Comparision of Innovation Policies in selected European, Asian and Pacific Rim countries: How best to optimise Innovation Governance in New Zealand?

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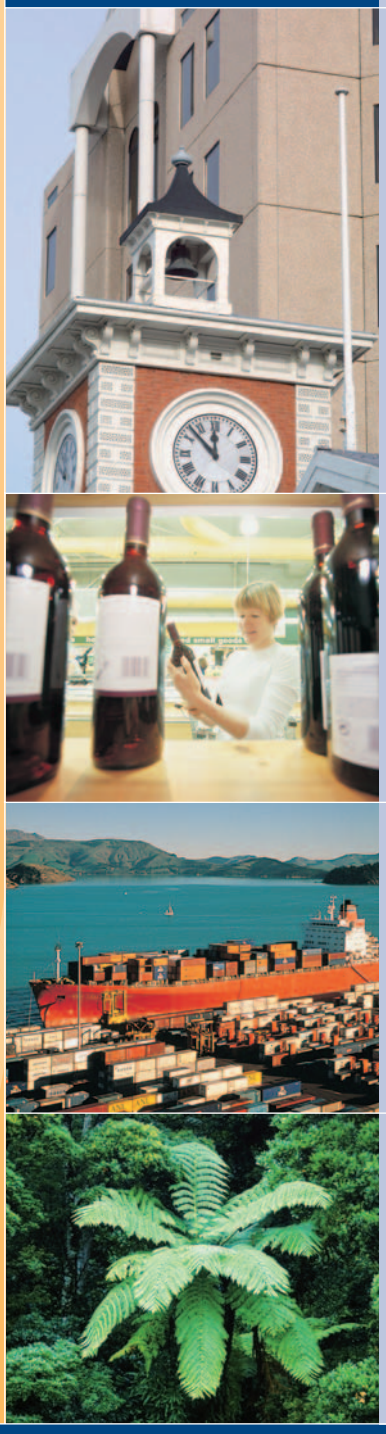

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Studies in Technology Users' Innovation (TUI)

Comparison of Innovation Policies in selected European, Asian, and Pacific Rim countries: How best to optimise Innovation Governance in New Zealand?

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Preface

An international focus is an important strand of the research themes among the studies completed by AERU personnel. Comparative work has included such topics as energy and greenhouse gas emissions, world trade policy effects, and food miles. Ongoing development of the Lincoln Trade and Environment Model typifies this international interest.

In keeping with this international focus, this report compares innovation policies in Europe, Asia, Australia and New Zealand. The approach taken is novel in that a broad range of countries are compared with a view to assessing innovation governance, and these assessments are used to consider how New Zealand might be able to improve its innovation policy settings.

This research illustrates well the collaborative arrangements between researchers in different organisations that are possible. Rene Wintjes (and Claire Nauwelaers formerly) work for the United Nations University Maastricht Economics and social Research and training centre on Innovation Technology (UNU-MERIT) while Julian Williams works as a consulting research economist.

This report will appeal to those interested in innovation policy both in New Zealand and elsewhere, and is particularly relevant to specialists in innovation policy.

Professor Caroline Saunders
Director AERU

Summary

The technology users' innovation (TUI) research programme aims to identify the conditions under which socio-technical networks best foster technology development, adoption and commercialisation, and thereby contribute to improved innovation outcomes and innovation governance in New Zealand. The main research objective of this report was to compare innovation policy across selected European and Pacific Rim countries in order to assess how best to optimise innovation policy in New Zealand.

Two assessments of National Systems of Innovation (NIS) policies settings were made, each using a different framework of analysis for the selected case study countries (20 and 21 cases respectively). The sample included selected European and Asian countries, Australia and New Zealand.

From the European experts' assessments, results from comparing New Zealand with the European Innovation Leaders shows that there is potential to improve NIS in New Zealand by giving attention to:

- Innovation policy strategic intelligence:
    - strategic exercises, advisory bodies, foresights, evaluations, peer reviews, benchmarking, NIS studies
    - capacity building within agencies in charge of policy design and implementation.
- Public private partnerships and knowledge transfer:
    - via competence centres and joint public-private organisation oriented towards innovation, clusters, networks and poles with businesses as main drivers
    - the provision of science parks and incubators
    - providing knowledge transfer incentives such as science-industry bridging organisations, university transfer offices, cooperative programmes, funding schemes, and research commercialisation schemes.
- Private R&D innovation:
    - direct and indirect support for private R&D via subsidies, loans and tax incentives
    - subsidies and vouchers, advisory services and management support for innovation
    - adaptation of curricula and training programmes to further innovation, and financial and non-financial support for human resources for innovation companies
    - demand stimulation policies, such as innovative public procurement and lead market initiatives.

- Entrepreneurship and new firm creation
    - spin offs and start up programmes including finance, infrastructure, advisory schemes, brokerage services, business plans, competitions to support new technology based firms (NTBFs),
    - entrepreneurship training such as courses and initiatives in basic or continuing education to enhance entrepreneurial spirit and facilitate innovation company formation
    - risk and venture capital to include guarantee mechanisms, co-funding of venture capital companies and business angel networks.

From the New Zealand expert assessments, results from comparing New Zealand with the European Innovation Leaders shows that there is potential to improve NIS in New Zealand by:

- Improving high-level horizontal agency framework, that is, the NIS provides a strong unifying approach that supports policy guided by government's strategic plan for the nation.
- Implementing a tangible commitment to horizontal coherence so that NIS policies are complementary.
- Establishing a clear national vision for innovation.
- Implementing and developing the proposed changes in governance to achieve:
    - improved vertical coherence so that NIS policies are implemented in the way they are intended, and
    - improved stakeholder and business involvement in policy making and priority setting.

From the two assessments made, Finland and Denmark are consistently seen as Innovation Leaders and there is a need to consider their innovation policy settings as potentially relevant to New Zealand.

Chapter 1
Introduction: Research Objectives and Framework for Analysis

1.1 Background

The technology users' innovation (TUI) research programme aims to identify the conditions under which socio-technical networks best foster technology development, adoption and commercialisation, and thereby contribute to improved innovation outcomes and innovation governance in New Zealand. The first objective of the research programme has a New Zealand focus and uses a case study method to examine successful and unsuccessful commercialisation of New Zealand inventions (Lambert and Fairweather, 2010). The second research objective seeks to understand New Zealand's distinctive culture of innovation and has two components: (1) formation of cultural models of national culture, national identity, and innovation, and (2) comparison of innovation policies across a number of key countries. Understanding these two components can inform policy development relevant to fostering commercialisation of invention. The policy settings are an important component of the socio-technical networks around invention. It is the second component of the second objective which is addressed in this report.

1.2 Research objectives

The overall objective of this comparative policy research is to enhance innovation policy in New Zealand. This can be achieved by comparing the innovation policies of New Zealand and other selected countries. The focus is on each country's innovation policy profile and the broad settings of its enactment, that is, innovation governance. Key questions about each nation's innovation policy profile include:

1. Can the National Innovation System (NIS) be characterised in ways that allow comparisons across countries?

2. Is it possible to group countries in terms of NIS policy? We acknowledge that at some level each country's innovation policy profile is distinctive but there may be sufficient similarities in innovation profile on which to make comparisons between groups of countries.

3. In making these country comparisons can we identify countries that perform well in terms of the management of their innovation governance? These comparisons can be informed by independent ratings of the level of innovation in each country. Specifically, we will examine the innovation policy characteristics of countries grouped according to their level of innovation.

4. Having made comparisons of innovation policy, how does New Zealand compare with other countries considered to be particularly innovative? Comparisons across countries and to New Zealand provide a base for considering the strengths and weaknesses of New Zealand's innovation policy settings and offer a means of critically assessing New Zealand's NIS. Are we doing what is generally considered to be the best practice in innovation governance? How does New Zealand fit current trends?

The main research objective is to compare innovation policy across selected European and Pacific Rim countries. The core issue is to assess how best to optimise innovation governance in New Zealand.

1.3 Frameworks used to evaluate NIS policies

To meet the above research objective it is necessary to profile the innovation policy system of each selected country and then make an assessment of each profile. In conducting this research, two approaches were developed by drawing on the expertise of innovation policy experts in Europe and in New Zealand (the second, third, and fifth authors of this report). These experts established a framework that would provide a basis for making assessments of the innovation governance in the case study countries.

In the approach developed by the European experts, a framework was developed in order to:

1. Provide a complete and balanced coverage of the wide realm of innovation policy
2. Set the scene for a comparative overview of policies in a large number of countries
3. Include innovation challenges.

The first component reflects the fact that it is necessary to provide a working framework in which the array of policies and instruments are covered systematically for all countries under review. The boundaries of innovation policy are fuzzy. The presence or absence of specific types of policy initiatives, as well as the balance between these various types, need to be elucidated in a systematic manner. The overview needs to provide a complete picture of the policy system, not one focused solely on recent changes, which, while important, might provide a truncated view on the system in place.

The second component refers to the need to develop a systematic organization of innovation policy profiles. This is necessary in order to place the various countries in perspective. A synthetic view on innovation policies' main driving forces and orientations is needed despite the multiplicity and complexity that emerge from individual country reviews. By organizing the reviews around broad dimensions of policy systems, comparability can be enhanced despite the proliferation of country-specific policy initiatives and instruments. Accordingly, this element of the framework serves to focus attention on key policy directions and instruments, rather than striving to provide exhaustive and detailed descriptions of policy content.

The third component addresses the need for garnering an understanding of each nation's unique situation with respect to innovation and innovation policy. This can be done by including information about the main challenges facing the NIS of each nation being analyzed. Challenges include any factors that prevent the development of effective innovation policy.

Table 1.1 below presents the framework devised the European policy experts and which responds to the above needs for comparative policy analysis. The tables presented in Appendix 1 use this framework to present innovation systems challenges and seven key dimensions of the national innovation policy system, that is, the innovation policy mixes for each of the countries under review.

Table 1.1: Framework for NIS policy profile - European expert

COUNTRY A: National Innovation System Challenges	
Challenge 1	Based on benchmarking of key indicators and expert assessment in Innovation Trendchart, Erawatch, CREST peer reviews, OECD reviews, national reviews, etc.
Challenge 2	
Challenge 3	
Challenge 4	
COUNTRY A: National Innovation Policy System	
1. Innovation policy governance structure and key actors	
Key Policy Documents	Strategic plans, Policy papers – main political statements with respect to innovation – degree of horizontalisation of innovation policy
Decision-making Bodies	Key actors, horizontal coordination issues
Implementing Bodies	Key agencies and policy delivery mechanisms
Multi-level governance	Division of labour between regional/national authorities, role of EU Structural Funds, vertical coordination issues
2. Innovation policy strategic Intelligence	
State-of-the-art and instruments for policy design capacities: Strategic exercises, advisory bodies, Foresights, evaluations, peer reviews, benchmarking, NIS studies, capacity building within authorities in charge of policy design and implementation, etc.	
3. Science base, public research, technology organisations	
Structural Funding	Institutional block funding channels for universities, PROs and Technology Organisations. Evolution of funding rules
Competitive funding	Competitive funding programmes for public research actors-generic or targeted
Reform of public research base	Mergers and reorganisations, focus on centres of excellence, prioritization between areas, new rules for universities and PROs management, etc.
Human resources for public research	Funding channels for researchers, including mobility schemes. Improvements to researcher's careers.
4. Public-private partnerships and knowledge transfer	
Structural co-operations	Competence centres, joint public-private organizations oriented towards innovation.
Clusters, networks, poles	Programmes and incentives for clusters and networks, with businesses as main drivers
Science parks, technopoles, incubators	Specific places for co-location of (public and private) innovation actors
Knowledge transfer incentives	Initiatives for technology transfer: structures (science-industry bridging organizations, university transfer offices, technology transfer offices…), cooperative programmes, funding schemes, research commercialization schemes, mobility initiatives, etc.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	Subsidies and loans (direct) and tax incentives (indirect) for private R&D
Support for innovation: financial and non-financial	Subsidies, voucher schemes, soft support, advisory services for innovation projects, innovation management support…
Human resources for innovation	Adaptation of curricula and training programmes to further innovation. Financial and non-financial support for human resources for innovation in companies.
Demand stimulation policies	Innovative public procurement, lead market initiatives…
6. Entrepreneurship and new firm creation	
Spin-offs and start-ups programmes	Finance, infrastructure, advisory schemes, brokerage services, business plans, competitions, to support NTBFs and spin-off creation.
Entrepreneurship training	Courses and initiatives in basic or continuing education, to enhance entrepreneurial spirit and facilitate innovative company creation.
Risk and venture capital	Guarantee mechanisms, co-funding of venture capital companies, business angels networks…
7. Framework conditions for innovation	
Intellectual Property Rules	Support and awareness raising activities for Intellectual Property protection
Innovation-friendly Rules and Regulations	Revision of regulations and administrative practices to remove barriers for innovative activities and companies
Public awareness and readiness for innovation	Awareness campaigns, innovation prizes, road-shows, etc.
Innovation and other policies	Innovation promotion within foreign direct investment, health, education, environment and energy policy.

While there have been a number of metrics used to depict NIS characteristics (Global and European Innovation Scoreboards notably), there is no metric available to date to depict

innovation policy systems. Efforts have been given (see e.g., European Innovation Progress Report 2008) to use the number of policy measures in certain policy areas, as an indicator of policy efforts, but this is unsatisfactory as the metric is more likely to reflect organization of policy delivery systems, rather than true policy efforts. A better metric would involve capturing public budgets devoted to policy lines, but this is notoriously difficult to achieve. This route has been tried, notably under the policy mix project[1], in a limited way, and in *European Innovation Progress report 2009*[2] . The lack of systematic data collection regarding budgets, however, limits the possibilities for such analyses, as the information used is based on publicly available budget-information.

For the purposes of this study, the framework data for each country were reviewed and assessed in quantitative terms by experts within the field of innovation policy. Each of the seven key dimensions of NIS was reviewed and for each country the dimension was rated on a 1-5 scale (low to high), reflecting the importance to the country as judged by the policy expert. The policy expert based their rating on the quantity of policy efforts (in terms of budget, number of activities, actors, and measures) and the relative importance of these efforts within the policy mix of the respective NIS. Regarding the first dimension of 'innovation policy governance structure', the rating takes into account the number of recent policy documents. Regarding the second dimension of 'innovation policy strategic intelligence' the rating tries to summarize the quantity of policy efforts in terms of the instruments and capacity for policy design and evaluation, including: strategic exercises, advisory bodies, Foresights, evaluations, peer reviews, benchmarking, NIS studies, etc. Regarding the remaining dimensions, the rating of policy efforts was primarily based on a combination of: the number of policy measures, programmes or schemes**,** recently taken initiatives, and an estimated share of the policy budget. In addition to the expert-assigned ratings of each dimension of policy, the challenges faces each NIS were noted so that frequency of challenges could be compared across nations included in the analysis.

This approach to documenting innovation systems is novel in several ways. First, it makes a quantitative assessment, using a number of criteria, of the innovation system. This kind of assessment has not been at the forefront of policy analysis to date. Second, it has a wide scope and goes beyond European countries to include some from the Pacific Rim. Third, this approach features broad coverage of policy issues and attempts to cover the innovation policy system as a whole. This approach is limited in that it does not document innovation policy outcomes.

In the approach taken by a New Zealand policy expert, a framework was developed in order to highlight two main dimensions of innovation governance and policy challenges (based on the OECD Governance of Innovation Systems 2005 report and the OECD Innovation Strategy 2010 report):

1. General structural characteristics of the NIS
2. Capabilities required for good governance.

[1] Nauwelaers, C., Boekholt, P., Mostert, B., Cunningham, P., Guy, K., Hofer, R., and Rammer, C. (2009) "Policy Mixes for R&D in Europe". Report to European Commission, Directorate-General for Research, UNU-MERIT, Maastricht. May 2009.

[2] http://proinno.intrasoft.be/admin/uploaded_documents/EIPR2009.pdf

Within these two main dimensions, selected features outlined and described in available OECD reports were assessed via content analysis (see databases accessed adjacent to the list of references). The information for each NIS was gathered from Pro Inno reports, OECD Reviews of Innovation Policy, and the Venturous Australia report. This content analysis is summarised in the attached country information pages – one set for each nation – shown in Appendix 2. Not all of the selected features are reported for all countries.

The selected features of each of the main policy dimensions are shown in Table 1.2 below.

Table 1.2: Framework for the profile of each NIS policy profile - New Zealand expert

1. General structural characteristics
High-Level horizontal agency framework – the NIS provides a strong unifying approach that supports policy guided by the governments' strategic plan for a nation
Horizontal coherence – NIS policies across government are complementary
Delivery agency influence in priority setting – the agency responsible for delivering funding also influences funding policy
Vertical coherence – NIS policy is implemented in the way it is intended
Stakeholder involvement in policy making
Business involvement in policy making
Mobilisation of actors - there is support from high level politicians and ministers for NIS.
2. Capabilities
National vision for all innovation – clear articulation of the country's vision for innovation
National innovation systems concepts
Strategic approach
Globalisation response.

In effect, assessing each country on these dimensions provides an evaluation in terms of an ideal arrangement of NIS governance characteristics. That is, in ideal terms, good NIS governance occurs when it is effectively set up and administered. This means it has a unified approach which is consistent with the plans for the country and is effectively put in place by virtue of being complementary with other policies. Further, there is good coordination by having the funding agency involved in funding policy, and having policies implemented as intended. Finally, there is strong involvement by both stakeholders and businesses. Note that having an NIS system effectively set up and running does not necessarily equate with being an innovation leader. That is, good NIS is a necessary but not a sufficient condition for innovation success. Factors beyond the NIS settings play an important role in the country's level of innovation including the capabilities of various people and institutions involved in governance and the ability of the national innovation system to learn, adapt, evolve and interact.

Nations were given a rank score based on the degree of presence of a particular feature of the innovation system. The score should be interpreted as a categorical label that helps us identify common features shared among countries as well as those features which make a country

distinct. The rank scores range from 5 (most intensive) to 1 (least intensive). The rank scores are discussed for each of the features and are summarised in a table. Charts were then prepared to compare pairs of features for all countries in scatter plots. This was done in order to inform a discussion on similarities and differences in innovation systems. Finally, the data were averaged and rank ordered to compare countries on these dimensions.

The two frameworks for assessing NIS policies are necessarily limited. The main limitation is that each assessment, while based on expert opinion, is still a personal assessment. It remains possible that other experts making these assessments would produce different scores, although we would like to think that even if such scores were different in detail they would still be similar in general. In effect, our experts have made qualitative judgements in forming their scores. Further, comparing European and Pacific Rim countries required using quite different data sources so it is possible that some the of the results are a reflection of data sources used rather than actual differences in results. Accordingly, we cannot argue for strong conclusions on the basis of the evidence presented and, at best, our conclusions are indicative only. However, the conclusions are still important because they provide the best available answers to our research questions. Until better measures of NIS policy are available then assessments such as those reported here are our only way of addressing the policy questions asked.

1.4 Choice of case-study countries

A wide range of case-study countries were considered for study. The authors' early thinking suggested that suitable case-study countries for comparison with New Zealand were those with similarity to New Zealand by virtue of being relatively small, open economies and at some distance from the major markets. Upon further thought additional criteria were added. A more implicit criterion "quality of innovation policies" was used in the selection of a subset of exemplary case-study countries including Austria, The Netherlands, Finland, Denmark and Sweden. These countries have a long history of innovation policies and have good availability of policy intelligence in the form of monitoring, analysis and evaluation. The availability of this type of information is highly relevant when the question of policy effectiveness is of concern. Further, some countries were chosen because they are considered 'developing' and have parallels with New Zealand in this regard. Finally, location in the Pacific Rim was another factor used in case-study country selection. Several small but highly innovative Asian nations were selected for inclusion in the study as well as Australia which shares a similar cultural heritage, namely European, with New Zealand. The final list of 21 countries is shown in Table 1.3 which also has the nations grouped by the level of development of their innovation system. The categories of developmental stage are: Leader, Follower, Moderate, and Moderate in Transition and were developed by PRO INNO[3]. The PRO-INNO-Policy TrendChart describes and analyses major innovation policy trends at national and regional levels across Europe in an independent way. It aims to contribute to policy assessment and to identify examples of good practice, thus improving the basis for decision making in innovation policy. A policy monitoring network tracks developments in innovation policy measures in 39 countries.

[3] http://www.proinno-europe.eu/

Table 1.3: List of case-study countries

Location	Country	Rating of development stage of innovation system
Europe	Denmark	Leader
	Finland	Leader
	Sweden	Leader
	Switzerland	Leader
	Austria	Follower
	Belgium	Follower
	Netherlands	Follower
	Ireland	Follower
	Iceland	Moderate
	Italy	Moderate
	Norway	Moderate
	Portugal	Moderate
	Czech Republic	Moderate transition
	Estonia	Moderate transition
	Slovenia	Moderate transition
	Subtotal	15
Asia	Malaysia	
	Singapore	
	South Korea	
	Taiwan	
	Subtotal	4
Australasia	Australia	
	New Zealand	
	Subtotal	2
	Total	21

Note that for the New Zealand analysis it was not possible to get the necessary performance rating data for Singapore, Malaysia, and Taiwan and we have used instead Japan and Chile. Note also that in the New Zealand at the present time, a new Ministry of Science and Innovation is being formed by a merger of the Foundation for Research, Science and Technology (FRST), and the Ministry of Research Science and Technology (MoRST). In addition, there has been recent reform of the Crown Research Institutes (2011) following the implementation of the Crown Research Institute Taskforce recommendations. Therefore it was necessary to include two analyses for New Zealand NIS - one for the governance arrangements as of September 2010 (pre-change) and one being the anticipated arrangements.

1.5 Conclusion

This chapter has briefly outlined the research objective, the framework, and the methods developed to characterise each country's innovation system, and described the case study countries to be included. The two methods reflect the experience of innovation policy experts located in Europe and New Zealand. The next chapter presents the findings of the comparative analysis of the NIS system for each country, the full collation of which is included in Appendices 1 and 2. A final chapter briefly discusses these findings.

Chapter 2
Comparative Analyses of National Innovation Systems

2.1 Introduction

The tables provided in Appendix 1 (National innovation policy system profile for each Country) and Appendix 2 (Structural characteristics and capabilities for each country) were studied in order to identify patterns of similarity and difference in the national innovation system (NIS) across the case-study countries. In detail, every country has a distinctive innovation policy profile, but at the level of the dimensions we chose for analysis some similarities emerge and countries can be groups according to shared characteristics. The chapter begins with the assessment by our European policy experts who looked at innovation challenges and dimensions of NIS policy. Since there are many countries included in the comparisons, this section presents the European country data first then introduces the Asian countries along with Australia and New Zealand. The subsequent section presents the data based on the assessment by our New Zealand policy expert and focuses on general structural characteristics, and on capabilities required for good innovation governance.

2.2 European expert assessment of NIS

In this section attention is given to: (1) countries having challenges similar to New Zealand, (2) policy answers which may contain lessons for New Zealand and (3) best practices for countries with a high quality of innovation policy. In effect, we employ a policy gap analysis which compares policy features in countries with a leading National Innovation System to other countries in Europe and the Pacific Rim.

2.2.1 NIS challenges

Table 2.1 lists the NIS challenges for the European countries and reports their frequency across countries. The table also reports the number of challenges in common with New Zealand, data that will be considered later in this section. The three most often-mentioned categories of priority challenges among the case-study European countries, shown in bold, were:

- “Human Resources, for research” (in ten European countries)
- “Enlarging the base of (small, indigenous) firms involved in innovation” (in nine European countries)
- “New firms, Venture Capital, entrepreneurship” (in seven European countries).

‘Human resources for research’ as the most frequent challenge indicates that many countries recognise good people as a vital part of the NIS. At the level of individual countries, the details of this challenge may differ. For example, in one country higher education in general is the HR challenge and in another country attracting top-research talents is the HR challenge. The second most reported challenge refers to an often-mentioned weakness of having only a small base of innovative and R&D intensive companies which calls for the need to increase the number of innovating firms, especially among SMEs and indigenous firms. The third most reported challenge refers to creation and growth of new innovative firms and thus strongly complements the second NIS challenge. Thus, while human resources for research was

apparent as a challenge in ten of the 15 European countries, this challenge is matched in importance by the challenge of increasing the stock of new firms either by spreading innovation among existing firms or by encouraging entirely new firms.

Table 2.1: Frequency of NIS challenges in Europe

NIS challenge	Aut	Cz	Be	Ice	Swi	Fi	Swe	Irl	Dk	Nl	It	Est	Slo	Nor	Port	Eur Sum
Enlarging the base of (small, indigenous) firms involved in innovation		1	1		1	1	1	1		1			1		1	**9**
Public R&D expenditures/capacity	1								1				1			3
Private R&D expenditures								1					1			2
HR, for research	1	1	1		1				1	1	1	1		1	1	**10**
Coherence, fragmentation policy support system	1	1	1										1		1	5
New firms, VC, entrepreneurship	1	1	1		1						1			1	1	**7**
Gap between science-industry, public-private, transfer		1	1					1			1	1				5
Impact from crisis on system and policy				1			1	1								3
More focus and prioritisation				1						1		1	1			4
Improve governance mechanisms, evaluation, intelligence				1		1										2
User-, demand-driven, services, non-tech innovation policy				1		1	1		1				1			5
Internationalisation of system						1										1
Growth, productivity, competitiveness return from research, technological development and innovation (RTDI)							1		1			1		1		4
Challenges in common with New Zealand	2	**3**	**3**	1	1	2	2	2	1	1	2	**3**	**3**	2	2	

Beyond the top three NIS challenges there were three challenges mentioned in five countries: ‘coherence, fragmentation of policy support system’, ‘Gap between science-industry, public-private, transfer’, and challenges which refer to ‘User-, demand-driven-, services-, and/or non-technological innovation policy’.

By expanding the focus from Europe to include Asia and Australasia we can begin to make international comparisons in ways that can potentially highlight the distinctive character of New Zealand’s NIS. Table 2.2 lists the NIS challenges for Europe, Asia, Australia, and New Zealand and shows the frequency with which they occur and the total for each country. Note that for New Zealand, more challenges have been reported than for other countries, with a total of seven challenges, just ahead of Slovenia with six, and ahead of the others which had between three and five. New Zealand is quite different from the European case-study countries in that it shares only ‘human resources for research’ as a priority challenge, with all the remaining six challenges relatively unimportant to the European countries. The Asian countries are similar to the European countries in their emphasis on ‘enlarging the base of firms involved in innovation’ and on ‘HR for research’ but do not emphasise ‘new firms, VC, entrepreneurship’. They give some attention to the ‘gap between science-industry, public-private, transfer’, as does Europe, along with New Zealand.

Table 2.2: Frequency of NIS challenges for Europe, Asia, Australia, and New Zealand

NIS challenge	Europe	Malaysia	Singapore	S Korea	Taiwan	Asia sum	Australia	New Zealand
Enlarging the base of (small, indigenous) firms involved in innovation	**9**	1	1	1	1	**4**		
Public R&D expenditures/capacity	3			1		1	1	
Private R&D expenditures	2				1	1	1	1
HR, for research	**10**	1	1		1	**3**	1	1
Coherence, fragmentation policy support system	5			1		1		1
New firms, VC, entrepreneurship	**7**		1			1		
Gap between science-industry, public-private, transfer	5			1	1	2	1	1
Impact from crisis on system and policy	3					0		
More focus and prioritisation	4					0		
Improve governance mechanisms, evaluation, intelligence	2					0		
User-, demand-driven, services, non-tech innovation policy	5			1		1		1
Internationalisation of system	1		1	1		2		1
Growth, productivity, competitiveness return from RTDI	4							1
Total		**2**	**4**	**6**	**4**		**4**	**7**
Challenges in common with New Zealand		1	2	4	**3**		**3**	

Table 2.3 show the results of modifying the raw data from Tables 2.1 and 2.2 by using the frequency to derive an average score for the European countries (including category of NIS development), Asia, Australia, and New Zealand. The NIS challenges with above average scores are shown in bold.

Among the challenges reported for leading NIS countries (Finland, Denmark, Sweden, and Switzerland), the two categories of challenges with high scores were 'Enlarging the base of innovation' and 'User-, demand-driven, services-, non-tech innovation policy'. For the follower countries (Netherlands, Ireland, Austria, and Belgium) fewer challenges were apparent and the two categories of challenges with high scores were 'Enlarging the base or internationalisation' and 'Human resources for research'. For the moderate NIS countries (Norway, Portugal, Italy, and Iceland), 'human resources for research', and 'new firms, venture capital and entrepreneurship' were the top challenges. Last, the moderate NIS in transition countries (Slovenia, Estonia, and Czech Republic) emphasise the largest number of challenges including 'enlarging the base of innovation firms', 'fragmentation', 'gap between science and industry', and the need for 'more focus and prioritisation'. These challenges may relate to the presence of relatively large public research sectors (compared to business R&D) in these countries and the difficulty they face in selecting sectors, clusters or technological areas on which to focus. In the past, research sectors were expected to be largely independent with broad academic profiles.

Table 2.3: Average score for NIS challenges for European and Pacific Rim countries

NIS challenges	Eur Avg	Leading NIS (4)	Follower NIS (4)	Moderate NIS (4)	Moderate NIS, in transition (3)	Asia (4)	Aust	N Z
Enlarging the base of (small, indigenous) firms involved in innovation	**0.6**	**0.8**	**0.8**	0.3	**0.7**	**1.0**		
Public R&D expenditures/capacity	0.2	0.3	0.3		0.3	0.3	1	
Private R&D expenditures	0.1		0.3		0.3	0.3	1	1
HR, for research	**0.7**	0.5	**0.8**	**0.8**	**0.7**	**0.8**	1	1
Coherence, fragmentation policy support system	0.3		0.5	0.3	**0.7**	0.3		1
New firms, VC, entrepreneurship	**0.5**	0.3	0.5	**0.8**	0.3	0.3		
Gap between science-industry, public-private, transfer	0.3		0.5	0.3	**0.7**	0.5	1	1
Impact from crisis on system and policy	0.2	0.3	0.3	0.3	0.0			
More focus and prioritisation	0.3		0.3	0.3	**0.7**			
Improve governance mechanisms, evaluation, intelligence	0.1	0.3		0.3				
User-, demand-driven, services, non-tech innovation policy	0.3	**0.8**		0.3	0.3	0.3		1
Internationalisation of system	0.1	0.3				0.5		1
Growth, productivity, competitiveness return from research, technological development and innovation	0.3	0.5		0.3	0.3			1

Fragmentation of policy support and the gap between science and industry are not new challenges. Science-industry linkages have been reported as a main challenge for more than a decade and are actually at the core of the very concept of NIS. Several years ago, these challenges were frequently reported by 'leading' countries (e.g., Denmark) and 'following' countries (e.g., the Netherlands). Currently both these challenges are still key for countries with an NIS rated as "Moderate, in transition" (Czech Republic, Estonia, Slovenia), while they are no longer reported for countries with a leading innovation system (Finland, Denmark, Sweden, Switzerland).

Overall, the table shows that all countries except the moderate NIS, Australia, and New Zealand have 'enlarging the base of firms involved in innovation' as a priority NIS challenge. The moderate NIS countries, Australia, and New Zealand do not see this as a challenge. All countries, except the leading NIS ones, emphasise human resources for research as a challenge. Beyond these comparisons, the leading NIS countries are distinctive in identifying 'user-, demand-driven, services, non-tech innovation policy' as a policy challenge although this is a challenge for New Zealand's NIS.

The Asian countries are broadly similar to the European countries and closely match the Follower and Moderate in Transition countries. Including the third challenge of 'gap between science-industry, public-private, transfer' shows them to be similar to the moderate in transition European countries.

For New Zealand, the data in the table show that its NIS challenges are distinctive in two main ways. First, it does not give priority to enlarging the base of firms involved in innovation. Second, unlike many of the case study countries, it does emphasise 'user-, demand-driven, services, non-tech innovation policy' which is a characteristic of Leading NIS countries in Europe. New Zealand is also distinctive in that it emphasises the challenges of 'private R&D expenditure' and 'internationalisation of the system' while most other case

study countries do not. Two other New Zealand priorities 'coherence, fragmentation policy support system' and 'gap between science-industry, public-private, transfer' are shared with Moderate in Transition countries.

These results lead to further consideration of countries which are similar to New Zealand in terms of NIS challenges. Table 2.4 lists the countries which share similar challenges to New Zealand. Four out of the 15 European countries have three key challenges in common with New Zealand: Czech Republic, Belgium, Estonia and Slovenia. Also Taiwan and Australia share three challenges with New Zealand and South Korea shares four challenges. Thus, in terms of NIS challenges, New Zealand is similar to South Korea, three of the four Moderate in Transition countries, plus Belgium, and it is similar to Taiwan and Australia.

Table 2.4: Challenges of countries which share three or more challenges with New Zealand

Challenges	**Cz**	**Bel**	**Est**	**Slo**	**S. Kor**	**Tai**	**Aus**	N Z
Enlarging the base of (small, indigenous) firms involved in innovation	1	1		1	1	1		
Public R&D expenditures/capacity				1	1		1	
Private R&D expenditures				1		1	1	1
HR, for research	1	1	1			1	1	1
Coherence, fragmentation policy support system	1	1		1	1			1
New firms, VC, entrepreneurship	1	1						
Gap between science-industry, public-private, transfer	1	1	1		1	1	1	1
Impact from crisis on system and policy								
More focus and prioritisation			1	1				
Improve governance mechanisms, evaluation, intelligence								
User-, demand-driven, services, non-tech innovation policy				1	1			1
Internationalisation of system					1			1
Growth, productivity, competitiveness return from RTDI			1					1
Number of shared challenges with New Zealand	3	3	3	3	4	3	3	3

Another way to consider countries which are similar to New Zealand is to count the number of countries with the same challenges as New Zealand. In Table 2.5, for each of the challenges reported for New Zealand, the case-study countries which share a similar challenge are identified. The challenge of 'Internationalisation' which is characteristic for New Zealand is only shared with three other countries among our sample, namely: Finland, Singapore, and South Korea. Especially in the latter two countries there are many different policy schemes which promote internationalization of the NIS. In Singapore these policy efforts are very diverse: not only supporting the internationalization of its public research base but also supporting companies, in attracting foreign researchers and investments (e.g., the International Headquarters Scheme, the Singapore International Manpower Programme) and through International Enterprise supporting business development activities in overseas markets by local firms. In South Korea and Finland the focus of policy efforts seems to be more on strengthening the international competitiveness of the public research infrastructure, although for instance the scheme 'International Science and Business Belt (ISBB) in South Korea also suggests that public-private linkages are also seen as modes of internationalization.

