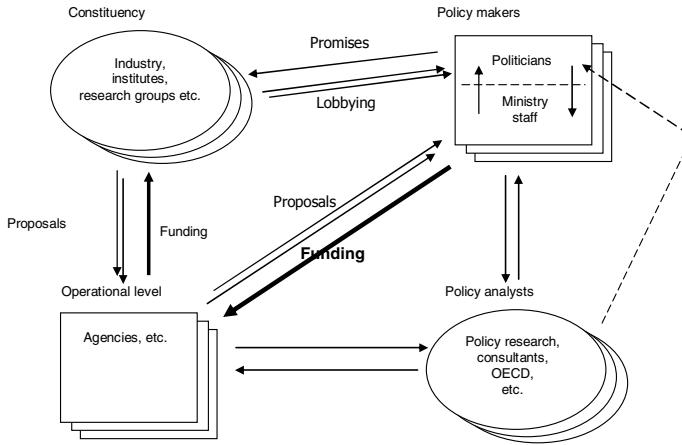
A point of departure

While most countries find their policy making and institutional set-up increasingly ill-adapted to the challenges of the innovation-driven, dynamic economy of the early 2000s, they typically respond within national development paths or on the basis of national perceptions of conceivable adjustment paths.

Governance structures and mechanisms vary considerably, and the formal structures of governmental organisations and institutions do not allow the necessary insight into governance practices. Rather, a dynamic model is needed, which builds upon the analytical framework presented above. Figure 4.1 presents such a model, which highlights the importance of processes, influence and linkages in policy making.

Setting agendas and ensuring priorities: strategic innovation policy making

Many governments have initiated new forms of policy making with a view to overcoming the many inherent tensions and shortcomings of their systems. This section discusses some important mechanisms for strategic innovation policy making.

Figure 4.1. A dynamic model of policy making

Source: Based on Lennart Elg, Sweden.

Creating strategic frameworks

In member countries, the institutional set-up of governmental bodies has often become fragmented and difficult to govern. Further, these bodies have to deal with increasing globalisation and generate a new basis for economic growth in light of significant innovative pressures as well as the delocalisation of manufacturing and services. Over the past decade, countries like New Zealand and Norway have increasingly relied on market-based, liberal models of economic policy and taken a rather strong “hands-off” stance towards what is typically termed industrial policy. Increasingly, innovation policy is taking up some of the role of traditional industrial policy as an approach to enhancing economic growth and ensuring structural adaptation.

For example, in June 2000 the New Zealand government established an advisory council to look into a wide range of issues on how best to develop the talent base for the economy, attract appropriate foreign direct investment, develop the innovation system, build a more inclusive economy, ensure that social development is appropriately incorporated and measured and take a sustainable development approach to policy development and implementation.

This and other initiatives were encapsulated in a framework called the “Growth and Innovation Framework” (GIF) (see Box 4.1). The framework’s main function is to create a vision and a focus for a broad approach to economic growth, and it gives innovation policy a central place. Hence, the framework is useful for encouraging the debate and dialogue necessary for a horizontal, coherent and long-term commitment (Williams, 2005).

Box 4.1. The Growth and Innovation Framework in New Zealand

GIF has two key aspects:

- Strengthening existing foundations in macroeconomic settings, social cohesiveness, health, education and innovation.
- Focusing on the four main challenges to build effective innovation.

The four main challenges are:

- Enhancing the existing innovation system.
- Developing, attracting and retaining people with exceptional skills and talents who are able to innovate and so contribute to increasing overall productivity.
- Increasing the nation’s global connectedness.
- Targeting innovation areas that can impact across the economy. Currently these are:
 - Biotechnology.
 - Information and communication technology.
 - Design.
 - Screen production.

Norway’s strategic plan for a coherent innovation policy was initiated in 2003 as a broad action plan for innovation. The context was the future discrepancy between public expenses for pensions and the revenues from the petroleum sector. This was often referred to as the “shark’s jaw”, implying significant problems ahead with the likely phase-out of the petroleum industry and a concern that the industrial structure will prove incapable of generating the growth necessary to compensate (Remøe, 2005).

The Norwegian plan generated an agenda for innovation and growth, but failed to achieve a comprehensive strategy for implementation. An interesting problem was the apparent mismatch between the implied innovation policy strategy and the dominant macroeconomic rationale in key

areas of the public administration. Hence, the plan has met resistance and represents to some extent a clash of paradigms in Norwegian policy making.

Such frameworks, however, have a significant role to play in policy, as key policy areas may be redefined to fit the strategic direction of a nation's economy. The lessons to be learned from such framework policies may be that:

- The framework should be guided by broad, but precise, visions for industrial development.
- It should integrate innovation as a driver in economic growth.
- It should address linkages and division of labour between ministries.
- It should provide directions for developing and implementing policy.
- It should address conflicting relations between key policy areas.

Strategic policy making through councils

The typical institutional set-up in OECD countries has been a ministerial structure with a relatively high degree of division of labour. This has often led to differentiated trajectories and rationales. Moreover, these structures are increasingly ill-suited to meeting the need for comprehensive policy-making approaches for innovation-based growth and development. In particular, governments often need to remedy structural deficits by creating new institutions to mediate between different government positions and priorities. Many countries have been setting up science and technology policy councils to deliver authoritative, negotiated policy recommendations.

The prime example is Finland's Science and Technology Policy Council which has created a legitimate basis for the priorities set by the Finnish government. But it also illustrates that a such a body does not necessarily lead to a comprehensive, horizontal innovation policy. Some important features of the Finnish council illustrate its role in the governance system (Hayrinen-Alestalo and Pelkonen, 2005; Pelkonen, 2005):

- There is a strong commitment to the concept of the national innovation system, giving core technology and innovation policy a key role.
- Science and technology policy is not broadly debated in Parliament.
- The Ministry of Trade and Industry does not play a central role in technology policy.
- The Ministry of Education has a strong role in science policy.

- A top-down but consensus-based approach gives significant leverage to the corporatist system and key stakeholders.
- Informal processes among a small number of well-placed actors have become important.

The Finnish Science and Technology Policy Council has been very influential in directing the process of priority setting. It has a comprehensive membership, with key ministers, representatives from other institutions and agencies, as well as stakeholders. Institutions like TEKES and the Academy of Finland have important roles. The council's main function has been to encourage key policy makers to commit themselves to innovation policy and help direct resources to targeted priority areas. The strong consensus orientation and small circle have ensured priority for agendas that have been perceived as important, notably innovation related to the information society. The council has not been able to develop more comprehensive economic development strategies that integrate many ministries. This is related to current developments in Finland, as its hitherto successful policy-making system is approaching a point where changes are needed. A horizontal, comprehensive approach may well lead to a redefinition of the council's role in decision making.

The Netherlands, with its Innovation Platform, and Austria have seen similar developments, in which the integration of stakeholders in agenda setting and priority setting represent a vital mediating role in an otherwise fragmented system. This is different from the Norwegian Innovation Committee, which has membership from six key ministries but less stakeholder involvement, although there is significant stakeholder involvement in the implementation process and project selection.

Thus, policy councils may be a powerful tool for creating a mediated and negotiated outcome in the priority-setting process, but may have weaknesses in terms of the ability to develop comprehensive, horizontal policies for innovation and sustainable growth.

Consultation and stakeholders

Among the merging patterns of governance is a growing tendency to relate to stakeholders more generally. In countries like Norway and Austria, the traditional corporatist set-up has played an important role in co-ordinating the state, employers and employees. However, this is typically weaker in the context of a more market-oriented system and new public management (NPM) practices. In innovation policy, as in other areas, this is often replaced by a "committee corporatism" of limited duration and mandate. However, as the following examples illustrate, practices vary.

The implementation of New Zealand's Growth and Innovation Framework (GIF) required widespread stakeholder involvement and commitment across the public and private sectors. To focus resources strategically in important sectors, the government established in May 2002 four private-sector taskforces to develop sector-specific strategies in biotechnology, information and communication technology (ICT), screen production and design. These sectors were chosen for their high growth potential and because they have horizontal impacts across the economy. The rationale for focusing resources was to create critical mass, scale (in order to compete globally) and specialisation.

A trend that seems closely linked to NPM is the increased use of external bodies and committees that play a role in formulating and implementing policies. This trend is visible in the Netherlands and Norway and constitutes in the latter a transformed "committee corporatism". External help is used to improve co-ordination and coherence, *e.g.* through frequent use of external committees and separate action programmes in which outsiders have increasingly a steering role.

One key task for good governance is to ensure effective prioritisation and agenda setting for innovation policy. This function may suffer in the absence of an explicit body for long-term strategic policy making such as a science and technology policy council or framework policies. An important finding from the MONIT project is that agenda setting and prioritisation are often weakly linked to strategic intelligence. In other words, strategic intelligence (like foresight) is given too little attention, either because such a function to improve policy learning is not available, or because its outcomes for policy making are neglected.

Stakeholder involvement in innovation policy should give greater weight to distinct governance issues. The experience of New Zealand and Finland suggests that more traditional stakeholder involvement, including of corporatist systems, should be expanded to develop participatory governance systems in which expert and lay groups have a say in innovation policy agendas and formulation. Table 4.1 summarises the positive and negative aspects of stakeholder involvement in the Netherlands.

Table 4.1. Positive and negative aspects of stakeholder involvement in the Netherlands

Positive aspects	Negative aspects
<ul style="list-style-type: none"> • Increases the user orientation of policies and consequently their effectiveness • Invites more transparency on the rules of the game • De-politicises some contested decisions • Circumvents departmental turf fights • Facilitates networking between different stakeholder groups 	<ul style="list-style-type: none"> • Lengthens the decision-making process • Increases the transaction costs of policy making • Composition of stakeholder groups can be skewed in favour of certain interest groups or positions

Source: Boekholt and den Hertog (2004).

Transforming agendas into implementation

Dealing with complexity

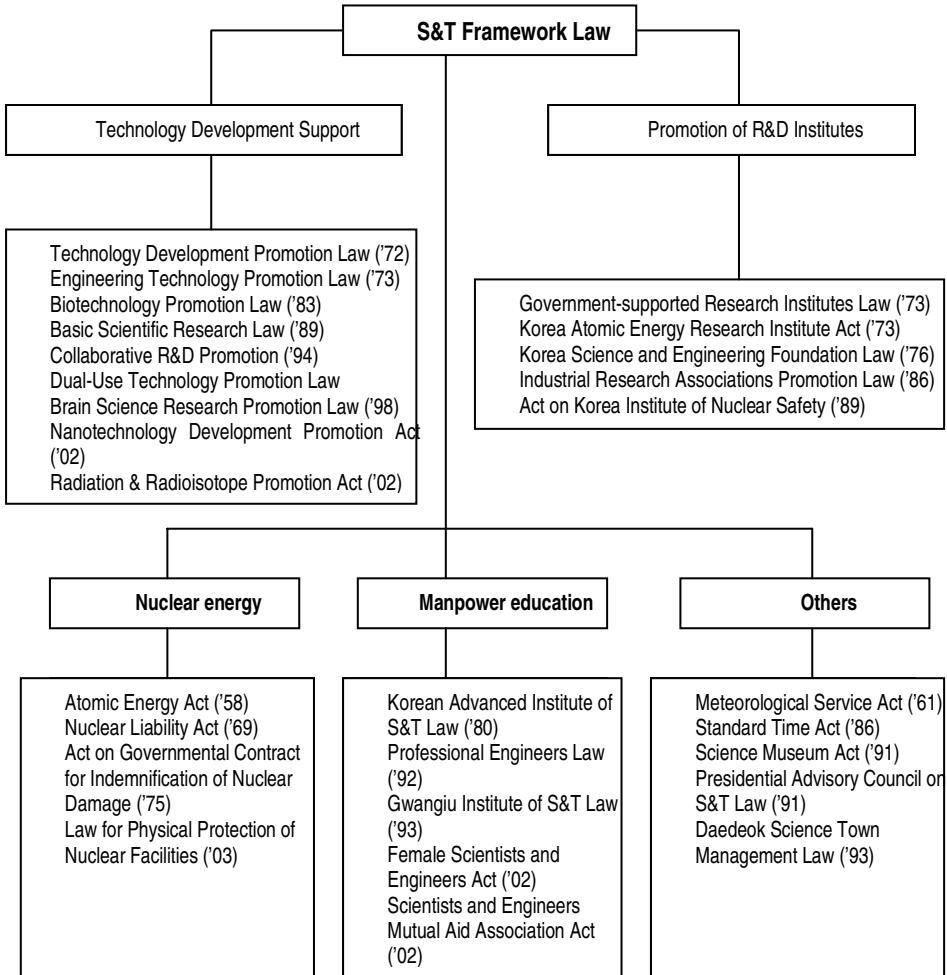
The institutional set-up is extremely complex in many countries, and governments will often need to adjust and simplify it in order to develop governable systems with acceptable co-ordination costs. Studies in the MONIT project show that governments are increasingly concerned about fragmentation, complexity and governability. As mentioned above, they increasingly respond by creating structures such as Science and Technology Policy Councils (Finland, Austria, Japan, Korea, the Netherlands) or strategic frameworks (New Zealand, Norway) to help achieve co-ordination and coherence.

Korea, for example, is in the process of reducing the complexity of the institutional environment and changing the governance system from the linear model to a more comprehensive approach. A complicated set of laws and regulations for science, technology and innovation (Figure 4.2) reflect the government's active role and leadership, but, at the same time, duplication and intervention. Indeed, the government sees excessive regulations and duplication of R&D programmes as problematic. Hence, the Korean government has developed plans to deal with this complexity (Hong, 2005):

- It recently strengthened the role and authority of the National Science and Technology Council.
- It has improved the system for planning, management, evaluation and diffusion of the outcomes of R&D projects.

- It will support government research institutes in order to improve their basic abilities, educate excellent research manpower and perform mid- and long-term projects that produce world-class research results.

Figure 4.2. The Korean STI system



Note: Figures in parentheses are the years the listed law were enacted.

Source: Korean Ministry of Science and Technology.

Ireland also demonstrates the need to deal with built-up complexity to meet the demands of new development models. In recent years, significant efforts have been made to bring innovation to the forefront of priorities, and contributions such as White Papers and inputs from stakeholders have pointed to the problems of a complex set-up and lack of coherence in policies and programmes. This is also related to country size:

“To some extent, the problem lies in the very complexity of the institutions and arrangements that comprise the governance system, which have their own historical origins and rationale, but at the same time reflect an insupportable policy overload for a small country, with associated gaps and duplications at the point of delivery.” (Hilliard and Green, 2005)

The Irish government’s commitment to innovation policy was laid down in the National Development Plan 2000-2006. Implementation of this plan is seen as dependent on a clear and strategic framework in which complexity is reduced and policy delivery enhanced. Such a framework was proposed, and after intense deliberations showing that the issue was highly contested, the following key pillars of the framework emerged in 2004:

- The appointment of a Chief Scientific Advisor.
- The introduction of a Cabinet Committee on STI to co-ordinate a “whole-of-government” approach to setting and delivering on STI priorities.
- Initial work on a knowledge society foresight exercise (Hilliard and Green, 2005).