Table 2.5: Challenges of New Zealand and countries which share similar challenges

Challenges of New Zealand	Challenge also reported for case-study countries	Number of countries with same challenges
Internationalisation	Finland, Singapore, S. Korea	3
Business R&D expenditures	Ireland, Taiwan, Australia	3
Coherence, fragmentation policy support system	Austria, Czech Republic, Belgium, Slovenia, Portugal, S. Korea	6
Gap between science-industry, public-private, transfer	Czech Republic, Belgium, Ireland, Italy, Estonia, S. Korea, Taiwan, Australia	8
User-, demand-driven, services, non-tech innovation policy	Iceland, Finland, Sweden, Slovenia, S. Korea	5
Growth, productivity, competitiveness return from RTDI	Sweden, Italy, Norway, S. Korea	4
HR, for research	Austria, Czech Republic, Belgium, Switzerland, Denmark, Netherlands, Italy, Estonia, Norway, Portugal, Malaysia, Singapore, S. Korea, Taiwan, Australia	15

Selecting best practices which could be transferred and adopted by New Zealand calls for a more detailed benchmarking of such practices. In the case of internationalization we can for instance refer to the PRO INNO study: "International aspects of support to innovation" of the INNO Learning Platform (2008)[4]. Besides comparing evaluation studies, such benchmarking would need to be complemented with an analysis of the relevance, barriers and opportunities for transfer, adoption and adaptation.

Regarding the concept of Technology Users' Innovation (TUI) some challenges and the responses of different countries are of special interest. The category of challenges labelled: 'User-, demand-driven, services, non-tech innovation policy' consists of a broad range of challenges. In Finland, the government makes a distinction between user-driven innovation and demand-driven innovation, where the former refers to the interactive involvement of users in the innovation process, as is often the case in service industries and which also includes non-technological innovation. Schemes to promote innovation in the public sector are examples of user-driven innovation. Demand-driven is seen as a more macro level of use, where societal challenges can be addressed, e.g., climate change.

2.2.2 Dimensions of innovation policy

Table 2.6 shows the ratings of the quantity of each nation's policy efforts. The rating is based on an assessment of policy budget, number of activities, actors, and measures and the relative importance of these efforts within the policy mix of each nation's NIS. A rating is given for seven policy dimensions across all 15 European case study countries as well as for the European average. The dimension of 'science base, public research, technology organisations'

[4] http://www.proinno-europe.eu/promotion-pro-inno-europe-results/admin/uploaded_documents/Mini-study_8-final.pdf

received the highest rating (3.7) of any dimension and suggests that the 'linear-model' is still apparent in many innovation systems. That is, funding of pubic research is seen to lead to R&D that will diffuse and be used by members of society. However, the dimension of 'public-private and knowledge transfer' partnerships was rated almost equally high at 3.5 and, in addition, many public research policy efforts are also addressing or aiming for transformation of the public research sector. The lowest-ranked policy dimension was 'innovation policy strategic relevance'.

Table 2.6: Rating of the seven dimensions of innovation policy systems for Europe

Policy dimension (1=low, 5=high)	**Aut**	**Cz**	**Be**	**Ice**	**Swi**	**Fi**	**Swe**	**Irl**	**Dk**	**Nl**	**It**	**Est**	**Slo**	**Nor**	**Port**	**Eur Average**
Governance structure	5	3	2	2	3	5	4	3	4	3	3	2	3	3	3	3.2
Policy strategic intelligence	5	2	3	2	3	4	4	3	3	4	2	2	2	3	2	2.9
Science base, public research	3	4	4	4	5	4	4	2	4	3	3	4	4	5	3	**3.7**
Public-private partnerships, knowledge transfer	5	3	4	2	2	4	3	3	5	4	4	3	3	4	3	**3.5**
Private R&D & innovation activities	3	2	3	3	1	4	3	3	3	4	2	3	3	4	4	3.0
Entrepreneurship & new firm creation	4	2	4	3	2	4	3	4	3	3	2	4	2	3	3	3.1
Framework conditions for innovation	4	3	4	3	2	3	2	4	3	4	3	3	3	3	3	3.1

Striking is the difference between the challenges noted earlier in Table 2.1 and the current policy investments shown above. Among the current policy measures we note that R&D policy is still dominant over innovation policy, and public R&D policy is dominant over private R&D policies, but in terms of challenges both public and private R&D expenditures are not often mentioned as a major challenge.

Table 2.7 shows the ratings of the policy dimension for Europe, Asia, Australia, and New Zealand. The averages for the Asian case-study countries show that the same two dimensions as for Europe are important, and, in particular, public research has the highest rating. Governance structure is second equal for Asia whereas in Europe it was third. New Zealand also emphasises public research but has governance structure as equally important.

Table 2.7: Rating of the seven dimensions of innovation policy systems for Europe, Asia, Australia and New Zealand

Policy dimension (1=low, 5=high)	**Europe Avg**	**Malaysia**	**Singapore**	**S. Korea**	**Taiwan**	**Asia Avg**	**Australia**	**New Zealand**
Governance structure	3.2	3	3	4	**3**	**3.2**	3	**4**
Policy strategic intelligence	2.9	3	2	4	2	2.8	3	3
Science base, public research	**3.7**	3	**4**	**4**	**3**	**3.4**	3	**4**
Public-private partnerships, knowledge transfer	**3.5**	3	3	3	**3**	**3.2**	**4**	3
Private R&D & innovation activities	3.0	2	3	3	2	2.6	3	2
Entrepreneurship & new firm creation	3.1	2	3	2	2	2.4	3	2
Framework conditions	3.1	3	3	2	2	2.8	**4**	3

The data in Tables 2.6 and 2.7 were then used to calculate an average score for each group of European countries and these are shown with the actual scores for Australia, and New Zealand in Table 2.8. European countries with above-average scores are shown in bold, as are the higher averages for the other countries. The first observation is that the Leader and Follower countries do have overall averages higher that for Europe as a whole, while the Moderate and Moderate in Transition countries are lower than for Europe as a whole. When comparing the relative importance of the seven dimensions by category of NIS development, we observe that the rating of 'governance structure' and 'policy intelligence' seem associated with the rating of the state of NIS as a whole. 'Follower' and 'leading' NIS nations had above-average scores while 'moderate' NIS nations had below-average scores. Both 'governance structure' and 'policy intelligence' dimensions deal with design capacities, degree of horizontal interaction, strategic exercises and policy learning activities (especially evaluations). The number of ministries that are directly and primarily involved with policies directed at these two dimensions is generally only two or three. More actors and more agencies are not always better, since fragmentation and complexity can frustrate the quality of governance.

The general pattern among the European countries in Table 2.8 is that the leading and follower NIS countries have a greater number of above-average scores. The moderate and moderate in transition countries have fewer above-average scores. What is noticeable is the high number of above-average scores (five) for the follower countries. This indicates that they are emphasising a wide variety of policy dimensions, presumably in order to catch up to the leaders.

Table 2.8: Score for each dimension of innovation policy systems for Europe, Asia, Australia, and New Zealand

Policy dimension (1=low, 5=high)	Europe	Europe, Leading NIS (4)	Europe, Follower NIS (4)	Europe, Moderate NIS (4)	Europe, Moderate NIS, in transition (3)	Asia (4)	Aust.	New Zealand
1. Governance structure	3.2	**4.0**	3.3	2.8	2.7	**3.2**	3	**4**
2. Policy strategic intelligence	2.9	**3.5**	**3.8**	2.3	2.0	2.8	3	3
3. Science base, public research	3.7	**4.3**	3.0	3.8	**4.0**	**3.4**	3	**4**
4. Public-private partnerships, knowledge transfer	3.5	3.5	**4.0**	3.3	3.0	**3.2**	**4**	3
5. Private R&D & innovation activities	3.0	2.8	**3.3**	**3.3**	2.7	2.6	3	2
6. Entrepreneurship & new firm creation	3.1	3.0	**3.8**	2.8	2.7	2.4	3	2
7. Framework conditions for innovation	3.1	2.5	**4.0**	3.0	**3.0**	2.8	**4**	3
Average	3.2	3.4	3.6	3.0	2.9	2.9	3	3

The Asian countries also have high ratings for two of the first three policy dimensions and thus share some similarities with the European Innovation Leaders. The relatively lower rating for the last three dimensions (Private RTDI policies, Entrepreneurship & new firm creation, Framework conditions) is due to the relatively few mentioned policy schemes for those dimensions, and the still relatively large emphasis on policies involving public R&D. There is, however, a trend towards policies addressing the demand-side, including schemes addressing innovation in SME's, but these policy efforts are still difficult to quantify. Secondly, the low rating on the last three innovation policy dimensions is to some extent compensated by policy to attract Foreign Direct Investment (FDI). For countries like Singapore and Malaysia in Asia, and Ireland and Czech Republic in Europe (and other European NIS in transition) attracting FDI is a major policy effort which impacts innovation, and is therefore often close to direct innovation policy efforts.

New Zealand has high scores for 'governance structure' and 'public research' and is different from Australia which has high scores for 'pubic private' and 'framework conditions'. Comparing the New Zealand scores with all other countries shows lower rating on the policy dimensions regarding 'private RTDI policies' and 'entrepreneurship & new firm creation'. On the other, higher-rated dimensions the scores are similar to the Leading and Follower European countries. New Zealand's average score of three puts it behind Australia and Europe, and equivalent to the Moderate countries.

Comparing the scores for the seven innovation policy dimensions of New Zealand (Figure 2.1) with those of the four European countries which have similar challenges (Figure 2.2) shows that the policy response of Czech Republic is similar to New Zealand.

Figure 2.1: Profile of the seven innovation policy dimensions for New Zealand

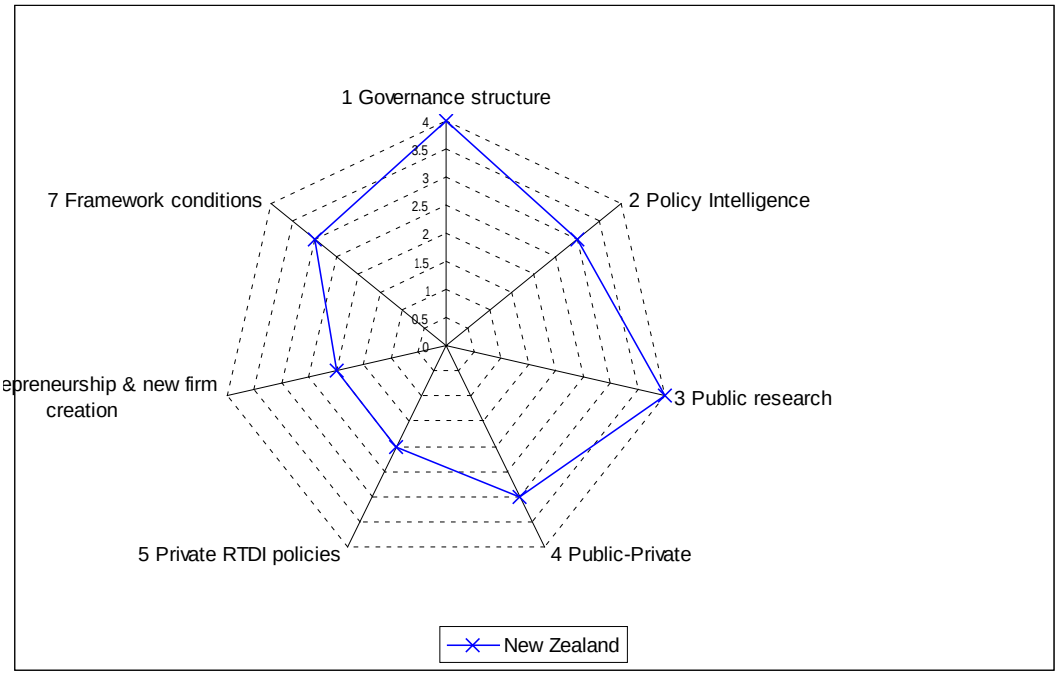
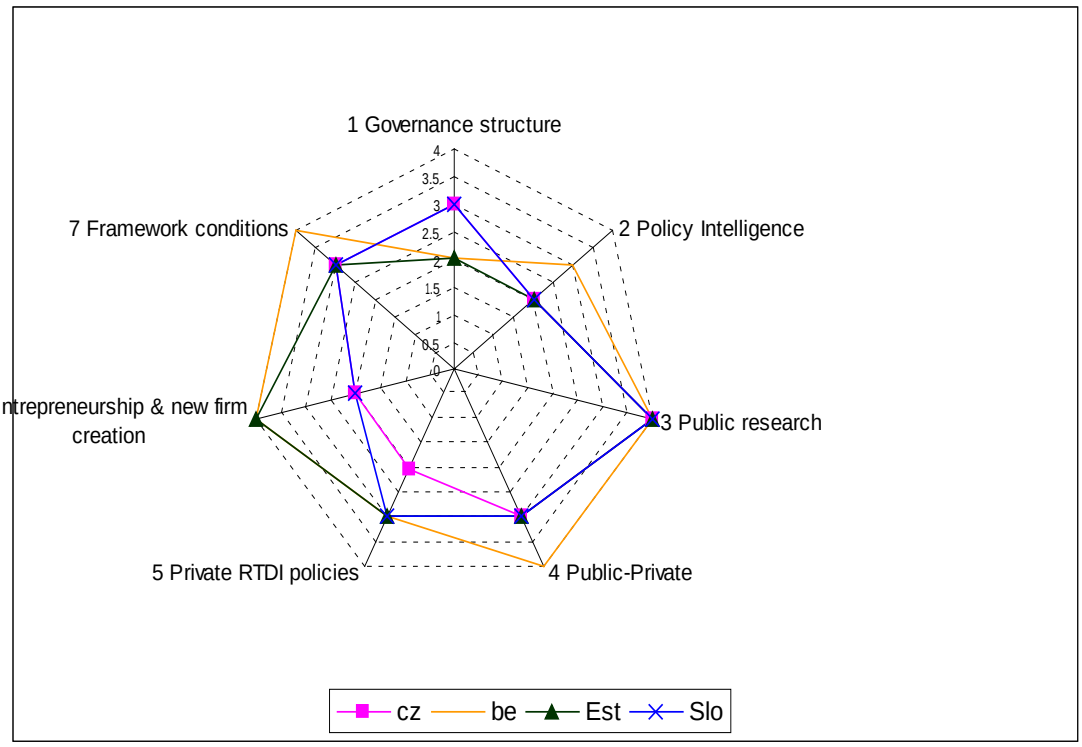


Figure 2.2: Profiles of innovation policy dimension for European countries with challenges similar to New Zealand



Overall, the comparative analysis of the ratings of the seven dimensions of NIS policy shows that across all countries, most of the emphasis is given to ‘governance structure’, ‘public

research', and 'public-private partnerships'. Europe as a group is similar to Asia in that these three dimensions are the highest rated. New Zealand is similar in that it emphasises the first and third of these dimensions. Within Europe, the Innovation Leaders are distinctive in that they have high ratings for two of the top three but in addition, emphasise 'policy intelligence'. Innovation followers emphasise 'policy intelligence' but also four other dimensions, apparently trying to catch up. Both leaders and followers have more dimensions with above average ratings. The policy response of the Czech Republic, one of the four European countries which have similar challenges to New Zealand, is similar to New Zealand.

2.3 New Zealand assessment of NIS

The New Zealand assessment of NIS includes three components. The first component includes background data on R&D expenditure relevant to NIS assessments. This then sets the scene for the ratings of the countries according the criteria described in the methods section (e.g., high-level framework, horizontal coherence etc.). In the third section paired comparisons of criteria are made where emphasis is given to countries with high NIS performance.

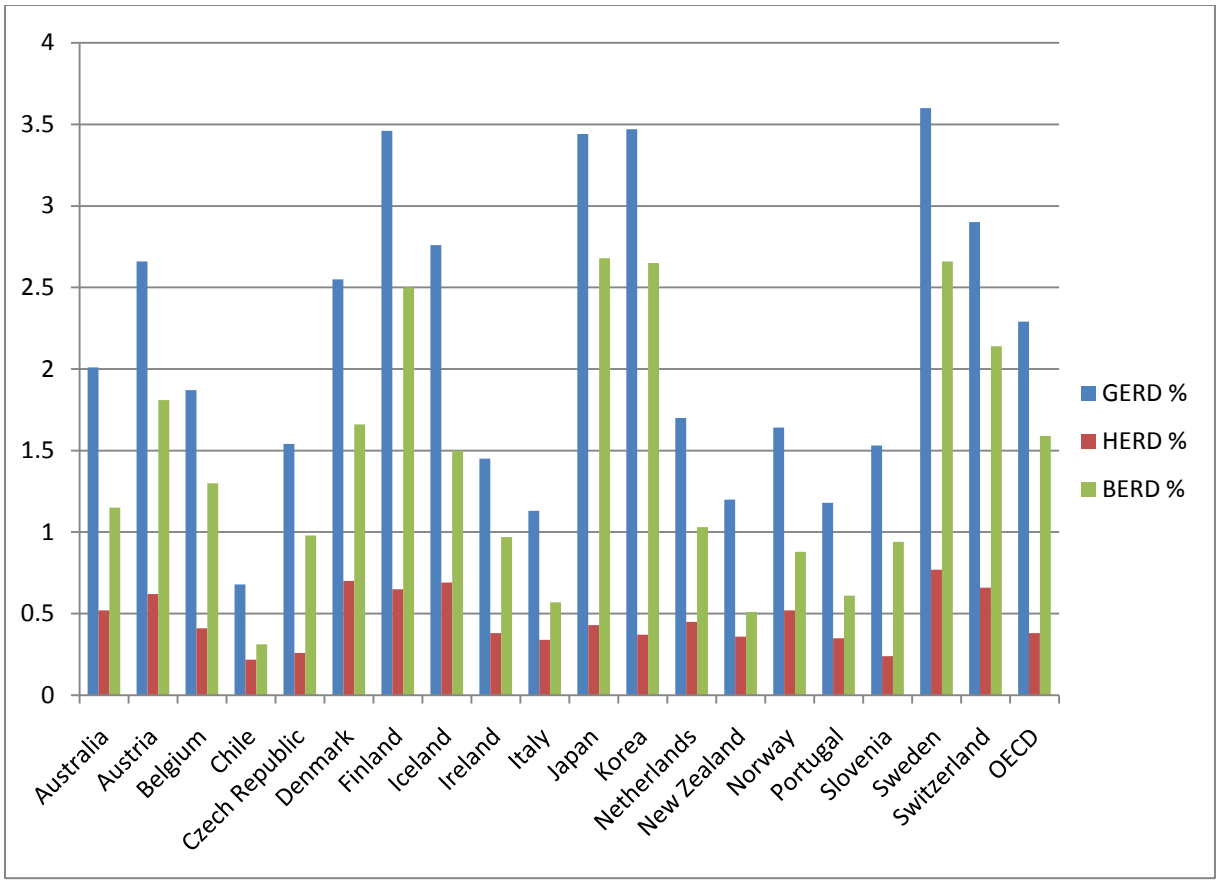
2.3.1 Background data relevant to NIS assessments

Relevant background data include expenditures by government, higher education institutes and the private sector on R&D as a percentage of GDP. The aggregate of these is gross expenditure on R&D (GERD). GERD comprises: (i) higher education expenditure on R&D (HERD); (ii) business expenditure on R&D (BERD); and (iii) government expenditure on R&D (not shown). Figure 2.3 shows the data for each of these variables for each of the case study countries. This chart compares each nation's relative weighting of these expressed as a proportion of the national economy.

The chart shows that for all countries BERD is higher than HERD. There are wide variations in the proportions of R&D expenditure, with Austria, Denmark, Finland, Japan, Korea, Sweden, and Switzerland all having higher levels than the OECD average. In some cases this high level can be attributable to the presence of large multi-national enterprises (MNEs), such as in Japan and Sweden. The four European countries in these top seven high expenditure countries are classified as Innovation Leaders among European countries.

The four nations with the highest levels of BERD as % GDP are Finland, Japan, Korea and Sweden.

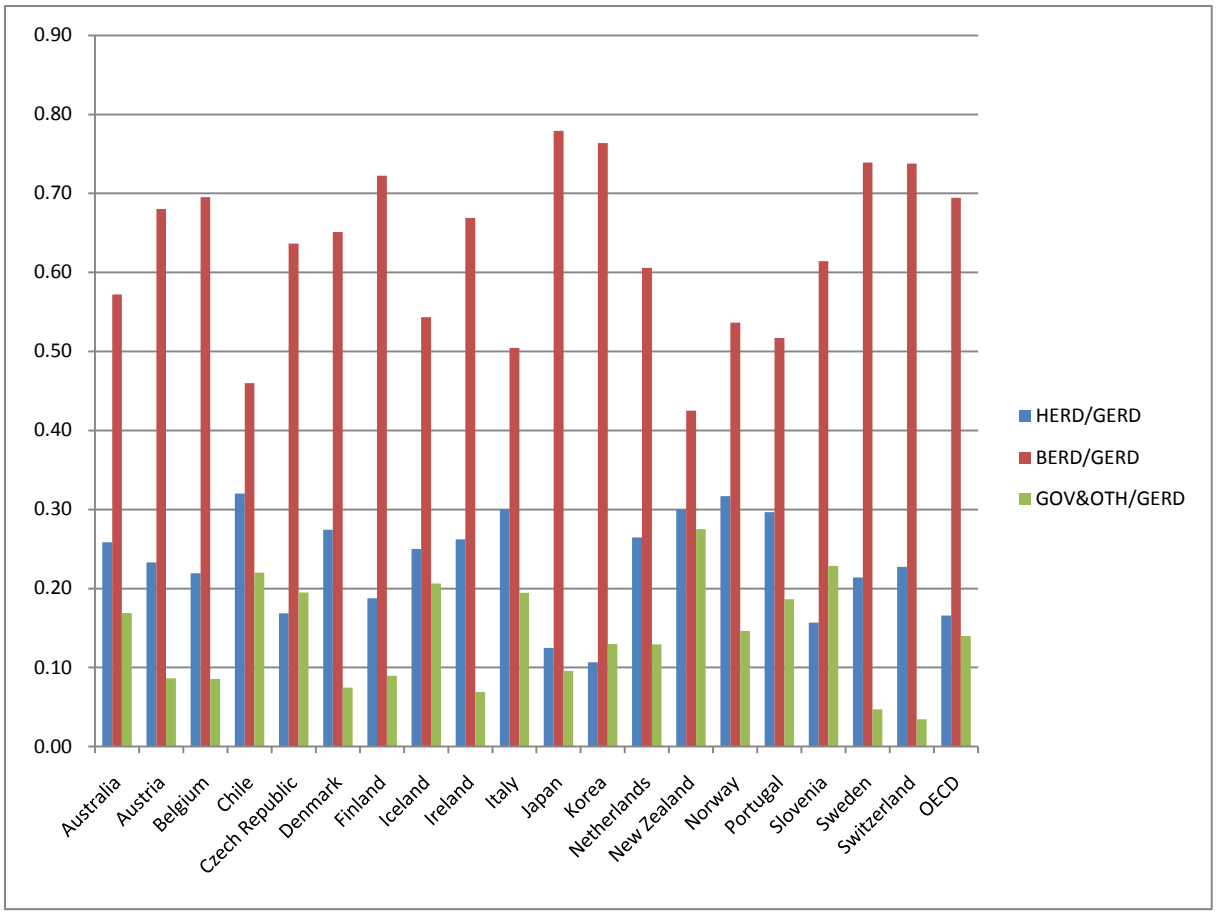
Figure 2.3: GERD, HERD, and BERD as % GDP



Source OECD MSTI, 2009

Figure 2.4 shows HERD and BERD and GOVERD (government performance on R&D) as a proportion of GERD. In New Zealand, GOVERD is primarily, but not entirely, performed by public research institutes. Using GOVERD as a proxy for the importance of public research institutes, it is clear that for most nations measured in these terms, public research institutes dominate over universities. For all nations BERD/GERD dominates as above. New Zealand is very low on BERD relative to other OECD nations. Other countries with low BERD expenditure include Australia, Ireland, Italy, Netherlands, Norway, Portugal, Slovenia and Chile. Note that public institutional research (HERD and GERD) is important in different ways for different countries. In Ireland, the tertiary education sector is relatively undeveloped and the public institutional sector is very weak with heavy reliance on foreign R&D typically from the EU and the UK. In New Zealand, public research institutes have substituted for large R&D intensive firms and are a unique part of New Zealand innovation. Universities are very important for Switzerland which has a very low public institutional base but has a very strong private sector R&D base because large firms, rather than government policy, dominate the innovation system. Similarly, in Japan and Korea, business R&D dwarfs HERD and GERD. These observations suggest that in these countries, business plays a large role in shaping the innovation system.

Figure 2.4: HERD, BERD and GOVERD as % GERD



Source OECD MSTI, 2009

Figure 2.5 shows BERD as a percentage of GDP by HERD as a percentage of GDP. This chart shows a pattern of association between the two variables such that countries high on one variable are also generally higher on the other. There are a number of outliers. Interestingly the chart is helpful in distinguishing Japan and Korea which while high on BERD % GDP are much lower on HERD % GDP than might be suggested by the levels of other OECD nations. New Zealand scores low on both counts, along with Portugal, Italy, and Chile.

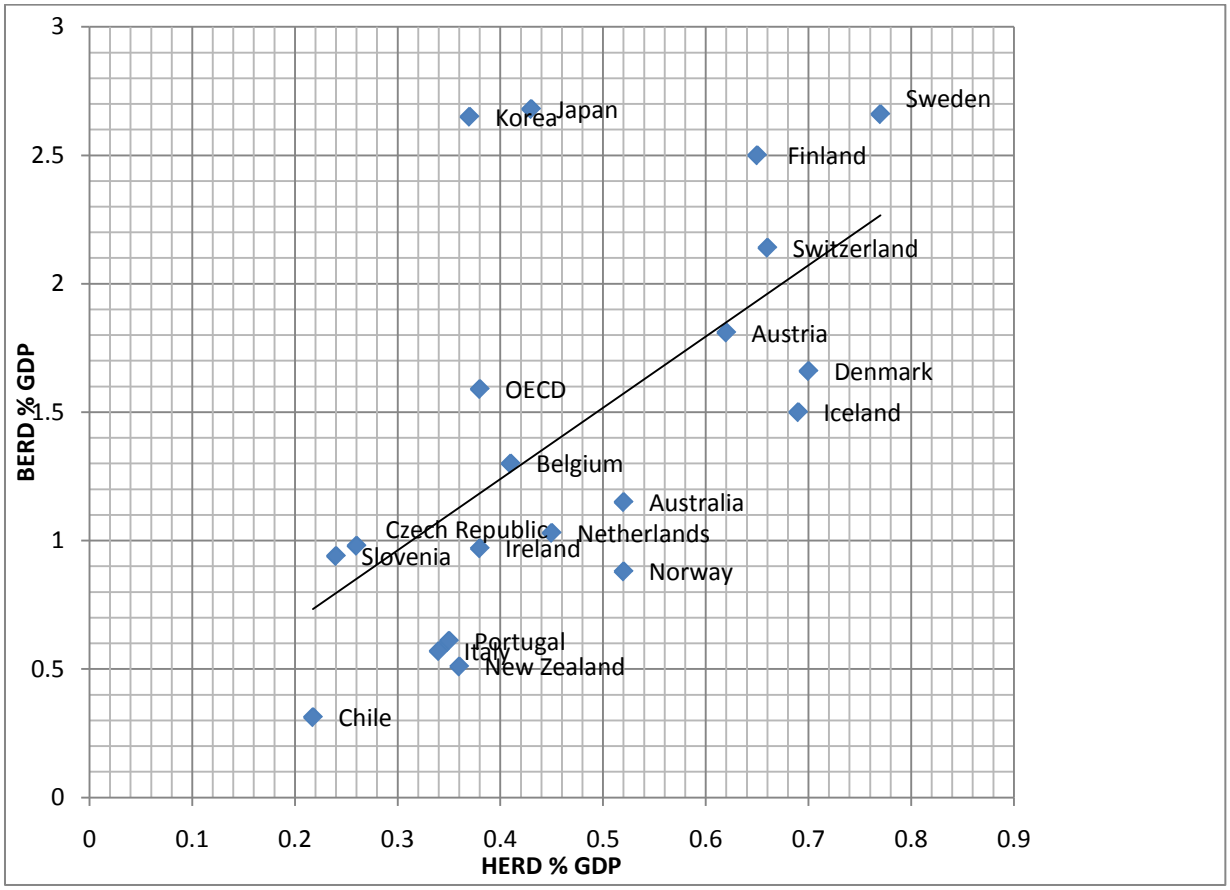
This chart demonstrates that an important factor differentiating the innovation systems of nations is the level of BERD % GDP compared with the level of HERD % GDP. Often nations are compared only by the BERD % GDP but this has a number of shortcomings, notably that different industrial compositions of different countries will separately influence the level of BERD[5].

However, Figure 2.5 demonstrates that the OECD average exhibits a "central tendency" in the BERD/HERD ratio that is characteristic of the all OECD nations. Such a ratio for all nations may reflect a nexus between two intrinsic features of innovation systems underscored by the size of the economy that is common for all OECD nations – human capital for R&D, as measured in HERD and business capital for R&D, as measured in BERD. If such a nexus holds for all nations, and as given by the OECD average shown on the chart, then we may

[5] Refer Williams et al in http://www.morst.govt.nz/publications/research-reports/berd-in-nz/

have another way of explaining differences in BERD % GDP between nations. This will supplement existing knowledge of this topic[6] in an important and new way.

Figure 2.5: BERD % GDP by HERD % GDP



Awareness of BERD and HERD as a percentage of GDP is very important for nations such as New Zealand, where it is acknowledged that BERD % GDP is relatively low, yet little information exists to aid in identifying the amount by which New Zealand needs to increase BERD. Figure 2.5 may suggest that an appropriate measure is the amount that would raise it to the line shown in the figure. This is different to the commonly-cited suggestion that BERD be raised to the OECD average, also shown in Figure 2.5. We propose in future to investigate this measure further in line with previous studies on the topic[7]. Importantly, exclusion of Japan and Korea as outliers, may change the position of the central tendency. If this link between BERD % GDP and HERD % GDP is valid and reflects a feature of all OECD national innovation systems holds, this may suggest that Japan and Korea have excessive levels of BERD that are unsustainable in the long term unless HERD % GDP increases.

Figure 2.6 shows both HERD and BERD as a proportion of GERD, that is, the share of GERD allocated to HERD and BERD and emphasises the relative importance of business versus tertiary research in the innovation system. Japan and Korea are outliers again because of very high BERD. Importantly this figure demonstrates the well-reported characteristic of commodity exporting nations to have low BERD levels. In many of these nations, New Zealand in particular, the public research institutes play a much greater role in R&D.

[6] Ibid.
[7] Ibid.

Figure 2.6: BERD/GERD by HERD/GERD

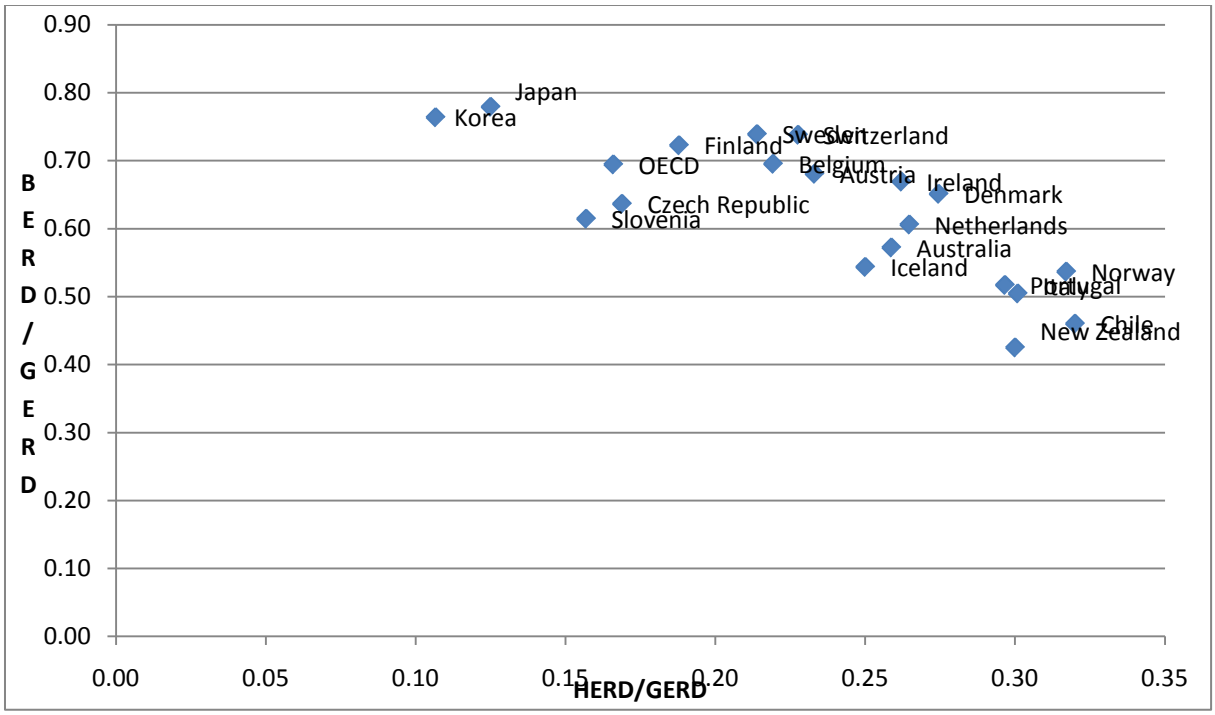
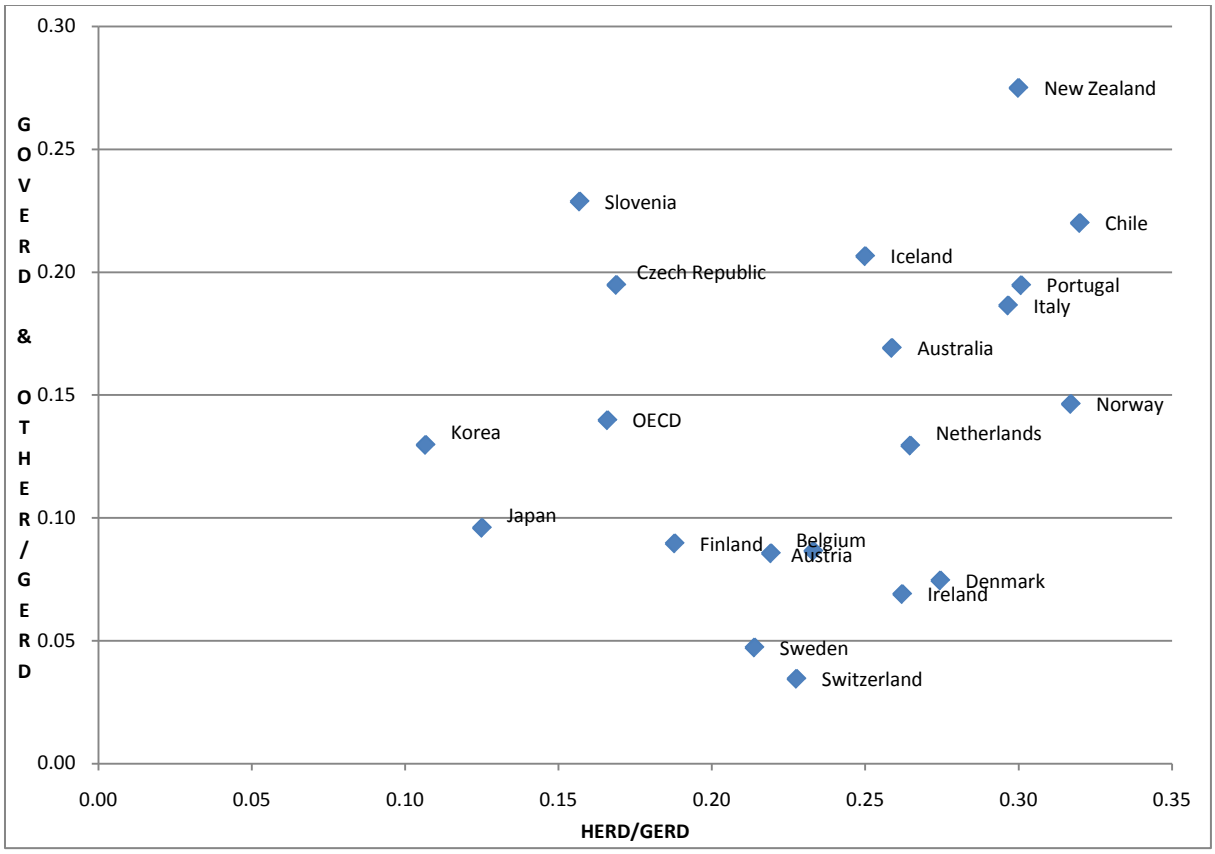


Figure 2.7 shows the ratio of GOVERD and other GOVERD to GERD compared to the ratio of HERD to GERD. Korea and Japan are highly industrialised with low HERD and low GOVERD. New Zealand has a distinctive position in this chart because it has high GOVERD due to the importance of public research institutes recognised as substitutes for large R&D intensive firms. Chile is simply a low BERD nation where primary research institutes and universities are both not very well developed. Note the low position of Switzerland and Sweden which rely much less on public research institutes and which are dominated by private sector R&D. Universities remain important for basic research, but private sector R&D is usually defined by MNEs. In New Zealand, private sector R&D is still influenced by local features unique to New Zealand. The leading European Innovation Leaders are all located near the lower part of the chart.

Overall, two main observations can be made via analysis of Figures 2.5 - 2.7. First, innovation leading countries have higher than average levels of R&D expenditure. Second, New Zealand is among the countries with the lowest levels of R&D expenditure, along with Portugal, Italy, and Chile. Korea and Japan are distinctive in that they have high BERD and low HERD. It is important to recognise that behind these data are variations across countries which reflect the particular situations or contexts to innovation and innovation policy.

Figure 2.7: GOVERD and other GOVERD by HERD/GERD



2.3.2 Rating of dimensions of innovation policy

In this section we turn our attention to the structural division of labour/policy domain and the capabilities of the innovation system (see Appendix 2 for country assessments). Table 2.9 shows the ratings for each country on eleven dimension of innovation policy. The table includes an additional column for the number of policy agencies in each country. While most countries have only two or three agencies, Belgium is distinctive in that it has seven agencies, which is due to its complex federal structure and the presence of three language communities.

Table 2.9: Ratings (1-5) of each country on each of the 11 dimensions of innovation policy

Country	High-Level Framework	# Policy Agencies	Horizontal Coherence	Delivery Agency influence in priority setting	Vertical Coherence	Stakeholder Involvement in Policy	Business Involvement in Policy	Mobilisation of Actors	National Vision for Innovation	NIS concepts	Strategic Approach	Globalisation response
Finland	5	2	5	5	5	5	5	5	5	5	5	5
Netherlands	4	2	3	5	3	3	3	2	4	5	3	3
Iceland	4	2	2	3	2	3	4	5	4	4	2	2
Ireland	3	2	5	3	3	3	2	5	4	5	4	3
Italy	4	2	2	2	2	3	4	3	4	3	3	3
Denmark	5	2	3	3	5	5	5	5	5	5	5	5
Estonia	5	2	5	3	5	3	3	5	3	5	2	3
Japan	5	2	4	4	4	5	3	5	5	5	5	5
Korea	5	2	3	3	3	3	5	5	5	3	3	3
NZ pre-chg	2	3	2	2	2	3	2	5	2	3	2	3
NZ post-chg	2	3	2	5	3	4	4	5	3	4	4	4
Norway	2	3	2	4	3	5	5	5	5	5	5	5
Portugal	2	2	2	4	2	2	3	5	3	4	4	3
Slovenia	4	2	2	3	2	4	4	4	4	4	4	3
Sweden	3	3	2	4	3	3	4	3	2	2	2	4
Switzerland	2	2	4	2	5	5	5	3	4	3	3	4
Austria	3	4	2	2	2	3	4	2	2	2	3	3
Belgium	4	7	4	3	3	3	4	3	2	4	3	3
Australia	2	2	3	2	2	3	3	5	2	3	3	3
Chile	2	2	2	4	2	2	2	3	2	2	2	3
Czech Republic	2	2	2	4	2	3	2	3	5	3	2	3

High-level horizontal agency framework

High-Level horizontal agency framework is a measure that describes the way that nations provide a strong unifying approach that supports policy guided by the governments' strategic plan for a nation. Various measures are used by nations. Possibly this is influenced by size of the nation and by political and cultural factors also.

Score 5 - Finland, Estonia, Japan, Korea, Denmark.

These countries have high-level councils or a dominant ministry in place that has explicit powers to set national objectives for innovation. Estonia is a small nation that appears to copy its EU neighbours in putting in place similar frameworks to them for consistency, even though it may be unnecessary.

Score 4 – Netherlands, Iceland, Italy, Slovenia, Belgium.

These countries have a department or inter-ministerial council that has no explicit power to set national objectives.

Score 3 – Ireland, Sweden, Austria.

These countries have inter-departmental committees of civil servants coordinating policy work and objective setting. Sweden is highly industrialised and regarding innovation performance is significantly influenced by large multi-national enterprises. Yet Sweden is not driven by government frameworks.

Score 2 – NZ pre-chg, NZ post-chg, Norway, Portugal, Switzerland, Australia, Chile, Czech Republic.

These countries have no formal coordinating framework in place across government. Norway is highly industrialised and has a significant influence of large multi-national enterprises on innovation performance, yet is not driven by government frameworks. Switzerland has a strong social consensus approach to policy and so overarching frameworks may not be necessary to bring actors together in common action for innovation. Further, in Switzerland, innovation is considered to be led by the private sector and for this reason it would appear that such frameworks are unnecessary.

Framework conditions vary for different countries. New Zealand had a Growth and Innovation Framework (GIF) framework in place for some years but in recent years and currently in 2010, policy is guided by sets of priorities set by the Prime Minister for the entire nation and then within these there are specific sub-priorities, such as for economic growth, which strongly influences the current science and innovation agenda in New Zealand.

On this dimension, the European Innovation Leaders have scores ranging from two to five that is, there appears to be no relationship between high level of innovation and high-level horizontal agency framework.

Horizontal coherence

Horizontal coherence is the extent to which policies across government are complementary, that is, they are implemented in the way intended rather than modified so as not to conflict with other government agencies. Horizontal coherence is influenced by a number of other features including frameworks, vision, NIS approach, top-down dominance and bottom-up consensus. Horizontal coherence can be limited even if there are only two main ministries with different policy perspectives on innovation issues. It is important to note that horizontal

coherence is difficult to achieve and a trade-off will be the freedom of individual policy domains to exercise influence and the freedom to negotiate for efficient policy compromises. Some countries will prefer this type of adversarial approach to policy making continues.

Score 5 – Finland, Estonia, Ireland.

These countries have good horizontal coherence. In some cases, there was a merger of ministries and a strong framework has been put in place. Estonia has a relatively new innovation system and has not encountered problems and Ireland reports very strong cohesion across a complex array of agencies. Interestingly, Ireland does not have a well developed public research institute system and is heavily influenced by foreign funded R&D and EU-supported R&D. This suggests policy makers are not so much concerned with creating new policy as ensuring that they adhere to external influences.

Score 4 – Japan, Belgium, Switzerland.

In these countries horizontal coherence is compromised to a small extent. For Japan, their high-level council, the Council for Science and Technology Policy, has limited power and is mainly a watchdog. For Belgium, their federal government has a complex task, more so than most countries, and is focussed on coordination of several regions and communities. In Switzerland, two main ministries create scope for some disharmony.

Score 3 - Korea, Netherlands, Denmark, Australia.

These countries recognise horizontal coherence as an issue and are taking formal steps to improve it. Some countries such as Korea and Denmark have merged multiple ministries to form super ministries and this supports coherence.

Score 2 - Iceland, Italy, Slovenia, Sweden, Austria, NZ pre-chg, NZ post-chg, Norway, Portugal, Chile, Czech Republic.

These countries recognise horizontal coherence as an issue. Note that 2010 reforms in NZ are not designed to radically change horizontal coherence so much as to improve vertical coherence and stakeholder involvement (see later).

On this dimension, the European Innovation Leaders have scores ranging from two to five that is, there appears to be no relationship between high level of innovation and horizontal coherence.

Delivery agency influence in priority setting

Delivery agency influence on priority setting occurs when the agency responsible for delivering funding for research also influences funding policy.

Score 5 – Finland, NZ post – chg, Netherlands.

In these countries the delivery agency explicitly plays a key role in setting policy priorities. The influence of policy delivery agencies – such as funding agencies – can reflect many different factors. The government may have a very pragmatic approach to policy and prefer that policy is influenced by agencies which implement policy and the researchers and business people they connect with. Possibly this explains the strong role of TEKES in Finland and SenterNoven in Netherlands. In New Zealand, following the merger of MoRST and FRST, the former ministry and the former delivery agency will be one and the same. This is designed to reduce fragmentation and overlapping policy decision-making.

Score 4 – Japan, Sweden, Norway, Portugal, Chile, Czech Republic

In these countries the delivery agency plays a strong role in influencing detailed priorities, once high-level priorities have been set. Here the presumption is that ministries need only set high-level priorities and the delivery agencies have the competencies to develop detailed programmes. This may work in some innovation systems.

Score 3 – Estonia, Ireland, Belgium, Korea, Denmark, Iceland, Slovenia.

In these countries the delivery agency operates under appropriate vertical lines of accountability.

Score 2 – Switzerland, Australia, Italy, Austria, NZ pre-chg.

In these countries the agency arrangements give rise to fragmentation and lack of coordination of policy mix. In New Zealand, the shortcomings of this approach are documented in the OECD Review 2007 of New Zealand innovation policy. It can lead to fragmented policy decisions where there is too strict an application of the separation of ministry and delivery agency.

On this dimension, the European Innovation Leaders have scores ranging from two to five that is, there appears to be no relationship between high level of innovation and delivery agency influence on priority setting.

Vertical coherence

Vertical Coherence occurs when policy is implemented in the way it is intended. This requires clarity of policy signals from ministries to delivery agencies. It also requires a culture of vertical dialogue to provide continuous feedback for effective and pragmatic implementation. This does not always occur. It may be inhibited in an arrangement that is strongly top-down oriented. It can also be inhibited when there is no culture of bottom-up involvement of stakeholders and business in policy making.

Score 5 – Finland, Estonia, Denmark, Switzerland.

In these countries vertical coherence occurs to an appropriate level. In all cases except Switzerland, no issues are reported. In the case of Switzerland, the bottom-up culture of consensus policy making supports vertical coherence.

Score 4 – Japan.

For Japan vertical coherence is inhibited to a limited extent.

Score 3 - Netherlands, NZ post-chg, Sweden, Norway, Ireland, Belgium, Korea.

In these countries vertical coherence can be improved.

Score 2 – Portugal, Chile, Czech Republic, Iceland, Slovenia, NZ pre-chg, Australia, Italy, Austria.

In these countries vertical coherence is recognised as a significant shortcoming of the innovation system. As with horizontal coherence, the OECD review noted that New Zealand needed to improve vertical coherence as well. Institutional change in 2010 is expected to improve vertical coherence for New Zealand.

On this dimension, three of the four European Innovation Leaders have scores of five that is, there appears to be a relationship between high level of innovation and vertical coherence.

Stakeholder involvement in policy

Stakeholder involvement occurs when there is a reasonable mix of top-down and bottom-up decision-making where policy makers, research providers and end-users work together to decide on priorities for research. Stakeholder involvement in policy occurs well in those countries with active involvement and collaboration of social partners as a key structural characteristic of the policy process e.g., the Nordic model. Apart from such an explicit recognition of stakeholder involvement the information is not sufficiently detailed to provide a useful discussion and only a score of five is presented here. On this dimension, three of the four European Innovation Leaders have a score of five.

Score 5 – Denmark, Switzerland, Japan, Norway, Finland.

Business involvement in policy

Business involvement in policy occurs when there are formal arrangements in place for public-private partnerships.

Score 5 – Denmark, Switzerland, Norway, Finland, Korea.

In the case of Denmark, for example, the GTS framework of business collaboration is an integral part of the national innovation system. There is active involvement and collaboration of social partners is a key structural characteristic of the policy process (e.g., the Nordic model). Only a score 5 is presented here. Apart from such an explicit recognition of policy mechanisms for business participation the information is not detailed to provide a useful discussion. On this dimension, three of the four European Innovation Leaders have a score of five.

Mobilisation of actors

Mobilisation of actors refers to the level of support from influential people and institutions who can facilitate innovation policy formation and implementation by building confidence in its value for society. These include high-level politicians, industry champions, entrepreneurs, and research leaders. Many nations exemplify this practice.

Score 5 – Denmark, Norway, Finland, Korea, NZ post-chg, Iceland, Japan, Estonia, Portugal, Ireland, NZ pre-chg, Australia.

National vision for innovation and strategic approach

National vision for innovation and strategic approach refers to how well a nation articulates and actions its vision for innovation. This includes identifying the challenges to innovation it faces, and then developing an appropriate response to these challenges. Many countries have policies supportive of innovation and yet fall short of having an adequate set of arrangements. These shortcomings often result from poor evaluation processes and from emphasis on the linear approach of innovation, as can be seen in Sweden. The OECD Review 2007 for New Zealand identified a number of areas for improvements needed, particularly around improving evaluation processes and increasing involvement of wider stakeholders in decision-making.

Score 5 – Denmark, Norway, Finland, Korea, Japan, Czech Republic.

These countries have established a systematic and dynamic innovation policy support system that is intended to be an adequate answer to emerging challenges.

Score 4 – Iceland, Ireland, Slovenia, Switzerland, Italy, Netherlands.

In these countries the traditional policy approaches and measurement processes are in place and are adequate and supportive of the national innovation system's conceptual framework. Challenges are addressed by viewing innovation as occurring in a system of interactions.

2.3.3 Selected analyses of country rating data

The data in Table 2.8 have been described in the preceding section. We now look at the relationships between selected variables. The combinations of variables were selected to highlight graphically disparities at the national level. This then enables correlations to be shown between variables. While causation and relationships cannot be proven from these correlations, they nevertheless do provide a basis for grouping nations according to common themes. An important theme is the achievement of horizontal coherence because this is one important indicator of good governance practices. The data presented are illustrative and, given the limitations of the data, are meant to inform rather than be definitive studies.

Horizontal coherence

Figure 2.8 shows how the case study countries rate on both high-level horizontal agency framework and horizontal coherence. In general, nations with horizontal coherence and framework scores of 3 or greater have strong national plans (Finland) or influential top-down delivery (Japan) or horizontal coherence is not an issue because of nature of society (Switzerland consensus). Even countries with high GERD and high BERD, such as Sweden, still have horizontal coherence problems because it is a complex thing to resolve. Having a high-level framework does not necessarily deliver strong horizontal coherence, for example, Korea and the experience of New Zealand with the Growth and Innovation Framework (GIF).

Note that among the ten countries rated low on horizontal coherence, six of them feature as low on HERD, BERD, and GERD.

Figure 2.8: Coherence by high-level framework

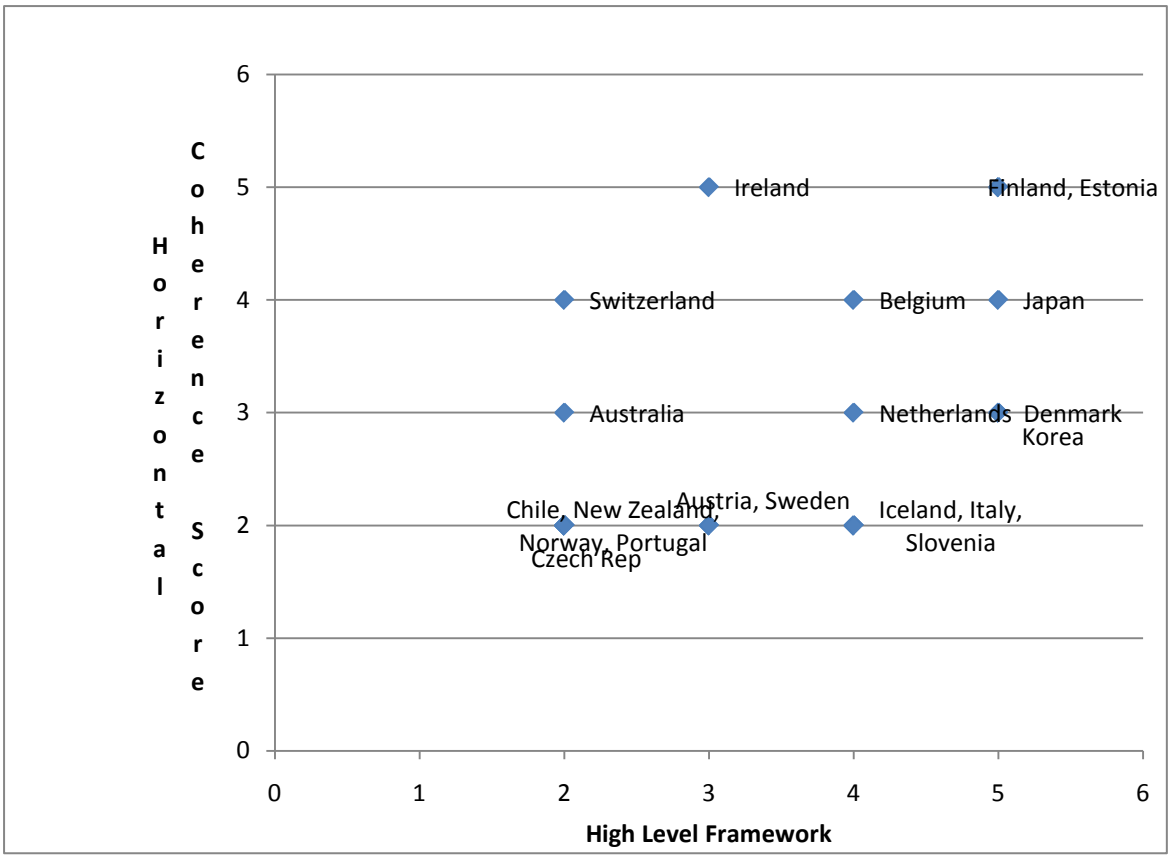
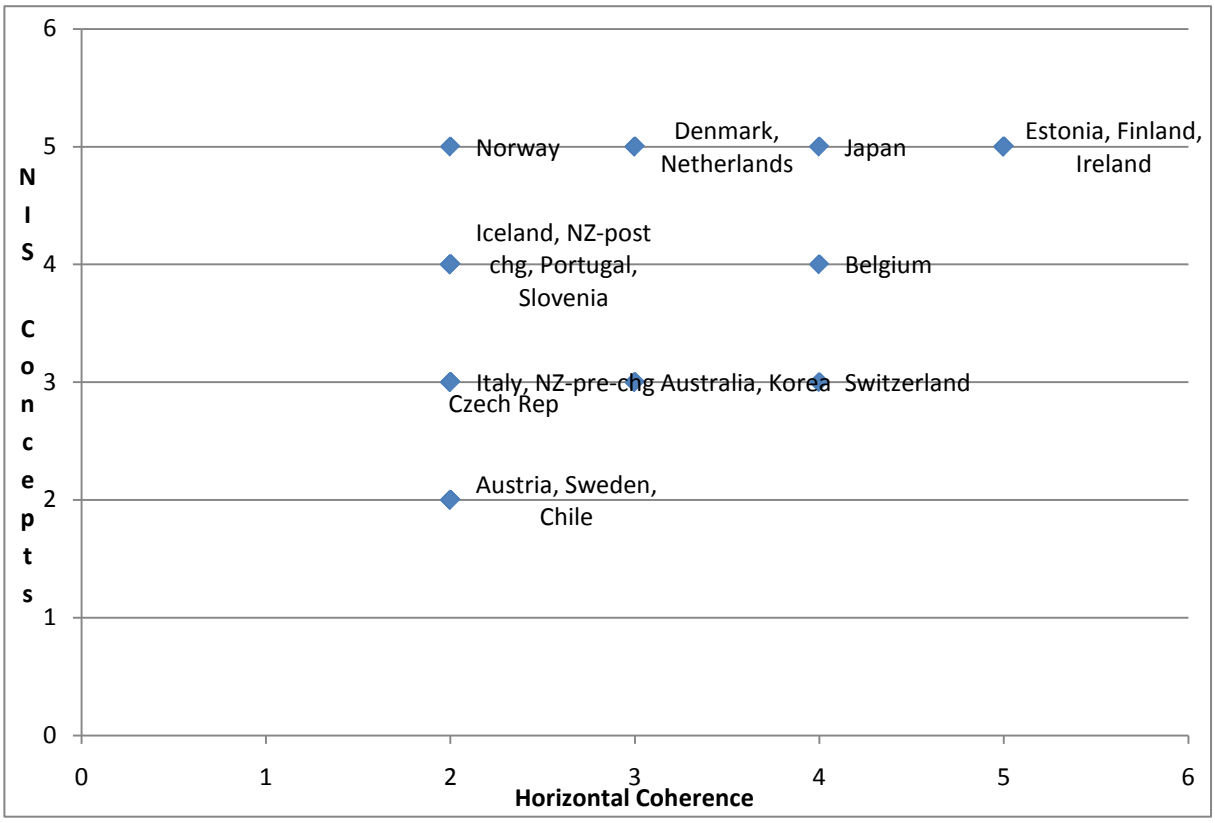


Figure 2.9 shows how the case study countries rate on both adherence to NIS concepts and horizontal coherence. Having a sophisticated or advanced NIS system does not assure horizontal coherence – it is still a problem for Norway. Horizontal coherence and NIS concepts may not necessarily imply competence to a run system or the appropriateness of the system, e.g., Estonia. Similarly, horizontal coherence and NIS concepts may not necessarily imply completeness of NIS, e.g., Ireland (lack of developed public research sector). Note that many other countries' horizontal coherence, including New Zealand, is limited by agencification of policy domains which will always occurs to some extent. Note that Belgium is able to achieve some degree of horizontal coherence because it is a policy priority, and this suggests that other countries may have to put more priority on horizontal coherence to achieve improvements since it will not happen by itself.

The implication for New Zealand as it implements changes to governance arrangements is that better adherence to NIS concepts will not itself ensure better horizontal coherence. The lesson from Belgium is that a tangible commitment to horizontal coherence will produce the result.

Figure 2.9: NIS concept by horizontal coherence



National vision for innovation

Figure 2.10 shows how the case study countries rate on both NIS concepts and national vision. Generally, the graph suggests that NIS concepts work well with national vision. It also suggests that countries with strong NIS concepts with weaker national visions still thrive but perhaps need to develop further. This observation suggests that reforms to NIS, such as the current governance reforms for New Zealand, may not be the final state and there may yet be another dimension of change.

One implication for New Zealand is that "national vision for innovation" and adherence to "NIS Concepts" are not substitutes for each other. To some extent this has been recognised in the proposed changes to governance arrangements in New Zealand. It will be important to monitor the extent to which features such as these two need to be adjusted both together and separately to further improve governance settings.

Figure 2.10: NIS concepts by national vision

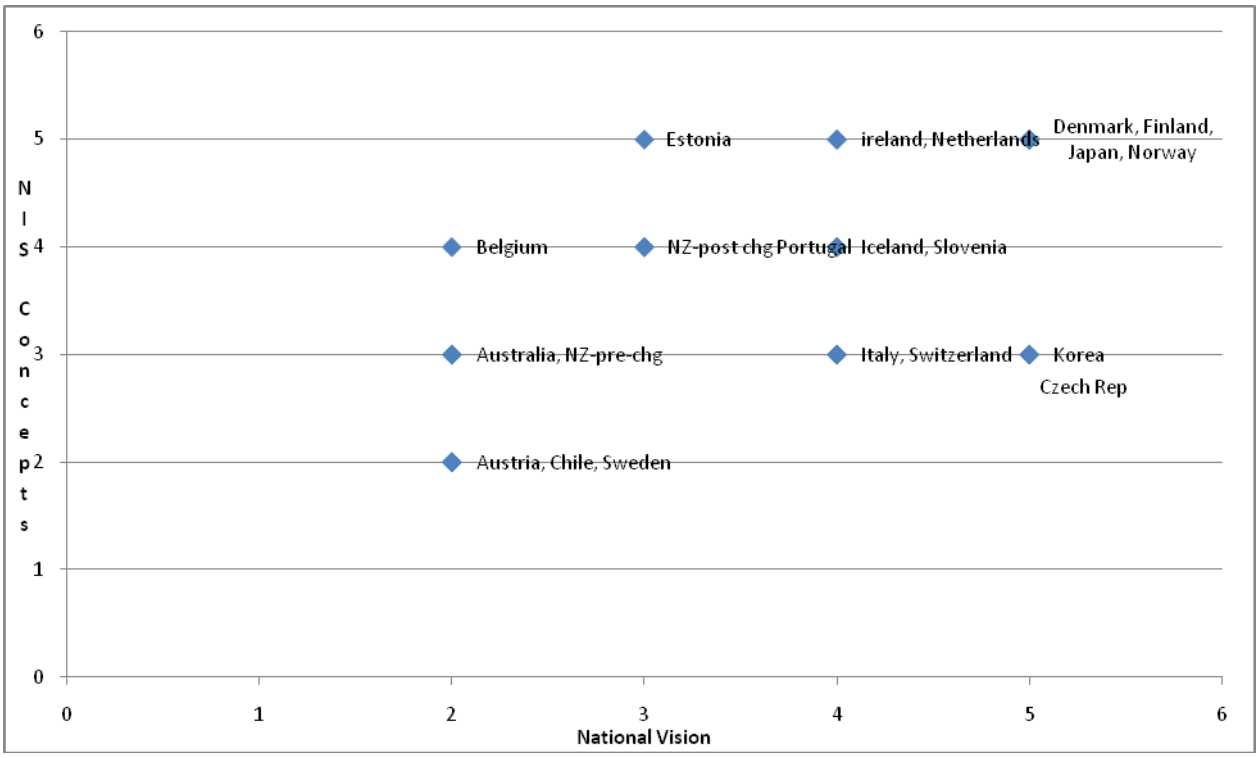
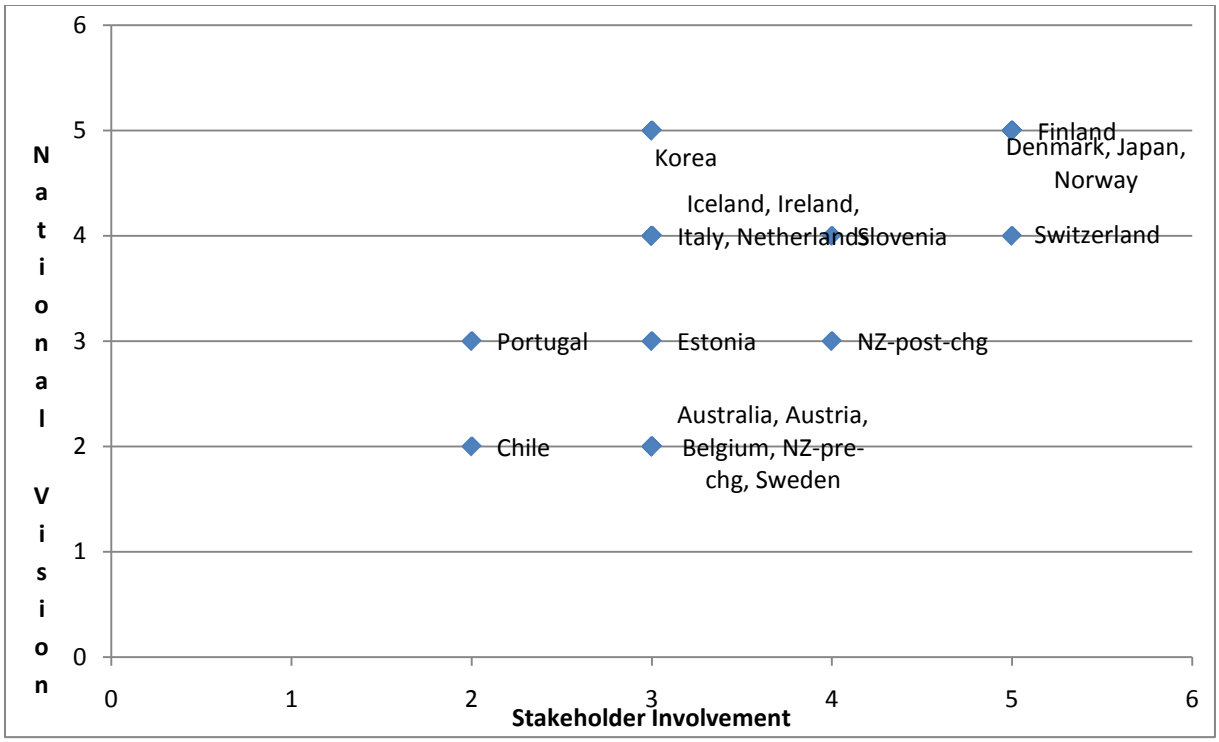


Figure 2.11 shows how the case study countries rate on both national vision for innovation and stakeholder involvement in policy priority setting. It is a bold step to put a trend to the data but there is some indication that nations that take efforts to develop national visions also make efforts to involve stakeholders in priority setting. Interestingly, Finland and Japan contrast with Sweden whereas all three have high GERD and high BERD levels. Denmark scores high on involving stakeholders in priority setting and on setting a national vision and yet does not have an extraordinarily high level of BERD.

The results do not indicate the extent to which the national vision is influenced by different stakeholder groups. For example, for Switzerland where universities dominate the public research system, it may be that the national vision is itself dominated by influences from universities. In the case of Japan and Finland with high BERD levels, it may be that certain technology sector groups influence the national vision. In the case of Denmark, it may be that society at large may be an important influencer of the national vision.