Institutional renewal to ensure implementation

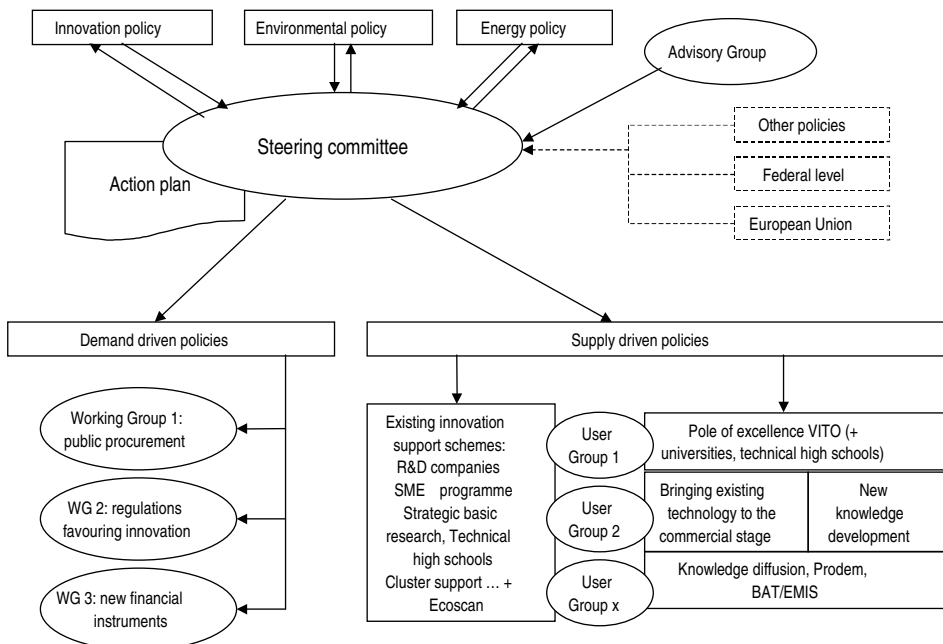
Traditional governmental structures may not be able to solve the inherent priority problems, and new governance structures will be needed to ensure integration and consistent agendas. The Flemish government has recently established a mediating institution to enhance integration between environmental and innovation policy, the Innovation Platform for Environmental Technologies (Dries *et al.*, 2005). As depicted in Figure 4.3, the aim is to activate innovation synergies among all relevant private and public actors and elaborate an action plan which defines key objectives and pinpoints synergies for the actors involved in implementing the platform. The implied networking arrangement will provide a useful arena for mediation and negotiation in achieving horizontal coherence.

The Dutch study of the information society (IS) argues that agenda setting plays a key role in horizontalisation, with the IS/ICT (information

and communication technology) policy agenda broadening from a science and technology agenda into one encompassing social and governmental changes. However, the organisation of horizontalisation is a slow process. In agenda setting, policy formulation and evaluation of individual departments, rather than integrated programmes, tend to dominate. This is illustrated, for example, by the relatively modest budget for interdepartmental programmes as compared to the overall IS/ICT budget (den Hertog and de Groot, 2005).

In many countries, traditional practices for implementing new policies are relatively rigid. As they seek to become more flexible to adapt to new needs, they often adopt new institutional solutions. In Norway, for example, to increase investment in R&D and reach the OECD average, a new fund for research and innovation was established, and earnings may be used to fund new initiatives. This made it possible to launch a long-term commitment for R&D investment that would have been impossible within the logic of the annual state budget (Remøe, 2005). Similar developments are taking place in Austria (Jörg, 2005) and Ireland (Hilliard and Green, 2005).

Figure 4.3. The Flemish innovation platform



VITO = Flemish Institute for Technological Research.

BAT/EMIS= Best available technology/Energy and Environmental Information System for the Flemish Region.

Source: Dries *et al.* (2005).

Because of organisational or institutional inflexibility, it is easier to create new governance structures than to try to adapt existing ones. The shift from institutional to more network and programmatic types of initiatives leads to more complex governance structures, as these help to weave an increasingly complex web of new and old players in the innovation system. Well-managed older players make sure to join and even shape in part the new initiatives so as to avoid being abolished.

Decentralisation and accountability: the increasing role of agencies

Throughout the 1990s, governance practices changed in many OECD countries. NPM was introduced in various ways and degrees and led to decentralisation and governance by objectives and incentives, including in governance practices influencing innovation policy. MONIT has demonstrated that this has helped increase accountability, but at the same time has often led to increased fragmentation.

The division of labour between upper and lower levels of government is changing, leaving the upper levels (ministries) responsible for policy and the lower levels charged with co-ordinating a number of instruments often financed by separate ministries. In some cases this is linked to the need to reduce complexity and redirect the roles of institutions. The general process may be termed agencification, a process most evident in Japan where the Ministry of Economy, Technology and Industry has launched a process in which the ministry's policy making has become more separate from implementation because implementation agencies are more independent (Ichikawa, 2005). One of the main results was to give implementation agencies like the New Energy and Industrial Technology Development Organisation more operational freedom to ensure that managing and implementing R&D policies can be more independent from the fiscal constraints of the annual budget (Shiozawa, 2004). This reform also sought to improve vertical coherence through regional cluster policies.

In the countries covered by the MONIT project, the pattern varies. One clear trend is towards regionalisation of innovation policy, as in the Norwegian plan for holistic innovation policy. This is supported by more agency freedom and a clearer interface between policy formulation and implementation (Jörg, 2005). The Research Council of Norway, instead, is micromanaged, with significant earmarking by ministries, even though a unified council has been formed (Remøe, 2005). In Finland, TEKES takes on co-ordination tasks by promoting horizontal policies in its programmes but has no mandate to do so (Hayrinen-Alestalo and Pelkonen, 2005).

A critical question that arises is: To what extent are the agencies designed to promote co-ordination and increase coherence in the system? Results from various MONIT studies indicate that policy makers should refrain from micromanagement and give the agency level more independence and thus a more strategic role. This is important since the pervasive trend towards greater use of NPM in recent years tends to increase the need for compensating practices to ensure coherence (see Box 4.2).

Box 4.2. New public management may reduce strategic orientation in policy systems

NPM and decentralisation may reduce the strategic orientation of policy and reinforce short-termism. On the one hand, it may be more difficult to involve stakeholders in long-term strategic decision making, and on the other, policy may be dominated by concerns of the ministry of finance and short-term or annual budgeting practices. This leads to some further points:

- Some countries have established strategic bodies like science and technology policy councils to help overcome fragmentation and short-termism.
- Long-term orientation/goals are not effective without visible or specific commitment by government.
- The process of agencification is often coupled with regionalisation of governance structures to involve regional institutions and authorities more closely in innovation policy making.
- The pervasive trend towards NPM leads to a concentration of co-ordination in the implementation phase, in some cases resulting in institutional overload at the agency level.
- A referee function is often lacking in decentralised systems, leading to conflicts and overlaps between institutions and instruments.

Policy integration and linkages

When applying the NIS approach in innovation policy, governments face the challenge to combine efforts for knowledge creation, diffusion and use in many domains, basically with economic growth in mind. Co-ordination and integration of policy objectives and instruments takes place within the context of a joint imperative, and policy components in each domain may build upon and reinforce each other.

There is a great potential for linking innovation policy with other policy areas. However, even in such cases, many ministries and departments engage in the process based on their traditions, perception of their own area and competence, as well as perceptions of other policy areas. Typical issues that arise are:

- Lack of understanding of innovation policy in other policy domains undermines communication in the co-ordination process (see next section).
- Strong traditions, in particular in the science policy domain, create segmented “belief systems”.
- Different “schools of thought”, e.g. between neo-classical economics and innovation research, may block integration of innovation and economic policy.
- Dynamic coupling of problems, policy proposals and politics often takes place in the context of specific windows of opportunity.
- Specific sectoral policies may be framed in ways that define others as rivals.
- Strong political leadership is necessary to create a common vision and a legitimate basis for joint agendas.

Integrated policy agendas are more difficult in the case of opposing imperatives. Such a conflict of interests is evident for linkages of innovation policy with sustainable development (Hjelt *et al.*, 2005), transport policy (Whitelegg, 2005) and health-care policy (Hayrinen-Alestalo and Pelkonen, 2005). In addition to the above-mentioned issues, others arise as well, as indicated in the sustainability summary in Annex E):

- *Stakeholders differ.* S&T policy focuses on economic competitiveness, and the most relevant stakeholders are the business and research communities. Very little effort has been made to engage stakeholders representing technology users in the policy process. For its part, sustainable development policy has from the beginning had very broad stakeholder involvement from different interest groups.
- *Drivers of policy formulation differ.* Sustainable development and environmental policy are traditionally driven by international agreements and global problems, whereas innovation policy in most countries is very much driven by national concerns. S&T policies traditionally aim at increasing national competitiveness and wealth, whereas sustainable development policy is concerned with improving international governance for tackling global problems. It follows that

S&T policy needs to be more alert to international developments and that sustainable development policies have to tackle national challenges.

- *Policy measures differ.* Sustainable development and environmental policies mainly use regulative and fiscal measures, often based on international agreements, with strict targets and rules regarding actions. In addition, they adopt measures such as standards, voluntary agreements and information sharing. In contrast, the main innovation policy measure is resource allocation for R&D, and regulatory and fiscal instruments have a much smaller role.
- *Resources for actions differ.* Political power is ultimately linked to control of money. Typically, sustainable development and environmental policies have very few resources, whereas S&T policies are based on the state budget for R&D allocations. This difference may hamper efforts to design joint actions that would require some reallocation of resources (Hjelt *et al.*, 2005).

In the area of environmental protection, opposing imperatives are not simply technical, as the environment takes precedence over economic growth. However, to release the win-win potential in this relationship it is necessary to decouple the link between policies for economic growth and environmental pressures and create different linkages for green innovation (innovation that promotes economic growth while improving or being neutral to the Earth's carrying capacity) (see Box 4.3).

The win-win potential is better exploited if environmental policy is transformed into sustainable development policy, including social and economic development. This will also create more space for adjoining imperatives and ensure that policies for innovation and growth as well as sustainable development reinforce each other.

Studies in Norway address the issue of policy integration from the viewpoint of environmental policy, but with relevance for the present discussion (Collier, 1997; Lafferty *et al.*, 2005). According to a three-point definition, environmental policy integration should aim to:

- Achieve sustainable development and prevent environmental damage.
- Remove contradictions between as well as within policies.
- Realise mutual benefits and achieve the goal of mutually supportive policies.

Box. 4.3. Linkages between innovation and environmental policy

There are several good reasons why a more explicitly innovation-oriented environmental policy is needed:

- *Environmental effectiveness*: An innovation-oriented environmental policy is necessary to promote the development and introduction of a new series of techniques that make major improvements in environmental quality more attainable.
- *Decoupling economic growth from environmental pressure*: An innovation-oriented environmental policy is necessary to achieve simultaneously ambitious socio-economic and environmental objectives and substantially raise the eco-efficiency of the economy.
- *Cost-effectiveness*: An innovation-oriented environmental policy is necessary to reduce the cost of environmental measures and achieve more environmental results for the same level of costs.
- *Take advantage of win-win opportunities*: An innovation-oriented environmental policy is necessary to focus on win-win opportunities that have remained unused in order to lower production costs and at the same time pollute less.
- *Market and socio-economic benefits*: An innovation-oriented environmental policy is necessary to benefit from the promising market and socio-economic benefits of the fast-growing environmental industry.

At least three main reasons for a more explicitly environmentally oriented innovation policy can be mentioned:

- *Innovation policy promotes R&D on promising future technologies*. Given the scale and magnitude of environmental problems, technologies limiting the environmental damage of production and consumption are important. Such innovations are not only hampered by “positive” knowledge spillovers that discourage inventors in general but also by “environmental externalities” in the diffusion stage. In such a situation, there is obviously an important role for innovation policy in remediating these market failures.
- *Environmental innovations have some particular properties* compared to most other types of technologies. This is why there is relatively little environmental R&D. First is the importance of government policy in creating demand by regulatory and other environmental instruments. Second is the fact that R&D in environmental innovations is often very complex because it usually involves various scientific and technical disciplines and the necessary competence may not be available in the company undertaking the research.
- *Innovation policy needs to be internalised by other policy domains* to be comprehensive and perform through better integration with the demand side. Innovation becomes a pull factor if it is part of sectoral policies and if public tenders take it explicitly into account. These “third-generation” innovation policies have to become fully horizontal and support a broad range of social goals if they are to achieve their objective of increasing the overall innovation rate in societies.

Source: Dries *et al.* (2005).

From the perspective of environmental policy, integration into innovation policy needs to be based on three criteria: comprehensiveness, aggregation and consistency (Lafferty and Hovden, 2003). This leads to a perspective for integrated policy agendas for sustainable development:

“Environmental policy integration implies the incorporation of environmental objectives into all stages of policy making in the non-environmental sector, with a specific recognition of this goal as a guiding principle for the planning and execution of policy.

“Further it is accompanied by an attempt to aggregate presumed environmental consequences into an overall evaluation of policy, and a commitment to minimise contradictions between environmental and sectoral policies by giving priority to the former over the latter.” (Lafferty and Hovden, 2003)

Empirical findings from the MONIT project confirm that, to be more easily implemented, policy integration may need some standards. The Norwegian study identified benchmarks against which policy makers can identify key leverage points for integrating policy. Bringing together the two key dimensions for coherence, Lafferty *et al.* (2005) develop benchmarks for horizontal and vertical environmental policy integration (Table 4.2).

Table 4.2. Benchmarks for horizontal and vertical policy integration

Benchmarks for horizontal policy integration	Benchmarks for vertical policy integration
<ul style="list-style-type: none"> • A “constitutional” mandate providing special status of rights and goals in a given domain • An overarching strategy for the given domain, with clear goals and operational principles with a political mandate from high-level authority • A national action plan with overarching and sectoral targets, indicators and timetables • A responsible executive body for co-ordination, implementation and supervision of integration processes • A communication plan for sectoral responsibility and transparent intra-sectoral communications • An independent auditor with responsibility for monitoring and assessing implementation at both governmental and sectoral levels • A board of petition and redress for resolving conflicts 	<ul style="list-style-type: none"> • A scoping report providing initial mapping of sectoral activity with (environmental) impacts associated with key actors and processes • A forum for structured dialogue and consultation with stakeholders and citizens • A sectoral strategy for change with basic goals and strategies for the sector • An action plan to implement the strategy with priorities, targets, timetables, policy instruments and responsible actors • A green budget for the integration and funding of the action plan • A monitoring programme for overseeing the implementation process and its impacts and results, with learning loops to revision of strategies and targets

Although the study finds that the level of integration meets some (parts) of the benchmarks, the overall assessment is that integration of innovation and environmental policy has not taken place.

In line with the Finnish study on sustainable development (Hjelt *et al.*, 2005), this illustrates that policy integration needs to be based on appropriate agenda setting, including promoting a wide understanding and acceptance of how innovation policy can help achieve goals for sustainable development and *vice versa*.

It should be noted that policy co-ordination and integration do not only take place between single ministries or sectors. Ministries are often informally grouped in camps with overlapping interests (see Box 4.4 for an example). Such grouping may have conflicting impacts: they may ease negotiations as important positions to be negotiated are fewer, but they may also make negotiations more difficult if these positions are less negotiable.