Figure 2.11: National vision by stakeholder involvement



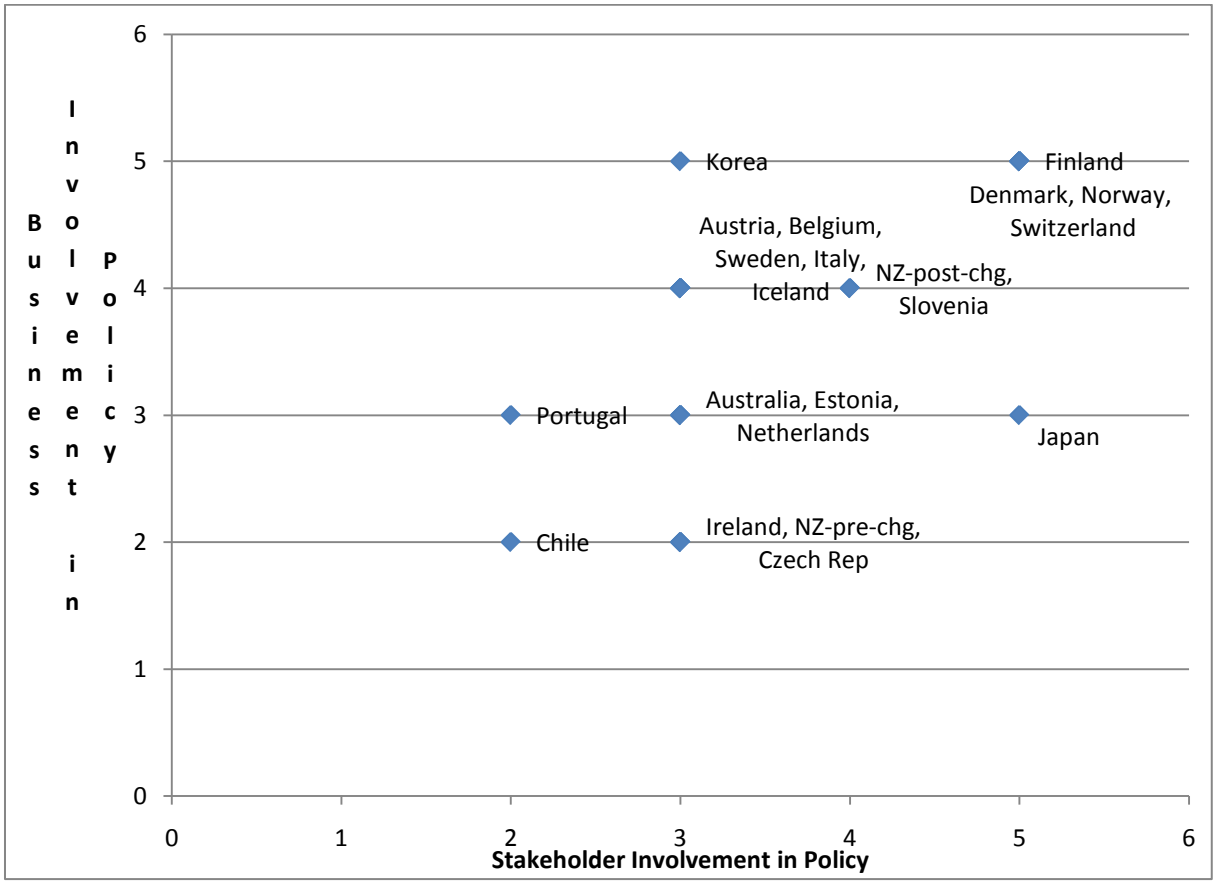
The implications for New Zealand are two-fold. Firstly, adaptations of a national vision will also likely imply associated stakeholder involvement in priority setting and vice versa. Secondly, there are many different types of stakeholders who may influence the national vision. Giving greater emphasis to only certain stakeholder groups in priority setting – such as from universities, sector groups, public research institute groups associations – will influence the national vision accordingly. Similarly, amending the national vision with a bias to any one group may likely bias that group's effective involvement in setting priorities.

Business involvement in policy

Figure 2.12 shows how the case study countries rate on both stakeholder involvement in policy and business involvement in policy. The results suggest that strong stakeholder involvement in priority setting is compatible with strong business involvement in setting priorities. The determinants of each of these influences are complex – including the degree of social consensus achievable, the dominance of particular business interests, the influence of foreign investment in R&D, etc.

For New Zealand with relatively low investment in business R&D, the implication is that the involvement of traditional stakeholder groups in priority settings need not be compromised by raising business involvement. This suggests that large increases in BERD may be achievable through greater business involvement in priority setting without compromising the decision making power of stakeholder groups such as research providers and certain end-users groups.

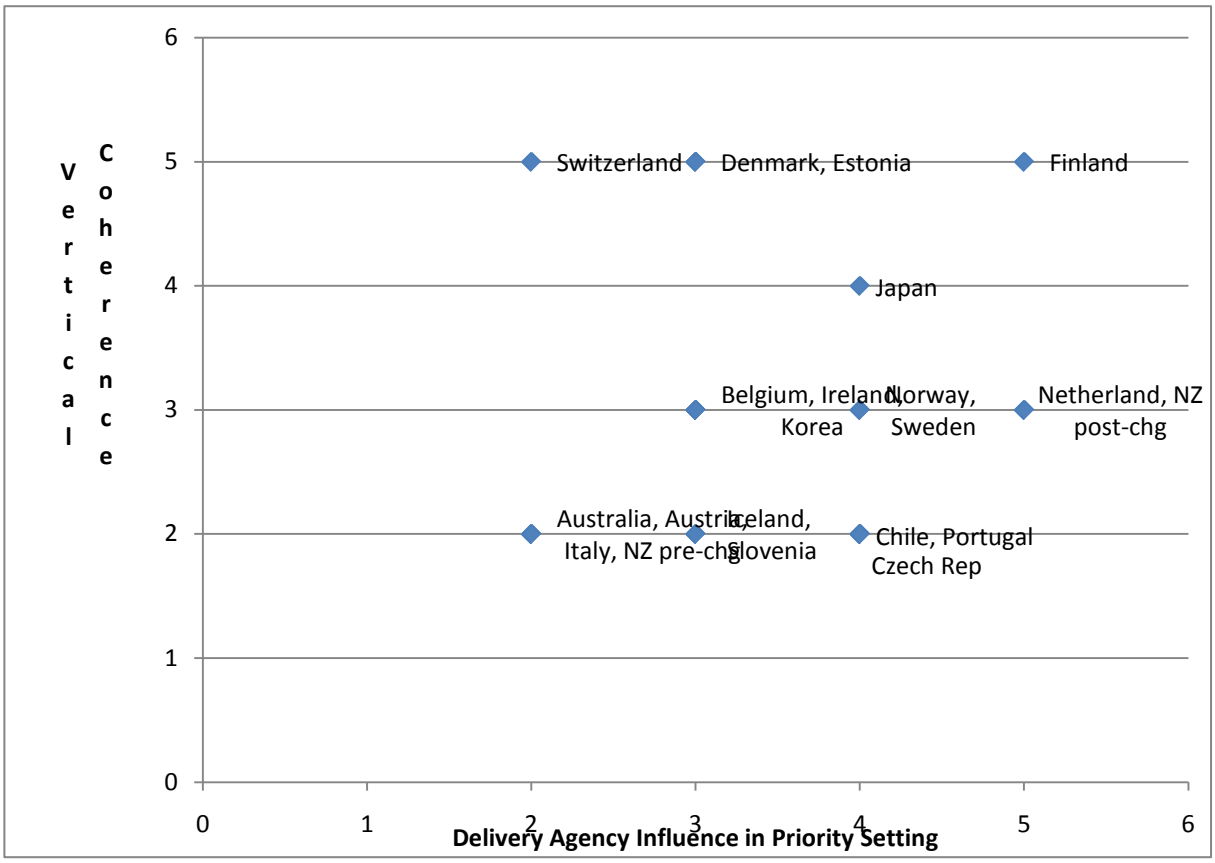
Figure 2.12: Business involvement in policy by stakeholder involvement in policy



Delivery agency and vertical coherence

Figure 2.13 shows how the case study countries rate on both delivery agency influence in priority setting and vertical coherence. Switzerland has strong vertical coherence by nature of its social consensus culture and rules of government. Denmark and Finland (Estonia still new) achieve high vertical coherence with quite different settings for delivery agency influence and this suggests something else is important. However, the scores seem to suggest that more vertical coherence is achieved with greater delivery agency influence on policy priorities. The implications for New Zealand are that the proposed establishment of a Ministry of Science and Innovation in 2010 to replace the existing Ministry of Research, Science and Technology and the Foundation for Research, Science and Technology will help achieve an improved level of vertical coherence.

Figure 2.13: Vertical coherence by delivery agency influence in priority setting



2.3.4 Overall assessment of ratings

The data presented earlier in Table 2.9 have been reordered according to the innovation classification used in the earlier analyses and are shown in Table 2.10. The table includes in the bottom row averages across all 11 dimensions, and above-average scores are shown in bold.

Table 2.10: Score for each dimension of innovation policy system for Europe, Asia, Australia, and New Zealand

Policy dimension (1=low, 5=high)	Eur	Leading NIS (4)	Follower NIS (4)	Moderate NIS (4)	Moderate NIS, in transition (3)	Asia	Australia	NZ pre change	NZ post change
High-level Framework	3.5	3.8	**3.5**	3.0	**3.7**	**3.6**	2.0	2.0	2.0
Horizontal Coherence	3.0	3.5	**3.5**	2.0	3.0	3.0	**3.0**	2.0	2.0
Delivery agency influence in priority setting	3.3	3.5	**3.3**	3.3	3.3	3.3	2.0	2.0	**5.0**
Vertical Coherence	3.1	**4.5**	2.8	2.3	3.0	3.2	2.0	2.0	3.0
Stakeholder Involvement in Policy	3.5	**4.5**	3.0	3.3	3.3	**3.6**	**3.0**	**3.0**	**4.0**
Business Involvement in Policy	3.8	**4.8**	**3.3**	**4.0**	3.0	3.8	**3.0**	2.0	**4.0**
Mobilisation of Actors	3.9	**4.0**	3.0	**4.5**	**4.0**	**4.0**	**5.0**	**5.0**	**5.0**
National Vision for Innovation	3.7	**4.0**	3.0	**4.0**	**4.0**	**3.9**	2.0	2.0	3.0
NIS concepts	3.9	3.8	**4.0**	**4.0**	**4.0**	**3.9**	**3.0**	**3.0**	**4.0**
Strategic Approach	3.3	3.8	**3.3**	**3.5**	2.7	3.4	**3.0**	2.0	**4.0**
Globalisation response	3.5	**4.5**	3.0	3.3	3.0	3.5	**3.0**	**3.0**	**4.0**
Average	3.5	4.0	3.2	3.4	3.4	3.6	2.8	2.5	3.6

Note: Asia includes Japan and Korea in this assessment, while it included Malaysia, Singapore, Taiwan and Korea in the earlier assessment.

The averages show that only the Leaders have an overall average score higher than for Europe as a whole. The Leaders emphasise vertical coherence, stakeholder and business involvement in policy, mobilisation of actors, national vision and globalisation response. The Followers emphasise some of these but also give attention to high-level framework, horizontal coherence and delivery agency influence in priority setting. New Zealand pre change was rated with the lowest average score across all countries considered. New Zealand post change has an average score similar to Asia and the European average.

The data presented earlier in Table 2.9 can also be rank ordered, as shown in Table 2.11. According to the New Zealand assessment of NIS policies in our selected case study countries, Finland has a well-crafted NIS, while Denmark and Japan also rate well and Norway has an average score over four. Finland, Denmark and Japan have high expenditure on R&D, well above the OECD average, while Norway is below this average but scores high in other areas. The next group of seven countries have scores between 3.5 and 3.8. These include a variety of countries from an established European nation, Sweden, to an emerging nation, Estonia, to an Asian nation, Korea. New Zealand post-governance change is included in this group as well. The next group includes those with lower scores but not at the lowest

level and includes several European countries as well as Australia. Finally, the lowest ranked countries include New Zealand pre-change, Austria and Chile.

Table 2.11: Rank order of case study countries by average rating across all 11 dimensions

Country	Average rating
Finland	5.0
Denmark	4.6
Japan	4.5
Norway	4.2
Estonia	3.8
Korea	3.7
Ireland	3.6
NZ post-chg	3.6
Switzerland	3.6
Netherlands	3.5
Slovenia	3.5
Belgium	3.3
Iceland	3.2
Portugal	3.1
Italy	3.0
Sweden	2.9
Australia	2.8
Czech Republic	2.8
NZ pre-chg	2.5
Austria	2.5
Chile	2.4

Focussing on the four countries in the top group, Finland has a score of five on each of the criteria used. Denmark was rated at less than five for horizontal coherence and delivery agency influence in priority setting. Japan was rated at less than five for horizontal coherence, delivery agency influence in priority setting, vertical coherence, and business involvement in policy. Norway was rated at less than five for horizontal coherence, delivery agency influence in priority setting, and vertical coherence. It appears that when less than perfect NIS governance occurs it is in terms of horizontal coherence, delivery agency influence in priority setting, and vertical coherence.

Chapter 3
Discussion and Conclusion

3.1 Introduction

The purpose if this policy review was to compare innovation policy settings in a number of case study countries in order to make country comparisons and learn about best-practice innovation policy. The main purpose was to assess how best to optimise innovation governance in New Zealand. Two methods were used to appraise NIS characteristics in a number of European and Asian countries, and for Australia and New Zealand. The first, by European researchers, assessed the NIS by counting NIS challenges and by evaluating seven dimensions. These dimensions included: innovation policy governance and structure, strategic intelligence, science base, public/private partnerships and knowledge transfer, private R&D and innovation activities, entrepreneurship and new firm creation, and framework conditions for innovation. The second, by a New Zealand researcher, assessed the NIS system in terms of general structural characteristics and capabilities. The dimensions included: high level frameworks and horizontal agencies, horizontal coherence, vertical agencies, vertical coherence, mechanisms to involve stakeholders in policy making, mechanisms to involve business in policy making, mobilisation of actors, national vision, NIS conceptual framework, and strategic approach. The case study countries included in each of the studies were similar but not identical, the New Zealand study including some different Asian cases, and Chile.

3.2 Key findings

Results from the analysis of the NIS challenges showed that:

- All countries except the Moderate Innovation countries, Australia, and New Zealand have ‘enlarging the base of firms involved in innovation’ as a priority NIS challenge.
- All countries, except the Leading Innovation countries, emphasise human resources for research as a challenge.
- The Leading Innovation countries are distinctive in identifying the challenge of ‘user-, demand-driven, services, non-tech innovation policy’ although this is also a challenge for New Zealand’s NIS.
- The Asian countries are broadly similar to the European countries and in this regard they more closely match the Follower and Moderate in Transition countries.
- New Zealand does not give priority to enlarging the base of firms in innovation but unlike many of the case study countries, it does emphasise ‘user-, demand-driven, services, non-tech innovation policy’ which is a characteristic of Leading NIS countries in Europe.
- New Zealand is also distinctive in that it emphasises the challenges of ‘private R&D expenditure’ and ‘internationalisation of the system’ while most other case study countries do not.
- In terms of NIS challenges, New Zealand is similar to South Korea, three of the four Moderate in Transition countries, plus Belgium, and it is similar to Taiwan and Australia.

Results from the European experts' analysis of NIS policy showed that:

- Across all countries, most of the emphasis is given to 'governance structure', 'public research', and 'public-private partnerships'.
- Europe as a group is similar to Asia in that these three dimensions are the highest rated. New Zealand is similar in that it emphasises the first and third of these dimensions.
- Within Europe, the Innovation Leaders are distinctive in that they have high ratings for two of the top three but, in addition, emphasise 'policy intelligence'. Innovation Followers emphasise 'policy intelligence' as well but also emphasise four other dimensions, apparently trying to catch up. Both Leaders and Followers have more dimensions with above average ratings.
- The policy response of the Czech Republic, one of the four European countries which have similar challenges to New Zealand, is similar to New Zealand.

For the New Zealand component of this research, the main findings were:

- Leading Innovation countries have higher than average levels of R&D expenditure.
- For all countries analysed, BERD is higher than HERD. Austria, Denmark, Finland, Japan, Korea, Switzerland and Sweden have higher levels than the OECD average. New Zealand, along with Chile, Italy and Portugal, has low levels of R&D expenditure.
- Data on BERD as a percentage of GDP and HERD as percentage of GDP illustrate a positive association, with Sweden and Finland having high values on both variables. New Zealand, along with Portugal, Italy and Chile, has low scores on these variables.
- Finland, Denmark, Japan, and Norway have high average scores across all the criteria used to evaluate NIS policy. New Zealand ranks in the second tier of countries on this average score.
- European countries designated as Innovation Leaders were appraised as having a high score for vertical coherence, for stakeholder involvement in policy (research providers and end users contribute to policy setting), and for business involvement in policy.

For New Zealand, the comparative data show that the current policy changes will improve its governance of NIS. The recent changes include:

- Improved vertical coherence through the creation of the Ministry of Science and Innovation from the existing Ministry of Research, Science and Technology and the Foundation for Research, Science and Technology.
- Improved governance arrangements for the new Ministry in line with contemporary good practice of national innovation systems.
- Improved mobilisation of actors through the appointment of a Chief Science Adviser, reporting directly to the Prime Minister.

- Changes to the governance arrangements for the public research institutes consistent with the recommendations of the OECD Review 2007 to provide the crown research institutes with:
    - improved strategic direction through mission statements;
    - increased influence in making priority setting decisions;
    - increased stability of long-term research programmes;
    - improved interfaces with business end-users;
    - improved monitoring and evaluation of institutional performance and research impact according to both financial and non-financial performance.
- Greater transparency and reduced fragmentation of R&D support programmes through restructure of priorities for government investment in science and innovation.
- Improved support for business R&D through programmes that enable businesses to have more influence in defining research themes.

3.3 Comparison of results across the two assessments

There is some similarity between the results of the New Zealand assessment of NIS policy and the PRO-INNO innovation classification which has Denmark, Finland, Sweden and Switzerland as leaders. The table showing overall assessment of New Zealand ratings has Denmark and Finland as having good NIS governance but also includes Norway in the top group while it is classified as moderate in the European classification. The New Zealand assessment rated Switzerland lower in terms of innovation and Sweden much lower.

Norway is higher in the New Zealand rankings because they have a well-managed NIS policy in large part because oil revenue allows them to and because they appear to be thoughtful and thorough in what they do. The result is the provision of many agencies and supports for research. The PRO-INNO classification has Sweden and Switzerland as Innovation Leaders. In the case of Sweden this may be because of the high level of business expenditure which masks any deficiencies in their NIS. Their NIS illustrates the linear approach to innovation and is not particularly sophisticated and does not adhere to current NIS concepts. In Switzerland, there is a strong influence on R&D from universities, so government innovation policy is not well developed because it is not needed.

Results from both assessments of innovation policies have Denmark and Finland consistently as innovation leaders. If we take Denmark and Finland as good examples of effective innovation policy then we can consider their policy settings to be laudable goals. Both countries are similar to New Zealand in that they have small populations and see themselves as having to innovate well to compete in the world. There are therefore, reasonable grounds for considering that their innovation policies are relevant to New Zealand, subject to the need to adapt them to New Zealand conditions.

3.4 Policy implications for New Zealand

From the European experts' assessments, results from comparing New Zealand with the European Innovation Leaders shows that there is potential to improve NIS in New Zealand by giving attention to:

- Innovation policy strategic intelligence:
    - strategic exercises, advisory bodies, foresights, evaluations, peer reviews, benchmarking, NIS studies
    - capacity building within authorities in charge of policy design and implementation.
- Public private partnerships and knowledge transfer:
    - via competence centres and joint public-private organisation oriented towards innovation, clusters, networks and poles with businesses as main drivers
    - the provision of science parks and incubators
    - providing knowledge transfer incentives such as science-industry bridging organisations, university transfer offices, cooperative programmes, funding schemes, and research commercialisation schemes.
- Private R&D innovation:
    - direct and indirect support for private R&D via subsidies, loans and tax incentives
    - subsidies and vouchers, advisory services and management support for innovation
    - adaptation of curricula and training programmes to further innovation, and financial and non-financial support for human resources for innovation companies
    - demand stimulation policies, such as innovative public procurement and lead market initiatives.
- Entrepreneurship and new firm creation
    - spin offs and start up programmes including finance, infrastructure, advisory schemes, brokerage services, business plans, competitions to support new technology based firms (NTBFs),
    - entrepreneurship training such as courses and initiatives in basic or continuing education to enhance entrepreneurial spirit and facilitate innovation company formation
    - risk and venture capital to include guarantee mechanisms, co-funding of venture capital companies and business angel networks.

From the New Zealand expert assessments, results from comparing New Zealand with the European Innovation Leaders shows that there is potential to improve NIS in New Zealand by:

- Improving high-level horizontal agency framework, that is, the NIS provides a strong unifying approach that supports policy guided by government's strategic plan for the nation.
- Implementing a tangible commitment to horizontal coherence so that NIS policies are complementary.

- Establishing a clear national vision for innovation.
- Implementing and developing the proposed changes in governance to achieve:
    - improved vertical coherence so that NIS policies are implemented in the way they are intended, and
    - improved stakeholder and business involvement in policy making and priority setting.

Databases Accessed

CREST peer reviews

The Expert Group operated within the framework of the third cycle of the Open Method of Coordination for the implementation of the action lines of the 2003 European Commission Communication 'Investing in Research: an Action Plan for Europe' (also called the '3% Action Plan'). The following 21 European Union Member States and countries associated to the European Framework Programme for Research and Technological Development participated in the activities of the Expert Group: Austria, Belgium, Czech Republic, Denmark, Germany, Greece, Finland, France, Ireland, Island, The Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom. Seven meetings of the Expert Group were held between February and November 2007. The chair of the Expert Group was Jörn Sonnenburg (International Bureau of the German Federal Ministry of Education and Research at the German AeroSpace Centre). The rapporteurs were Arie van der Zwan (Ministry of Economic Affairs, The Netherlands) and Peter Teirlinck (Belgian Science Policy Office).

ERAWATCH

ERAWATCH provides information on European, national and regional research policies, actors, and programmes in the EU and beyond. ERAWATCH supports evidence based policy making in Europe and contributes to the realisation of the European Research Area (ERA). Currently ERAWATCH covers 49 countries in total: 27 EU Member States, countries associated with the European Community's Research Framework Programme and main trading partners of the EU. ERAWATCH information is collected and presented with the support of the ERAWATCH Network of national experts.

Data obtained from: http://cordis.europa.eu/erawatch/index.cfm

OECD Reviews of innovation Policy

The OECD Reviews of Innovation Policy offer a comprehensive assessment of the innovation system of individual OECD member and non-member countries, focusing on the role of government. They provide concrete recommendations on how to improve policies which impact on innovation performance, including R&D policies. Each review identifies good practices from which other countries can learn.

Data obtained from:
http://www.oecd.org/document/62/0,3343,en_2649_34273_38848318_1_1_1_1,00.html

Pro-Inno Europe, Innovation Trendchart

The PRO-INNO-Policy TrendChart describes and analyses major innovation policy trends at national and regional levels across Europe in an independent way. It aims to contribute to policy assessment and to identify examples of good practice, thus improving the basis for decision making in innovation policy. A policy monitoring network tracks developments in innovation policy measures in 39 countries. The information collected by this network is used to run and maintain an inventory of innovation policy information and policy measures, and also feeds into annual country reports and an annual European Innovation Progress Report.

Data obtained from: http://www.proinno-europe.eu/trendchart

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Appendix 1
National Innovation Policy System Profile for each Country

COUNTRY A: National Innovation System Challenges	
Challenge 1	Based on benchmarking of key indicators and expert assessment in Innovation Trendchart, Erawatch, CREST peer reviews, OECD reviews, national reviews, etc.
Challenge 2	
Challenge 3	
Challenge 4	
COUNTRY A: National Innovation Policy System	
8. Innovation Policy Governance structure and key actors	
Key Policy Documents	Strategic plans, Policy papers – main political statements with respect to innovation – degree of horizontalisation of innovation policy
Decision-making Bodies	Key actors, horizontal coordination issues
Implementing Bodies	Key agencies and policy delivery mechanisms
Multi-level governance	Division of labour between of regional/national authorities, role of EU Structural Funds, vertical coordination issues
9. Innovation Policy Strategic Intelligence	
State-of-the-art and instruments for policy design capacities: Strategic exercises, advisory bodies, Foresights, evaluations, peer reviews, benchmarking, NIS studies, capacity building within authorities in charge of policy design and implementation, etc.	
10. Science Base, Public Research, Technology organisations	
Structural Funding	Institutional block funding channels for universities, PROs and Technology Organisations, evolution of funding rules
Competitive funding	Competitive funding programmes for public research actors, generic or targeted
Reform of public research base	Mergers and reorganisations, focus on centres of excellence, prioritization between areas, new rules for universities and PROs management, etc.
Human resources for public research	Funding channels for researchers, including mobility schemes. Improvements to researcher's careers.

11.Public-Private Partnerships and Knowledge transfer	
Structural co-operations	Competence centres, joint public-private organizations oriented towards innovation.
Clusters, networks, poles	Programmes and incentives for clusters and networks, with businesses as main drivers
Science Parks, technopoles, incubators	Specific places for co-location of (public and private) innovation actors
Knowledge transfer incentives	Initiatives for technology transfer: structures (science-industry bridging organizations, university transfer offices, technology transfer offices, …), cooperative programmes, funding schemes, research commercialization schemes, mobility initiatives, etc.
12.Private R&D and innovation activities	
Direct and indirect support for private R&D	Subsidies and loans (direct) and tax incentives (indirect) for private R&D
Support for innovation: financial and non-financial	Subsidies, voucher schemes, soft support, advisory services for innovation projects, innovation management support, …
Human resources for innovation	Adaptation of curricula and training programmes to innovation needs Financial and non-financial support for human resources for innovation in companies
Demand stimulation policies	Innovative public procurement, lead market initiatives…
13.Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	Finance, infrastructure, advisory schemes, brokerage services, Business plans competitions,… to support NTBFs and spin-offs creation
Entrepreneurship training	Courses and initiatives in basic or continuing education, to enhance entrepreneurial spirit and facilitate innovative company creation.
Risk and venture capital	Guarantee mechanisms, co-funding of venture capital companies, business angels networks, …

14.Framework conditions for innovation	
Intellectual Property Rules	Support and awareness raising activities for Intellectual Property protection
Innovation-friendly Rules and Regulations	Revision of regulations and administrative practices to remove barriers for innovative activities and companies
Public awareness and readiness for innovation	Awareness campaigns, innovation prizes, road-shows, etc.
Innovation and other policies	Innovation promotion within FDI policy, health policy, education, environment, energy policy…

AUSTRIA: National Innovation System Challenges	
Challenge 1	Maintain and extend growth in public R&D expenditures achieved in the last 10 years, despite budgetary restrictions
Challenge 2	Enhance supply of human resources for innovation: address gap in S&T engineers supply, limited participation of women, limited attractiveness of researchers careers at universities
Challenge 3	Further improve effectiveness and coherence of policy portfolio (overcoming "programme jungle")
Challenge 4	Find remedies for lack of new, growth-oriented firms creation, for deficits in entrepreneurship and in venture capital provision
AUSTRIA: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	Government Programme 2008-2013: securing attractiveness of Austria as STI location; nurturing excellence; fostering human resources and internationalization; improving policy delivery system; special emphasis on basic research. Promoting science-industry collaboration is no longer a main priority as programmes launched in the past have reached their goals. Strategy 2010: Perspectives for RTI development in Austria. New RTI strategy under development. R&D policy stands high on the (successive) governments' agendas. Main orientations: drive towards excellence, public-private interactions, internationalization. Private sector's R&D activities are mainly self-funded.
Decision-making Bodies	Ministry of Science and Research (BMWF), in charge of research; Ministry for Education, Arts and Culture (BMUKK) in charge of education Ministry of Economy, Family and Youth (BMWA) in charge of innovation support, technology transfer and entrepreneurship promotion, and the Ministry of Transport, Innovation and Technology (BMVIT), in charge of the largest share of competitive public R&D funding and applied research. Problems of horizontal coordination across ministries, cumbersome responsibility system for overseeing implementing agencies, limitation of annual budgeting cycles.
Implementing Bodies	Austrian Wirtschaftsservice (AWS) for spin-offs and innovation promotion Austrian Science Fund (FWF) for basic research Austrian Research Promotion Agency (FFG) for applied research
Multi-level governance	Federal context: nine Federal States with own governments are developing their engagement in RDTI, co-finance some major federal programmes, as well as some public research institutes. Most regions host regional agencies supporting innovation. Their strategies vary according to regional diversity. Overall, regional contributions to public RDTI funding are increasing, but still limited in quantitative terms. Use of Structural Funds (limited funding source). Main regional actions: incubators, clusters initiatives, competence centres. Limited vertical coordination.

2. Innovation Policy Strategic Intelligence	
• Broad "Research Dialogues", major hearing carried out in Summer, based on studies and broad stakeholders' involvement; "Future Dialogue", governmental think-thank for STI and structural issues • Major systemic evaluation of whole portfolio of R&D policies and programmes in 2009 • Well-developed culture of evaluation at programme level (fteval: Platform Research and Technology Policy Evaluation) • Technology-Innovation Policy Consulting (TIP), source of studies and advice for innovation policy • Limited role of formal advisory structures (Austrian Council for Research and Technology Development, Science and Innovation Committees in Parliament)	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• Structural funding is the major funding source for HEIs and PROs, but this share is declining • The largest share of block type public funding goes to HEIs (more than 80%) • Extension of performance-based funding rules to universities and PROs (20% of structural funding to universities based on performances achieved)
Competitive funding	• Increased number of thematic programmes and competitive funding schemes for HEIs and PROs • The share of targeted programmes/generic programmes in FFG is 13% in 2006.
Reform of public research base	• Focus on excellence and internationalization (in line with ERA challenges) • Funding of "Clusters of Excellence" by FWF for durations of 8-12 years; "Special Research Programmes", "National Research Programmes" (FWF) promote excellence and critical mass • Reform of universities and PROs management, introduction of performance contracts, of three-years planning systems • Openness of PROS for international cooperation (Christian Doppler Laboratories, CIRCE programme for cooperation with Eastern European countries)
Human resources for public research	• Openness of labour market for foreign researchers, abolition of mobility restrictions • Incentives for women participation in science careers • Many issues under discussion for improving researchers careers
4. Public-Private Partnerships and Knowledge transfer	
Structural co-operations	• K-plus and K-ind Net Competence centres, limited duration (7-10 years) joint public-private organizations oriented towards strategic long term R&D – 40 centres established since 1998 (followed by COMET programme). Contribution to regional innovation policy, Positively evaluated. • Christian Doppler laboratories
Clusters, networks, poles	• Programmes and incentives for clusters and networks are developed mostly at regional level
Science Parks, technopoles, incubators	• Austrian Association of Technology Centers • Technopoles and incubators are co-funded by the regions (notably through the A+B programme) • REGplus programme to support technology centres and networking activities in the regions

Knowledge transfer incentives	• Lack of inter-sectoral mobility incentives • Thematic cooperative programmes such as FIT-IT,TAKE-OFF (aeronautics), NANO initiative. Most targeted programmes require public-private collaboration • Innovation vouchers to foster research cooperation between SMEs and public research organisations
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Low overall amounts of public funding for private RDTI activities. Most important public funding source: generic funding from FFG • High private foreign funding for R&D activities • "Head quarters" strategy: funding for R&D by multinationals in Austria (FFG) • Tax allowances for R&D introduced in 2001: increasing share of funding • Innovation vouchers for SMEs to foster collaboration with public research organisations
Support for innovation: financial and non-financial	• COIN (Cooperation and Innovation) programme to support participation of SMEs in innovation • Regional development agencies, advisory centres
Human resources for innovation	• Adaptation of curricula and training programmes to innovation needs • Financial and non-financial support for human resources for innovation in companies
Demand stimulation policies	• Underdeveloped policy area: supply-side policies are over-emphasised • In 2001 creation of an agency for reducing costs of supply of public authorities by centralising them ("Bundesbeschaffungsagentur"): electronic platform for offers and efforts to increase innovativeness in public procurement
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Programme for entrepreneurship and spin-offs creation: A+B programme • Austria Wirtschaftsservices supports new firm creation with finance and advice, support for IPR protection
Entrepreneurship training	• A+B programme involves entrepreneurship training at universities
Risk and venture capital	• Seed financing credit initiative and guarantees given by Austrian Economic Services (AWS) for high-tech start-ups • JITU programme for establishment of new companies: seed and pre-seed capital • i2 market for business angels: matching platform between investors and creative entrepreneurs to get capital (also guarantees) and know-how • Regional branches of Austrian Federal Chambers of Commerce offer equity guarantees for new high-tech firms

7. Framework conditions for innovation	
Intellectual Property Rules	• Uni:invent programme at universities: installation of innovation scouts, support of patent financing, and the sub-programme tecma which supports the systematic establishment of a services structure for intellectual property rights and their commercialisation
Innovation-friendly Rules and Regulations	• Not a key policy priority in innovation policy. Overregulation in knowledge-intensive services is thought to remain a bottleneck for innovation.
Public awareness and readiness for innovation	• Awareness campaigns for S&T studies amongst the youth: “Sparkling Science”; “Forschung macht Schule” (research goes to school) • Several awards: “Staatspreis Innovation”, “Staatspreis Multimedia und e-business“ or “Jugend Innovativ” • Awareness campaign “Innovatives Österreich” (Innovative Austria)
Innovation and other policies	• Climate Change and Energy Fund (KLIEN) for research into environmental protection and energy saving • Extension of possibilities for life-long learning (“educational sabbaticals”) for employees

CZECH REPUBLIC: National Innovation System Challenges	
Challenge 1	Decoupling of public research (Academy of Science, vanishing of applied research institutes) and industrial research and technology development; weak performances in research exploitation: deficiencies present both on the demand and on the supply sides
Challenge 2	Bottlenecks in human resources for research and innovation in public and private sectors, deficits in qualifications, low salaries, brain drain
Challenge 3	Low number of domestic companies engaged in R&D and innovation
Challenge 4	Fragmented support system for R&D and innovation, administrative costs, lack of concentration on large and best projects
Challenge 5	Weak new firms and spin-offs creation rate