Box 4.4. Ministerial camps in Norway

There is a tension between Norwegian ministries, in particular the two camps of “industrial ministries” like trade and industry, agriculture and fisheries, and “welfare ministries” like social affairs and health. These two camps have quite different outlooks on R&D policy and very different traditions and cultures, making positions in the research committee of the ministries (DFU) quite different. The Ministry of Science and Education has better contact with the industry ministries, as the latter seem to have a stronger R&D policy as a means to achieve political goals. There is no policy integration between the two camps, *e.g.* to let industrial R&D be better integrated in areas of health to enhance health technology and the relevant industrial development. Rather, such group structures compete to some extent to have their priorities and ways of thinking embedded in White Papers. For example, the recent White Paper on research is tilted towards industrial issues while welfare issues are less present. In addition, there are bilateral negotiations between ministries, as currently between the ministries of Agriculture and of Fishery in their attempt to align their research policies.

Source: Remøe (2005).

The challenge of co-ordination

As governments attempt to respond to greater external and internal complexity and dynamism, policy co-ordination becomes the main vehicle to achieve improved coherence. Table 4.5 indicates some major tools for co-

ordination and their primary function in coherence terms. Some findings from the MONIT work illustrate the trade-off nature of policy co-ordination:

- Co-ordination mechanisms may be static and short-term rather dynamic. This is particularly true when there is significant institutional fragmentation and short-term considerations dominate the agenda setting. Co-ordination may be reduced to annual budget-related decisions and decentralised to implementing institutions rather than serving to create long-term or strategic policy priorities.
- Designing co-ordination mechanisms takes time and requires financial support. Efforts to co-ordinate policy need a sense of urgency to affect policy governance. Without a sense of urgency, co-ordinating arrangements may fail, and the system may build up resistance to later attempts. If policy co-ordination leads to a perception of inability to follow up responsibilities in the line of command, co-ordination is likely to be associated with costs and will suffer. In the case of the Dutch information society (den Hertog and de Groot, 2005), it is argued that policy-making processes are rather slow, as strategy formulation (and consensus seeking) involves lengthy consultations and discussions in which quite a number of actors participate. Co-ordination and co-operation are mostly considered when it is more or less compulsory owing to departments' clear responsibility in a particular area. It is less perceived as a way of organising matters more conveniently or as a way to speed up policy implementation. Hesitancy and loss of policy coherence are reported as well.
- People are more decisive than structures but structures support people. Well-functioning co-ordinating activities require personal leadership and commitment, and policy makers should take care to ensure supportive structures for person-based co-ordination activities.
- Different levels typically require different mechanisms. This implies that well-functioning arrangements for co-ordination at ministerial level may be less relevant on lower levels. The study of sustainable development, for example, also shows that different mechanisms are needed for different types of policy issues. Furthermore, in some cases successful co-ordination on one level reduces the need to invest in co-ordination on another. This may depend on the "political urgency" of the issue. In cases where there is low long-term potential for conflicting policy issues, co-ordination at the implementation level can compensate for the lack of co-ordination in agenda setting, but when there is a high short-term potential for conflict, the basis for policy integration must be determined when setting the agenda.

- As in the innovation system, there is a need to identify strong and weak links in the system. Appropriate analysis of failures of co-ordination may make it easier to design and implement targeted co-ordination arrangements.

Table 4.5. Co-ordination tools and coherence

Co-ordination tools	Horizontal coherence	Vertical coherence	Temporal coherence
Policy frameworks	X		X
Policy councils/platforms		X	X
White Papers	X		
State budgets	X		
Government committees	X		
Task forces	X		
Informal networks and negotiation	X		
Agency development		X	
Co-ordination with regions		X	
Monitoring systems	X	X	X
Merging ministries	X		
Joint programmes		X	

Providing learning to policy processes

Policy learning

Learning, evaluation and accountability all become more important as governance structures change and decision making become more complex. The general trend towards NPM modes of governance has taken place with a view to increasing accountability. But the very same trend increases complexity as well. Governments therefore need to find better ways to produce, disseminate and use policy-relevant knowledge.

Policy learning implies seeing policy makers and other actors linked to the policy-making process as endogenous to the overall innovation system. An evolutionary view of policy learning implies that policy making is itself an evolutionary process with institutional change and innovation as inherent outcomes (van der Steen, 2000).

Evaluation of innovation policies and their instruments is key to policy learning, but is seldom institutionalised and implemented to accommodate such a role. For example, studies in Austria illustrate the marginal role of evaluation, as evaluation results are mostly used to legitimise programmes *ex post* rather than integrated in the learning process (Table 4.6).

Table 4.6. Use of evaluations in Austria

Impacts of conducted evaluations		
	N	%
<i>Ex post</i> legitimating of the programme	27	90 %
Re-allocation of funds	10	33 %
Input for stop-or-go decisions	6	20 %
Substantial change of funding policy	9	30 %
Change of processes	2	7 %
Other	9	30 %
Total	30	

Source: OECD TIP survey, Jörg (2005).

Emergent policy making

NPM generally results in improved accountability and a stricter interface between policy making and implementation. However, it may also point to potential loss of the capacity of the state to govern innovation policy (Grande, 2001). Findings from policy studies in the MONIT project suggest that complex, comprehensive policy areas like the information society and sustainable development require a great effort on the part of governments to make these areas coherent. Both structural and cross-sectoral complexity requires close policy attention. Such policy areas typically cut across sectors and ministries' competencies and represent a degree of comprehensiveness that exceeds the knowledge available for traditional governance practices. This finding may be further fine-tuned:

- Emergent policy making is different from traditional, bureaucratic policy making, is less downstream-oriented and relies less on hierarchical control and information systems. It relies more on flexible, decentralised management practices, appropriate learning and flexibility. A high degree of self-organisation under a broader strategic objective from the top is typical.

- To achieve coherence, formal co-ordination may not be needed. In fact, co-ordination is a costly process, and comprehensive policy areas may be better off with indirect co-ordination that supports self-organisation and development and use of policy-relevant knowledge. Too deliberate co-ordination schemes may reduce collaborative behaviour and lead to inefficiencies.
- By-pass operations which circumvent existing structures with new arrangements often emerge to tackle these complex policy issues and may be more efficient in achieving coherence.

The Norwegian information society study shows that the country's comprehensive e-Norway policy has a different influence on the policy cycle and a different functional impact than smaller-scale policy schemes. The larger the policy scheme, the less the traditional, downstream or deliberate policy-making style is effective (Pedersen, 2005).

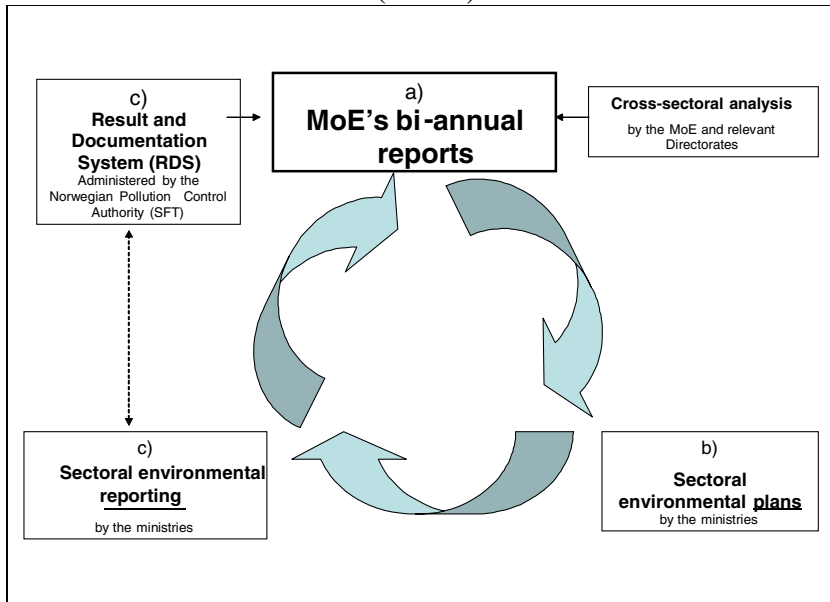
Similar lessons are derived from the Austrian study on the information society (Ohler *et al.*, 2005). Two attempts to establish an overarching information society strategy failed. However, they had a mobilisation effect and triggered initiatives in the various information society domains. They showed that there are only weak links between STI policy and sectoral policies (*e.g.* transport and ICT). There is also co-ordination fatigue: co-ordination is (perceived as) a costly and time-consuming activity and there is a tendency to minimise co-ordination efforts.

The importance of emergent policy making is also supported by another lesson from the Austrian case. Often, coherence is not achieved by consensual policy planning, but stems from actions of an agent of change able to act as a point of orientation or centre of gravity for other players. Such an agent can however also use its position to implement formal co-ordination mechanisms that would not otherwise be developed.

Horizontal monitoring

Emergent policy making for comprehensive, cross-cutting policy areas requires well-developed information and learning systems. An example of such a system is illustrated in Figure 4.4, taken from the Norwegian environmental monitoring system. Innovation policy that cuts across ministerial boundaries will need management and documentation systems based on mandatory reporting on progress on given indicators in each area.

Figure 4.4. The main elements of the National Environmental Management System (NEMS)



Source: Ruud and Mosvold Larsen (2004).

All countries organise evaluation and assessment activities linked to the policy cycle in one way or another. The information and documentation presented in Figure 4.4 is but one example. However, it is also generally the case that monitoring and benchmarking are not coupled with policy evaluation. For example, they are seldom used for evaluation purposes to analyse the impact of information society or ICT policies – which would require advanced evaluation studies – but to analyse their position *vis-à-vis* competing countries and to motivate adaptation or more intense policy efforts, which are mostly presented in separate policy documents. Policy design, monitoring and benchmarking, and policy evaluations, where available, take place separately. Policy learning is therefore mainly piecemeal.

Building more intelligence into policy making

Evaluation and learning practices vary in the MONIT countries, but some important lessons emerge:

- Policy learning is mostly *ex ante* through mechanisms like White Papers, but there is less focus on *ex post* and follow-up of programmes

and institutional reforms. Norway provides one example of institutional evaluation of the reform of the research council that was integrated with the policy-making process.

- Various organisational mechanisms in place in most countries may enhance learning if exploited properly. Task forces, teamwork, etc., should be institutionalised to support a more learning-intensive governance style.
- Some countries engage in international learning beyond the usual exchange mechanisms, *e.g.* in international bodies like the OECD. For example, the Netherlands commissioned a consulting group to conduct an international, comparative study of innovation governance in selected countries (Technopolis, 2003).
- Piecemeal evaluation has shortcomings, and, as many reforms and innovation policies span sectors and interact with others, there is an increasing need to conduct more systemic evaluations in order to improve understanding of interactions and impacts.
- With more weight given to NPM in many countries, the agency level should be better equipped with strategic and intelligence functions to better co-ordinate governance levels.
- Fragmented governance structures often represent a loss of strategic capacity, and governments should pay more attention to improving mutual understanding of innovation-related issues across ministries.
- Institutions for knowledge production and policy analysis are often linked sectorally to specific ministries and domains; this may reinforce a segmented culture that makes it difficult to produce coherent, policy-relevant knowledge.
- Intelligence and policy learning may get a boost from the implementation of monitoring and reporting systems that improve the joint knowledge base for innovation governance.
- Structural challenges often require governance processes that include changes in trajectories and infrastructures over a longer time span. A focus on transition management may create a comprehensive platform for innovation governance (Box 4.5).

Box 4.5. Transition management

Transition management implies a policy process that is different from existing processes in extent, duration, and approach:

- It is built on *policy integration* and horizontal co-operation between policy agents is a fundamental condition because it supports the co-ordination of system actors and creates new possibilities for interaction in the transition.
- It sets *long-term goals* whereas policy today is dominated by short-term concerns. It is essential to treat the short-term agenda in a long-term perspective. The transition agenda sets no fixed long-run objectives, but formulates a shared concept of sustainable development as a point of departure to co-ordinate existing and new initiatives.
- The particularity of transition management is that it stresses the challenges in the *path* towards an end state. It redefines the role of policy as “modulation” agent, with conflicting time scales in the transformation at different systemic levels and different subsystems. This is achieved through the organisation of project-based learning experiences and policy experiments in co-ordinating the different time scales of different institutional processes.

Source: Dries *et al.*, 2004.

Chapter 5

Implications for Policy: Towards National Capabilities in Innovation Governance

OECD countries face a number of both common and nation-specific challenges in terms of accommodating governance structures and processes to a changing world. Tensions and inertia are typical of all countries, and most need to develop long-term strategies for growth and change while inducing changes in governance practices, institutions and learning capabilities.

National capabilities

The results reported illustrate a number of dilemmas and implications for innovation policy governance in OECD countries. Globalisation, a more innovation-driven economy, structural change, ageing of populations, tight fiscal constraints, etc., drive governments to make long-term changes in their innovation systems and socio-institutional changes in governance and policy-making. They face several dilemmas in this process, for example:

- Significant tensions between disparate cultures, priorities and constituencies signify that traditional governance structures are under pressure. Governments must manage these tensions with the goal of creating a legitimate basis for coherent agenda setting.
- History counts and represents strong inertia for governance. Governments need to renew governance and institutions, and these adjustments are difficult to induce as corporatist and other influences take part in prioritisation.
- Many countries have a great need to develop long-term strategies for growth and change, but may lack the institutional resources and mechanisms to do so. Perceived challenges are all too often not met as inherent short-termism maintains its grip.

The material presented in this report points to a number of issues that need to be addressed in third-generation innovation policies. They hint at some important capabilities required of governments.

Balancing imperatives: Innovation policy is generally compatible with most policy areas, despite differences in their need for growth. However, social and environmental policy and, more generally, sustainable development policy, have different or even opposing objectives and requirements. The increasing debate on climate change and carrying capacity makes it necessary for government to promote a growth model that limits negative pressures on environmental and social objectives.

Creating a vision: Vision plays an important role in the integrative potential of political leadership. It can communicate a rationale, objectives and preferences, and create a legitimate basis for priorities that may otherwise be difficult to justify. An effective vision will also facilitate co-ordination of ministries and agencies through joint understanding of the goal of common efforts.

Developing appropriate knowledge bases: The innovation system approach argues strongly for networking and collaboration among actors, as does third-generation innovation policy, with its focus on broader, more comprehensive agendas. To overcome inertia, governments need to ensure appropriate knowledge bases and find ways to promote policy-relevant knowledge. Such knowledge should include insight into the sources and consequences of current dynamic changes and a good understanding of how policy areas interact to create incentives or disincentives for innovators. It should also include better collective understanding of innovation policy on the part of governments and of its potential role in strategic approaches to sustainable economic development.

Developing a strategic horizontal approach: Many countries lack a strategic focus, while others have established institutions like science and technology policy councils. The MONIT material indicates that these may be too narrow, as they often concentrate on core science, technology and innovation (STI) policies. A strategic horizontal approach needs to include and develop the innovation policy potential in other ministerial domains and ensure a co-ordinated division of labour between them. This becomes more important because of social issues (e.g. welfare issues) that need to be better integrated with innovation. This implies a definition of innovation policy that goes beyond the sectoral approach.

Designing agencies: Because most governments have introduced NPM practices, the design of agencies and their interface with their principals (ministries) become crucial. Governments should design agencies so as to create an effective division of labour between the two layers. While governments should retain long-term policy competence, they should give agencies a sufficient degree of flexibility to ensure coherent and timely implementation of policies and programmes. In particular, micro-

management of agencies is counterproductive if the goal is to achieve coherent governance. It will be of great importance to better exploit learning gained through reform and implementation processes.