CZECH REPUBLIC: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	Recent involvement of government into innovation promotion. Multiplicity of policy documents: National Reform Programme of the Czech Republic 2008-2010; the Economic Growth Strategy for the Czech Republic 2005–2013, White Paper on Tertiary Education (2009) and the Operational Programmes for R&D and innovation and for Entrepreneurship and Innovation (2007-2013). National Innovation Policy of the Czech Republic 2005–2010 and Reform of the Research, Development and Innovation System in the Czech Republic (2008) are two major documents. Main accents are on: creating bridges between science and industry; reinforcing performances in public research sector and third mission of HEIs; streamlining policy delivery system; ensuring adequate human resources for the knowledge-based economy
Decision-making Bodies	Responsibility for innovation policy is split between: Ministry of Industry and Trade, responsible for industrial and trade policy, small and medium-sized enterprises, industrial research, and the development of engineering and technologies; and Ministry of Education, Youth and Sports in charge of public research and higher education. The Council for Research and Development is the advisory body to the government
Implementing Bodies	Ministry of Education, Youth and Sports and Academy of Science provide R&D funding for public research. Ministry of Industry and Trade provides funds for industrial R&D. Planned Technology Agency (2010) would simplify policy delivery system. Czech Science Foundation provides project-based funding to PROs Czechinvest is responsible for FDI promotion and support to companies' investments Complicated and overlapping structures of implementing bodies, multiplicity, volatility of schemes and programmes, lack of horizontal coordination
Multi-level governance	Policy is centralized, regions have little responsibilities in the RDTI domain. Several regions have established regional innovation strategies, of which cluster strategies are main elements. The state Ministry of Regional Development has established a programme to support public R&D actors in the regions. Major role of EU Structural Funds (ERDF) for R&D and innovation financing

2. Innovation Policy Strategic Intelligence	
• Expert groups prepared Green (diagnosis) and White (actions) Papers on Research, Development and Innovation in Czech Republic in 2008, submitted to public consultation • Foresight exercises for identification of thematic orientation of National Research programmes • Use of ad hoc groups of experts • Evaluation culture in infancy, but new system for evaluation and monitoring of results of R&D programmes planned under 2008 Reform Plan	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• Institutional funding from Ministry of Education, Youth and Sports and Academy of Science: share of institutional funding on total R&D funding is decreasing and went below 50% in 2008. Limited moves towards performance-based funding • Use of Structural Funds to finance large research infrastructures, with a preference for infrastructures shared by public and private R&D performers, and integrated into international cooperation networks • Planned Centres of Excellence to concentrate research activities and funding through cooperation between several PROs • Technology Centres supported by Ministry of Trade and Industry
Competitive funding	• Rise of project-based funding in the form of competitive grants by Czech Science Foundation • Thematic research programmes (ICT, environment, social sciences) by Ministry of Trade and Industry
Reform of public research base	• Initial programmes to foster research excellence in HEI and Academy of Science (still underdeveloped) • Reform of tertiary education: recent evolution of universities from mainly teaching universities towards research-active universities, and increasing linkages between education and needs of the economy • 2007 law on PROs reinforced their autonomy and budgetary independence; their control over IPR rights
Human resources for public research	• Measures for improving conditions for foreign researchers (immigration law) • Few attention to drive curricula in higher education, towards businesses' present and future needs. Planned under the new White Paper on Tertiary Education
4. Public-Private Partnerships and Knowledge transfer	
Structural co-operations	• Lack of bridging structures between public research and industrial research actors
Clusters, networks, poles	• Cluster programme (Spoluprace) by the Ministry of Trade and Industry (funded by ERDF) • Cluster initiatives launched at regional level
Science Parks, technopoles, incubators	• Business incubators and science parks funded by ERDF • Prosperita programme for the establishment of technopoles, science parks, incubators, innovation centers, centers for technology transfer
Knowledge transfer incentives	• Tandem, Sustainable Prosperity and Impulse programmes by the Ministry of Trade and Industry support industry-science R&D collaboration • Tax incentives for cooperative research (subcontracted research) are planned • ERDF programme "Education for Competitiveness" intends to support mobility schemes between science and industry

5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Direct funding for industrial R&D: TIP, Innovace and Potencial programmes by the Ministry of Trade and Industry • Tax incentives for private R&D introduced in 2005: little use according to 2007 evaluation
Support for innovation: financial and non-financial	• Funding of business advisory services • Several support schemes dedicated to SMEs (loans, subsidies) for various types of business development projects
Human resources for innovation	• ERDF programme "Education for Competitiveness" intends to support actions within the education sector to respond to innovation challenges in business world
Demand stimulation policies	• No use of public procurement for innovation
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Business incubators to stimulate spin-offs, funded by ERDF • "Start" loans for first-time entrepreneurs
Entrepreneurship training	• Few attention to entrepreneurship into second and third level education curricula
Risk and venture capital	• Underdeveloped venture and seed capital markets, no initiatives for provision of early stage venture capital • Czechinvest offers a forum to present new business plans to investors
7. Framework conditions for innovation	
Intellectual Property Rules	• The Innovace programme by the Ministry of Trade and Industry supports IPR protection
Innovation-friendly Rules and Regulations	• Creation of a network of one-stop-shops for business registration and administrative procedures • Simplification of trade licensing procedures for newly created companies
Public awareness and readiness for innovation	• Several innovation competitions, by Czechinvest, Association of Innovative Entrepreneurship, Economic Chamber
Innovation and other policies	• Investment incentives under FDI policy, to foster localization of knowledge-intensive activities

BELGIUM: National Innovation System Challenges	
Challenge 1	Concentration of R&D and innovation activities into limited number of large, mostly foreign-owned companies
Challenge 2	Mismatch between scientific activities and absorptive capacities of productive sector
Challenge 3	Improving framework conditions for new ventures: addressing limited entrepreneurship dynamics, regulatory and administrative hurdles, frilosity of capital providers for early stage ventures
Challenge 4	Securing an adequate labour force for research and innovation, improving attractiveness of research careers, making education curricula more responsive to needs of innovative companies
Challenge 5	Raising effectiveness of individual policies, and achieving coherence and synergies across state entities in charge of various streams of innovation support

BELGIUM: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	No key document from federal state except general government policy declaration. Flanders in Action 2009: innovation is a horizontal policy goal, accents on building a strong knowledge base in the public sector, the valorisation of this base in the society, entrepreneurship promotion, creation of critical masses in technology and innovation, improving human resources base, rationalisation of public support and evaluation of public programs and actions. Walloon's Marshall Plan 2009 (generic regional development policy including RDTI promotion chapter): focus on research valorization and innovative public-private partnerships in key sectors, notably through the competitiveness poles instrument; on promotion of innovation in SMEs, on creation of more synergies in public research activities. The Brussels Capital region has not produced a strategic document for innovation.
Decision-making Bodies	The regional Ministers in charge of research, on the one hand, and economy, on the other hand, take decisions with respect to innovation policy matters. In Flanders, there is an ongoing trend to co-locate science and innovation responsibilities under a single Minister, while in Wallonia and the French Community (two separate governments contrary to the Flemish Community), decision-making is fragmented between several Ministers. The ministerial cabinets are traditionally powerful decision bodies in the Belgian context. Amongst the numerous advisory councils, the Flemish VRWB is the one with strongest influence on policy decisions.
Implementing Bodies	The landscape of policy delivery is complex. The federal science policy service implements federal science programmes and administers tax incentives schemes. Each region has established its bodies for policy delivery: IWT in Flanders is the central regional innovation agency, while the regional administration (with economy and research technology departments recently merged) is in charge of policy implementation in Wallonia.
Multi-level governance	The regions and communities hold the main responsibility for research and innovation in Belgium. The federal level holds limited competencies, confined to some aspects f science and research policy (not innovation). In budgetary terms, the main actor and funder is the Flemish Community. The Walloon and French Community interventions are substantial, these from Brussels Capital marginal. No coordination takes place between the two Communities, the three regions and the federal state, due to sensitivity of institutional issues of competences allocation between the 6 entities. The tendency is towards an erosion of responsibilities at federal level, with the exception of the R&D tax incentives. Important EDRF funding in the past helped establish competence centres in Wallonia, nowadays this contribution has become a minor source.

2. Innovation Policy Strategic Intelligence	
• Evaluation tools and practice widely implemented and used in policy cycle in Flanders, both for individual programmes and for policy portfolio • Study and strategic role of Flemish Advisory Council VRWB • Flanders holds a network of "support points" providing policy-relevant expertise on innovation policy subjects • Evaluation practices on the rise in Wallonia and French Community, still underdeveloped in Brussels-Capital • Attention to optimization of innovation advisory structures and networks in Flanders and Wallonia • Foresight or technology assessment exercises carried out at regional, not federal level	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• The two Communities provide structural funding for HEIs, with limited performance-based portion. The latter is more developed in the Flemish Community, which has introduced criteria to assess research performance and third mission activities. • Regional Funds (FWO and FNRS) finance researchers on an intra-university competitive basis (envelopes are fixed across universities) • Structural funding to federal scientific institutions is an important part of federal budget for STI • The Flemish Community has established large strategic research centres in key areas (microelectronics, environment, …): these receive structural funding based on 3-years performance contracts and regular evaluations • Flemish competence poles, centres of expertise linked to specific sectors • The Walloon region funds smaller regional research centres: the funding system is slowly evolving towards performance-based funding (labelling procedures with unclear budgetary implications)
Competitive funding	• Federal targeted programmes are accessible to HEIs on a competitive basis (though keys are respected for allocation of funds across HEIs from the two Communities). One programme (inter-university attraction poles) finances bi-community research, an exception in the Belgian landscape. Space research is an important component of federal research funding • The three regions allocate funding to HEIs (and regional research centres) through competitive programmes. These tend to be generic in the Flemish Community, while Wallonia pursues evolving thematic "mobilizing programmes" and Brussels Capital has a few thematic programmes in ICT, life science and environment. The share of these competitive programmes in total university funding is low in international comparison • Flanders allocate funds for industrially – relevant research to universities, on a competitive basis (Industrial Research Fund), and for Strategic Basic Research (SBO) • Small-scale competitive programme in Brussels for research of regional interest at universities located in the region
Reform of public research base	• Universities are key public research actors in the whole country, Flemish excellence centres are important players in Flanders. HEIs have a large degree of autonomy and undergo a major and difficult process of restructuring following mostly the Bologna process

Human resources for public research	• Introduction of generous federal tax incentives system for researchers in HEIs and PROs, progressively extended to several categories • Lowering of social security premiums for researchers in the public sector • Several international mobility programmes for researchers in the public sector. Limitations of linguistic laws to develop education activities in English • The Flemish Community has developed a competitive programme to fund top level researchers (Methusalem) • Regional grants for researchers in the three regions, available on a competitive basis (thematic in Brussels-Capitak)
4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• Competitiveness poles are a major initiative of the Walloon region: challenges relate to private participation in these poles • Dedicated competence centres with businesses on the driving seat in Flanders
Clusters, networks, poles	• Flanders has abandoned its cluster policy • Wallonia has a cluster policy running in parallel to competitiveness poles
Science Parks, technopoles, incubators	• The three regions host science parks and incubators, most of them co-located in the vicinity of universities
Knowledge transfer incentives	• Wallonia: FIRST schemes promoting science-industry mobility • Technological guides in regional research centres of Wallonia • Interfaces in charge of research valorization are funded at universities of the two communities • Flanders has a well-developed network of innovation intermediaries VIS (Flemish Innovation Cooperation Networks),some of which perform technology transfer functions • Flemish Tetra Fund supports projects of knowledge transfer between HEIs and companies
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Tax incentives for R&D: new schemes introduced in 2006 have increased the use of this formerly ineffective instrument • The three regions provide subsidies for industrial R&D, including some specific schemes for SMEs. Delivery by IWT in Flanders and the regional administrations in Wallonia and Brussels-Capital • Evaluations in Flanders generate changes in the schemes delivery
Support for innovation: financial and non-financial	• Networks of innovation intermediaries in Flanders (VIS) and in Wallonia (ongoing reorganization in view of higher effectiveness) provide soft support for innovation • Support for innovation projects in companies through grants in the three regions. Innovation audits in Flanders • Tax incentives for investors in innovative ventures in Flanders (Arkimedes)
Human resources for innovation	• Small subsidy schemes to hire innovation project officers in Wallonia (RIT) and Flanders (SME programme)

Demand stimulation policies	• Public procurement for innovation a new concern in Flanders
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• The three regions provide soft support and coaching for new firm creation, business plan development • Incubators provide infrastructure and a favourable environment for start-ups • University interfaces support academic spin-offs through stimulation programmes, support for intellectual property management, provision of equity through investment companies
Entrepreneurship training	• Entrepreneurship courses at universities and HEIs • Action Plan "Entrepreneurial Education" in Flanders
Risk and venture capital	• Investment company GIMV in Flanders provides risk capital in specific sectors such as biotech • Regional innovation fund (VINNOF) provides seed and risk capital in Flanders • Regional investment companies in Wallonia and Brussels-Capital provide guarantees and equity to innovative ventures • Walloon inter-municipal investment companies provide limited risk capital • Business angels networks in the regions
7. Framework conditions for innovation	
Intellectual Property Rules	• Regional financial support for IPR is available for SMEs
Innovation-friendly Rules and Regulations	• Administrative simplification efforts at federal level for company creation and operation • Reform of federal public body in charge of norms and standards
Public awareness and readiness for innovation	• Innovation competition and awards, business plans competitions, in the regions • Science weeks in the Communities
Innovation and other policies	• Environment-Innovation Platform in Flanders, joint initiative under the two policy areas • Platform for multidisciplinary knowledge in health in Flanders

ICELAND: National Innovation System Challenges	
Challenge 1	Maintain STI and the development of the knowledge-based economy as priority for an economy facing huge economic and financial crisis
Challenge 2	Introducing more prioritization in governmental action to support STI, evolve towards more focus on demand-side policies
Challenge 3	Improving policy governance mechanism and developing policy intelligence tools to monitor and assess the system
Challenge 4	Enlarging the base of companies involved in innovation, and thereby the relative size of the knowledge-based activities in the economy

ICELAND: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	The Science and Technology Policy Council adopts 4-yearly policy declarations which give the key directions for STI policy. Focus evolved between (2003-2006) and (2006-2009): from a priority on the reorganization and enhancement of quality of the public science base and developing the research function at universities, towards a concern for business innovation and more attention to societal objectives of research. The government sees its role as facilitator and provider of good framework conditions for innovation, direct interventions towards the private sector in this area are not a priority
Decision-making Bodies	The Science and Technology Policy Council (STPC), established in 2003, is the key decision-making body, under Chairmanship of Prime Minister and with participation of several sectoral Ministers. Individual Ministers enjoy a lot of independence with respect to decision-making, which weakens the coordinating role of the STPC
Implementing Bodies	Rannis is the key agency at the centre of the system, managing most competitive funds and performing policy support functions. The Icelandic Innovation Centre performs a business support function for (technological) innovation.
Multi-level governance	The regions have a very limited role in innovation promotion. Economic and knowledge-based activities are heavily concentrated in the capital. Regional knowledge centres are being established, gathering antennas of universities, PROs and support organizations.
2. Innovation Policy Strategic Intelligence	
• First participatory Foresight exercise carried out in 2006-2007: delivered a number of priorities for STI • General lack of detailed and strategic data on the policy system – acknowledged need for reinforcement of the role and tools at Rannis • International benchmarking is practiced (e.g. recent STI "crisis" think thank established with participation of external experts, OECD peer review, etc.) but hampered by lack of absorptive capacity and limited staff in charge of STI policy issues • Limited evaluation practices but general openness to change and constructive analysis	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• Structural funding to HEIs and PROs constitutes the main channel for delivery of public funding. Limited use of performance-based funding procedures, but trend in this direction.
Competitive funding	• Introduction of competitive funding schemes (Research Fund, Technology Development Fund) at the establishment of the STPC in 2003, and fulfillment of policy goal to increase their importance over time, even during the current crisis. These represent 14% of total public funding to HEIs and PROs. Sectoral funding for fisheries (AVS Fund) available.

Reform of public research base	• Important reforms under way since 2004: numerous mergers and reorganizations undergone and planned for both HEIs and PROs, creation of critical masses, reinforcement of research duties at universities, completed accreditation procedure for universities in 2008, introduction of PhD degrees, introduction of contracts and supplementary funding agreements linked to performance targets (including third mission indicators) enhancement of internal quality procedures at universities
Human resources for public research	• Competitive funding schemes include researchers grants. No specific mobility schemes but generous student outwards mobility grants (weakened by the current drop of the currency) • Reinforcement of performance-driven internal funding allocations at universities, to concentrate funds on best performing researchers
4. Public-Private Partnerships and Knowledge transfer	
Structural co-operations	• Recent establishment of Centres of Excellence (limited size) involving public-private partnerships.
Clusters, networks, poles	• Not in operation in Iceland
Science Parks, technopoles, incubators	• Incubator at the University of Iceland, and plans for Science Park (on hold)
Knowledge transfer incentives	• No knowledge transfer schemes of initiatives in the Icelandic policy portfolio, with the exception of the role of Innovation Centre Iceland
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• The Technology Development Fund and AVS (Added Value for Seafood) are accessible to companies. Establishment of R&D tax deductions discussed
Support for innovation: financial and non-financial	• Soft support by IMPRA (part of Icelandic Technology Centre) with a focus on firms outside the capital area
Human resources for innovation	• No specific scheme
Demand stimulation policies	• Not in operation

6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Proliferation of initiatives in the wave of financial crisis including counselling, awareness-raising, provision of office space… • New firms business plans competitions organised by University of Iceland • Support provided by the University of Iceland Technology Transfer office
Entrepreneurship training	• No major initiative needed in a country with good entrepreneurship culture
Risk and venture capital	• New risk capital fund Frumtak established by the government, with mixed funding origin
7. Framework conditions for innovation	
Intellectual Property Rules	• Support for patenting by researchers offered by University of Iceland Technology Transfer office
Innovation-friendly Rules and Regulations	• Not an explicit policy consideration
Public awareness and readiness for innovation	• Innovation contest by University of Iceland, several private initiatives to raise awareness of the general population on the need for nurturing innovative businesses to address deep crisis
Innovation and other policies	• Higher education policy linked to innovation

SWITZERLAND: National Innovation System Challenges	
Challenge 1	Spur innovation in smaller firms, broadening the base for innovative activities
Challenge 2	Improve the provision of early-stage venture capital
Challenge 3	Raise domestic availability of science and technology graduates

SWITZERLAND: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	Current four-year strategic plan for education, research and innovation 2008-2011: the general orientation of Swiss STI policy is very liberal and concentrates on funding basic and applied research in the public sector (with universities as main actors), and to a lesser extent on technology transfer. Large multinationals who are responsible for the majority of private R&D in Switzerland militates against intervention of the State towards private actors. The current policy focus is on an increase in public budgets for fundamental R&D, encouraging transfer of knowledge from High schools to businesses, and internationalization of research , particularly outside Europe. Promotion of entrepreneurship and start-ups is a growing policy concern
Decision-making Bodies	Ministry of Internal Affairs is responsible for Higher Education and basic research; Ministry of Economy is responsible for Universities of Applied Science and support to applied research. The Swiss Science and Technology Council (SSTC) is the advisory body for the federal government
Implementing Bodies	Two key implementing bodies: • SNF (Swiss National Foundation) provides funding for basic research at universities and manages national research programmes • KTI (Swiss Innovation Promotion Agency) supports applied research and technology transfer. KTI's budget is only 20% of that of SNF
Multi-level governance	Responsibilities for HEI are divided between the Confederation and the 24 Cantons. The Swiss University Conference coordinates strategies between the two levels. Studies have reported a situation of "impossible coordination" between the two levels of governance. Cantons are responsible for economic promotion and support for SMEs, but do not develop explicit innovation policies
2. Innovation Policy Strategic Intelligence	
• Relatively weak role of the SSTC • Extended consultation procedures before adoption of new strategies: stakeholders consultations in preparation of the 4-year strategic plan and direct influence of large companies (through Economiesuisse body) and rectors' conference are main sources for policy design • No prioritization of funding explains the lack of use of foresight or similar exercises • Evaluations are regularly implemented and used for policy evolution (e.g. of KTI cooperative funding scheme)	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• Two federal institutes of Technology of high standard, and new Universities of Applied Science (oriented towards professional education) are funded through block grants by the Confederation (by far their largest source of funding, 70% of research funding). This funding is ruled by 4-year performance agreements. The cantons fund their own universities (ten cantons have their own universities), and these also receive supplementary funding by the state (based on student numbers). • Limited role of PROs in public research

Competitive funding	• Shift of the balance between core and competitive funding to the benefit of the latter type of funding • SNF provides funding for individual R&D projects in academia • SNF funds networks of excellence and Centres of Competence linking departments of various types of universities together • SNF funds national research programmes conducted in collaboration between several university laboratories
Reform of public research base	• The university system has been progressively reformed since the '80s, with the aim to increase universities' autonomy, introduce deregulation of hiring and salary policies, and establish strategic planning practices. This evolution is most visible with federal universities, and diversity holds across cantonal universities. Refocusing on main strengths is a currently ongoing process supported by federal funding of cross-university cooperative projects. Re-allocation of disciplines across the two federal universities has taken place. Quality assessment procedures are scaled up • The research system shows a dual profile with the successful creation of Universities of Applied Science in 1997: these are geared towards professional education and have a mandate to focus on the needs of industry
Human resources for public research	• SNF provides grants for researchers at universities, covering various careers stages • Very wide openness of HEI system to foreign students • Promotion of PhD participation in research
4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• Structural initiatives for public-private cooperation not part of the Swiss policy portfolio, with minor exceptions (e.g. Swiss Centre for Microelectronics)
Clusters, networks, poles	• The government is not directly involved in clusters and networks promotion
Science Parks, technopoles, incubators	• Science parks and technopoles are established throughout the country, linked to universities
Knowledge transfer incentives	• The main instrument for fostering public-private partnership is the creation of the Universities of Applied Science in the late nineties, who have the mission to cooperate with companies • KTI supports joint applied projects between universities and private companies, with funding allocated to the public actors only • KTI has established technology transfer intermediary services geared towards SMEs, improving their access to knowledge sources in HEIs • Universities have established technology transfer offices, which are progressively being networked

5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• The Swiss Innovation policy portfolio is characterized by the almost complete absence of direct support for companies' R&D and innovation
Support for innovation: financial and non-financial	• No specific financial schemes to support innovation in businesses. KTI's advisory functions are geared towards start-ups
Human resources for innovation	• No specific initiatives beyond the investments in improving tertiary education, and in particular professional education
Demand stimulation policies	• The Swiss innovation policy portfolio is composed of instruments to support research and technology transfer on the supply side, not on the demand side
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• KTI implements a start-up programme, consisting in advisory and coaching services for entrepreneurs, and the granting of a CTI label to best performing start-ups, which is used to facilitate access to finance • Various new firms and innovative companies awards are run by private actors such as banks and HEIs
Entrepreneurship training	• KTI runs the Venturelab entrepreneurship training programme, in cooperation with several HEIs
Risk and venture capital	• No governmental initiative
7. Framework conditions for innovation	
Intellectual Property Rules	• Since 2004 federal institutes of technology are allowed to take share in companies for exploiting their IPR
Innovation-friendly Rules and Regulations	• Mechanism to incorporate SMEs views into the development of regulations • Initiative to simplify the authorization procedures for companies
Public awareness and readiness for innovation	• "Science and Society" foundation organizes events in order to raise public awareness on science and technological innovation
Innovation and other policies	• Education policy is the main contributing policy area for the promotion of innovation, corresponding to the non-interventionist stance of the government in the innovation policy domain

FINLAND: National Innovation System Challenges	
Challenge 1	Broadening the base of companies involved in innovation
Challenge 2	Increase internationalization of the research system in order to address its size limitation, and concentrate on human capital and other less mobile factors
Challenge 3	More focus and horizontal coordination of public involvement
Challenge 4	Adaptation towards new models of innovation: user- and demand driven innovation, open innovation, and innovation in services

FINLAND: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	Current priorities include: broadening the basis of companies involved in R&D, further reforms of the PROs, creation of critical masses of research clusters, gearing research towards the response to societal challenges, encouraging new forms and user-driven innovation, promoting entrepreneurship, strengthening internationalization of the system
Decision-making Bodies	The Research and Innovation Council (RIC), formerly the Science and Technology Policy Council of Finland, led by the Prime Minister, plays a key role in policy design for STI and in coordination of the various actors. The key ministries concerned with research and innovation policy are the Ministry of Education (MoE) and the Ministry of Employment and the Economy (MEE).
Implementing Bodies	Tekes, which falls under the Ministry of Employment and the Economy, is the Finnish Funding Agency for Technology and Innovation. The Academy of Finland which falls under the Ministry of Education and Science, is responsible for the financing and strategy formulation of the basic research, research training and science policy. Other agencies involved in implementation are: Finnvera, Finnish Industry Investment, Finpro, Sitra, Employment and Economic Development Centres (T&E Centres), and the Foundation for Finnish Inventions.
Multi-level governance	At international level of governance level the cooperation with other Nordic countries is intense. Recently also the cooperation with Baltic Sea regions has increased. Below national level, regions play a very limited role in terms of governance of innovation policy. Decentralised policy structures include regional offices and innovation clusters. Finnvera, a state-owned company, providing risk financing services, has 16 regional offices, and there are 15 T&E Centres across the country.
2. Innovation Policy Strategic Intelligence	
• Traditionally Finland has a supply-based strategy which is strongly based on the coordination by Tekes. During recent years the strategic emphasis has been put on demand driven innovation and user-driven innovation. One every three year a strategic policy review is drawn up by the Research and Innovation Council. This council it self has served as a good practice example in promoting strategic policy intelligence regarding innovation, since it includes different stakeholders.	

3. Science Base, Public Research, Technology organisations	
Structural Funding	• Public R&D funding is directed mainly to universities, to government research institutes as well as to the Academy of Finland and Tekes. There are plans to further increase government funding especially for universities (Science and Technology Policy Council, 2008), since the core funding for universities is recently considered to be too low.
Competitive funding	• The amount of competitive funding instruments is significant in Finland and has also increased rapidly. It mainly flows through the Academy of Finland and Tekes.
Reform of public research base	• Ongoing university reform and many years of reform and changing governance of the public research institutes
Human resources for public research	• Establishment of a four-stages career system for researchers in order to improve working conditions along the life cycle of researchers
4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• There are many research programmes in Finland which promote structural cooperation with public research institutes, in the form of public-private partnerships, specifically for applications in certain technological fields. Most prominent fields: health, humanities and environment
Clusters, networks, poles	• The new Centre of Expertise Programme period started in 200. The programme builds on the clusters of expertise for development of inter-regional co-operation. Its focus is on international R&D and business activities, the growth of knowledge-intensive companies and linking the programme closer to national innovation policies. The Government has approved 13 nationally significant clusters of expertise and 21 Centres of Expertise.
Science Parks, technopoles, incubators	• The Foundation for Finnish Inventions supports and helps individual inventors and small entrepreneurs to develop and exploit invention proposals. Overall budget is EUR 7,100,000
Knowledge transfer incentives	• The large amount of public research centres are stimulated by policymakers and their programmes to promote the transfer to commercial use, transferring the knowledge to companies.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• The many programmes to promote private R&D investments are also organized around specific technological fields and they also often promote somehow the cooperation with public R&D institutes.
Support for innovation: financial and non-financial	• Grants aimed at enhancing diffusion and absorption of knowledge in firms, and grants for applied R&D, development and prototyping. Again often per technology field. • Advisory services and innovation support services from TEKES for small and medium sized companies

Human resources for innovation	• Schemes addressing the weakness of the system to (maintain and) attract foreign students and high educated knowledge workers. Promoting PhD projects and research career-mobility.
Demand stimulation policies	• Compared to other countries in the EU many recent support measures in Finland focus on the demand side, stimulating innovation in Grand Challenges, especially in fields such as: health, social-economic issues and humanities, and environment (including climate change).
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Finnvera's financial services for start-ups and micro-enterprises; Incubator programmes; Business accelerator programme for fast growing innovative start-ups, 'Gazelles'.
Entrepreneurship training	• The advise services and risk financing provided by the Foundation for Finnish Inventions
Risk and venture capital	• Seed-capital-, business-angel-, and venture capital schemes (e.g.Seed Fund Vera Ltd; InvestorExtra; Venture Cup Finland, etc.);
7. Framework conditions for innovation	
Intellectual Property Rules	• Received less attention over recent years
Innovation-friendly Rules and Regulations	• no specific measures
Public awareness and readiness for innovation	• Over recent years more non-R&D performing firms or less R&D intensive sectors are addressed in measures. • Also new schemes for non-technological innovation, and in the service industries
Innovation and other policies	• Links with other policy fields have increased by increasingly addressing more social or societal (Grand) challenges, e.g. regarding Health and environment.

SWEDEN: National Innovation System Challenges	
Challenge 1	Strong dependence of innovation system on a small number of mature, large, globalised firms
Challenge 2	Dealing with the impact of the crisis, in particular uncertainty about the viability of the auto industry
Challenge 3	Lack of policies for supporting non-technological innovation, e.g. innovation in services
Challenge 4	Inadequate return on public investments in R&D

SWEDEN: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	In the Government Bill "Competing on the basis of quality - tuition fees for foreign students" (Govt. Bill 2009/10) the Government proposes that higher education be free of charge for Swedish citizens and citizens of an EU/EEA state. In the research bill "A Boost to Research and Innovation" the government dedicated €165b to 24 strategic research areas.
Decision-making Bodies	The Ministry of Education and Research, and the Ministry of Enterprise, Energy and Communication. Three permanent advisory bodies assist the ministries in their work: The Research Policy Council (RPC), the Innovation Policy Council (IPC), and the Institute for Growth Policy Studies (ITPS),
Implementing Bodies	The main agency supporting R&D is the Swedish Research Council (VR), funded by the Ministry of Education and Research. There are also six major national semi-public foundations such as the Swedish Foundation for Strategic Research (SSF), which supports research in science and engineering. Research of an applied nature is supported by the Swedish Governmental Agency for Innovation Systems (VINNOVA). It was established in 2001.
Multi-level governance	Research policy is decided on the national level but in the latest government bill on regional policy, "Regional growth – for jobs and welfare" and "A policy for growth and vitality in the whole country" (2002), the coordination of research and regional policy was stressed, regarding development of clusters and regional innovation systems. Linking regional growth initiatives with national research and innovation policy, includes improving the dialogue with regional actors and national authorities.
2. Innovation Policy Strategic Intelligence	

- Most policy measures which address innovation fall under either the research policy or under the enterprise policy budget umbrella while many framework conditions are set under other policy areas;
- Steps have been made towards developing strategic capacity of universities;
- Shift of intelligence to agencies: policy design is delegated to agencies such as VINNOVA who also implement innovation policy measures. Policy design at the ministry level is in principle limited to providing targets and resource allocations to agencies, and monitoring to what extent they achieve their targets.

3. Science Base, Public Research, Technology organisations	
Structural Funding	• The main beneficiaries of government R&D funding are universities and university colleges, which ultimately receive over 60% of the total. • Quality will be assessed based on the ability of the higher education institution to attract external funding and on the number and quality of scientific articles published by each institution.
Competitive funding	• A large part of public R&D funding is competitive, e.g grants provided to individual researchers
Reform of public research base	• Strong incentives from HEI to become increasingly autonomous. • A new feature in the research policy is the introduction of strategic investments in areas of specific importance for the development of the NIS.
Human resources for public research	• Access to human resources has been one of the strongest incentives for foreign companies to establish their research activities in Sweden. • Sweden spends 6.9% of its GDP on human resources, second highest in the EU. • Researchers working in the higher education sector have higher salaries than in other sectors. • A major challenge is to secure a replacement for 45% of researchers that are expected to retire within the coming decade.
4. Public-Private Partnerships and Knowledge transfer	
Structural co-operations	• Sweden stands out in measures promoting excellence in universities, while linking this to the business sector through cluster building, PPPs, etc.; for example the 'Green nano' programme of VINNOVA
Clusters, networks, poles	• a rapidly growing share of measures are directed towards strengthening existing or developing new clusters • Cluster programme of VINNOVA and of Swedish Agency for Economic and Regional Growth. • VINNOVA's sectoral R&D programs are based on calls for proposals in selected areas and involve requirements for active industry participation. Two major programs: motor vehicles and aeronautic engineering.
Science Parks, technopoles, incubators	• The National Incubator Programme has been launched in order to increase the number of new R&D-intensive growth companies. The incubators engage in development of business ideas and support to companies in the pre-seed phase, i.e. the phase where the risk is too high from the perspective of the venture capitalists.
Knowledge transfer incentives	• less emphasis on knowledge transfer than most of EU, but most universities have tech-transfer offices.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Less emphasis on direct support to business R&D compared to most of EU; • 'Research & grow' is a programme promoting research, development and innovation in SME's. • New scheme: 'Innovation financing' from ALMI Företagspartner AB

Support for innovation: financial and non-financial	• The program "Innovation for Future Health" support life science research and innovation in areas such as food, medical treatment, diagnostics, biotechnology and medicine technology. The long-term objectives of the program are to improve quality of life, support needs-driven research and innovation, and to create high quality research and global competitive companies; • VINNOVA is also involved in funding commercialisation, and in the 2008 bill, the universities were allocated some direct funding earmarked for commercialisation activities.
Human resources for innovation	• Mobility of researchers is not really a priority; • The scheme: 'company graduate schools' promotes collaboration between companies and a university. It is multidisciplinary, and the objective is to increase the number of PhD graduates in industry. • The Knowledge Foundation's postgraduate programmes allow Swedish companies to increase the number of people they hire who have an advanced university degree. This promotes the development of products and services as well as learning in companies.
Demand stimulation policies	• The scheme 'Environment-driven markets' of Swedish Agency for Economic and Regional Growth. Provides support to projects which are based on cooperation between companies, and projects to enhance knowledge about environmentally driven growth. • Programme: 'Innovation in food': focus is on creating useful knowledge for the development of food for health and well-being.
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Most universities have some sort of incubator facility, often jointly financed by regional actors and one of the national actors mentioned previously. • VINN NU is a competition for new companies that base their operations on R&D results. The aim of VINN NU is to make it easier for new R&D-based companies to prepare and clarify commercially-interesting development projects at an early stage
Entrepreneurship training	• No specific scheme
Risk and venture capital	• Support to risk capital is not a priority; • Innovationsbron AB (the Innovation Bridge), a company jointly owned by the Ministry of Enterprise and Industryfonden (the Industry Fund), a state-owned seed capital firm.
7. Framework conditions for innovation	
Intellectual Property Rules	• No programme
Innovation-friendly Rules and Regulations	• No specific measure.
Public awareness and readiness for innovation	• Some element of programmes have a secondary order aim to raise awareness, e.g. in the scheme 'Environment-driven markets'.
Innovation and other policies	• Horizontal structures and policies to promote linkages between innovation and other policy fields and other ministries are increasing but still rather weak.