Developing pragmatic public-private interfaces: Over the years, the interface between the public and private sectors has shifted from strong state intervention (up until the early 1980s) to much less intervention under NPM. While sound macroeconomic policies and framework conditions are a must for modern innovation policy, there is great potential for more pragmatic interfaces. These could include balanced stakeholder mechanisms as well as cluster policies which offer greater potential for packaging a number of policy areas in a given cluster. Effective interfaces are needed to leverage longer-term priorities and manage transitions in structures and infrastructures.

Integrating learning in governance practices: To achieve horizontal as well as vertical coherence, governments need to draw on the support that knowledge offers. This points to the need to manage an appropriate knowledge base and include it for policy purposes, but the MONIT material also implies that governance and co-ordination modes might be improved in order to promote learning processes throughout the system. In particular, governments should develop ways to introduce what this report terms “inherent policy making”, which combines learning with decentralisation and increased self-organisation.

Develop and implement action plans with monitoring and reporting systems: Third-generation innovation policy cannot be properly implemented without precise targets and intelligent follow-up. Governments should increase their capacity to develop actions plans based on horizontal strategic approaches and translate these into concrete measures to be taken by each ministry or agency. This will enhance vertical coherence, with monitoring and indicator systems ensuring sound reporting of empirical results to the strategic apex. This is tightly linked to evaluation and learning.

Improving evaluation and learning: Evaluation practices in MONIT countries are mostly piecemeal and far less geared towards informing policy than they might be. In general, governments should create a solid basis for evaluation and learning and integrate it into the policy-making process. This includes evaluation of broader reforms, as knowledge about the impact of innovations is useful for feedback and policy formulation. A more holistic approach to evaluation and learning will enhance the reflective capabilities of the governance system and lead to more effective policy.

Conducting meta-evaluations: Policy makers should invest more in evaluating the broader institutional framework and policy mix than they presently do. Evaluations are often limited, and policy makers lack systemic

insights into the policy set-up. As governments themselves, through segmentation and bureaucratisation, tend to reinforce a segmented understanding of the system, such meta-evaluations may prove highly useful for overall, strategic learning among policy makers.

Directions for further work

The two years of the MONIT project have left several questions unanswered. Seeing the NIS project and the MONIT project as a continuum, some directions for further work are indicated.

Evaluation and learning practices. These lie at the heart of comprehensive, coherent policy making, but the MONIT project has shown that there is insufficient attention to these practices. A joint effort in the TIP working party might contribute.

Agency management and policy implementation. Continuing restructuring and development of governance practices indicate that the agency level is gaining in importance but its role in implementing policies in a setting with multiple principals lacks sufficient focus.

Integrating mechanisms between policy areas. Tools are needed for mutually supportive policies and instruments.

Stakeholder participation. This includes both the policy level, through various councils or other means, as well as programme management and project selection. Work should also address the impact in terms of inherent priorities, preferences for established industries and long-term commitments.

Improved methods for country peer reviews of policy mixes and governance practices. It becomes more important to understand the strengths and weaknesses of a national innovation and governance system on its own merits in addition to learning and benchmarking based on indicators.

Annex A

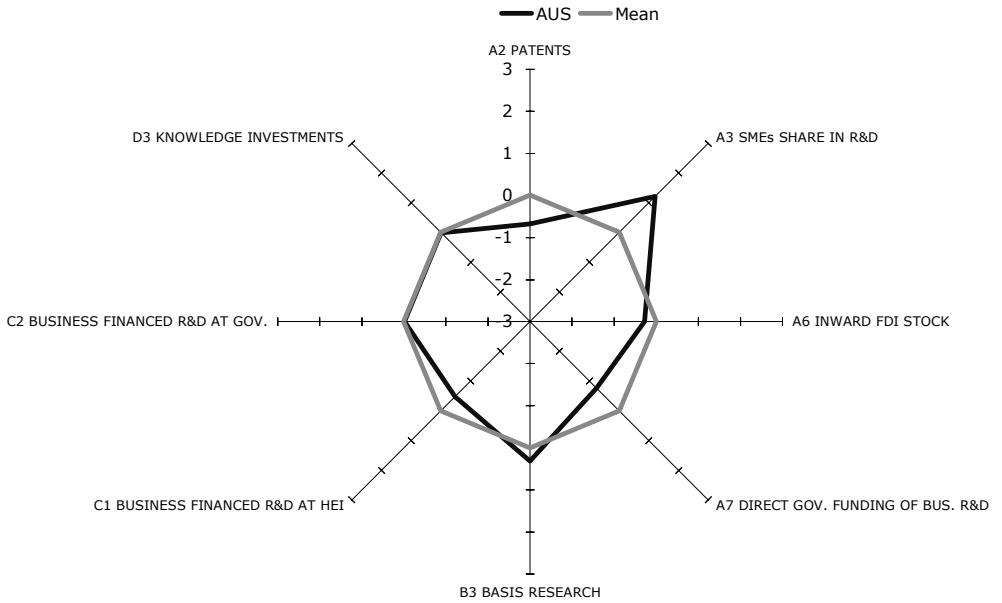
Participation

Country	WP 1: Governance	Information society	Sustainability / transport	Regional policy
Australia	X			
Austria	X	X	Both	
Belgium	X		Sustainability	
Korea	X			
Finland	X	X	Sustainability	
Greece	X	X		
Ireland	X	X		
Japan	X			
Netherlands	X	X		
New Zealand	X			
Norway	X	X	Sustainability	X
Sweden	X	X		
Switzerland				

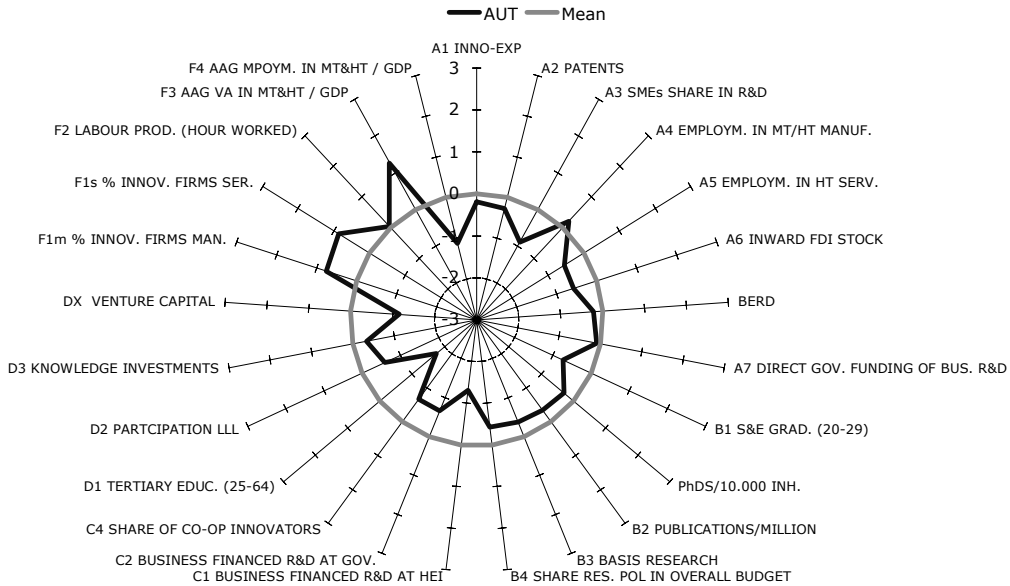
Annex B

STI Performance of Participating Countries

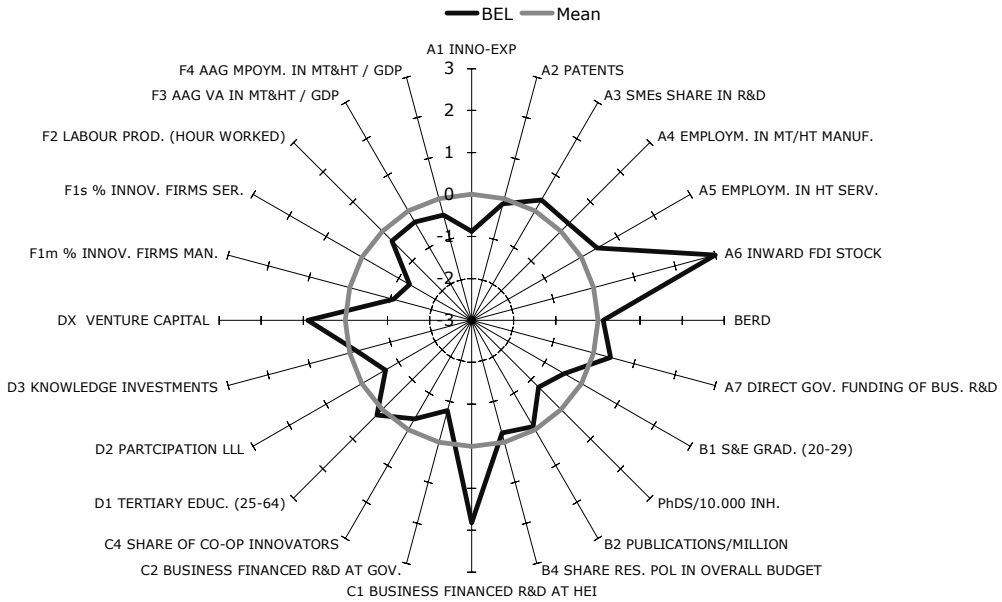
Australia

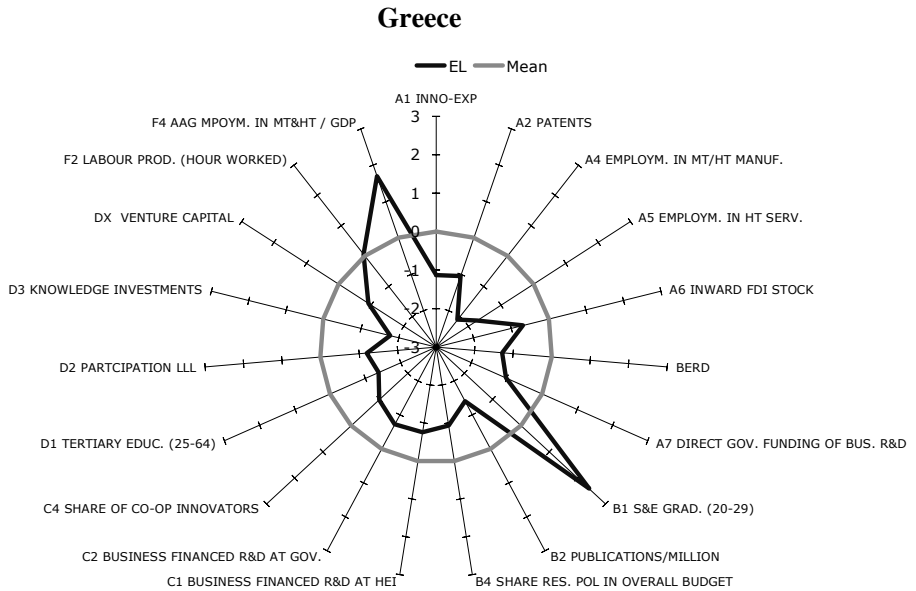


Austria

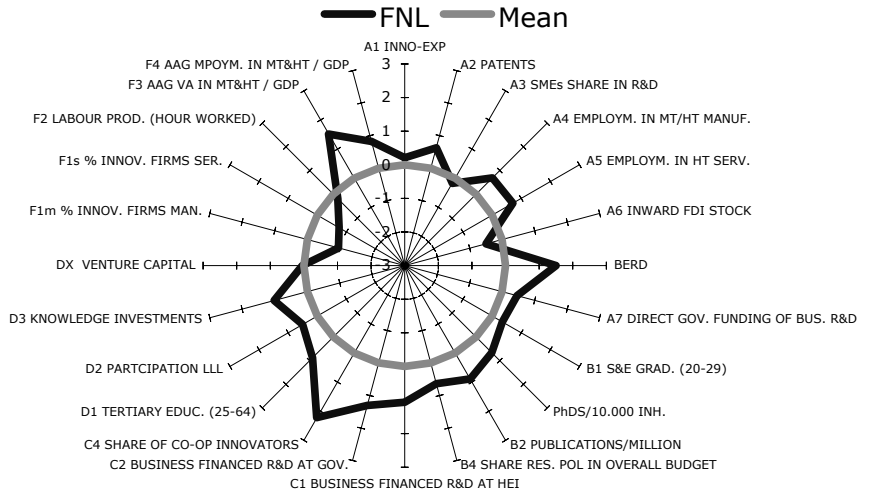


Belgium

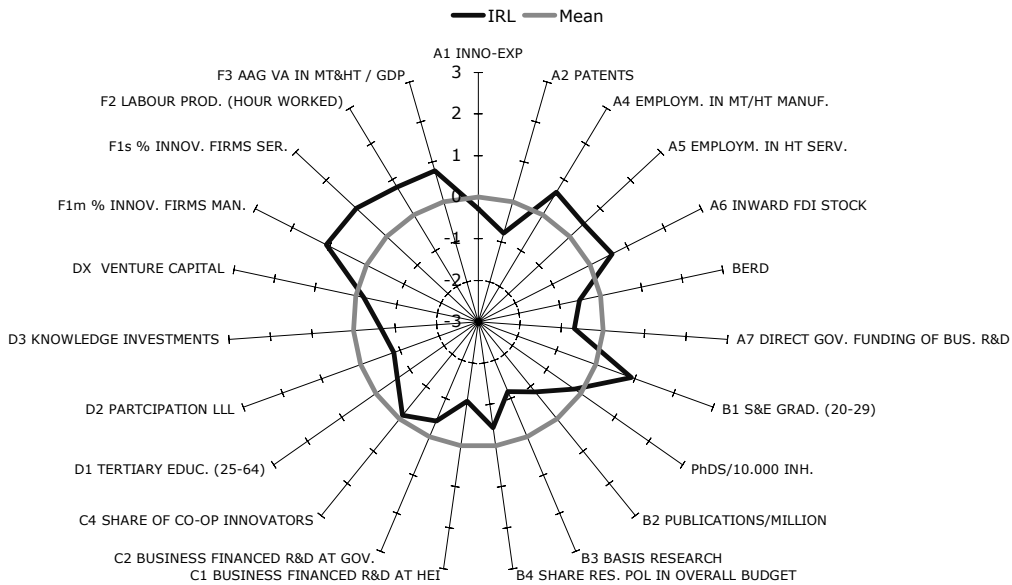




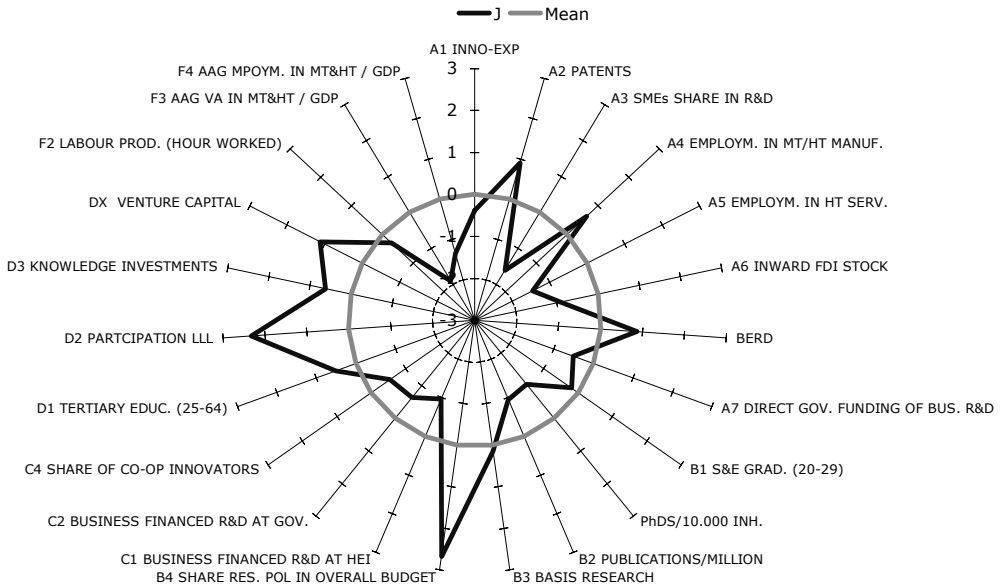
Finland



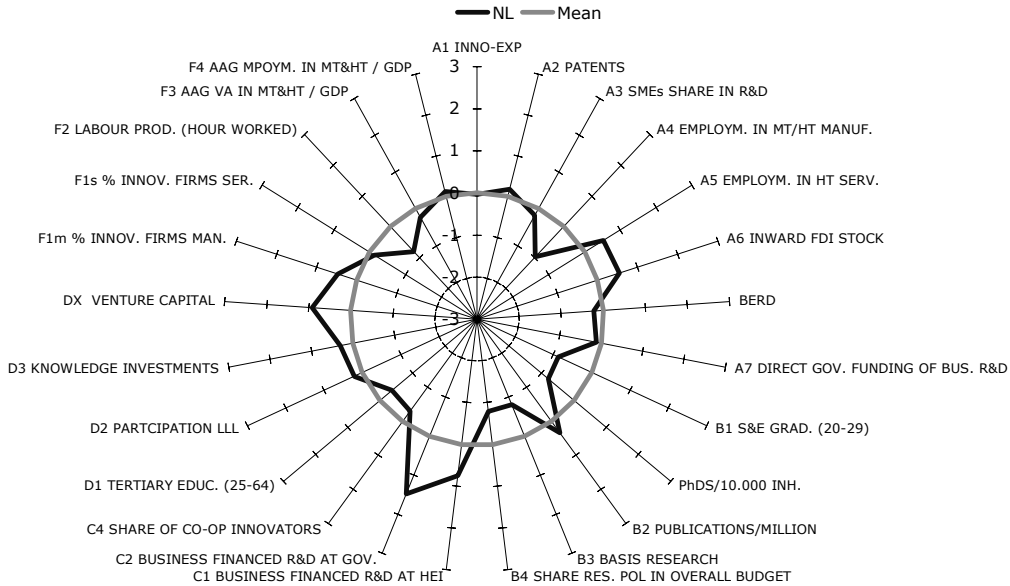
Ireland



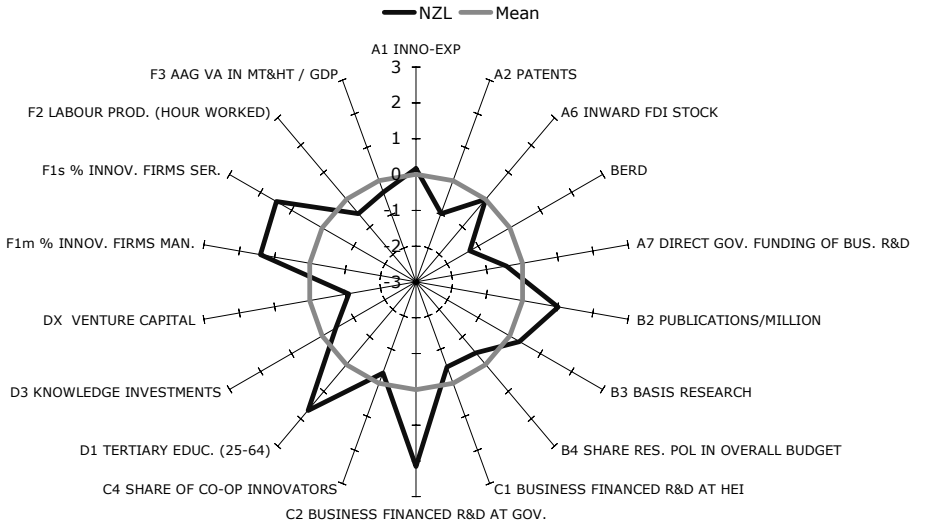
Japan



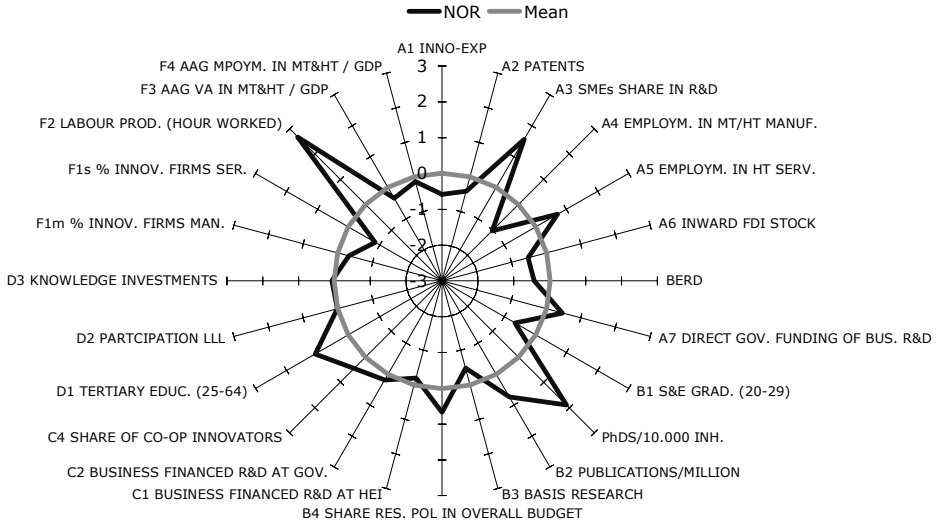
Netherlands



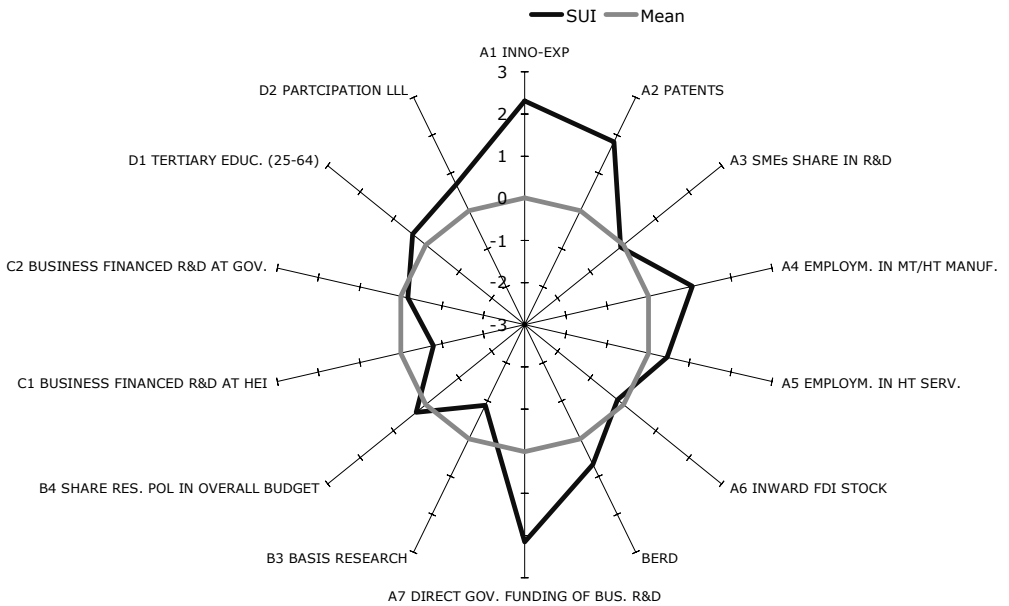
New Zealand



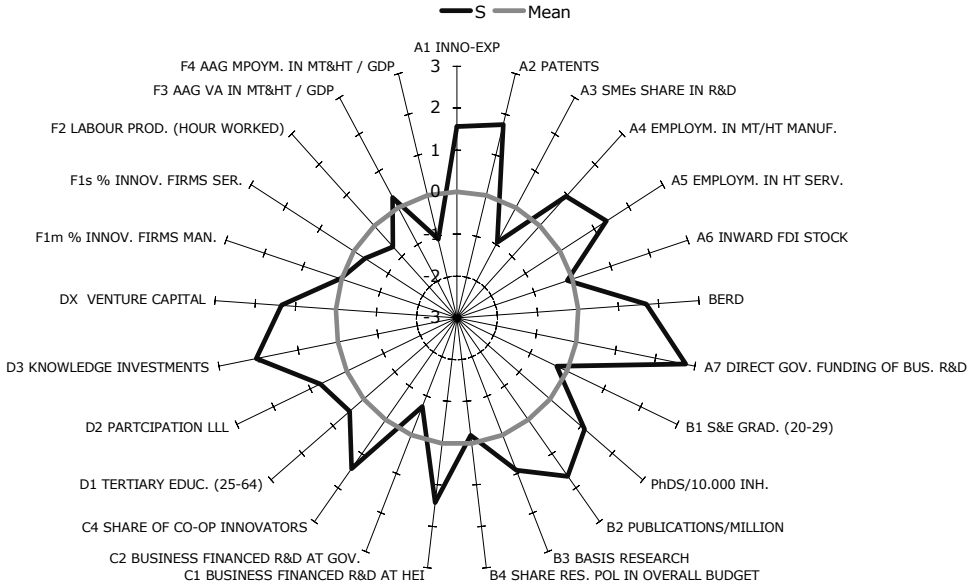
Norway



Switzerland



Sweden



Annex C

Short List of Indicators

**Indicators used for assessing STI performance of national innovation systems
(including original source)**

	Indicator	Source
<i>A. Innovation in the company system</i>		
5	A1 Innovation expenditures (% of all turnover in manufacturing)	EIS, p. 16
7	A2 Patents in triadic patent families per million population (1997)	CIBE
10	A3 SMEs share of national R&D performance (% of total business R&D 1999)	OECD STI, p.119
13	A4 Employment in medium and high tech manufacturing (% of total workforce)	EIS, p. 6
14	A5 Employment in high tech services (% of total workforce)	EIS, p. 7
15	A6 Stock of inward FDI (% of GDP)	UNCTAD
17	Business expenditure on R&D (BERD) (% GDP)	EIS, p. 9
18	A7 Direct government funding of business R&D	OECD STI , p. 115
<i>B. Knowledge generation through education and research system</i>		
1	B1 New S&E graduates (% 20-29 years age class)	EIS, p. 3
	number of PhDs per 10.000 inhabitants	IRCE, p. 11 (Fig. 1.2.1)
4	B2 number of publications per million population	IRCE, p. 37 (Fig. 3.2.1)
7	B3 Basic research as a percentage of GDP	CIBE
10	B4 Share of annual government budget allocated to research	IRCE, p. 21 (Fig. 2.3.1)
<i>C. Industry-science linkages</i>		
1	C1 Business-financed R&D performed by higher education as a % of GDP	CIBE
	C2 Business-financed R&D performed by government as a % of GDP	CIBE
5	C4 Percentage of innovative firms co-operating with other firms, universities or public research institutes	IRCE, p. 42
<i>D. Absorption capacity (aspects of demand, infrastructure and framework conditions – very partial!)</i>		
2	D1 Population with tertiary education (% of 25-64 years age classes)	EIS, p. 4
3	D2 Participation in life-long learning (% of 25-64 years olds)	EIS, p. 5
4	D3 Investments in knowledge as a percentage of GDP	OECD STI, p.285
1	E1 Seed and start-up venture capital (investment per 1000 GDP)	IRCE, p. 28 (Fig. 2.5.1)

		Indicator	Source
<i>F. Overall performance</i>			
1m	F1m	Share of innovative firms as a percentage of all firms (manufacturing)	Eurostat
1s	F1s	Share of innovative firms as a percentage of all firms (services)	Eurostat
2	F2	2) Labour productivity/CAGR, GDP per hour worked	IRCE, p. 47 (Fig. 4.1.2)
4	F3	3) average annual growth of value added in high and medium tech as compared to average annual growth of GDP	IRCE, p. 52 (Fig. 4.2.3)
4	F4	4) average annual growth of employment in high and medium tech as compared average annual growth of total employment	IRCE, p. 53 (Fig.4.2.4)

Sources: EIS = European Commission (2002), "2002 European Innovation Scoreboard: Technical Paper No. 4 Indicators and Definitions"

OECD STI = OECD (2002), *OECD Science, Technology and Industry Outlook*.

UNCTAD (2002), World Investment Report 2002; www.unctad.org/Templates/Page.asp?intItemID=2441&lang=1.

IRCE = Report by STRATA-ETAN Expert Group (2002), "Benchmarking National Research Policies: The Impact of RTD on Competitiveness and Employment (IRCE)", Brussels.

CIBE = OECD (2002), "Comparative Innovation Performance: Countries and Policies for Review", internal working document.

Eurostat, CIS-2 (CD-Rom).

IRCE Annex = "Annex to the Progress Report on Benchmarking of National Research Policies. A Set of Commented Indicators on 4 Themes".