IRELAND: National Innovation System Challenges	
Challenge 1	Coping with financial and budget crisis, restructuring
Challenge 2	To maintain the level of innovation in the private sector
Challenge 3	Improve linkages between higher education and indigenous enterprise sectors
Challenge 4	Stimulate companies in crisis to opt for increasing innovation capacity, enlarge small base of indigenous R&D performing companies

IRELAND: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• Irish Government (2008), Building Ireland's Smart Economy – A Framework for Sustainable Economic Renewal; DETE (2008), Lisbon Agenda, Integrated Guidelines for Growth and Jobs, National Reform Programme. Ireland National Reform Programme 2008-10; • DETE (2008), Innovation in Ireland (policy statement on innovation).
Decision-making Bodies	• The Cabinet Subcommittee on Science, Technology and Innovation (STI): the top coordination and policy making committee for innovation in the Irish government; • The Inter-Departmental Committee (IDC) on Science, Technology and Innovation: coordinates the work of the eight government departments responsible for formulating policy and the state agencies. The IDC is chaired by the Assistant Director General responsible for the Office of Science, Technology and Innovation (OSTI); • The Department of Enterprise, Trade and Employment (DETE); • The Office of Science, Technology and Innovation (OSTI); • The Department of Education and Science (DES).
Implementing Bodies	• Enterprise Ireland (EI): the government agency responsible for the development and promotion of the indigenous business sector; • Industrial Development Authority (IDA): Ireland's inward investment promotion agency; • Science Foundation Ireland (SFI), focus is on three broad areas: Biotechnology, Information and communications technology (ICT), Sustainable energy and energy-efficient technologies
Multi-level governance	• InterTradeIreland: the only organisation which has been given responsibility by both governments to boost north/south economic cooperation to the mutual benefit of Northern Ireland and Ireland. • The IDEAS Campaign: sought people's ideas on key areas required for economic renewal. It was a citizens' voluntary response to the current recession. The initiative consisted of three distinct phases. Brainstorming period in March 2009 generated 5 284 ideas, which covered a wide range of topics. An advisory group evaluated the ideas, an action plan was developed, which was then submitted to the government on 14 May 2009. The ideas varied from Active Citizenship to Stimulating Enterprise and Employment to Developing the Knowledge Economy. • Cabinet Committee on Economic Renewal: was established to guide Ireland through the current recession; • Limited role for (sub-national) regional policy.

2. Innovation Policy Strategic Intelligence	
• Adequate measurement processes and strategy evaluation activities are in place to react and adjust to changing international situations. The 2008 report on Building Ireland's 'Smart Economy' was meant to refine the 2006 strategy. Awareness that this could prove to be inadequate led to a new task force being established (June 2009) to focus on how to improve innovation in the worsening current environment (recession, credit crisis and a large shortfall in the government budget)	
3. Science Base, Public Research, Technology organizations	
Structural Funding	• The Higher Education Authority (HEA) which falls under the Department of Education and Science provides the HEA Block Grant and runs the Programme for Research in Third Level Institutions which provides support for institutional strategies, inter-institutional collaboration, large-scale research programmes and infrastructure. Over 90% of students in higher education are in institutions of a public nature, and 90% of funding comes from the state. • Ireland, unlike major EU Member States, does not have a large public research sector. Total research expenditure by public research institutes in Ireland amounted to €141m in 2007 of which Teagasc, the agriculture and food development authority, accounted for over 50%.
Competitive funding	• The Higher Education Authority proposed major new initiatives to be funded on a competitive basis, e.g., new faculties, research programmes etc; experimental and innovative programmes to be provided, as appropriate, on a pilot basis. • The two Research Councils collectively provided €21m in funding for research while Enterprise Ireland provided €35m for research in the higher education and government sectors
Reform of public research base	• Reform of the higher education sector: more strategic funding, more competitive funding and diversity of funding sources; • Higher Education R&D (HERD) spending has almost quadrupled over the past 10 years
Human resources for public research	• Public support for establishment of a new Innovation Academy by University College Dublin and Trinity College Dublin which will focus on fourth level PhD training. • The SSTI target to double the output of science and engineering Ph.D.s by 2013 over the 2005 base is advancing significantly; • In 2007, a total of 31 Stokes Professorships and 37 Lectureships were awarded EUR 57 million. This programme is attracting highly skilled researchers to Ireland - 49 of the 67 approved candidates are foreign-based.
4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• Innovation Partnership Initiative is to support the undertaking of collaborative applied research with direct industrial and commercial application, between industry and third level colleges.

Clusters, networks, poles	• Industry Led Research Networks pilot initiative: support, through grants, proposals from industry networks/groups of companies (comprising of clients of Enterprise Ireland, IDA Ireland, Shannon Development, Udarás na Gaeltachta and County Enterprise Boards) to undertake time limited collaborative projects; • US-Ireland R&D Partnership Programme: to increase the level of collaborative R&D amongst researchers and industry in the three jurisdictions that will generate innovations and market-introductions. Focus on healthcare, disease prevention, nanotechnology and sensors. • The aim of the CSET programme is link scientists and engineers in partnerships across academia and industry to address crucial research questions, foster the development of new and existing Irish-based technology companies, attract industry that could make an important contribution to Ireland and its economy, and expand educational and career opportunities in Ireland in science and engineering. • The Strategic Research Clusters Programme was launched in July 2006 by Science Foundation Ireland (SFI) which was established to manage Ireland's technology foresight investment programme in biotechnology and Information and Communications Technologies (ICT).
Science Parks, technopoles, incubators	• Business or Campus Incubation programme aims : 1) To foster entrepreneurship and new company activity on campus; 2) To commercialise research carried out in third level institutions; 3) To support balanced regional development by creating new companies.
Knowledge transfer incentives	• The Voucher scheme; • Licences from state-funded research have more than tripled from 15 in 2003 to 55 in 2007; invention disclosures from researchers have grown from 135 in 2005 to 264 in 2007.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• supported by tax relief and grants; • In January 2008, IDA and EI launched a new EUR 500 million revised and simplified R&D grant scheme for companies. • The R&D Fund is designed to provide support for research, development and technological innovation relevant at all stages of company development
Support for innovation: financial and non-financial	• The 'Innovation Voucher' initiative was introduced in April 2007. Innovation Vouchers worth EUR 5 000 are allocated to small businesses to work with public knowledge providers on specific innovation questions.
Human resources for innovation	• The National Institute of Technology Management, part of the Smurfit School of Business in UCD, Dublin was established in 1997 with the support of Enterprise Ireland, as part of the Government's initiative to build and improve the capability of Irish-based companies to manage Innovation & Technology.
Demand stimulation policies	• Vouchers stimulate the demand from companies for knowledge of institutes; •

6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• EI supported 71 new high-potential start-ups (HSPUs) in 2008 to pursue growth opportunities across global markets. EI supports these companies from their embryonic concept stage and continues to work with them as they grow. • "HPSUs - High Potential Start-Up companies": HPSUs are selected from a learning programme that assists potential new entrepreneurs to research and plan their new businesses. This approach particularly suits people moving from multinationals to their own new enterprise. The type of support from Enterprise Ireland can vary from mentoring to the provision of equity or new product development funding.
Entrepreneurship training	• See HPSU scheme
Risk and venture capital	• In 2007, Enterprise Ireland announced a further investment of €175m. to further develop the venture capital sector in Ireland under the Seed and Venture Capital Programme 2007-2012; • There is one central business angel network in Ireland, initiated by Enterprise Ireland
7. Framework conditions for innovation	
Intellectual Property Rules	• The Intellectual Property Fund supported 120 patents in 2007 compared to just 33 in 2005; • Copyright & Related Rights Act, 2000 and its Amendment (2007): legal protection that applies to a number of categories of work, principally the traditional "artistic" categories of literary, dramatic, musical and artistic works, and categories of work which approximate to these traditional categories. Among the latter are computer programs.
Innovation-friendly Rules and Regulations	• No specific measure
Public awareness and readiness for innovation	• Science awareness is promoted through Discover Science and Engineering, which is managed by Forfás on behalf of the Office for Science, Technology and Innovation (OSTI). It brings together all existing awareness activities and expand these, while eliminating duplication and provide a more focused and effective communications strategy.
Innovation and other policies	The IDC (inter-departmental committee) on Science, technology and Innovation ensures coordination with other relevant policy fields. It consists of representatives from the following government departments: • Department of Enterprise, Trade and Employment (DETE) (Chair) • Department of the Taoiseach (Prime Minister) • Department of Health and Children • Department of Education and Science (DSE) • Department of Agriculture and Food • Department of the Environment, Heritage and Local Government • Department of Finance • Department of Communications, Marine and Natural Resources.

Denmark: National Innovation System Challenges	
Challenge 1	Enhance impact of innovation and R&D policy on competitiveness, justify public investments
Challenge 2	Increase quality and level of public R&D infrastructure investments, Securing long term investments in research
Challenge 3	Improve innovation output for companies, Dealing with uncertain returns and other barriers; innovation in service sector
Challenge 4	Providing high qualified human resources

Denmark: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• DASTI (2007): Danish Council for Technology and Innovation's Action Plan for more innovation and effective knowledge dissemination Innovation Denmark 2007-2010. • DASTI (2009): The National Programme for Research Infrastructure. • Danish Government (2008): Denmark's National Reform Programme 2008; • The Ministry of Science, Technology and Innovation (2008), 'RESEARCH2015 – A Basis for Prioritisation of strategic Research'. • Danish Government (2009): a Business-oriented Innovation Strategy; • DCTI (2008), Strategy for Enforced Innovation in the Public Sector; • DCTI (2008), Strategy for the International Innovation Activities of the Enterprises; • DCTI (2008), Innovation Strategy for the Service Industry;• • DCTI (2008), Innovation Denmark 2008.
Decision-making Bodies	Over the past few years, governance bodies, levels of responsibilities, and public sector organisation have been reformed. There is coordination among the different organisations involved in policymaking related to innovation and inter-ministerial committees. The Ministry for Science, Technology and Innovation has the main decision-making and coordinating role regarding innovation policy. The Ministry for Economic and Business Affairs is concerned with innovation issues in the traditional industrial sector, with the emphasis on supporting entrepreneurship, cluster policies and intellectual property rights (IPR) issues. The Danish Council for Research Policy gives advice at the highest government level.
Implementing Bodies	In most cases, the ministries involved in policy formulation also have the responsibility for the implementation. The Danish Council for Technology and innovation, as well as all research councils fall under the responsibility of the Ministry for Science, Technology and Innovation. The Danish Enterprise and Construction Authority (DEACA) falls under the Ministry for Economic and Business Affairs .

Multi-level governance	There is no formal regional government authority in Denmark (except in the health sector). However, the regional innovation system has gained a much stronger position on the innovation policy agenda, as a consequence of the structural reform in 2006. The Danish Enterprise and Construction Authority, DEACA, has the responsibility for a number of regional development initiatives, also in relation to EU Regional Funding. So-called 'regional growth forums' have recently been established (with participation of up to 20 representatives from central stakeholders) responsible for the strategic planning, monitoring and development of initiatives. The growth forums are not themselves implementing units. The initiatives which the growth forums wish to launch must therefore be implemented by others, for example municipalities, independent institutions or other independent legal entities. The regions receive a block grant and the projects are co-financed e.g. by EU structural funds, local enterprises and governments and knowledge institutions. At supra-national level, besides the EU, the cooperation between Nordic countries, e.g. the Nordic Council plays a role for innovation and R&D.
2. Innovation Policy Strategic Intelligence	
• A rich set of councils are engaged in advice, monitoring and strategy development. There is a positive attitude towards evaluations, foresight and international benchmarking. Intensive stakeholder involvement, horizontal communication and consensus building are beneficial to enhance policy intelligence and improve policy making capacities	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• Structural (block/core) funding for public research has recently been reduced • The degree of performance orientation regarding the core funding of HEI is moderate, but increasing
Competitive funding	• two new, competitive funding pools to which universities can apply for funding: The Infrastructure Pool, with a total of €80.4m for financing investment in large-scale, interdisciplinary research infrastructure in Denmark and abroad. A €26.8m share was put up for tender in spring 2007. UNIK (University Research Investment Capital) for large, long-term initiatives. €32.2m has been earmarked for 2008 and for 2009.
Reform of public research base	• As a result of the restructuring of the public research sector, most of the applied research institutes have merged with universities. The re-organisation in 2007 of the landscape of 12 universities and 13 public research institutes resulted in eight universities and three national research institutes. • Universities have to become more competitive and entrepreneurial, and more responsive to the needs of industry. Contracts between government and individual universities. The knowledge production of universities is to be measured by bibliometric indicators and core funding given accordingly
Human resources for public research	• For improving PhD education and attracting foreign PhD students, in April 2008 the Minister for Science, Technology and Innovation approved 12 elite educational courses at Danish universities. • The government is planning to revise the researcher taxation scheme for attracting more foreign researchers. • Introduction of subsidies for experimental courses for S&T students

4. Public-Private Partnerships and Knowledge transfer	
Structural co-operations	There are many programmes that promote cooperation between public research and companies on strategic fields: • The Centres of Exellence programme is an initiative of the Danish National Research Foundation. • The foundation supports strategic initiatives in form of advanced technological project or platforms of innovation and research. Areas of focus are nanotechnology, biotechnology, and information and communication technology. The foundation takes a particular effort in supporting the innovation of SMEs. • Main focus of the programme is the interaction between food and health. • Strategic programme Research in Food : prioritised projects are carried out in a close collaboration between firms and research institutions for developing new ideas that can be applied in the firms; • The Danish Council for Strategic Research (DCSR) uses Innovation Accelerating Research Platforms (IARP) as a tool to pinpoint research areas in which is makes sense to invest, and which can accelerate innovation in society; • For the implementation of the Strategic Programme for IT Research, the priority is strategic IT research that promotes interaction among research institutions, the private sector and other institutions
Clusters, networks, poles	• The Innovation Act is intended to contribute to an improvement of the innovation performance of the food, agriculture and fisheries sector.
Science Parks, technopoles, incubators	•
Knowledge transfer incentives	• Knowledge Vouchers: since 2008 SMEs may apply for a knowledge voucher which can be used for the procurement of knowledge from academic and research institutions. • Research Vouchers: a similar initiative for facilitating research collaboration with academic and research institutions also commenced in 2008: this policy measure can annually fund up to €2m research collaboration with SMEs; • Act on technology transfer on Public Research Institutions • Establishment of Danish innovation centres in USA, China and Germany
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Few (and even decreasing) government incentives for private R&D; The share of R&D performed in the business sector directly financed by government sources is quite low: in 2005 2% of the R&D performed in the business sector was funded by the government. • Large and increased number of support measures for cooperation between public and private R&D actors.
Support for innovation: financial and non-financial	• Two of the five Danish regions in cooperation with other parts of the innovation support system have established an experimental project where socalled innovation agents offer an innovation check to SMEs of the region in question. • GTS institutes are private independent consulting firms, which develop and sell technological services to private enterprises and public authorities. The GTS institutes offer knowledge, technology and consultancy, co-operation on technological and market-related innovation, testing, optimisation, quality assurance, certifications and benchmarking.

Human resources for innovation	• The many programmes for human resources are mostly addressing researchers, e.g. PhD's
Demand stimulation policies	• Fund for employee-driven innovation in the public sector: funding concept development and demonstration projects in public institutions. In order to improve solutions, services and quality in the public sector.
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• 'Proof of concept' scheme where researchers can get funding to test the commercialisation possibilities of their research.
Entrepreneurship training	• No specific programme
Risk and venture capital	• Venture capital seems to cover the major part of the total budget under the innovation support measures
7. Framework conditions for innovation	
Intellectual Property Rules	• Act on technology transfer on Public Research Institutions: The act allows for universities and sectoral research institutes to establish a limited company responsible for the transfer of knowledge/technology to the private sector. These companies shall support commercialisation of intellectual property
Innovation-friendly Rules and Regulations	• No specific regulations
Public awareness and readiness for innovation	• Through the webpage www.BedreInnovation.dk ('better innovation'), which was active from 24th of April to 1st of July 2009 the Danish Agency for Science, Technology and Innovation sought to interact with users and other stakeholders of the Advanced Technology Group (GTS) services and of the innovation support system in general, in order to encourage debate.
Innovation and other policies	• Parts of policies from other ministries are promoting innovation, e.g. in health policy, defense, environment and energy policy.

Netherlands: National Innovation System Challenges	
Challenge 1	Raise the number of innovative SMEs, not only in industry, but also in the services sector.
Challenge 2	Improve the attractiveness of the Netherlands as a location for knowledge-intensive activities.
Challenge 3	Create an excellent climate for both learning and research to secure a sufficient supply of new (doctorate) graduates.
Challenge 4	More focus and critical mass in areas where the Netherlands can excel

Netherlands: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• Ministry of Economic Affairs (2008), 'Budget 2009', sets out the new budgets per scheme and objective and reports on policy performance/target indicaters. Main objective remains to strengthen the innovativeness of the Dutch economy. A basic package of innovation support is aimed at more companies that develop and utilise more (technological) knowledge. The Innovation programmes aim at top-level performance in prioritised innovation themes. • Working programme of the project Netherlands Entrepreneurial Innovation Country (NOI) which sets out the following objectives: making the Netherlands more entrepreneurial and innovative; solving societal problems with knowledge, innovation and entrepreneurship; reducing shortages in the labour market with regard to science & engineering; making the Netherlands a hub for knowledge workers; more entrepreneurial spirit in students; more innovative start-ups from knowledge institutes; more collaboration between SMEs and knowledge institutes; a more innovation-oriented government (e.g. launching customer, innovative procurement) • Ministry of Education, Culture and Science (2007): Strategic agenda for higher education, research and science policy. • 'Towards an agenda for sustainable productivity growth' (2008) is the long-term strategy for knowledge and innovation. This strategy presents the vision, ambitions and policy objectives for 2030. It contains three 'policy agendas' (for Talents, Public & private research and Innovative entrepreneurship) with policy objectives and targets for 2011.
Decision-making Bodies	The two key governmental actors that play a key role in setting broad innovation policy directions are the Ministry of Economic Affairs (EZ) and the Ministry of Science, Culture and Education (OCW). They have divided responsibilities, with EZ being responsible for industry-oriented R&D and innovation policy and OCW for scientific research and education. The most prominent change since 2007 has been the establishment of an interdepartmental 'Knowledge & Innovation' programme department (K&I) in which all relevant ministries collaborate on joint issues in innovation policy. In 2008, K&I published a long-term strategy to guide investments in knowledge and innovation.
Implementing Bodies	Three implementation organisations of the Ministry of Economic Affairs: SenterNovem, Netherlands Patent Office and the Netherlands Foreign Trade Agency (EVD), have recently been brought together under one implementation organization named 'Agency NL' – which fits with the horizontal policy objective to reduce the number of front offices for firms and citizens. The Netherlands Organisation for Scientific Research N.W.O. serves as a research council, and performs according to broad guidelines from the Ministry of OCW. The Technology Foundation STW operates as an independent part of NWO. STW supports and finances scientific-technological research projects and promotes utilisation of results of research by third parties. Both the ministries provide structural funding for STW.

Multi-level governance	With the programme 'Peaks in the Delta' the national government provides programme funding for regional (Nuts 1 level) innovation policy. This has also increased the coherence between innovation policy from the various levels of governance (EU Structural Funds, national and regional). Funding from the regional authorities (Nuts 2, provinces) for innovation policy is very limited, but Provincial governments fulfill an important role in strategy development, coordinating grass-roots bottom up initiatives. Coordination with cross-border regional innovation initiatives is important for regions bordering Germany and/or Belgium.
2. Innovation Policy Strategic Intelligence	
• There are several organizations providing advice to the ministries and the system as a whole. Advisory Council for Science and Technology Policy (AWT) will be merged with the Dutch Energy Council (because energy also falls under the ministry of Economic affairs) • Besides the Innovation Platform, and advisory councils, there are other lobbying groups which report on R&D and/or innovation, e.g. the association of Dutch Universities. • Within the ministries (as in every other ministry, there are so-called 'knowledge chambers' for which they invite actors with specific policy intelligence. • Evaluation of policy at many levels is a well established practice.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• Public funding of university research mainly goes via a block grant (the "first flow") but this has been reduced a bit towards more competitive funding by the national research council NWO (the "second flow") and "third flow" (=contract research). • Structural, core funding for the PRO-organisations of KNAW, N.W.O.-institutes and TNO. • For the public research organizations the 'programmatic' funding has increased over structural funding. E.g.: In 1997 the first four Technological Top Institutes (TTIs) were established as "centres of excellence" based on PPPs. In 2008, nine such TTIs are active. They have become part of the programmatic approach and play important roles in the performance of the R&D in the innovation programmes.
Competitive funding	• Competitive funding of public research has increased with more focus on thematic programming, e.g. from the measure: 'Innovation Programmes'.
Reform of public research base	• The latest initiative to make university research funding more performance based, was taken in 2008, when the minister of OCW decided to transfer €100m/year from the block grant to the N.W.O scheme: Innovational Research Incentives scheme (from first to second flow) . In addition, with the increase in programmatic modes of R&D funding, universities increasingly had to co-fund participation in the programmes from their block grants. • The stimulus package of the government to counter the economic crisis does not contain major new public investments in knowledge and innovation. It does, however, introduce two new measures to prevent the loss of knowledge workers by R&D intensive firms.

Human resources for public research	• Policy focus on mobility of Dutch students; international orientation of knowledge institutes; "brain circulation"; and an ambitious learning culture and an excellent research climate.Practice-oriented research in universities of applied sciences (HBO or "hogescholen") is stimulated via lectors and a so-called RAAK-subsidy. • The three Universities of Technology have received a subsidy for joint centres of excellence and other collaborations; • The Innovational Research Incentives scheme is the major measure to promote HR for public research, it was also made accessible for foreign researchers that want to come to the Netherlands. • There are several measures in the Netherlands that stimulate international mobility of researchers (e.g. NWO Rubicon-mobility grants, NWO exchange programmes with China, Japan, South Korea and Taiwan, NWO Visitors Travel Grant for foreign senior researchers and grants of universities).
4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• Gradual growth of the Innovation Programmes in strategic areas of the Dutch economy. Currently, there are nine innovation programmes in which public and private actors cooperate in various initiatives; • PPP in the form of Technological Top Institutes (TTIs);
Clusters, networks, poles	• Because the National Innovation Programmes all have some geographical core regions, they also work as a sort of cluster-policy, especially when regional policy adds up.
Science Parks, technopoles, incubators	• Supported by regional and local initiatives; • Incubation oriented measures of the Techno-partner programme complement/funds these sub-national initiatives. • All universities have some kind of incubation facilities.
Knowledge transfer incentives	• The public research organization TNO serves knowledge transfer to companies, e.g. serve as knowledge providers in many Voucher projects. • Universities have individual transfer policies, offices, foundations.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• The tax incentive R&D work Stimulation Act (WBSO) which is by far the largest measure in the Dutch policy mix with budget of EUR 0.5 billion per year has been further broadened and extended. The budget of WBSO has a temporary increase of EUR 300 million (EUR 150 million for both 2009 and 2010). • Also the budget for the Innovation Credit scheme was increased: The Innovation Performance Contracts (IPC) scheme aims at facilitating collaboration and the transfer of knowledge within a group of SMEs. The budgetary size is ca. €20m/year. • Other schemes provide R&D subsidies for collaboration in projects.
Support for innovation: financial and non-financial	• Innovation Vouchers; • The Innovation credit scheme was launched to address the problem that SMEs find it difficult to finance their innovations. The budget has increased from EUR 21 million in 2008 to EUR 50 million in 2010.
Human resources for innovation	• Most policies to promote human resources for research, not specifically for innovation. Some regional initiatives, e.g. 'innovation officer' scheme from the Synthens organization in region of North Brabant specifically focus on HR for innovation (in SME's).

Demand stimulation policies	• A small scale Small Business Innovation Research (SBIR) pilot programme inspired by the US SBIR programme. Contracts are awarded in a three-phase competition: feasibility, research phase and commercialisation. The goal of this innovative public procurement programme is to stimulate R&D and innovation by SMEs and to contribute to solving societal problems.
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• TechnoPartner is a so-called packaged programme. TechnoPartner carries out four programmes: TechnoPartner Knowledge Exploitation Subsidy programme (SKE), TechnoPartner Seed facility, TechnoPartner Certificate and TechnoPartner Business Angel Programme (BAP). The overall aim is aim to improve the economic climate for technology-based start-ups (technostarters) by: giving technostarters access to capital, knowledge, experience and equipment; motivating knowledge institutes and investors to invest money and knowledge in pioneers; and providing a platform where technostarters can ask questions, explore ideas, etc. • The Valorisation Grants programme aims to stimulate commercialisation of knowledge and know-how within public knowledge institutes by awarding grants to researchers that want to explore the possibilities of knowledge valorisation.
Entrepreneurship training	• Increasingly included in education curricula, e.g. at most universities
Risk and venture capital	• TechnoPartner Certificate decreases the risk for banks (the Dutch Government guarantees the bank loan) to finance technostarters and increases the chance for technostarters to get financing. • TechnoPartner Business Angel Programme (BAP) informs (starting) entrepreneurs and starting informal investors (virgin angels) about the possibilities of informal
7. Framework conditions for innovation	
Intellectual Property Rules	• Schemes to provide advice on IP-protection; a IPR-voucher which can be used at the Patent office to apply for a patent
Innovation-friendly Rules and Regulations	• Since 2001, a statutory regulation has been incorporated in the Income Tax Act which allows foreign knowledge workers, subject to deductions from their salaries, to receive under certain conditions a tax-free reimbursement from their employers (max. 30% of salary from present job).
Public awareness and readiness for innovation	• Promotion of technical studies in order to attract students; • Initiatives to promote science among school children; • But no scheme specifically regarding innovation
Innovation and other policies	• Other ministries (e.g. Agriculture, Nature & Food Quality, Health, Welfare & Sport and Transport, Public Works & Water Management) also have their own specific innovation policies. All ministries have set up 'knowledge chambers' which are responsible for organising and coordinating 'knowledge for policy' and 'policy for knowledge'; • Attracting R&D-performing firms from abroad has received more attention in the last five years.

Italy: National Innovation System Challenges	
Challenge 1	Innovation financing (especially venture capital)
Challenge 2	Mobility of talents
Challenge 3	Improvement of technology transfer mechanisms
Challenge 4	

Italy: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• "Industry 2015", (2006), Ministry for Economic Development; • Research Plan in the energy sector 2009-11 (2009), Ministry for Economic Development; • National Strategic Framework (2007-11), Ministry for Economic Development, (2007); • National Research Plan 2005-07, Ministry of University and Research, (2005)
Decision-making Bodies	• The Ministry of Economic Development (MSE); • The Ministry of Education, University and Research (MIUR); • The Ministry for Public Administration and Innovation, whose main mission is the modernisation of public administration through information and communication technologies; • Other ministries involved in innovation are the Ministry of Environment and the Ministry of Health. The main science and technology organisations coordinated by these Ministries are the Institute for research and environmental protection (ISPRA) and the National Institute of Health (ISS)
Implementing Bodies	• The bulk of government-sponsored scientific and technological research in Italy is delivered through the CNR and ENEA. The CNR was set up in 1923 and has been supervised by the MIUR since 1989. Presently, the CNR has over 100 research institutes and centres all over Italy, most of which are closely connected to universities. • The National Agency for new Technologies, Energy and the Environment (ENEA) directly engages in a wide range of research projects, with special emphasis on alternative energy, environment and biotechnology. ENEA's primary mandate is to conduct applied research, which can then be transferred to the Italian industry; • The IPI-Institute for Industrial Promotion is an in-house body of the Ministry of Economic Development whose objective is to offer technical assistance and support to the Ministry in order to plan and implement programmes and interventions. In particular, it offers support in 'analysing, planning, implementing and assessing policies and interventions to develop, innovate and provide competitiveness in the national production system'; • Another important body recently operative is the National Innovation Agency, based in Milan. It will be in charge of promoting innovation in the country, as well as carrying out studies, statistics and forecasting.

Multi-level governance	• At regional level, there is no unique model to manage and implement innovation policy, as regions have some discretionary power in this field. Many regions have created Regional Innovation Agencies with the role to fund and implement innovation policy measures. Others have specific departments for innovation, or in some cases innovation is dealt with within departments that have a broader scope (e.g. economic development), where innovation policy might be less decisive. • Strengthening of local excellence, which is an ongoing process at regional level, is also pursued through decentralised policies and delegation by the central state to Regions boasting several powers in innovation policy design and implementation
2. Innovation Policy Strategic Intelligence	
• Since 2007 IPI supports the Ministry in monitoring and evaluation activities through a specific department with the mission to evaluate – ex ante, in itinere, and ex post – the support instruments managed by the Ministry of Economic Development.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• The current crisis has not led to cuts in public R&D expenditure and business support
Competitive funding	• Regarding funding of the public research base the picture is quite complex, partly due to multi-level governance, but nationally there is an increase in project-based funding.
Reform of public research base	• Until 1989 the CNR was in charge of the coordination and the support of public R&D in Italy. In the 1990s its coordination function was progressively moved to the Ministry of Education, Universities and Research. The CNR has been under reform for several years.
Human resources for public research	• The scarce number of measures in the Human Resources category reveals the low level of attention that education and skills receive in the Italian system (fiscal incentives have been introduced only recently to encourage the recruitment of researchers by firms and to avoid brain drain); • The scientific degrees project, jointly promoted by the Ministry of Education, the Ministry for University and Research, Confindustria, and the National Conference of Scientific and Technological Universities' Deans, seeks to encourage young people to enrol in scientific degrees, to provide more adequate preparation in basic science subjects at the upper middle school level, and to increase the interaction between university and business.
4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• R&D cooperation (joint projects, PPP with research institutes), makes up a third of total budget for RTDI
Clusters, networks, poles	• "Technological districts": One of the priorities of the National Research Plan (2005-2007), approved in March 2005, is the promotion of the capacities of SMEs to innovate processes and products and form clusters at local regional areas. Technology districts in key sectors are being jointly promoted by the government together with the regions, as territorial entities which are systemically grouped and characterised by technology-intensive products and services. Twenty-four technology districts have been promoted so far in key strategic areas; • High Technology Poles: scheme started in 2005: finance the establishment of 36 high-tech poles in specific sectors: telecommunications, automation, aerospace, electronics and transport. The funds allocated to this initiative come from the Fund for Technological Innovation and have been increased to 616 million Euro. The financial conditions are particularly interesting as 10% of the funding is a grant, 80% at low interest rates

Science Parks, technopoles, incubators	• Many small scale initiatives
Knowledge transfer incentives	• Many small scale initiatives, e.g. in technological districts, which are very small in geographical scale: rather local than regional.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Direct support of business R&D (grants and loans) make 32% of the total budget of innovation policy measures; Direct public support to companies through grants and loans has been the traditional approach to finance research and innovation activities; • grants represent the dominant way of funding support measures
Support for innovation: financial and non-financial	• National Fund for Innovation : This fund is endowed with EUR 60 million and has been created by the Ministry of Economic Development to promote innovative projects based on strengthening and exploitation of industrial property.
Human resources for innovation	• No specific measure, except for ICT related skills
Demand stimulation policies	• Not a priority issue
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Measures to promote entrepreneurship and the creation and growth of innovative enterprises are rather limited; • Only 12% of the total number of support measures is specifically targeted to SMEs
Entrepreneurship training	• No specific measure
Risk and venture capital	• Tax exemption on capital gains from start-ups: This measure is oriented to reinforce the role of private investors, especially business angels; • Also new is the “Risk capital fund for SMEs” measure: the Ministry for public administration and innovation has launched the fund for risk capital for the SMEs located in the South of Italy. This is one of the measures included in the e-government 2012 Plan and its objective is to favour the influx of risk capital in the region, as well as in Abruzzo and Molise.