Annex D

Long List of Indicators (Basis for Annexes B and C)

Indicator	Source	
<i>A. Innovation in the company system</i>		
1	% sales of new-to-market products	EIS & IRCE
2	Share of firms introducing new or technologically improved products or processes on the market	CIBE
3	Business exp. on R&D as a % GDP	EU RTD, IRCE, also CIBE
4	Triad patents per capital	EU RTD, IRCE
5 A1	Innovation expenditures as a % of total sales	EIS, IRCE
6 A2	Business researchers per 10.000 labour force	CIBE
7 A2	Patents in triadic patent families per million population	CIBE, close to IRCE
8 A4	EPO high tech applications	EIS
9 A5	USPTO high tech applications	EIS
10 A3	SMEs share of national R&D performance	STI, 2002, p. 119
11 A7	SMEs innovating in house	EIS
12 A8	Percentage of firms innovating with and without co-operation as a share of all (innovating firms)	STI, 2002, p. 137
13 A4	Employment in high tech manufacturing	EIS
14 A5	Employment in high tech services	EIS
15	Inward FDI stock as a % of GDP	EIS, orig.UNCTAD
<i>B. Knowledge generation through education and research system</i>		
1 B1	S&E engineering graduates as a % of working population	IRCE/EU RTD
2	Governmental exp. on R&D as a % of GDP	IRCE
3	Higher education exp. on R&D as a % of GDP	IRCE
4 B2	number of publications per million population	IRCE
5	R&D performed by non-business R&D as a % of GDP	CIBE
6	Non-business researchers per 10.000 labour force	CIBE
7 B3	Basic research as a percentage of GDP	CIBE
8	Scientific and technical articles per million population	CIBE
9	Total researchers per thousand labour force	STI, 2002, p. 44
10 B4	Share of annual government budget allocated to research	IRCE Annex, p. 21

	Indicator	Source
<i>C. Industry science linkages</i>		
1	C1 Business-financed R&D performed by government or higher education as a % of GDP	CIBE
2	Scientific papers cited in US-issued patents	CIBE
3	Publications in the 19 most industry-relevant scientific disciplines per million population	CIBE
4	C2 Direct government funding of business R&D	OECD, STI, 2002, p. 15
5	C3 Share of innovative firms co-operating with other firms, universities or public research institutes	IRCE Annex, p. 42
<i>D. Absorption capacity (aspects of demand, infrastructure and framework conditions)</i>		
1	% GDP spent on education	IRCE/OECD
2	D1 % working population with 3rd level degrees	IRCE/EIS
3	D2 Participation in life long learning	IRCE/EIS
4	D3 Investments in knowledge as a percentage of GDP	OECD, STI 2002, p. 25
5	Share of population between 25-64 years participating in education and training	
<i>E. Other system indicators</i>		
1	E1 Volume of venture capital investment in early stages (seed and start-up in relation to GDP)	IRCE Annex, p. 28
<i>F. Overall performance</i>		
1	F1 Share of innovative firms as a percentage of all firms (split between manufacturing and services	
2	Labour productivity (EU/adjusted and updated, see Ch 2 (IRCE), in fact 2 measures:	
2	1 Labour productivity in GDP/hour worked in PPS	IRCE Annex, p. 46
2	F2 2 Labour productivity/CAGR, GDP per hour worked	
3	Relative trade performance in high tech goods	OECD also IRCE
4	Share of value added of high- and medium tech industries	
4	1 In total output	IRCE Annex, p. 50
4	2 In total employment	Idem, p. 51
4	F3 3 Average annual growth of VA in high and medium tech as compared to average annual growth of GDP	Idem p. 52
4	F4 4 Average annual growth of employment in high and medium tech as compared average annual growth of total employment	Idem p. 53
5	Various technology balance of payments indicators	IRCE Annex, p. 56-58
6	World market share of exports of high tech products	IRCE Annex, p. 60
	1 share latest available year	
	2 CAGR	

PPS = purchasing power standards. These are a fictive currency unit that eliminates differences in purchasing power, *i.e.* different price levels, between countries. Thus, the same nominal aggregate in two countries with different price levels may result in different amounts of purchasing power. Figures expressed in Purchasing Power Standards are

derived from figures expressed in national currency by using Purchasing Power Parities (PPP) as conversion factors. These parities are obtained as a weighted average of relative price ratios in respect to a homogeneous basket of goods and services, both comparable and representative for each country. They are fixed in a way that makes the average purchasing power of one Euro in the European Union equal to one PPS. The calculation of GDP in PPS is intended to allow the comparison of levels of economic activity of different sized economies irrespective of their price levels. It is less suited for comparisons over time. Eurostat compiles PPP and presents them in the AUX_IND domain of New Cronos\theme2.

[http://europa.eu.int/comm/eurostat/newcronos/reference/sdds/en/regio/gdp95_sm.htm]

Sources: EIS = European Commission (2002), "2002 European Innovation Scoreboard: Technical Paper No. 4 Indicators and Definitions"

OECD STI = OECD (2002), *OECD Science, Technology and Industry Outlook*.

UNCTAD (2002), World Investment Report 2002; www.unctad.org/Templates/Page.asp?intItemID=2441&lang=1.

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Annex E

Summary of the MONIT Sustainable Development Policy Case Study

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Introduction

This annex summarises the results obtained from four countries (Austria, Belgium, Finland and Norway) participating in the Case Study on Sustainable Development of the OECD Monitoring and Implementing Horizontal Innovation Policy (MONIT) study. It is based on the reports produced for each country and on the results of several workshops focused on observations across the countries.

The focus is on the main questions posed by the MONIT project and the implications and recommendations for co-operation between environmental and innovation policy that emerge. It draws on, but does not detail, the multifaceted and complex descriptions of the evolution of sustainable development and environmental policy in each country. Nor does it describe the recommendations applied to these individual policy sectors. More information on these areas can be found in the individual country reports (OECD, 2005a; 2005b).

The focus of the MONIT work and this summary is on innovation policy, but the precise definition of this policy domain was at the same time one of the key challenges of the MONIT work. Throughout the project, the core of innovation policy has been defined as the domain of science and

technology (S&T) policy, with strong links to industrial, employment and regional development policies. However, each participating country in the work on sustainable development had to modify this definition to reflect its own national conditions. This summary still refers innovation policy mainly to S&T policy and evidence collected in the past has also mostly focused on S&T policies. However, in recent years the scope has been significantly widened to include complementary assets for successful innovation, such as venture capital, education and training, entrepreneurial and management skills and intellectual property rights (IPR), which are in related policy domains. In the future, innovation policy may extend beyond these traditional sectoral domains if “third-generation innovation policy” integrates the innovation needs of all domains that can help to advance the knowledge society. The obvious candidates for such a “wedding” are environmental policy and other key policy domains for sustainable development, which are in need of new technological and organisational solutions. It is important to recall that innovation policy as well as sustainable development policy domains are continuously evolving.

The challenge of summarising the work of the different countries is the variety of analytical frameworks used in the case studies. Although the key MONIT questions and general project framework were followed, every country specified a methodology that fit the discussion into current debate. This has led to an exciting range of discussions on how governance should be conceptualised. For example, the Norwegian case study relies heavily on the research tradition of assessing the success of environmental policy integration (EPI) and the analytical approach is more explicitly related to evaluation studies. The Flanders (Belgium) case study suggests a framework of transition management as a basis for new policy governance. The Austrian report draws attention to the way in which policies are formed in a small country with highly developed and autonomous policy fields; there is considerable informal co-operation among policy fields, but formal forms of interaction are rare. In the Finnish case study, an approach focusing on the policy process is used to collect experience of ways to tackle co-operation issues. Individual country reports have in-depth discussions of these approaches.

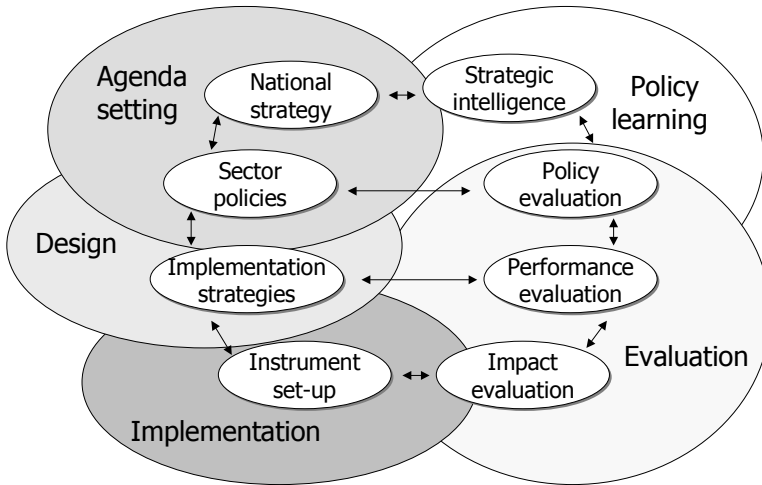
This summary adopts the policy cycle framework of the Finnish and Austrian case studies to structure observations and recommendations. The policy cycle provides a dynamic framework for monitoring policy processes and addresses the question of what has been done and what is emerging. It does not provide a tool to evaluate the processes or suggest what should be done. But in focusing on the governance issue, and the status of policy co-ordination and integration in particular, it makes it possible to derive recommendations about the level of systemic coherence and capabilities

needed to advance integration. By structuring the discussion in this manner, the approach is generic and applicable to any policy domain. Some generic observations on the conditions for successful integration of innovation policy and sustainable development can therefore be explored.

Figure E.1 gives an overview of the policy cycle. The process can be described as consisting of eight parts that can be further divided roughly into five main parts:³

- *Agenda setting* covers the processes needed to define the policy objectives. This includes both the national strategy setting and sectoral strategies. This part of the policy cycle is strongly influenced by different interest groups and is based on an analysis of policy needs. It includes the processes of understanding why certain issues are on the political agenda and how they get there. It also includes such processes and decisions made with the aim to set up national organisational structures.
- *Design* covers the part of the policy cycle in which the issues on the policy agenda are formulated into concrete initiatives, programmes or policies. This involves an assessment of the situation and of the needs and the development of concrete actions.
- *Implementation* refers to the implementation of the policy measures developed in the last phase. It is important to see it as a separate phase, as implementation is often very different from design, owing to changes in context and practical trade-offs.
- *Evaluation* is an important part of the policy cycle. Here policies that were formulated and implemented are evaluated. These evaluations are often *ex post* but increasingly *ex ante*.
- *Policy learning* covers all the research, analysis and interaction processes that together enable a strategic understanding of the development requirements of the policy system. Policy learning is defined as all those processes by which policy systems generate and incorporate knowledge and understanding about: *i*) the underlying causes and preconditions for policies and initiatives; and *ii*) the effects of the policy and initiatives. This knowledge is derived throughout the policy cycle and policy learning feeds back to all stages.

3. Naturally the boundaries between these parts are often vague. Also, different organisations may cover varying parts of the cycle depending, for example, on the policy issue to be dealt with.

Figure E.1. The different parts of the policy cycle

Characteristics of sustainable development issues in the context of MONIT discussions

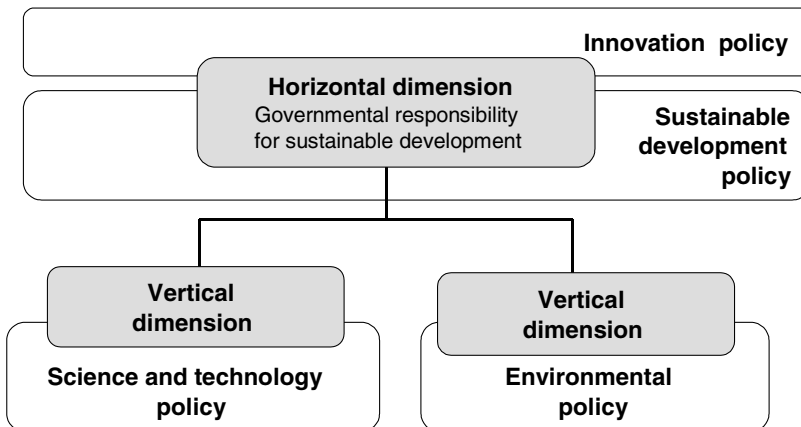
There are clear synergies between issues of interest for innovation policy within the MONIT project and issues that have been at the centre of sustainable development and environmental policy discussions over the last decades. In its broad sense, sustainable development policy aims to integrate sustainable development as a guiding principle in all government actions in order to ensure that economic and social developments keep within ecological limits. In the same way, competitiveness, economic wealth or innovations that help to tackle societal challenges are issues that can be defined as overarching governmental responsibilities, and mechanisms can be found to integrate these principles in all governmental actions. Thus both sustainable development and innovation tend to be very broad concepts which are applied horizontally to policy processes across sectoral policy boundaries and even meet on the level of the renewal of the “societal project” that both pursue. The breadth of the concepts also results in some vagueness, as stakeholders and policy makers tend to use the same words with different meanings. The general guiding principle is also easily used as a stamp to justify all actions.

In assessing the interaction between sustainable development and innovation policies, it is challenging to define the policy processes precisely, as both of these policy domains are evolving in a very complex and dynamic

environment. The evolution of innovation policy may take parts of the traditional – mostly sectoral – S&T policy into a direction that includes more interaction with other policy domains. However, this is a new trend and it is thus not clear what innovation policy will look like in the future. Sustainable development policy is also continuously evolving. It originated from a very broad international perspective, with sustainable development as a guiding principle that various government actions should follow. One of the questions for the future is whether this broad principle should – and can – be a clearly defined policy domain. In most countries, including the case study countries, discussions of sustainable development still strongly emphasise environmental issues. Environmental policy is a clearly defined sectoral policy with a set of clearly defined objectives and the means to reach them. Thus, the MONIT studies have also mostly focused on environmental policy in order to collect experience from policy processes that have already taken place.

Figure E.2 highlights the viewpoints covered in the case studies. First, sustainable development and innovation policies are very horizontal and are not yet (or may never be) clearly defined policy domains. The convergences and divergences in the development path of these emerging horizontal policies may be viewed as the potential for further interaction and integration. Second, the evidence and observations in the case studies are essentially from two sectoral policy domains (which are traditionally vertically organised), namely S&T policy and environmental policy.

Figure E.2. Horizontal and vertical dimensions of policy domains of interest in this study



Source: Adapted from Ruud and Larsen (2004).

In studying how the different policy processes interact while aiming towards sustainable development, there are two linkages of interest. First, there are the existing, implemented policy processes aimed at increasing the interaction between S&T and environmental policies. Second, there is the question of how horizontal sustainable development or environmental principles are taken into account in the sectoral S&T policy domain.

The requirements for improving interaction and co-ordination among sustainable development and innovation policies are clear. New, radical innovations are needed to improve eco-efficiency to the extent required to decouple economic growth and environmental pressure.⁴ New environmental innovations also offer an opportunity for new businesses to emerge. In the area of sustainable development challenges, improvements have not taken place at a desirable pace when they are only based on market conditions; further government intervention is needed in several policy domains. The need for “systemic” innovation is rooted in a “lock-in” of the innovation systems of industrial countries in non-sustainable growth models that are too material- and energy-intensive.

Despite logical arguments for a win-win opportunity that may result from more intense interaction, such co-operation between policy domains has insufficiently developed. From the point of view of governance, certain cultural and institutional differences between the innovation and the sustainable development policy domain act as potential barriers to co-operation.

- *Stakeholders differ.* S&T policy focuses on economic competitiveness and technological excellence, and the most relevant stakeholders are the business and research communities. Very little effort has been made to engage stakeholders representing technology users in the policy process. On the other hand, sustainable development policy has, from the beginning, had very broad involvement of different interest groups as its basis, groups that are often very critical of business and science.
- *Policy formulation drivers differ.* Sustainable development and environmental policy are traditionally driven by international agreements and global problems, whereas innovation policy in most countries is very much driven by national concerns. S&T policies traditionally aim at increasing national competitiveness and wealth, whereas sustainable development policy is concerned with improving

4. Decoupling signifies that necessary environmental protective measures should be pursued regardless of economic growth patterns and business cycles. In the OECD’s policy document on how to enhance policies for sustainable development, decoupling has been identified as a key challenge (OECD, 2001).

international governance for tackling global problems. It follows that S&T policy will need to be more alert to international developments and sustainable development policies will have to tackle national challenges.

- *Policy measures differ.* Sustainable development and environmental policies primarily use regulative and fiscal measures, often based on international agreements, with strict targets and rules regarding actions. In addition, they use measures such as standards, voluntary agreements and information sharing. In contrast, the main innovation policy measure is resource allocation for R&D,⁵ and regulatory and fiscal instruments have a much smaller role.
- *Resources for actions differ.* Political power is ultimately linked to control of funds. Typically, sustainable development and environmental policies have very few resources for action, while S&T policies control the state budget's allocations for R&D. This difference may hamper processes aimed at designing joint actions that would require some shared control of resources.