7. Framework conditions for innovation	
Intellectual Property Rules	• No specific measure
Innovation-friendly Rules and Regulations	• Although it is mentioned in several documents, no specific actions stand out
Public awareness and readiness for innovation	• There are a number of measures, • Activities such as workshops and conferences. Examples include the Innovation Forum organised by IDC, the Innovation Day organised by Confindustria
Innovation and other policies	• In general the horizontal linkages are poorly developed

Estonia: National Innovation System Challenges	
Challenge 1	To increased productivity, especially in manufacturing industries
Challenge 2	To create focus and critical mass in selected priority sectors or clusters
Challenge 3	Increase supply of highly educated employees, especially in science, technology and engineering
Challenge 4	To increase circulation of knowledge between public and private actors in Estonian System of innovation

Estonia: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• Knowledge-Based Estonia. Estonian Research and Development and Innovation Strategy 2007-2013; • The development plan of the Ministry of Education and Research, Educated and Active People 2009 −2014; • Action Plan for Growth and Jobs 2008−2011; • The National Strategic Reference Framework 2007−2013; • The Operational Programme for Human Resource Development 2007−2013; • The Operational Programme for the Development of Economic Environment 2007−2013 • Estonian Energy Technology Programme; Most policy support is spent on measures improving: higher education & public research, and their cooperation with the business sector.
Decision-making Bodies	• The Government's most explicit body for RDI policies is the Research and Development Council, an advisory body established in 1990 (formerly called the Research Council). The R&D Council is part of the State Chancellery. Three ministries (including the Ministry of Finance) and the Prime Minister are represented. After restructuring in 2000, business representatives were included in the Council. Since a few years there are also two sub-committees — the Research Policy Committee (coordinated by the Ministry of Education and Research) and the Innovation Policy Committee (coordinated by the Ministry of Economic Affairs and Communications).
Implementing Bodies	• The ministries of Education & Research has established the Archimedes Foundation as it's agency. • Enterprise Estonia is the implementing agency of the Ministry and Economic Affairs and Communications. It is one of the largest institutions within the national support system for entrepreneurship and innovation in Estonia. • The credit and export guarantee fund (KredEx) has its focus on financial support, especially for exporting companies. • Recent establishment of the Estonian Development Fund in 2006
Multi-level governance	• Small country without regional authorities. Estonia has a centralised governance structure: research policy elaboration, governance and implementation are done only at the national level. Local governments have neither the responsibility nor financial and policy making capacity to develop their own research policies; • Co-financing from the EU Structural Funds plays a significantly bigger role in Estonia than in EU27; 67% of the Estonian measures are co-financed by EU Structural Funds

2. Innovation Policy Strategic Intelligence	
• Few mechanisms for technology assessment or identification of broader societal needs for knowledge; • Research assessment and peer review mechanisms are in place but remain based largely on scientific criteria and less on their relevance for the economy or society; • Little is done aside from programme level evaluations to monitor impact of policy initiatives; • Although initial measures have been launched, the foresight and strategic planning of scientific and industrial research still requires greater efforts; • Tradition of transparent public consultation on policies; • Management capacities in R&D institutions remain weak.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• The performance contract system for public R&D started to be implemented recently; HEIs and PROs receive the annual baseline funding on the basis of their R&D performance evaluation results. • Funding of structural funding for competence centres in biotechnology, ICT and industrial production in general, and more recently in 1) food, agriculture and fisheries, 2) health, and 3) nanotechnology; • The Estonian R&D policy system is dominated by generic, institutional instruments: baseline and infrastructure funding assures the institutional stability of HEIs and PROs. At the same time, there has been a rapid growth in the volume of the competitive or quasi-competitive instruments like targeted funding, and national R&D and innovation programmes.
Competitive funding	• R&D activities in HEIs and PROs are funded dominantly from the state budget, via the mix of institutional and project-oriented allocations; • The targeted, programme based financing budget doubled in 2003-2008. For 2009, the number of projects and estimated budget is comparable (209 projects in total for a sum of €24m); • R&D grants are intermediated by the Estonian Science Fund and allocated on a competitive basis for several types of the individual grants; • Only the National (State) Research Programmes have a thematic focus
Reform of public research base	• During 2005-2008, the budget for baseline funding has steadily increased; • modernisation of research and teaching facilities of R&D institutions and HEIs; • new programmes introduced
Human resources for public research	• Many measures, e.g. for management of research at universities, stimulation of PhDs, research infrastructures and mobility of researchers. • E.g: Researcher mobility programme MOBILITAS: to enhance research potential and the diversification of international research through mobility and exchange of knowledge, by recruiting qualified research personnel; • Regional college grant: The objective of the programme is support development of the regional university colleges as regional competence centres through the sectoral specialisation

4. Public-Private Partnerships and Knowledge transfer	
Structural co-operations	• The Competence Centres programme is one of the major programmes. Eight centres have been funded with the aim to generate important R&D results which in turn could be commercialised at some point.
Clusters, networks, poles	• Cluster development programme: the eligible companies have to be members of a cluster-establishing consortium, including non-profit organisations or foundations with certain cluster-developing objectives. Main objectives are: to increase value added of companies and promote cooperation between actors. There are no specific technology fields referred to in the regulation of the programme; • a strong tendency to focus on a rather limited number of fields
Science Parks, technopoles, incubators	• In 2009, Enterprise Estonia announced that it will support enterprise incubators with EUR 1.8 million in the period 2008-2013. In the previous programme period 2004-2007 a total of eleven incubators were supported.
Knowledge transfer incentives	• A small scale measure: Innovation vouchers: SMEs can be supported in getting better access to specialists and know-how in a number of areas, such as product development, production, design, standardisation and certification, feasibility studies, compatibility tests and a wide range of patent-related issues.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Promoting R&D cooperation through grants is the dominating type of R&D support; • R&D Financing Programme: for three types of activities: 1) feasibility study, 2) applied research projects, 3) product development projects.
Support for innovation: financial and non-financial	• Relatively large areas of innovation policy are: measures to support industrial design, innovation management tools and diffusion of technology in enterprises; • The favorite mode of support are grants
Human resources for innovation	• Support for the involvement of innovation staff. The government agency Enterprise Estonia supports companies in hiring R&D specialists/staff for a period of 36 months. Primarily developed for SMEs, but also big enterprises are eligible for funding, hiring staff presently based abroad is encouraged.
Demand stimulation policies	• No specific measure
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Enterprise Estonia has announced that it will support enterprise incubators with EEK 28 million (EUR 1.8 million)in the period 2009-2013. There are several enterprise incubators of various size throughout Estonia; • SPINNO+: to promote the emergence of spin-off companies from academic institutions.
Entrepreneurship training	• No specific measure
Risk and venture capital	• Support for risk capital consists of a single measure but for 13% of all policy funding.

7. Framework conditions for innovation	
Intellectual Property Rules	• Included in some programmes, e.g. in The SPINNO Programme
Innovation-friendly Rules and Regulations	• No specific measure
Public awareness and readiness for innovation	• The InnoAwareness programme, which mainly aims to raise awareness of innovation among companies
Innovation and other policies	• Due to themes of EU programmes the linkages between innovation and other policy fields have increased.

Slovenia: National Innovation System Challenges	
Challenge 1	Maintain the level of R&D investment, both in the public and business sector: in spite of declared targets to pursue the Barcelona target of 3% by 2013, Slovenia witnessed a stagnation of public R&D investment and decline in business investment in 2007, even prior to the economic/ financial crisis.
Challenge 2	Better coordination and transparency of the innovation support network: in spite of various support institutions, the rate of innovation activity in small enterprises is still low. The business sector often complains of insufficient and complicated instruments for RD&I support.
Challenge 3	Low innovation activity among small enterprises as observed by CIS, EIS and national data.
Challenge 4	translation of identified priorities to funding programmes of the public institutions is slow and not systematic. Particularly in public R&D sphere internal setting of priorities dominates, with little regard for external knowledge demand.

Slovenia: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• Slovenian Development Strategy 2006-13; • Resolution on the National Research and Development Programme 2006-10, NRDP; • National Reform Programme for Achieving the Lisbon Strategy Goals 2005-10 (with 2008 revision) (NRP); • Programme of Measures for Entrepreneurship and Competitiveness 2007-13; • National Strategic Reference Framework (NSRF) with the three Operational Programmes; Main objectives: increasing public R&D investment; shifting balance of public research funds from basic non-targeted to targeted (and applied) research; introduction of support measures to stimulate growth of investment of business sector in R&D; growth of number of researchers with Ph.D.s in the business sector; higher rate of establishment of new high-tech firms, including promotion of spin-offs from universities.
Decision-making Bodies	• Within the Ministry of Economy, it is the Directorate for Entrepreneurship and Competitiveness which looks after the promotion of entrepreneurship and innovation activity of businesses with a special focus on SMEs; • Within the Ministry of Higher Education, Science and Technology (MHEST), the Directorate of Technology is in charge of promoting R&D and technology development activity of business units, especially SMEs. • An advisory body to the government in the R&D area is the National Science and Technology Council, with members from the research community, higher- education institutions, the business community and the government • The proposed budgets for 2010 and especially for 2011 are highly discouraging for innovation policy, since the allocations for innovation and entrepreneurial support are to be seriously reduced.

Implementing Bodies	• The Ministry of Economy directs the implementation of its programme through the Public Agency for Entrepreneurship and Foreign Investment (PAEFI), through Technology Agency (TIA) and Slovene Enterprise Fund (SEF). • MHEST has transferred most of its measures to TIA and SRA.
Multi-level governance	• Slovenia is in the current financial perspective still considered as a single region at the NUTS 2 level. Still, for the purposes of cohesion policy, it was agreed that two cohesion regions were formed. • Gradually, development of regional research infrastructure is planned.
2. Innovation Policy Strategic Intelligence	
• Awareness and strategic papers have not been translated in more dynamic allocation of public resources for R&D (intelligence is no guaranty for successful implementation) • Intelligence seems more founded on good practices in other EU countries than on own experiences; • Several structures for identification of knowledge demand exist, but translation of identified priorities to funding programmes of the public institutions is slow and not systematic. Particularly in public R&D sphere internal setting of priorities dominates, with little regard for external knowledge demand; • Ex-ante and ex-post evaluation at the level of research programmes and introduction of socio-economic relevance as assessment criteria has improved evaluation practice. Still, this remains an internal system within publicly funded science and does not assess how the knowledge demand in society/ economy at large is met.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• SRA is in charge of financing basic and applied research primarily in the public research sector; Major share of the SRA funding is taken up by so called Research programmes, where contract period is usually five years; • While SRA provides annually funding for research equipment, these funds are very limited and for most of the investments the research institutes have to find other sources, either from business sector, through international projects, or more recently through centres of excellence.
Competitive funding	• HEIs are treated as any other public research unit and apply for competitive funding through public calls for research programmes/projects at SRA; • A gradual shift in the structure of financing with a reduction of share of programme financing in favour of more project-based financing was planned, but not implemented.
Reform of public research base	• Higher education reform to stimulate enrolment in S&T studies; • development of independent evaluation body in higher education and changed evaluation procedures in public R&D • All research programmes/ projects have to report on socio-economic relevance of their research at the end of the programme/ project; • Europeanisation of the policy and the measures has been significant over the years, both in introducing instruments, observed as good practice in EU, as well as more recently, by applying the EU Structural Funds in co-financing of RD&I programmes; • Establishment of the development groups within the Competitiveness Council, Establishment and support to Technology platforms; Setting up centres of excellence
Human resources for public research	• Well-developed system of support for young researchers; expansion of the Young Researchers Scheme; • Various researchers' mobility schemes; new scholarships for Slovenian students to study abroad, for promotion of the enrolment in S&T studies and for the enrolment of foreign students especially in S&T studies in Slovenia

4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• The established ten Centres of Excellence48 combine research facilities at different public research units (both institutes and universities are involved) with research units in the business sector – members of the centres of excellence. The financial resources go to the main research unit, but co-financing must be coming from business sector for each individual project.
Clusters, networks, poles	• Target Research Programmes represent a system created in 2001 for inter-sectoral cooperation in planning and implementing networked R&D projects for specific areas of public interest.
Science Parks, technopoles, incubators	• Unresolved problem of fragmentation and frequent changes of the support measures, especially regarding technology parks/ incubators, technology centres, platforms and the new idea of the logistics-research-development centres; • Subsidies for technology centres/parks: Technology centres provide a common platform for SMEs where they can organize their RD activities.
Knowledge transfer incentives	• Many different bridging institutions to facilitate knowledge flow exist, but are not sufficiently specialized; • Increased support to joint R&D projects; • PAEFI announced a new pilot measure, called Innovation Vouchers in July 2009. The measure (SI54) was created by the Ministry of Economy with the objective of promoting technological upgrading of micro and small enterprises and stimulating cooperation of these firms with public R&D units.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• In recent years, a number of new measures have been introduced, targeting specifically business R&D to somehow offset policy bias towards public R&D. • Several support measures, introduced to stimulate business R&D investment, proved to be insufficient. Partly due to fragmentation, the numerous and changing instruments to stimulate business R&D spread the resources too thinly. On the other hand, high concentration of business R&D in some industries shows that most problematic segment of business sector are R&D and innovation inactive enterprises, particularly SMEs. These have only recently become the target of the support measures.
Support for innovation: financial and non-financial	• Voucher system for consultancy and training services: Small businesses are often reluctant to approach consultancy services due to high costs. The aim of the measure is to increase the demand for external expert help through assurance of qualitative and financial accessible consulting services; •
Human resources for innovation	• Co-financing of employment of researchers in enterprises: to increase the research capabilities in business R&D units by increasing number of PhD. researchers in business sector.
Demand stimulation policies	• Financial Assistance to institutions supporting innovation activity; • The measure supports establishment of a network of local consultancy companies which will be able to assist the Public Agency for Entrepreneurship and Foreign Investment (PAEFI) in providing different services to SMEs, especially to new businesses.
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• Co-financing of start-up of innovative companies: The co-financing scheme is offered by Slovene Enterprise Fund to start-up companies, located within business or university incubators or technology parks for less than 12 months and have not yet entered the market. The main objective is to help them finance further development, implementation of their business/ production programme.

Entrepreneurship training	• No specific measure
Risk and venture capital	• Venture capital is lacking.
7. Framework conditions for innovation	
Intellectual Property Rules	• Innovation Voucher: The objective of the programme is to provide co-financing for costs of the industrial research, where the aim is registration of a patent or other ways of protecting intellectual property rights.
Innovation-friendly Rules and Regulations	• No specific regulation
Public awareness and readiness for innovation	• Active promotion of S&T studies: attracting students; • As part of the measure on Financial Assistance to institutions supporting innovation activity
Innovation and other policies	• Limited horizontal co-ordination (between ministries) on innovation policy

Norway: National Innovation System Challenges	
Challenge 1	Growth of new, knowledge-based start-ups
Challenge 2	Increase the number of S&E graduates
Challenge 3	Adequate and robust innovation policies for the Norwegian economy (rather than mere R&D expenditure policy)
Challenge 4	Impact from globalisation; cross-sectoral and systemic scope of innovation policy

Norway: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• White Paper No 7 (2008-2009), An Innovative and Sustainable Norway; • White Paper No 30 (2008-2009) Climate for Research; • White Paper No 36 (2008-2009) Public Procurement (Det gode innkjøp); • White Paper No 25 (2008-2009) Local Growth and Hope for the Future: The rural and regional policy of the Norwegian Government; • Cross political agreement on climate policy 17.01.08 (Klimaforliket)
Decision-making Bodies	• The Ministry of Trade and Industry (Nærings- og handelsdepartementet, NHD); Coordination of sector innovation policies is the responsibility of the Ministry of Trade and Industry. • The Ministry of Education and Research (Kunnskapsdepartementet, KD); • Ministry of Local Government and Regional Development (Kommunal- og regionaldepartementet, KRD), responsible for innovation policies at the regional level; • Also essential parts of the responsibility of several other ministries
Implementing Bodies	• Three agencies have the main responsibility for implementing national innovation and industry-oriented R&D policies: (a) the Research Council of Norway (RCN); (b) Innovation Norway (IN); business-oriented policy instruments; network of offices, covering all Norwegian counties and more than 30 foreign countries (c) and the Industrial Development Corporation of Norway (SIVA): a network organisation which offers an infrastructure for entrepreneurship and innovation nationwide. It contributes to the development of strong regional and local industrial environments as co-owner of virtually all the science and research parks, incubators and business parks in the country
Multi-level governance	• Norway is a unitary state divided into 19 county administrations (Fylke). The county councils together with the municipalities form the regional governance system in Norway. Initiatives have been taken by some county authorities to develop research and innovation policies of their own. • In late October 2008 the government presented a proposal for regional administrative reform to be made effective from 2010. Among the proposals are to set up new regional research funds. The counties will also be responsible for selecting board members to university colleges in the region.

2. Innovation Policy Strategic Intelligence	
• Fairly extensive use and openness of both evaluations and indicators in the policy-making process. Reports are openly published, and have become subject to extensive policy awareness and debate. Evaluations are typically done by international peer panels; • Systematic/periodic evaluations of research institutes, research programmes and disciplinary fields of research; and the development of effective follow-up measures by the Research Council of Norway; enhancement of the strategic management of university research.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• Performance-based institutional core funding for research (HEIs). In Norwegian research funding there is a relative emphasis on institutional over competitive/strategic funding. Instead of devolving funds from the institutional to the competitive/strategic channels, much effort has been made to make an increasing part of institutional funding performance based; • The establishment of Centres for research-driven innovation, a scheme for establishing collaborative partnerships between companies and public research institutions;
Competitive funding	•
Reform of public research base	• New performance-based system for institutional core funding • Proposals on improved quality and framework conditions for recruitment of researchers and infrastructure; • The National Budget for 2009 the government proposes to increase the total funding for research and development (R&D); • Intensified public funding to green energy technology, in particular CCS and off- shore wind energy; New centres for environmental friendly research; Increase in funding for health related research
Human resources for public research	• Increased number of research positions; • New white paper on internationalisation in higher education; • Scheme for supporting young, excellent researchers; • There are several programmes under the Research Council of Norway (RCN) which aim to attract international researchers to Norway.
4. Public-Private Partnerships and Knowledge transfer	
Structural cooperations	• Highly sectorised funding system • CRIs (Centres for Research-based Innovation): CRIs are designed to promote innovation by supporting long-term research projects which are conducted in a close collaboration between research communities and research-intensive private enterprises. • Above OECD average of firm cooperation with public research organisations.; • Eight new Centres for Environment-friendly Energy Research (CEER) have recently been established.; • The thematic priorities (energy and environment; health, food; marine/maritime research) are to a large extent funded by sector ministries. • The OFU and IFU programmes (Public and Industrial Research and Development Contracts) have been in place since 1968 and are currently operated by Innovation Norway. The aim of the programmes is to stimulate innovative firms and improve the quality and efficiency of public services through the acquisition of new technologies or solutions by promoting co-operation between a company and a public institution acting as customer.

Clusters, networks, poles	
Science Parks, technopoles, incubators	• The national innovation network comprises more than 80 units spread across the country, and includes science parks located on the main university campuses, knowledge parks (a 'light' version of science parks) located close to the state university colleges
Knowledge transfer incentives	• Following new regulations universities have set up TTOs. Industry PhD scheme is intended to facilitate cooperation. • Measures are in place to enhance commercialisation of research. The programme for Commercialisation of R&D results (FORNY) and TTOs are central measures in this context
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• Direct: Tax support for industrial R&D; • Indirect: subsidies for projects at Centres for research based innovation;
Support for innovation: financial and non-financial	• BIA (programme for user driven research based innovation): This programme focuses exclusively on research-based innovation, without being confined to particular thematic areas or branches of industry. • Design driven innovation programme (DIP): to initiate projects that strengthen the ability of businesses and public institutions to provide innovative solutions by using design-driven innovation methods. The Programme focuses on improving skills-development and investments at the ideas stage based on user studies and design methodology. The Programme has EUR 1 million at its disposal in 2009. It is a collaborative project between the NDC, IN, and the RCN.
Human resources for innovation	• Lifelong learning is a policy priority; • Recently implemented industry PhD scheme will benefit from additional €5m; • Programme to strengthen qualifications in businesses
Demand stimulation policies	• User-driven R&D and innovation: • Public procurement measures: Increase competency on how public procurements can contribute to innovation and simplify the use of R&D contracts for public procurers; • Grant scheme for procurement consortiums for energy intensive industries • Strengthen the public R&D contract scheme, with a particular focus on the promotion of innovation in the social care sector; • Increased funding of green energy technology, especially for offshore wind energy and CCS; Increased funding of public sector research, especially within the health sector

6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	A new measure was introduced by Innovation Norway in February 2008: NewGrowth ("Ny Vekst") and was set up to support new small and medium size firms with growth potential • Support programmes and infrastructure to facilitate the commercialisation of academic research; • Knowledge parks aim to establish new companies through actively connecting industry, public authorities, research and education institutes and investors. Another relevant scheme is the R&D incubator programme which provides support for incubator facilities which – in principle - address R&D based and innovative start-ups specifically.
Entrepreneurship training	• No specific scheme
Risk and venture capital	• Increasingly focused on facilitating access to finance by start up firms. Part of this policy is the newly established State Investment Fund (Investinor AS) with a capital of €275m to support early stage companies with growth potential. Targeted sectors are environment, energy, tourism, marine and maritime sectors.
7. Framework conditions for innovation	
Intellectual Property Rules	• Ratification of the European Patent Convention (EPC)
Innovation-friendly Rules and Regulations	• No specific rule
Public awareness and readiness for innovation	• Several policy instruments are set up to enhance absorptive capacity of SMEs.
Innovation and other policies	• Well embedded in many ministries: highly sector/vertical organization. Recent attempts for more horizontal approach/coordination; • E.g. the ministry for oil and gas has considerable role in R&D policies in that field

Portugal: National Innovation System Challenges	
Challenge 1	Strengthening human resources capabilities, particularly at undergraduate and graduate levels
Challenge 2	Fostering the emergence and establishment of new companies, both domestic and foreign-owned, to promote employment, particularly in knowledge intensive activities
Challenge 3	Strengthening of SMEs in-house innovation capabilities
Challenge 4	Improving policy coordination, delivery and medium-term consistency

Portugal: National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	• Report on the Investment and Employment Initiative and on the Budget changes stemming from the anti-crisis plan (2009); • Lisbon Strategy- National Reform Plan, Portugal, New Cycle 2008-2010 Consolidating Reforms (2008); • "Commitment to Science": policy document with the headlines of science policy for the legislature (2007) • (Plano Tecnológico) "Technological Plan, 2005
Decision-making Bodies	• The Ministry for Economy and Innovation (MEcI), • and the Ministry for Science, Technology and Higher Education (MCTES). • The National Coordinator of the Technological Plan and the Lisbon Strategy Office (GCNELPT) also plays a coordination role, An advisory body to the Technological Plan (Conselho Consultivo do Plano Tecnológico), including more than 40 people from businessmen and representatives of the main employers' associations to academics, was created in 2005, and meets every half year.
Implementing Bodies	• AICEP is responsible for investments by large firms, promotion of company internationalisation, and attracting international investment. • IAPMEI, on the other hand, mainly aims to support the enhancement of SME capabilities, promote investments by SMEs and coordinate financial instruments (venture capital, credit enhancement). • FCT is the main agency under the MCTES. It serves as research council, assigning funds to support post-graduate education and scientific research, and evaluating its performance. It is the body responsible for policy coordination and funding of scientific and technological research; • UMIC (the Knowledge Society Agency) was created in 2002 to coordinate science, technology and innovation relationships with the EU as well as to promote the development of the Information Society; • The Innovation Agency (AdI) is a joint venture between MecI and MCTES to promote innovation. Now, its role is mainly focused on the bridging universities and industry.
Multi-level governance	• Regarding national-regional responsibilities, the NSRF 2007-13 assigned responsibilities to regional authorities. Being to a large extent a novel experience, it requires adjustments and a learning attitude from both national and regional bodies. It would be desirable for regional authorities to have further competencies to better carry out their tasks, including the tailoring of support to the specific needs of the regional social and economic fabric.

2. Innovation Policy Strategic Intelligence	
• The process of selecting priority areas is not based on a consistent strategic intelligence approach. As policy tends to be designed en petit comité, the mechanisms for collecting and analysing information as well as for eliciting the contribution and listening to stakeholders are very limited. • There have been no foresight exercises to provide a sounder basis for policy. At the other hand of the spectrum, policy evaluation has been limited and, in spite of a few evaluation exercises mostly to comply with EU requirements, there is not an evaluation culture.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	• 'Public' funding for R&D in Portugal comes from two main sources: the national budget and European funds, The first source is the most important. It encompasses direct allocations and indirect ones, relating to tax incentives to R&D; •
Competitive funding	• Both institutional and competitive funding are used in Portugal
Reform of public research base	• University reform has been a critical policy area, providing more autonomy for universities managing and raising their resources
Human resources for public research	• The larger national universities host Mobility Centres intended to assist incoming researchers to move in; • The Invited Chairs programme, which aims to attract international high level researchers to stimulate the internationalisation of Portuguese universities.
4. Public-Private Partnerships and Knowledge transfer	
Structural co-operations	• Generic instruments dominate the scene; 'targeted and thematic funding' will increase in the future
Clusters, networks, poles	• Competitiveness and Technology Poles: This is a long-awaited measure, the first experience in implementing a clustering approach. Although not relevant budget-wise, it corresponds to a 'label' that facilitates access to other measures for organisations and projects included in clusters.
Science Parks, technopoles, incubators	• At sectoral level, there are also measures intended to promote the development of Science and Technology Parks as well as of incubator facilities.
Knowledge transfer incentives	• RTD Voucher: granted to a company to benefit from R&D services to be rendered by a S&T organisation;
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	• CITEC: a new breed of measures aimed at improving and sustaining in-house R&D capabilities; • The measure: "Individual Company RTD Projects"

Support for innovation: financial and non-financial	• "Innovation projects": This is a wide scope, large-budget type of measure addressed to relatively large projects, including FDI projects. It may contribute to introducing structural change in the company fabric. Provided that selectivity is ensured, it may also be an important instrument to encourage innovation in existing firms. This is the measure with the highest take up by companies; • FINOVA: measure (with relatively large budget) aimed at improving financial framework conditions for strengthening the capacity of SMEs to finance innovation as well as at the support to entrepreneurship. • "SME Skills Collective Projects": Collective projects are undertaken by public agencies, business associations or S&T organisations, and are aimed at improving the capabilities or responding the needs of a group of companies, mostly SMEs; • FINOVA – Innovation Financing Support Fund
Human resources for innovation	• Important budgetary wise are measures for Life Long Learning with respect to innovation; • Many measures include support for innovation management (-tools)
Demand stimulation policies	• Several measures aim at stimulation of demand for innovation, e.g. addressing the low awareness rate among traditional SME's
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	• FINICIA, launched in 2006, is aimed at providing financial support to the creation of new companies, with a specific vector to support "high innovation content projects";
Entrepreneurship training	• Entrepreneurship Projects, under the Innovation Support System of 'Compete' (NSRF 2007-2013), created in 2007
Risk and venture capital	• Within FINOVA: public venture capital, credit enhancement securitisation funds and venture capital syndication funds
7. Framework conditions for innovation	
Intellectual Property Rules	• Some IPR issues are dealt with as part of a measure, but no specific measure
Innovation-friendly Rules and Regulations	• No specific regulation
Public awareness and readiness for innovation	• Awareness raising is often one of the aims of the support to companies
Innovation and other policies	• Policy is not very horizontally coordinated. Separated between ministries, with little cross-ministerial initiatives.

Australia: National Innovation System Challenges	
Challenge 1	- Limited R&D spending within businesses
Challenge 2	- Australian ranks last in the OECD on collaboration for innovation between firms and higher education institutions
Challenge 3	- Australia's investment in knowledge is below the OECD average
Challenge 4	- In 2007-08, the Governments spending on science and innovation was 22% lower as a share of GDP than it was in 1993-94.
National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	- Venturous Australia: Building Strength in Innovation-produced during the National Innovation System Review - Australia's innovation agenda also draws on: - Collaborating to a Purpose: Review of the Cooperative Research Centres Program -Building Innovative Capability: Review of the Australian Textile, Clothing and Footwear Industries -Final Report of the Review of Australia's Automotive Industry -Final Report of the Pharmaceutical Industry Strategy Group -Final Report of the Review of Australian Higher Education -Building Australia's Research Capacity document - Innovation Nation (2008)
Decision-making Bodies	- Department of Innovation, Industry, Science and Research-when creating this department the government united policy responsibility for a major portion of the NIS into a single portfolio. - Department of Education, Employment and Workplace Relations
Implementing Bodies	- Commonwealth, State and Territory Advisory Council on Innovation-helps with intergovernmental coordination - Coordination Committee on Innovation-inter-agency coordination - Australian Research Council - National Health and Medical Research Council - PM's Science, Engineering and Innovation Council/Chief Scientist for Australia-advices the government
Multi-level Governance	- There are counterparts to the Australian Central Government at the state and territory levels that work to improve innovation at those levels

2. Innovation Policy Strategic Intelligence	
- Australian Public Service Management Advisory Council/Australian National Audit Office-offer advice on how best to implement recommendations laid out in the Review of the National Innovation System. - Move to strengthen the PM's Science, Engineering and Innovation Council in order to increase its capacity to identify emerging trends. - Annual report on the performance of the NIS. - National Research Infrastructure Committee-provides strategic advice regarding infrastructure-aids in identifying gaps and avoiding duplications.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	- Mission-based funding compacts-allow universities to form their own research and collaboration agendas while meeting national priorities - Education Investment Fund-money for research and teaching infrastructure - Better Universities Renewal Fund-for improving teaching facilities - Teaching and Learning Capital Fund for Higher Education-for improving teaching facilities - The National Collaborative Research Infrastructure Strategy-funds projects to support work in targeted areas (marshals commonwealth, state, territory and industry resources effectively) - A National Secondary School Computer Fund
Competitive Funding	- Research Infrastructure Block Grant Scheme - Super Science Initiative funding for research infrastructure (priority areas include space science and astronomy, marine and climate science, biotech, nanotech and ICT) - Super Science Fellowship-to support early-career researchers - Australian Laureate Fellowship-to support senior researchers - Research Training Scheme-funds domestic students working on higher degrees based on research. - International postgraduate research scholarships - The Australian Postgraduate Awards Scheme-helps with student living costs - Commercialization Training Scheme-provides funds to universities for teaching students the skills needed to bring innovations to market. - Joint Research Engagement Scheme-competitive and applicants need to demonstrate the ability to attract funding from other sources as well.