The challenge of increasing the interaction of sustainable development and innovation policies is a sizeable one. Clearly there is no single action or even single objective for joint work, so that multiple actions are required in different phases of the policy process. This is a huge challenge for governance structures that are traditionally vertical and conduct segmented administration of the policy instruments.

Agenda setting

Agenda setting refers to the processes related to setting a policy's objectives and priorities. On the S&T policy agenda of each of the case study countries, sustainable development, and environment-related objectives in particular, are among the policy objectives. However, objectives related to sustainable development are not a priority for innovation policy in any of the countries. The main focus of innovation policy is to support economic growth through the development of new technologies that increase productivity and offer new functionality. As a consequence, none of the case study countries has a clearly defined and coherent "green innovation policy" that would cover all relevant actors and actions. However, the relevance of sustainable development issues in

5. Among studies that list the policy measures promoting eco-efficiency or sustainable innovations, only a few are policy measures designed and implemented within the innovation policy domain; see Technopolis (2004).

innovation policy has, in general, increased over time and can be expected to increase.

In each of the countries, a large amount of work has been done to define strategies and action plans for sustainable development at the national level. There are strategy processes and active discussions across sectoral borders. For example, all the case study countries have national committees, working groups or platforms for sustainable development. However, national and sectoral strategies for sustainable development have had less impact than expected. There is a clear need for increased and more goal-oriented co-operation across sectoral policy domains, as isolated sectoral actions have not had the desired impact, and there is little political commitment to the obligations set by national strategies in many sectoral policy areas. There is thus a need for political leadership in order to put sustainable development items higher on the policy agenda and show real commitment to the stated objectives.

Particularly in the area of S&T policy, there is a lack of incentives to set strong priorities for promoting sustainable development. There have, of course, been changes over time, and in some cases a country's S&T policy increases the priority of sustainable development issues. However, sustainable development issues are also easily dropped from the agenda when situations change. This illustrates the fact that sustainable development and environmental issues are much more sensitive to changes in the political landscape than innovation-related issues. The stronger – and rising – position of innovation on the political agenda is shifting the discourse on sustainable development from “quality of life” towards “eco-efficiency”.

The lack of strong incentives for promoting eco-efficiency and sustainable development within the S&T area is linked to the observed tension in the prioritisation process between economic growth and other objectives. As remarked earlier, there is a perception that the main objective for innovation policy is economic growth. Thus, sustainable development issues easily lead to situations in which the economic objectives of innovation policy are felt to conflict with the sustainable development objectives. There are different viewpoints on this potential source of conflict:

- First, the potential for conflicts between the policy objectives are not necessarily recognised or acknowledged. The idea may be posited that a new technology will always lead to an improved situation with respect to the environment; on the other hand, there may be strong public

opinion against technological improvements.⁶ If the core issues relating to the policy objectives are not analysed in a consistent manner, a barrier is created that prevents horizontal co-operation. This is also reflected at the level of designing and implementing policy measures, and is further discussed below.

- Second, it may be that the potential for conflicts or synergy is not understood or analysed concretely. The statement that eco-efficiency is a win-win strategy for innovation policy as well as environmental policy is too superficial. The strategy for “sustainable growth” is an empty statement if not followed by an action plan that creates the right balance between short term “end-of-pipe” solutions and longer-term system changes.
- Third, across the case study countries there was a tendency to under-exploit the role of policies and policy makers to mediate in the area of conflicting and/or converging interests. Innovation policy aims to create a win-win situation for all and to be “neutral”. This leads to a tendency to be politically rather passive. However, it becomes more difficult to continue in this manner if innovation policy has to incorporate more and more objectives related to sustainable development into innovation policy.
- Fourth, agenda setting for sustainable development objectives has to be supported by a large fractions of public opinion and politicians. However, the governance solutions to obtain such backing also have to resist short-term political changes. Long-term planning and social contracts beyond the electoral cycle are therefore necessary decision making.

Design, implementation and evaluation of policy measures

In order to use technology to solve sustainable development challenges, potential technologies must be used and there must be a market for them. Markets for new sustainable development innovations need to be created and supported in part by government intervention. Market creation requires intense interaction and co-design of policy measures that cut across policy domains. The same is true for more far-reaching system innovations, *e.g.* in energy provision, that require a combined shift in technology, infrastructure and consumption patterns. Cluster policies can provide platforms for such

6. For example, discussions of genetically modified organisms (GMOs) are easily geared towards the idea that innovations are only linked to unacceptable potential risks.

multi-measure and multi-actor policy design. However, co-operative policy development is still limited.

Across the case study countries, innovation policy measures are largely designed and implemented in isolation from environmental and sustainable development policy measures. There is insufficient understanding of the interaction between measures and mechanisms that promote sustainable development (or environmental) innovations. Technology assessment is still weak. Improving the situation requires: *i*) more knowledge of how policy measures interact across domains; and *ii*) more intense co-operation across policy domains in designing these measures. The issue is to find the facilitating governance for this new kind of policy making. There is a need for experimentation that is hampered by the inertia in the current policy domains. Often it is necessary to bypass them with new forms of governance.

One way to strengthen the understanding of the interaction of policy measures is to evaluate their impact. Evaluations assessing the combined impact of different measures in stimulating new environmental innovations are rare. However, there is quite a strong tradition of assessing the environmental impact of individual policy measures. Different viewpoints on the impact of policy measures should be analysed more consistently. The case study countries have examples of these types of evaluation activities.

Mechanisms for co-designed policy measures across domains are generally weak. The case studies mention only a few examples of the use of environmental expertise in S&T policy design. Particularly, one would expect to see stronger links across policy domains in designing research and technology development (RTD) programmes. Large programmes that distribute R&D resources for technology development are the most important S&T policy measures. The case study countries offer numerous examples of very important programmes that have led to advances in environmental technologies. For example, Finland's national technology agency's (TEKES) technology programme concept is a good example of a long-term and consistent policy measure to advance environmental technology development. However, overall programmes in the case study countries are executed in isolation and not linked to a broader view of how markets develop and the role of other policy measures. There is a lack of programme concepts that take a strong systemic perspective on innovation. Programmes are often prepared with too little stakeholder participation, including users as well as developers of innovations. Austria gives an example of a more developed stakeholder participation process.

In Austria, Belgium and Finland, in contrast to Norway, there is a very active attitude towards environmental innovations within the agencies and

units responsible for the design and implementation of S&T policy measures. None of the countries has a clearly defined “green innovation policy” to cover the whole S&T domain. However, strategies and work within individual organisations – or parts of the S&T policy domain – are considered to be at a very advanced level. They can be considered as “autonomous” translations of the general guiding principle of sustainable development in their own S&T domain. Examples include the Flanders (Belgium) sustainable development “bonus” in all programmes for projects that meet stated eco-efficiency criteria and the TEKES strategy work and technology programmes in Finland. Although this “internalisation” strategy is successful, without more coherent support through agenda setting for innovation policy as a whole, these efforts tend to remain isolated, not be linked across the policy domains, and lose momentum.

Evaluation and policy learning

The case studies show the biggest gap in horizontal activities across the policy domains to be in the area of policy learning, including the accumulation of strategic intelligence and attitudes towards evaluation. A key factor in improving this is the broadening of the knowledge base within policy domains, both S&T and others. Thus, for example, there should be more joint actions and projects in which civil servants work across policy domains to combine their different backgrounds in knowledge-based decision making. The disciplines represented by the human resources within each policy domain should also be a more balanced combination of environmental, social and technological knowledge. In addition, S&T policy does not have the well-developed, broad stakeholder participation that would be needed to increase broad knowledge within the policy domain. As remarked above, these stakeholder processes should be strengthened, especially when designing concrete policy actions.

There is also a lack of supporting policy research. One barrier is the fact that the research institutes in different countries are often organised in line with the policy domains. For example, many countries have environmental research institutes related to the environment ministry which often do very little innovation research. This structure does not encourage cross-cutting policy research efforts. An example of an effort to overcome this is Finland’s environmental cluster programme, in which R&D funds were given to a programme to foster policy research related to eco-efficiency co-ordinated by the Ministry of Environment.

The participating countries agreed that broad evaluations are important tools for increasing knowledge and analysing policy needs. Examples were given of broad evaluations in which the policy domain completed an

evaluation of its actions with respect to sustainable development and more specifically the environment. These activities can also be linked to sustainability reports for a policy domain. Examples of broad activities in these areas were the Austrian ministerial report on sustainability of 2003, the evaluation of the Finnish sustainable development strategy in 2003, and the evaluation of the Finnish Ministry of Transport and Telecommunications' environmental programme in 2004. But more important than evaluation reports is evaluation-based policy design. The integration of evaluation as a policy learning experience in the policy cycle is also an issue for new governance, in which stakeholders participate and policy makers improve their understanding of interaction in the system. This is not a common practice.

Technological development often proceeds slowly over decades and sustainable development challenges are also characterised by their long time horizon. For example, the development of new energy sources (fusion energy) and energy investments are issues for which policy decisions need to take into account a very long time period. Thus one would expect S&T policy to be very active in promoting long-term thinking in policy discussions, in order to encourage opportunities that innovative technologies may offer in a long-term perspective. In many countries foresight studies have become better known. However, the case studies appear to indicate that the role of technology foresight exercises or other analytical, future-oriented tools is minor in creating this strategic knowledge.

Common recommendations

The integration of innovation policy and sustainable development is an emergent process. At present, the main efforts concern co-ordinating the vertical policy domains of S&T and environmental policy. Although there are compelling reasons to advance more quickly in order to tackle huge societal challenges, institutional inertia is strong. Cultural divides between policy domains have their historical origin in the functional specialisation of institutions to serve sectoral objectives. Today's policy agendas now have to tackle the complex problems of climate change or global competition that involve the combination of all resources in a horizontal way.

Therefore, the basic condition for policy integration between innovation policy and sustainable development policy is achievement of a new social contract for "sustainable growth", in which the operational logics of both domains can converge. At the same time, the establishment of a new integrative governance structure is the precondition and the result of this convergence. The case studies reveal that there are elements that support this

process, but that there are many more barriers to overcome to create a new governance structure for better integrated policy cycles.

Agenda setting

- Future innovation policy aims to tackle wider sustainable development objectives. This demands an active “internalisation” of the guiding principle of sustainable development. Internal analytical attitudes need to acknowledge that trade-offs must be made but also actively operationalise win-win opportunities.
- There is a need to increase the participation of different stakeholders in the priority-setting process for innovation policy.
- S&T policy should actively participate in the setting of priorities for sustainable development policy in order to bring an understanding of innovation to such discussions.
- There is a need to develop and activate processes within policy governance (cross-cutting policy domains) that aim to resolve conflicts and stimulate discussion on the basis of sound retrospective and prospective evaluations.
- The integration of sustainable development and innovation in a “sustainable growth” strategy has to be endorsed on a higher institutional level, in the form of a “social contract” and/or long-term planning objectives that set new “standards”.

Design and implementation of policy measures

- More active co-operation which also actively encourages and includes wider stakeholder participation is needed across policy domains during the design of policy measures. This involves capabilities and governance for the design of “policy mixes” and the management of “policy portfolios”.
- S&T policy measures should take a wider view of systemic innovations and pay attention not only to the development but also to the use of technologies.
- The understanding of mechanisms related to “environmental” innovations need to be strengthened in specific cluster programmes that address the environmental industry and the environmental challenges.

Policy learning

- Policy learning for the integration of innovation and sustainable development policies has to contribute to organising the “policy arena” for strategic convergence by a combination of analytical instruments and participative methods (strategic intelligence) that support interactive policy making.
- There is a need to strengthen research activities and to reorganise policy-oriented research in a less sector-focused manner. This implies a “distributed network” organisation of strategic intelligence which combines different sectoral and stakeholder perspectives under the wider umbrella of “horizontal” objectives.
- Stakeholder participation in the innovation policy process should be increased as a learning process for strategic convergence.
- More, and future-oriented, tools for analysing policy needs should be developed as instruments for managing change.

Annex F

Summary of the MONIT Information Society Policy Case Study

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Introduction

This annex draws together the results from country case studies on information society (IS) policies in seven countries (Austria, Finland, Greece, Ireland, the Netherlands, Norway and Sweden) carried out in the MONIT study. It is based on the reports produced in each country and on the outcomes of several workshops in which the individual studies were discussed and compared.

This summary aims to synthesise the main findings and draw general lessons from the case studies. While comparative policy studies always reveal a good deal of specificities, and even idiosyncrasies, this topic nevertheless lends itself to generalisation and cross-country comparison: almost all OECD member countries (and a number of non-member countries) made efforts to design overarching policy frameworks in the 1980s and 1990s to cope with the challenges of the information society. Even though the countries started from very different positions (with some Nordic countries well advanced in the use of information and communication technologies [ICT] throughout the economy, while others, like Austria and Greece, were laggards), the design and implementation of horizontal policies faced quite similar obstacles in terms of policy challenges. Much policy learning can therefore be gained from the comparisons. For the details of policy design, see OECD, 2005b.

The MONIT work looked mainly into the challenges and difficulties of linking innovation policy with other policy areas, such as information society policy. This meant trying to analyse the links between two policy areas that are themselves differentiated into various sub-areas and lack clear-cut boundaries. Innovation policy in its broadest sense includes science and technology policy and extends to competition and regulatory policies. However, the country studies reflected the ambiguities inherent in its definition in their individual national contexts. Throughout the MONIT

work, innovation policy was defined quite narrowly, and the case studies focused mostly on science, technology and innovation (STI) policies, while remaining aware that in recent years the concept has broadened significantly to include education and training, entrepreneurial and management skills, intellectual property rights (IPR), competition policy, regulation, etc.

The concept of the information society is equally indistinct, but its core is the use and application of ICT in various sectors of the economy and society. Thus, in their definitions of information society policy, most countries include sectoral policies like e-business, e-government, e-learning, e-health and others. Yet the precise mix and emphasis differ considerably from country to country (*e.g.* some countries focus on the build-up of ICT infrastructure, while others emphasise exploring best practices for societal purposes).

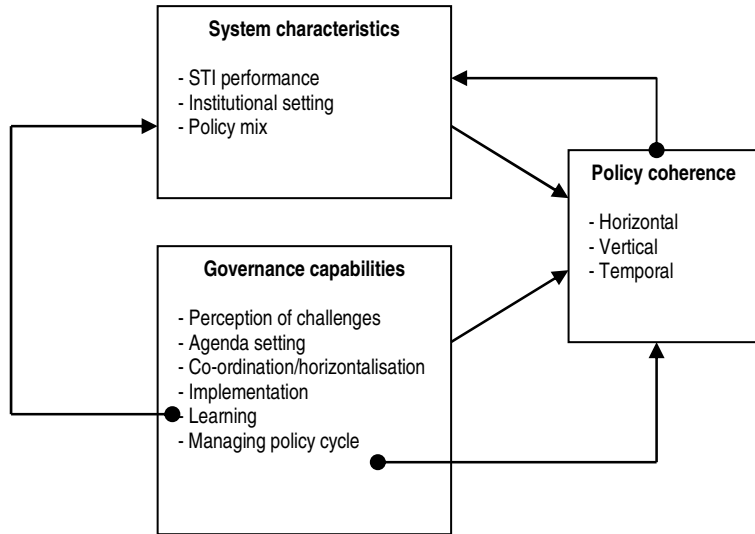
An additional challenge for information society policies is horizontal co-ordination of various sub-areas: there are, or there might be, for example, links between e-government and e-health in terms of regulations regarding data security, citizen involvement or technology compatibility.

The focus of the MONIT project has been on the policy process.⁷ The framework is furnished by the concept of the policy cycle and its stages and feedback loops:⁸ agenda setting, policy formulation, policy co-ordination, implementation and policy learning (*e.g.* from policy evaluation). The policy processes were not primarily assessed on the basis of their impact (*i.e.* on the development of IS and ICT), as evaluations that systematically link the *quality* of the process to impact are essentially lacking. Rather, the focus was on: *i*) the immediate outcomes (*i.e.* whether the country had been able to produce and implement the policy measures they aimed at; *ii*) the policy coherence these processes were able to create; and *iii*) the governance capabilities⁹ of the respective policy systems with respect to the policy cycle (Figure F1). Therefore, lessons and recommendations concern the quality of the process, *e.g.* is there scope to increase policy coherence over the policy

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7. For a description of the analytical framework see W. Polt (2004).
 8. Naturally the boundaries between these parts are often imprecise. Also, different organisations may cover varying parts of the cycle depending on the policy issue to be dealt with, for example.
 9. “‘Governance’ means rules, processes and behaviour that affect the way in which powers are exercised ..., particularly as regards openness, participation, accountability, effectiveness and coherence” (Commission of the European Communities, COM (2001) 428 final, Brussels, 25 July 2001) or: “The process by which stakeholders articulate their interests, their input is absorbed, decisions are taken and decision makers are held accountable.” (www.iog.ca/boardgovernance/html/gov_wha.html)

cycle? What was the experience with different institutional settings in the IS policy field?

Figure F1. Governance capabilities and policy coherence over the policy cycle



Source: OECD, internal working document for the MONIT project.

This framework was also applied to the IS country case studies, albeit with differences in rigour and emphasis. Also, it was sometimes difficult to distinguish between the different phases (*e.g.* between agenda setting and policy formulation or between coordination and implementation). Thus, these notions served as a guide rather than a rigid framework.

Agenda setting and policy formulation

IS policy rose to the top of political awareness in the 1980s and particularly the 1990s. In the surge of the ICT boom, it was felt that ICT offered pervasive technologies that could affect all parts of society and all sectors of the economy. Agenda setting was very much influenced in most countries by international policy discussions: the US initiatives for the “information super highway” or the EU Commission’s “Bangemann report”¹⁰ were influential starting points for defining national policy both in

10. *Europe and the Global Information Society – Recommendations to the European Council*, European Commission, Brussels, 1994.

countries starting from a relatively high level (the Netherlands) and catching-up countries (Austria, Greece). Many countries perceived the need to formulate an overarching IS policy, and indeed all countries surveyed have formulated such a policy. In countries like Greece, the funding for IS policy largely came from the EU's cohesion and structural funds (CSF). In this case, national policy was a direct response to EU policy and the process requirements associated with the CSF. In other countries, the Bangemann Report and later the e-Europe initiative were conceptually important triggers of national IS policy.

Yet the differences in how countries proceeded and the consequences for the policy process are considerable: some countries prepared strategic documents that had high policy visibility, others published White/Green Papers, and still others adopted quite comprehensive "action plans". This implies great variety in terms of the concreteness of the agendas: some set goals and described policy measures at a very abstract level, while others formulated very, and sometimes overly, concrete measures. Moreover, the emphasis on various elements of the IS policy (infrastructure, applications, regulation, institutional structures, etc.) differs, owing, among other factors, to the influence of different stakeholder groups (small and medium-sized enterprises, multinational enterprises, infrastructure providers, consumer groups, etc.). In Finland, for example, the policy agenda was largely technology-driven and targeted towards increased competitiveness owing to the strong policy stance of STI policy and its stakeholders.

Historical development paths are another important factor affecting the emergence of agendas. A country's national innovation system (NIS) "filters" international discussions and "translates" them into national policy agendas. The development of national agendas, and their design and implementation, are often based on previous activities, responsibilities or experience with earlier programmes, responsibilities for particular agendas (especially EU), current or previously established networks, and previously successful approval procedures. While this enhances and strengthens established competencies, it also leads to gaps, blind spots and "ad hoc-racy".

While the existence of comprehensive policy documents (White Papers, action plans) often seems to suggest a coherent strategy which links various policy domains and actors, in reality, this is often not the case. With a few exceptions (*e.g.* in Finland and Norway) most strategy documents are merely a compilation of the various strategies and actions envisaged by different departments or other stakeholders. Thus, even when overarching strategy documents exist, the process of agenda setting is predominantly context-specific, contingent and local. The question arises as to the extent to which more rational approaches for policy formulation are possible,

i.e. policies that are: *i)* pro-active; *ii)* horizontal/global in nature; and *iii)* avoid contextual randomness.

In most countries, IS policy is often not really articulated with STI policy. In Finland, however, the process of formulating IS policies has largely been driven by the STI policy agenda, with its emphasis on competitiveness. Here, the policy challenge might be to include more and broader societal goals (like e-democracy) into IS policy.

New agendas often arose with the advent of so-called “change agents” (*i.e.* new actors or institutions designed to encourage change). Windows of opportunity for change agents were especially large when changes in government occur, especially when a new government comes into power. New governments tend to be more active in setting directions, overcoming barriers and disrupting current IS policy processes. However, changes in the policy agenda – and sometimes in the institutions – also occurred in some cases too rapidly to carry out the policies in a sustainable manner. Such changes have to be well thought out, and support from stakeholders has to be secured.

Implementation and coordination of IS policies

“Grand policy strategies” that do not explicitly address the question of implementation are doomed to encounter difficulties or fail. The implementation of IS policy strategies has been cumbersome almost everywhere and has encountered various obstacles, some (but not all) of which can be attributed to problems of governance and policy coherency. On the other hand, in most countries, the handling of IS policy has given rise to “institutional innovation”, with the creation of new bodies that should ensure proper policy co-ordination and coherence. Ireland, for example, has created a whole array of institutions at the level both of operative units and of high-ranking advisory bodies to address almost all dimensions of the policy co-ordination problem. Austria is probably at the other extreme, as until recently no institutions were specifically created for the sustained monitoring and steering of the IS policy process as a whole. Greece has also chosen a radical approach by creating institutions specifically for the implementation of IS policy in order to bypass administrative inertia.

In general, policy coherence in IS policy has been stronger when achieved by institutional factors (specialised bodies, close links to EU procedures) rather than by strategy papers and co-ordination mechanisms. Definition of responsibilities, allocation of resources and setting of targets and deadlines are necessary in order to create “process ownership”.

However, this was found to be a necessary, but not sufficient, condition for policy processes to function.

It may also be observed that attempts to arrive at overarching IS strategies have faced the difficulty of getting the relevant actors motivated to work together in the same timeframe, and that some have failed (in Austria, two attempts to arrive at such a strategy did not succeed). Some of the reasons for such difficulties can be attributed to failures of the political actors, but others are due to the inherent difficulties of such complex policy making. Also, the case studies often found only weak links between some IS policy areas and between IS policy and innovation policy, which leaves little scope for overarching “strong governance” and hence little room for strong policy co-ordination.

This is a reflection of the fact that the various IS domains and innovation policy have very different policy processes. It was often observed that *within* a given policy domain, policy processes successfully built the basis for coherent development. Thus, IS policy initiatives were very often successful: even when attempts to establish an overarching IS strategy failed, they often had a mobilisation effect and triggered initiatives in the different IS domains.

Another frequent observation was the limited power of many co-ordinating bodies owing to the strong position of individual stakeholders (departments, enterprises, intermediary institutions) and the limited competence of the co-ordinating body. The same holds true for most of the bodies established to formulate strategies or to aid in their formulation; for example, the relevant Irish body was found to be of limited importance. In the Netherlands, there is only a thin layer of co-ordination at the top, while most policy is made mainly by departments. Thus, a co-ordinating body without specific power to steer or supervise the process (or even allocate funds) is very likely not to achieve very much. Means employed to overcome this institutional problem include the establishment of change agents with specific competences (*e.g.* IS envoys).

In addition, co-ordination has its costs. It implies a multitude of types of interaction and forms of communication (such as interdepartmental committees, working groups of stakeholders, *ad hoc* or permanent forums). In countries like Austria, the Netherlands and Ireland, the actors showed a certain level of “co-ordination fatigue”. Given a background of limited resources, incentives to engage in the resource-consuming process of co-ordination must be substantial. Such incentives are strongest when the allocation of funds is involved (as in Greece with the CSF or in Ireland with a specific IS fund), but even then co-ordination faces the problems inherent in the respective administrative systems.

Thus, while many countries tried to secure adequate co-ordination mechanisms on the overall policy level – and often did not achieve a great deal – there are numerous examples of both formal and informal co-ordination at the lower, operative levels which seem to have made progress in implementation (*e.g.* co-operation between programme managers, informal exchange between civil servants of different departments). Without such self-organising processes, neither co-ordination nor coherence is likely to be achieved, as the variety of actors does not readily allow for very centralised decision making or policy implementation. Too deliberate co-ordination schemes may reduce collaborative behaviour and lead to inefficiencies.

Emergent policy making of this sort is different from deliberate (traditional, bureaucratic) policy making, is less downstream-oriented and relies less on hierarchical control and information systems. It relies more on flexible, decentralised management practices, appropriate learning and flexibility. A high degree of self-organisation under a broader strategic objective from the top is typical.

Policy learning

International comparison and benchmarking has been, and is, a main source of policy learning in the field of IS policy. EU initiatives were an initial source of national policy design. The OECD, via its biannual Information Technology and Communications outlooks and its working groups within the ICCP committee has been a forum for exchange and policy learning. At present, permanent benchmarking processes have been established within the EU or within other international bodies for different sub-areas of IS policy (e-government, e-business, diffusion and use of ICT in private households, etc.). In this respect, there is a sound infrastructure for international policy learning.

With respect to the theoretical basis of policy learning, the picture is less positive. *Policy research* on the topic in the 1990s focused on the question of whether there is still room for government intervention in increasingly liberalised telecommunications markets (Grande, 2001) Also, policy-related research has been mostly confined to research within the sub-domain and specific questions of regulatory reform, competitiveness policies, etc. So far, there has been little research on the quality and efficiency of policy processes in this complex policy field. The MONIT exercise might have a pioneering role in this realm.

Evaluations of IS-related policies were sometimes carried out (*e.g.* with respect to specific funding programmes for ICT or for specific measures in

the educational sector, or in the Swedish case for IT policy in general), but neither overall IS policy nor the attendant policy processes were thoroughly evaluated. Given the relative maturity of the policy field, such an evaluation seems overdue in all countries, but it would face challenging methodological problems for relating the different instruments and their portfolio to the outcomes and impacts of IS policies. Currently, the EU, the OECD and certain countries are just beginning to apply such evaluations.

In some countries, reflections on the first phase of IS policies (and in some cases the second) enter current policy deliberations. By *adaptive learning from history*, institutional changes are considered as a reaction to the perceived pitfalls of the current institutional settings. Currently, most countries surveyed are looking to improve their institutional settings.

Conclusions and recommendations

When analysing IS policies against the background of the overall policy context of a country's national innovation system, it appeared that general problems of the policy system were reflected in IS policies. Thus, IS policies mostly were not a special problem area, but reflected the governance capabilities of the policy system in general. For example, the complex policy structures and rapidly changing policy agendas in Dutch STI policy were also evident in its IS policies. In the same vein, the problems of Greece's administrative system led to a specific institutional innovation in order to bypass the system's inertia, but this is again apparently a problem for all policy matters. Similarly, Austria's policy system was unable to produce a commonly accepted strategy document for both STI policy and IS policy.

So far, the policy agendas of IS policy and innovation policy are not well integrated in most countries. The same is true of the different sub-domains of IS policy (e-government, e-health, etc.). Programmes and initiatives are often designed without explicit or implicit reference to others. Numerous examples from the country case studies pointed to foregone synergies, sometimes even inconsistencies, between the respective policies. These examples indicate that there is room for better policy coherence. On the other hand, of course, there are also inherent limits and obstacles to policy co-ordination (as one means to achieving policy coherence). Given the complexity of the task, the differences between sub-fields of IS policy and between IS policy and innovation policy, the specific rationales of the various policy areas and the self-organising processes within and between these areas need to be respected. The task for policy process design would be to create institutions and bodies with incentive structures strong enough to foster co-operation and with role assignments clear enough to allow for

“process ownership”, while at the same time allowing for sufficient self-organisation.

The institutional innovations and experiments described in the IS country case studies could aid policy in further adapting to the difficult challenge of creating coherent policy in a complex policy field.

Agenda setting

Overall or overarching IS strategies are theoretically useful for creating more coherence among policies but face a very difficult task. Apart from the difficulty of devising and designing such a strategy, it faces the risk of not being accepted by all stakeholders. Localised IS policy strategies are useful both for orienting and guiding an organisation and for specifying how its activities differ from those of other organisations.

The systematic detection of ways to improve the current strategy (bottleneck analysis) is an alternative to the construction of overarching strategies. It consists of identifying hindering factors and then designing helpful measures. This approach has the advantage of being more realistic in terms of what can be achieved and thus has a better chance of being accepted and implemented.

One point at which agendas are strongly reformed and reformulated is when new governments come into power and create new change agents. They often set new directions and lead to the creation of new networks (however, they also destroy old agendas and old networks). The deliberate introduction of such change agents can be a sensible way to overcome policy inertia.

Policy implementation and co-ordination

In order for concepts to become reality, it is very important to carefully plan and carry out the implementation alongside strategy formulation. The quality and originality of concepts and programmes are greatly affected by the method of implementation as well as by its content. If implementation is to be successful, adequate resources are necessary for:

- *Ex ante* activities, including technology foresight and assessment.
- Co-ordinating activities to involve stakeholders in all phases of the programme.
- Outward communication, awareness-building activities.
- Use of analytical tools like evaluation, monitoring (project supervision) and benchmarking.

Concepts, lead documents or overall strategies that are not planned with respect to their implementation greatly risk being ineffective or having unplanned (and undesired) effects. In the past, policy makers have tried to outsource the implementation of initiatives; however, public organisations need to retain some process ownership. In order to determine which duties are to be outsourced, the contracting authority needs some managerial and hierarchical competence. This is essential for achieving the intended results of an initiative.

Policy learning and evaluation

Integrated learning processes, such as policy evaluation and the establishment of information and feedback channels are necessary for successful policy learning. A combination of local and higher-level policy learning must exist in a complex policy area such as the information society. The establishment and organised provision of strategic intelligence can be ensured through various instruments (market studies, technology assessment, technology foresight, monitoring, evaluation).

In sum, there is considerable room to increase policy coherence in the field of IS policy. At present, there is at best a weak link between IS policy and technology and innovation policy. On the other hand, even in the absence of an overarching IS strategy, policy has reacted to the challenges of the information society, although often within the framework of the respective administrative competences. In the various sub-fields of IS policy, failures were observed but also different ways to achieve policy coherence, some of which have succeeded quite well. It seems clear, from the case studies, that there may be little need to co-ordinate everything and everybody under the umbrella of a “grand strategy”.

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