Reform of Public Research Base	- Government has called for an education revolution-planned transformation of every stage of the learning journey. - A new national curriculum to be implemented in 2011-Seven key learning areas: English, mathematics, science, history, geography, languages and creative arts. - Science and Language Centres are being developed for Secondary Schools. - Increase the percentage of low income university students to 20%/reform student income support so it goes where it's need most. - The government wants to increase the number of Australian research groups performing at a world-class level-concentrating money in areas of strategic importance - ERA-Excellence in Research for Australia-will measure research quality against international benchmarks/will link funding to performance - Sustainable Research Excellence in Universities Initiative-includes quality assurance measures, helps guide resource allocation and contributes to meeting the indirect costs associated with research. - Collaborative Research Networks Scheme-to help regional universities increase their research capacity - Investment in research infrastructure as guided by the Strategic Roadmap for Australian Research Infrastructure (2008) - New requirements for activity-based reporting/performance targets - The use of Mission-based Compacts (one for teaching and learning and one for research) to help in the distribution of performance-based funds and alignment of university research with national priorities. They are also meant to drive excellence, promote sustainability, provide transparency and improve collaboration/responsiveness in the university sector.
Human Resources for Public Research	- Increased stipend for and number of Australian Postgraduate Awards - Incentives to get undergraduates to study maths and science - Super Science Fellowship-to support early-career researchers - Australian Laureate Fellowship-to support senior researchers - Australian Research Council fellowships to international researchers
4. Public-Private Partnerships and Knowledge Transfer	
Structural Cooperations	- Industry Innovation Councils-encourage collaboration between businesses and universities - Royal Institution of Australia-encourage collaboration between businesses and universities
Clusters, networks, poles	- Collaborative Research Networks Scheme—encourages organization into hubs and spokes, helps smaller/regional universities work with bigger institutions to improve research capacity. - Industry Innovation Councils-promote dialogue and facilitate cooperation between different players in the innovation network (built environment, ICT, automotive, future manufacturing, textiles)

Science Parks, Technopoles, incubators	- Cooperative Research Centres-promote public/private research partnerships - Science Parks (Australian Technology Park, Macquarrie University Research Park) - Incubators
Knowledge transfer incentives	- Mission-based funding compacts to encourage universities to undertake industry-driven research - Enterprise Connect Initiative-helps unite businesses, researchers and universities - Joint Research Engagement Scheme-support research collaborations between universities, industry and end-users
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	- 25% increase in the science and innovation budget for the government - R&D tax credit-doubles the tax incentive for small business R&D/lifts base incentives for large firms - 750 million Strategic Investment Fund to support innovation in advanced manufacturing, low-carbon technologies, biotech, ICT etc.
Support for innovation: financial and non-financial	- Development of a new portal to enable firms to access information to business innovation programmes in one place. - Small Business Online-helps businesses improve their e-commerce capabilities - Small Business and General Business Tax Break-tax deductions for allowable assets such as technology
Human resources for innovation	- Enterprise Connect Initiative-improve innovation skills of employees and general workplace capabilities. - Skilled migrants - Life-long learning account-workers are provided with learning credits they can draw on to receive training.
Demand stimulation policies	- Use of public procurement to help drive innovation within Australian firms
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	- Innovation Investment Fund - Pre Seed Fund - Early Stage Venture Capital Limited Partnership program - COMET-provides services to early-growth and spin-off companies
Entrepreneurship training	

Risk and venture capital	- Commercialising Emerging Technologies (COMET) - Innovation Investment Fund-A fund providing venture capital - Commonwealth Commercialisation Institute-brings research, business and finance together to aid in commercialization of new ideas and technologies. - Venture Capital Limited Partnership Program and Early Stage Venture Capital Limited Partnership program - Innovation Investment Follow-on Fund-a venture capital fund - The government plans to intensify efforts connecting Australian businesses with venture capital lying overseas.
7. Framework conditions for innovation	
Intellectual Property Rules	- Government is considering options for how best to reform the Australian patent system to further the nation's innovation goal. The system currently errs on being overprotective thus creating a choke to further innovation.
Innovation-friendly Rules and Regulations	- Rules to promote free-trade within Australia and abroad - Strong macroeconomic policies - Trade negotiations - Low interest rates - Openness to foreign R&D - Fiscal incentives
Public awareness and readiness for innovation	- New National Enabling Technology Strategy-to help maximize confidence in the benefits of biotech and nanotech. - PM's Science, Engineering and Innovation Council-works on raising community awareness
Innovation and other policies	- Initiatives such as Enterprise Connect, Clean Business Australia, $4.5 billion Clean Energy Initiative - Green car innovation fund - Climate Change action fund

Malaysia: National Innovation System Challenges	
Challenge 1	Developing indigenous talent. Currently there is a strong reliance on foreign multinationals.
Challenge 2	Need more technically skilled manpower to aid in R&D (Mani ?)/there is low tertiary level enrolment in Malaysia
Challenge 3	
Challenge 4	
National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	- Vision 2020-is a roadmap for economic development (Monroe 2006) - National Vision Policy-master plan for knowledge based economy - The 8th Malaysia Plan (2001-2005)-calls for increased knowledge flows - The 9th Malaysia Plan-move to a knowledge-based economy - Third Industrial Master Plan-move to a knowledge-based economy - National Higher Education Strategic Plan 2020-includes MyBrain15 to increase the pool of indigenous PhDs to 100,000 in the next 15 years and the Lifelong Learning Policy - Roadmaps for cyberspace security, grid-computer, national biometrics technology, national semantic technology, national wireless communications technology, national nanoelectronics, and microelectromechanical systems
Decision-making Bodies	- Malaysia Science, Technology, and Innovation Ministry - National Information Technology Council of Malaysia (NITC)-advised the government in ICT matters - National Innovation Council - Ministry of Information - Ministry of Science Technology and the Environment - Malaysian Development Corporation (MDC)-a government formed private entity that gives fiscal incentives for ICT start-ups (Monroe 2006)
Implementing Bodies	- ICT Policy Division- includes five sub-units:NITC Secretariat, Policy and Strategic Unit, IC Tech Studies Unit, Assessment and Monitoring Unit and ICT Acculturation Unit
Multi-level Governance	- Appears to be centralized

2. Innovation Policy Strategic Intelligence	
- Assessment and Monitoring Unit - Policy and Strategic Unit - Special Task Force for Monitoring the Impact of the Financial Crisis to the ICT industry	
3. Science Base, Public Research, Technology organisations	
Structural Funding	- The government has been increasing its investment into R&D as a percentage of GDP - National Higher Education Fund Corporation-provides low-cost loans for education to students
Competitive Funding	- Demonstrator Application Grant Scheme-a seed fund for ICT-based community projects - Innofund-for micro and small businesses as well as community groups - Sciencefund-for the public and private sector-provides support for R&D projects to aid in the development of new products and processes. - Technofund- a fund focusing on development of cutting edge technologies in biotech, ICT, industry, sea to space and S&T core - The inno-, science-, and techno- funds are designed to move Malaysia's economy up the value chain - MSC Malaysia Research and Development Grant Scheme (MGS)-supports R&D initiatives within the MSC
Reform of Public Research Base	- International benchmarking initiatives - Tighter collaboration with industry - Funding of Higher Education Institutes (HEIs) based on performance - HEIs asked to pursue alternative funding routes in addition to government funding - Initiate HEI strategic plans to be synchronized with the Ministry's transformation objectives - Increase number of PhDs in teaching roles at HEIs from 25% to 60% - Professors appointed strictly on basis of academic excellence. - Action plan to develop comprehensive plans to enhance R&D culture in HEIs: incentives, awards, leadership programs, collaboration and networking events. - Plan to establish one or two Apex Universities with world class status (global ranking)
Human Resources for Public Research	- Brain Gain Malaysia (BGM)-leverages the talent pool of the Malaysian population as well as foreign scientists and researchers through incentives ($) to act in advisory/consultative roles. - BGM-International fellowship and post doctoral program-recipients are offered remuneration for the duration of one year of fellowship/post-doctoral works at a higher learning or research institute overseas. - Fellowships for post-doctoral studies within Malaysia (ex. National science fellowship scheme)

4. Public-Private Partnerships and Knowledge Transfer	
Structural Cooperations	- MSC NET LEAP program-a series of networked cyber cities and centres-the hub being the Central Incubator at Multimedia University - 'My Malaysia, My MSC'-launched as part of the NET LEAP program-aims to spread the benefits of the Multimedia Super Corridor throughout Malaysian industry and general society (Monroe 2006)
Clusters, networks, poles	- Multimedia Super Corridor (MSC)-Malaysia's biggest science and tech cluster. Developed to give Malaysia a world-class IT industry. - Within the MSC are clusters: Kuala Lumpur, Petronas Twin Towers, Putrajaya, Cyberjaya-a R&D city, Technology Park Malaysia and Kuala Lumpur Tower - Priority clusters are : ICT, biotech, industry (advanced materials, nanotechnology etc.), sea to space, science and tech core (physical, chemical and environmental sciences), and Innovation (patent law, IP valuation, tech assessment etc.)
Science Parks, Technopoles, incubators	- Central Incubator at Multimedia University
Knowledge transfer incentives	- Brain Gain Malaysia (BGM)-has a package to provide incentives to eligible scientists residing abroad to come to Malaysia and undertake applied R&D that generates scientific discovery - Brain Gain Malaysia (BGM)-leverages the talent pool of the Malaysian population as well as foreign scientists and researchers through incentives ($) to act in advisory/consultative roles.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	- MSC projects to attract companies to Malaysia to establish R&D facilities-includes a bill of guarantees and incentives. - The government has been increasing its investment into R&D as a percentage of GDP - Brain Gain Malaysia (BGM)-has a package to provide incentives to eligible scientists residing abroad to come to Malaysia and undertake applied R&D that generates scientific discovery

Support for innovation: financial and non-financial	- Brain Gain Malaysia (BGM)
Human resources for innovation	- ICT Development Institute-addresses need for skilled labour. - Smart Schools project-transforming schools via ICT enrichment. Making them into "smart environments". - BGM-Diaspora Innovation Partnership (DIP)-provides incentives to attract both Malaysians and non-Malaysian technopreneurs residing abroad with high-potential commercialization ready innovations to relocate to Malaysia. - Human Capital Development (HCD)-a plan to increase the critical mass of researchers to achieve a ratio of 50 RSE : 10,000 labour force - Lifelong learning programs
Demand stimulation policies	- ICT Acculturation Unit
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	
Entrepreneurship training	- The Central Incubator at Multimedia University offers seminars business plan development, accounting and marketing
Risk and venture capital	- The Central Incubator at Multimedia University offers seminars on courting venture capital
7. Framework conditions for innovation	
Intellectual Property Rules	- When the government funds a third party who then creates intellectual property, the ownership of the IP rests with the third party not the government. - When the government disbursed funds to a government agency, which then funds a third party, the ownership of IP rests with the third party. - When a government agency disburses funds to a third party which collaborates with a research institution, IP is shared between the research institution and the third party. - If the government disburses funds to a project involving several recipients, the ownership of the IP rests jointly with the recipients. - When the funding is in the form of joint funding between the government and a third party and IP is created, the ownership of the IP rests jointly with the government and the third party. - A relevant body does not assert any rights or claims of ownership of IP for scholarly books, articles, audiovisual lectures or other scholarly work except with specifically commissioned by the relevant body.

Innovation-friendly Rules and Regulations	- MSC projects to attract companies to Malaysia to establish R&D facilities-includes a bill of guarantees and incentives.
Public awareness and readiness for innovation	- An innovation cluster with a focus on patent law, IP valuation, tech assessment, R&D commercialization and management - National Science Centre-promotes awareness, appreciation, interest and understanding of science and technology
Innovation and other policies	

Singapore: National Innovation System Challenges	
Challenge 1	A bigger technology-entrepreneurial community is needed
Challenge 2	More indigenous R&D (Singapore is heavily dependent on foreign MNC R&D)
Challenge 3	Increase the number of Masters and PhD degrees for research scientists and engineers engaged in R&D activity
Challenge 4	Dependent on external regional and global markets for growth
National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	- The Plan (1996)-five key strategies are outlined in The Plan. Focus and strengthen R&D capabilities in niche areas. Further encourage private sector research and development. Establish a system for effective technology transfer and intellectual property management. Recruit global talent and nurture local talent. Develop strong international relationships and networks. - S&T 2005 Plan - The ultimate goal of the innovation policy of the country was to enhance local development of technology through the medium of technology-based SMEs (Mani 2002).
Decision-making Bodies	- The Cabinet undertakes economic strategy
Implementing Bodies	- Economic Development Board (EDB)-focused on attracting multinational companies (MNCs) to establish manufacturing bases in Singapore. The EDB also plays a role in human resources development and raising productivity. The EDB has been the international spearhead of "Singapore Inc." - International Enterprise Singapore-for trade - Agency for Science, Technology and Research (A*STAR) - Standards, Productivity and Innovation Board (SPRING)-aims to help SMEs - Ministry of Education oversees Singapore's national educational system - Ministry of Manpower-oversees training and continuing education to serve the individual worker
Multi-level Governance	Centralized
2. Innovation Policy Strategic Intelligence	
- Singapore's government lacks transparency. The political and administrative systems have been endowed in a few key persons. - When S&T 2005 Plan was announced there was no public review of the outcomes of the preceding plan or detailed statement of the new targets, if any.	

3. Science Base, Public Research, Technology organisations	
Structural Funding	- Public financing of research institutes - (1991-95)-The government committed S$2 billion to develop a technology infrastructure, including the development of national research institutes and a Science Park, encourage private sector R&D through grants and assistance and lead manpower development. (1996-2001) the government committed S$4 billion) - Highly subsidized tertiary education at the university level
Competitive Funding	- Research Grants
Reform of Public Research Base	- Regulation of tertiary-level enrolments to line up with demand-side expectations-biased towards science and engineering.
Human Resources for Public Research	- Toning up primary and secondary education - Improving the quality of tertiary education, especially science and engineering - Vocationalising education by establishing polytechnics - Allowing the migration of skilled manpower in selected areas where severe shortages are felt subject to political feasibility. - Collaborations of Singaporean Universities with selected international institutions like MIT. - Scholarship schemes for postgraduate education at leading universities abroad - Internship scheme at local research institutes for postgraduates students
4. Public-Private Partnerships and Knowledge Transfer	
Structural Cooperations	- Engineering positive spillovers to local small and medium enterprises from FDI
Clusters, networks, poles	- Funds for industrial clusters-specific foci include biotechnology, environmental technology, electronics and manufacturing technology and information technology.
Science Parks, Technopoles, incubators	- Strengthening the technological infrastructure by setting up 13 GRIs in areas of high technology - One North-a science city - Biopolis-biomedical hub - HOTSpots (Hub of Technopreneurs)-network of 7 technoprenuer incubation centres

Knowledge transfer incentives	- Publicly funded secondment of research scientists and engineers from research institutes to local firms. - A*STAR assigns scientists and engineers from its research institutes to approved companies for up to two years. During the attachment, the company pays just 30% of the scientists/engineer's compensation.
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	- Tax incentives-double deductions on R&D expenses for both manufacturing and services - Research Incentive Schemes for Companies - The International Headquarters Scheme-A key plank of Singapore's strategy has been to attract FDI, and to leverage the benefits of that investment into the domestic economy. This scheme focuses on attracting foreign companies to establish regional or global headquarters in Singapore. Subsidies and tax incentives have been used. FDI can raise the stock of human capital through knowledge transfer. - "Pioneer Status"-provides exemptions from corporate tax for up to 10 years for activities that introduce substantially more advanced technology or skills into the industry. - Development and Expansion Incentive-provides a concessionary 10% corporate tax rate for up to 10 years. Available for new projects and expansions. - Innovation Development Scheme-encourages manufacturing and services businesses to undertake innovation projects in Singapore. The scheme covers up to 30% of qualifying costs of product or process innovations that promise to significantly improve productivity or make a significant improvement to a relevant industry or cluster. - The EDB's Patent Application Fund Plus-supports up to 50% of the cost of filing a patent up to limits of S$5,000 and S$25,000 over two stages of filing.
Support for innovation: financial and non-financial	- Strengthening tertiary education in S&T fields at the university and polytechnic levels - The EDB pioneered the concept of "one-stop investment facilitation," encompassing coordination of investment incentives, financing including co-investment, human resources and immigration, and industrial and commercial real estate. This comprehensive approach continues to be one of Singapore's key competitive advantages in attracting FDI, as it reduces investor transaction costs. - Singapore International Manpower Programme-to attract foreign professionals and managers. Technopreneurs targeted. - Local Industry Upgrading Programme (LIUP) to upgrade, strengthen and expand the pool of local suppliers of parts and services to MNCs. - Local Enterprise Technical Assistance Scheme (LETAS) supports SMEs in engaging consultants to advise on modernizing and upgrading their operations

Human resources for innovation	- CREST-Critical Enabling Skills Training Scheme-launched to prepare the workforce for a knowledge-based economy. It emphasizes seven core skills: learning to learn, literacy, listening and oral communication, problem-solving and creativity, personal effectiveness, group effectiveness and organizational effectiveness and leadership. 90% of approved CREST course fees are covered - Scholarships to develop local talent - Aggressive recruitment of foreign nationals - On the job training schemes
Demand stimulation policies	- Largely dependent on external market forces to signal for new market formation as the domestic market is quite small. - Have pursued an opportunistic role in identifying new market trends that emerge and quickly devise policy incentives and invested in supporting infrastructure resources to attract global players that are well placed to capitalize on new markets - Listening posts in key 'lead user' cities in the USA, Europe and Asia - Through International Enterprise, the government subsidizes the cost of business development activities in overseas markets by local firms. - Programs for the promotion of ICT adoption and usage and advanced manufacturing technologies
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	- Local Enterprise Finance Scheme (LEFS) supports SMEs in expansion and development of new capabilities through loans of up to S$15 million at fixed interest rates. - The Micro Loan Programme-offers financing of up to S$50,000 to very small local enterprises - The Technopreneur Investment Incentive encourages investment in new technology-based enterprises by permitting investors in approved start-ups to offset certificates for capital losses incurred against their taxable income. - Start-up Enterprise Development Scheme (SEEDS) provides equity financing for start-ups involved in the development of new or better products, processes and applications in the manufacturing and service sectors. - The Technopreneur Home Office (THO) Scheme allows approved technopreneurs to set up new businesses in their homes.
Entrepreneurship training	- This is a problem area. Failure is stigmatized in Singaporean culture so entrepreneurship is viewed as a very risky endeavour. - PS21-Public Service for the Twenty-First Century-initiative to introduce an entrepreneurial mindset in the civil service - TEC-The Enterprise Challenge-S$10 million fund to sponsor innovative proposals to create new value or significant improvements to the civil service. - Courses offered through Polytechnics and Universities

Risk and venture capital	- Techno-entrepreneurship Fund (now Enterprise 21): the government launched a USD 1 billion investment fund to attract more venture capital activities to Singapore. - Singapore offers public venture capital co-investment -Tax incentives for private venture capital investment
7. Framework conditions for innovation	
Intellectual Property Rules	- Entrepreneurs can now retain patents developed as a result of government-funded research
Innovation-friendly Rules and Regulations	- The government has systematically revised intellectual property laws to conform with Trade-related Intellectual Property Rights (TRIPS). It plans further revisions and increased enforcement to meet commitments made pursuant to the free trade agreement with the U.S. - IP Academy to train IP professionals
Public awareness and readiness for innovation	- Programs for the promotion of ICT adoption and usage and advanced manufacturing technologies
Innovation and other policies	

South Korea: National Innovation System Challenges	
Challenge 1	At the university level there is lagging capacity to conduct fundamental research
Challenge 2	System linkages between industry and universities need to be improved
Challenge 3	Under utilization of female labour. Women make up only 13% of Korean researchers
Challenge 4	Weak SMEs
Challenge 5	Weak performance in the service sector
Challenge 6	Unbalanced regional development-development centered in Seoul
Challenge 7	Weak international linkages
Challenge 8	Limited policy co-ordination
Challenge 9	Legacy of dirigisme

National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	- R&D Total Roadmap-help to operationalize innovation plans and to improve the strategic capabilities and efficiencies of public R&D investments. - S&T vision 2025 (1999)-Formulated by PACST-proposes the following fundamental changes-1. Move away from a government-led and development-oriented innovation system to a private industry-led and diffusion oriented innovation system, 2. Movement to a globally networked R&D system, 3. Move away from a supply-dominated investment enhancement strategy to an efficient utilization and investment-distribution strategy, 4. Movement from a short-term technology-development strategy to a long-term market-creating innovation strategy, and 5. Establishment of a science and technology-led national innovation system. The overarching goal of Vision 2025 is for Korea to become a global leader in specific S&T sectors and employ more than 300,000 R&D personnel and spend USD 80 billion a year on R&D by 2025. - Science and Technology Framework Law of 2001-legal basis for interministerial co-ordination of S&T policies and R&D programmes. Provides the legal basis for fostering an innovation-driven culture. - 577 Initiative-aims to make Korea and S&T powerhouse by 2012-Plans to reach an R&D target of 5% by 2012
Decision-making Bodies	The most prominent decision making bodies are the National Science and Technology Council (NSTC) and the Presidential Advisory Council for Education S&T (PACST). The main objective of the PACST is to develop strategic policies related to technological innovation and development of human resources; to provide guidelines for system reforms to the ministries related to S&T and to undertake special tasks. PACST members are appointed yearly and come from industry, academia and research institutes. Since 1999, the NSTC has been the highest decision-making body of the Korean government. It plays a role in policy coordination across ministries. This has mostly been a failure. The Ministry of Education, Science and Technology (MEST) (2008) is the secretariat for the NSTC, setting its agenda and providing supporting documents. The NSTC is supported by five committees specializing in industrial technologies, large-scale technologies, state-led technologies, cutting-edge converging and interdisciplinary technologies, and infrastructure technologies.

	- MEST has two wings one dedicated to education, the other to science and technology. Each wing is divided into several offices or bureaus, which are then divided into several divisions. - Ministry of Knowledge Economy (MKE)-involving with putting into place strategies to enhance the development and commercialization of advanced technologies.
Implementing Bodies	- Ministries-each Ministry has their own implementation bodies - There is a policy co-ordination problems across ministries/Intense competition between ministries
Multi-level Governance	- Mainly federal
2. Innovation Policy Strategic Intelligence	
- Access policy options based upon international good practices - Korea Institute of Science and Technology Evaluation and Planning-forecast S&T development trends and analyze and evaluate S&T related programmes. - Institute for Industrial Technology Evaluation and Planning-Dedicated to the evaluation and management of national industrial technology R&D programmes. It is also responsible for technology demand surveys and technology forecasting. - Institute of Information Technology Advancement-provides strategic intelligence on the ICT sector-a focus in R&D demand research and technology forecasting. - Science and Technology Policy Institute-Conducts research and analysis on issues relating to science, technology and innovation. - In 2006, the Korean government introduced a new evaluation system for R&D-the National Evaluation System. It has three components-self-evaluation by each ministry, and meta-evaluation and focused evaluation by the NSTC. - Research patented technology trends	
3. Science Base, Public Research, Technology organizations	
Structural Funding	- Plans to reach GERD 5% by 2012 - Most government departments have their own R&D programmes and government expenditure is high - Funding mainly goes to Government Research Institutes and businesses. Funding for fundamental research at Universities has traditionally been low. - Public R&D programmes at GRIs traditionally target mostly large-scale industrial technology, with the intention of supporting near-immediate industrial development by the chaebol. New programmes are focusing on frontier technologies. - National Research Laboratory programme-aims to identify and further develop laboratories in areas of core technologies - The government strongly supports ICT, nanotechnology, environmental technology and biotechnology with public R&D support.

Competitive Funding	- National Science Scholarship-scheme to support outstanding undergraduate and graduate students majoring in science and technology - Brain Korea 21-scheme aimed at fostering world-class researchers and world class graduate schools. Government invested USD 1.34 billion to support students in selected master's and doctoral programs, international exchanges and co-operation, and innovative curriculum development.
Reform of Public Research Base	- Government Research Institutes dominate with the majority of funding. There is recognition that fundamental research at Universities needs to increase. The 577 Initiative commits the government to expanding its investment in basic research to 50% of the public R&D budget by 2012. To achieve this there is a plan to expand research grants for individual investigations and increase the number of University professors receiving grants from 25% to 60%. ---There will also be expanded support for basic research in GRIs. - Developing centres for research excellence in Universities (Science Research Centres, Engineering Research Centres). The Science Research Centres focus on basic research that will lead to publications. The Engineering Research Centres focus on research with the potential for industrial advancement. They encourage interdisciplinary collaboration between industry and academia. - Action is being taken to encourage closer cooperation between government research institutes and universities as the GRIs have better infrastructure - Direct support of three special schools that set out to nurture high-calibre S&T manpower (ex. Korea Advanced Institute of Science and Technology) - Reform of universities to give them greater autonomy in selecting students (student selection had been previously governed by test scores from the College Scholastic Ability Test). - Introduction of regulatory policies related to quality assurance, evaluation and transparency as well as improved information for student choice. - NURI programme-to strengthen the capabilities of colleges and universities located outside of Seoul. The NURI programme works by concentrating support for universities on strategic areas of their region's economic development. Nurtures a local labour force. - Comprehensive Regional Science and Technology Promotion Plan
Human Resources for Public Research	- A high percentage of the population seeks S&T degrees. Need further involvement from women. - Brain Korea 21 - Recruitment Target System for Female Faculty-to eliminate the gender gap. - Points award system-Awards extra points on a sliding scale to proposals with female project managers and female participants. - Exemptions from military service for research personnel - Income tax deductions for researchers - Special tax treatment for foreign HRST/temporary tax exemption for HRST sent abroad - World Class University programme-designed to recruit top researchers from around the world to collaborate with Korean scientists in key fields

	- Preferential visa programmes for scientists - Study Korea Project-to attract foreign students to Korean Universities - Appointments of Nobel Laureates to Korean Universities
4. Public-Private Partnerships and Knowledge Transfer	
Structural Cooperations	- Funding from MKE and MEST is mostly funneled through public-private collaborative research projects (GRIs and Chaebols) - Law on Fostering Industrial Education and Industry-University Co-operation (2003)-has led to the establishment of Industry-University Co-operation offices (IUCOs) in Korean Universities-draw up contracts between industry and universities - Bridging Institutes (government funded, firm-funded, self-funded) - National S&T information system - Technology Transfer Promotion Act 2000/Korea Technology Transfer Centre-brings together technology users and suppliers-does regional level work as well as networking globally.
Clusters, networks, poles	- Daedeok Science Town-cluster of public R&D institutes and universities - Biotechnology clusters (Osong bioscience cluster) - Ochang information technology city - International Science and Business Belt (ISBB)-Will gather leading researchers from all over the world. The goal is to make Korea one of the Big Seven Powers. The ISBB will be more than a city for scientists, it will be a global nexus where research and industry meet. - Regional innovation clusters-specific to the needs of the region.
Science Parks, Technopoles, incubators	- The IUCOs support business incubators - National labs - National Core research centres
Knowledge transfer incentives	- Tax exemptions for industry-academic R&D collaboration in order to promote tech transfer

5. Private R&D and innovation activities	
Direct and indirect support for private R&D	- High levels of gross domestic expenditure on R&D (GERD-3.23% of GDP) - Loan financing/loan guarantee programmes/low interest rates - Korea Small Business Innovation Research System-government ministries and government finances institutions are required to allocate at least 5% of their R&D budget to support SMEs technology development. - SMEs' Technology Innovation Programme-SMEs capable of developing technologies without support can recover up to 75% of the expense of developing new products. - Inno-Biz-SMEs with technology development and innovation capabilities are fostered as a core engine of growth/Schemes such as technology assurance and preferential treatment for credit loans - Industry-University Research Consortium Programme-seeks to boost technological capabilities of manufacturing SMEs through collaborative technological development with universities or GRIs - Transferred Technology Development Project—covers the additional development costs required to commercialize transferred technologies owned by universities, research institutes and businesses. - Tax credit for technology and expenses for labour force development, tax exemption for the real estate of private enterprises' affiliated research centres, tax exemption for research devices and samples, and duty abatement or exemption on good for research. - Exemption from military service for research personnel - Over 250 government programmes targeted at innovation in SMEs
Support for innovation: financial and non-financial	- Introduction of strong competition policy and further liberalized product and labour markets-allows improved conditions for innovation.
Human resources for innovation	- Korea has ensured that virtually all students complete secondary education and has moved towards universal tertiary education - More young people pursue science and engineering degrees in Korea than in any other OECD country - Plans to establish the Asia Basic Science Institute, a research centre of 2000 researchers, many from overseas - University admissions reform that will help balance supply and demand in the labour markets. - Lifelong learning Promotion Plan-Two core strategies-developing lifelong learning tailored to the practical needs of individuals at each stage of their life; and facilitating a lifelong learning network that links all related organisations and programmes horizontally and vertically. Launched a new government body-National Institute for Lifelong Education. - Academic Credit Bank System-open educational system that recognizes diverse learning experiences gained not only in school but also outside of school. When the learner accumulates the necessary ACBS approved credits, he or she is awarded a bachelors degree. - Recruitment Target System for Women in S&T-the long-term target is for 30% of all new recruits to be women across all 99 S&T institutes like GRIs - R&D personnel tax exemption

	-Income tax deductions for researchers -Special tax treatment for foreign HRST/temporary tax exemption for HRST sent abroad -Korea Foundation for International Co-operation of Science & Technology-aims to make Korea and R&D hub by attracting foreign research institutes to Korea
Demand stimulation policies	- Demand-side policies have emerged/attention paid to increased commercialization of R&D, financing of innovative firms, and development of innovation intermediaries
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	- Policies to promote university spin-offs - Special Law to Promote Venture Firms (1998)-the law allows professors and researchers to obtain temporary release of up to three years from their universities or institutes for running a venture business - Incubation Centre Promotion Programme-support around 4000 venture companies/given financial support and consultancy services - Technology appraisal Centres-provides objective and fair evaluations of technology - Technology guarantee scheme-encourage financial lending to SMEs with viable projects but which are unable to provide adequate collateral. - Policies promoting the globalization of venture businesses through the establishment of overseas small business development centres.
Entrepreneurship training	- Within biotechnology, the government has sought to develop bio-business models that advocate entrepreneurship and induce private-sector investment.
Risk and venture capital	- Some venture capital supplied by incubators
7. Framework conditions for innovation	
Intellectual Property Rules	- Korea is a signatory of the Patent Co-operation Treaty (PCT) operated by the World Intellectual Property Organisation (WIPO)

Innovation-friendly Rules and Regulations	- The IUCOs help with patent management for dual university/industry projects - Patent information database - SMBA-provide IPR-related support programmes -Patent Technology Transfer System
Public awareness and readiness for innovation	- Korean society is a ready adopter of new leading-edge technologies - Invention promotion events - Republic of Korea Trademark Exhibition
Innovation and other policies	

Taiwan: National Innovation System Challenges	
Challenge 1	SME's dominate and their willingness to invest in innovative activities is low/scale barriers. This hampers high-technology industries, in particular.
Challenge 2	Shortcomings in the innovation infrastructure-insufficient laws and regulations concerning innovation which impose too many restrictions that discourage the private sector's interest; limited budget and manpower for innovation; the dependence of some key technologies on other leading countries (Shyu and Chiu 2002).
Challenge 3	Weak links between industry and universities-caused by a shortage of human resources in the engineering faculties at universities and the domination of SMEs with very limited resources for research.
Challenge 4	
National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	- 1959-Plan of National Long-Term Development of Science-basic guideline for science and tech development - 2002-Six-year National Development Plan called Challenge 2008-goal: Taiwan as a "green silicon island'
Decision-making Bodies	- Ministry of Economic Affairs - Ministry of Communications - Ministry of Defense - Ministry of Finance-tax incentives, venture capital
Implementing Bodies	- National Science Council-science parks, contract research/designs strategy and promotes research - The department of Industrial Technology (DOIT) of the Ministry of Economic Affairs - Committee for Aviation and Space Industry Development (CASID). Financial support from the Ministry of Economic affairs. - Industrial Development Bureau (IDB)-subsidies - Council of Labour Affair- training/human resources - Medium and Small Enterprise Bureau-Incubation centres - Industrial Technology Research Institute (ITRI)-government owned research institutes
Multi-level Governance	- Mainly the State government

2. Innovation Policy Strategic Intelligence	
- Marketing Guidance System-assists SMEs in market expansion by collecting and providing necessary market intelligence	
3. Science Base, Public Research, Technology organisations	
Structural Funding	- Science and Technological Fund of the National Science Commission-the government supplies an annual budget for universities and for fundamental research (Shyu & Chui)
Competitive Funding	- Research grants
Reform of Public Research Base	- Industrial Technology Research Institute (ITRI) was established in 1973 to improve science and technology capacities. ITRI receives contracts from the government to develop generic technologies, and transfer the results to the industries in a non-exclusive manner. - At each of the four national universities "key research institutes" and "centres of excellence" have been established for the fields of applied mechanics, material science, information technology and aviation and aerospace technology. - Other fields considered as key by the government: energy, automation, biotechnology, electron optics, hepatitis control, and food technology
Human Resources for Public Research	- Strengthening education has been a national priority - Government encouraged students to go abroad for post-graduate studies and thus learn from the outside world. This has become an important mode of technology transfer - Recruitment from abroad
4. Public-Private Partnerships and Knowledge Transfer	
Structural Cooperations	- ITRI receives contracts from the government to develop generic technologies, and transfer the results to the industries in a non-exclusive manner. It also conducts short-term R&D projects in cooperation with private organizations, to improve product performance and process efficiency. - DOIT-employs the strategy of industry-institute joint research projects - 'Open Laboratory' strategy-give access to companies for the purpose of maximizing existing resources and minimizing investment risks before commercialization can take place (Hsua and Chiang, 2001). - Mutual Support and Cooperation Guidance System-guide exchange and cooperation activities between SMEs - Government directed innovation alliances in key areas (notebook computers, high def TVs)-ex. Notebook PC Joint Development Alliance-alliance of 46 companies.
Clusters, networks, poles	- Aerospace clusters

Science Parks, Technopoles, incubators	- Hsin-Chu Science-based Industrial Park (HSIP) was established in 1980-hosts a large number of companies. One of the world's main centres of IC manufacture. Formal and informal relationships with Silicon Valley. - >60 incubators for incubating new products, new businesses and new technology
Knowledge transfer incentives	
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	- The state funnels cash for industrial automation through Chiao Tung Bank - The state funnels cash for improving management quality through the China Productivity Centre - Industrial development centres give technical support to companies - Assistance Program for Strategic Industries-government selects strategic products for development - Alleviation of taxation-exemption of import duties for R&D equipment, expenditure on R&D of 15-20% for a business can be tax deductible (Shyu & Chui) - Loan subsidy/non-interest loans - National Award of Small and Medium Enterprises (for management and upgrading technology) - National Award for Innovation (for R&D, technology upgrading, product quality improvement) - Little Giant Award (excellent export and management performance)
Support for innovation: financial and non-financial	- Guidance Programs for SMEs (ex. Management guidance system, R&D guidance system) - Mutual Support and Cooperation Guidance System-guide exchange and cooperation activities between SMEs - Industrial information centres-to improve the ability of SMEs to collect and process information (ex. China External Trade Development Council) - R&D minimums for companies enjoying preferential tax treatment
Human resources for innovation	- Strengthening education has been a national priority - Government encouraged students to go abroad for post-graduate studies and thus learn from the outside world. This has become an important mode of technology transfer - Incentives for Taiwanese working abroad to return home - Foreign R&D activities include setting up transfer technology units (TTU) or an indigenous technology unit (ITU) in Taiwan - Foreign Firms also set of international interdependent laboratories (IILs) to enhance technology learning. - Tax deduction for expenditures of 15-20% by a company on training manpower

Demand stimulation policies	- The government plays the role of setting up a mechanism for firms to find proper markets with export incentives or deregulation in some specific markets. - Rules to encourage government units to purchase local Taiwanese products (Shyu & Chui)
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	- Electronic Research and Service Organization (ERSO)-will help with spin-off companies via technology endowment and capital endowment from the government-designed to attract the private sector to invest.
Entrepreneurship training	- There is an intensity of ambition to be an independent entrepreneur among the Taiwanese (Hamilton 1998)
Risk and venture capital	- Provided by the Bank of Communication & the Ministry of Finance - Finance and Credit Guidance system - SMEs credit guarantee fund-to provide credit guarantees to SMEs which are promising but short of collateral necessary to obtain finance. - Since 1983 the government has implemented 'Administration Rules on Venture Capital'-gives incentives for investments
7. Framework conditions for innovation	
Intellectual Property Rules	- Patent law has been redrawn to improve patent protection
Innovation-friendly Rules and Regulations	
Public awareness and readiness for innovation	
Innovation and other policies	

New Zealand: National Innovation System Challenges	
Challenge 1	Isolation from world markets as well as a small national market/Limited international linkages
Challenge 2	Lack of investment in business R&D
Challenge 3	Fragmented government support for R&D
Challenge 4	Preferences for lifestyle businesses
Challenge 5	Inappropriate incentives for public-sector research institutions to build long-term capabilities
Challenge 6	Shortcomings in technology diffusion
Challenge 7	Low productivity growth
Challenge 8	Lack of qualified personnel in science and technology
National Innovation Policy System	
1. Innovation Policy Governance structure and key actors	
Key Policy Documents	- Growth and Innovation Framework-Main foci: Raising the capacity of firms to innovate, building connections of firms with international markets, lifting skills and talent of the workforce, ensuring a supportive regulatory environment and strong supporting infrastructures. Target four sectors; ICT, Biotech, Design, & Screen production - Economic Transformation Agenda-improving income per capita by raising innovation and productivity levels.
Decision-making Bodies	- Ministry of Research, Science and Technology (Primary role)-responsible for high-level research policies and strategies. FRST manages most of the funding. - Ministry of Economic Development (Primary role) - Ministry of Education (Primary role) - Ministry of Agriculture and Forestry (Secondary role) - Ministry of Fisheries (Secondary role)
Implementing Bodies	- Foundation for Research, Science and Technology-largest money giving organization - Health Research Council - Royal Society of New Zealand (Marsden Fund, James Cook Fellowships, Teacher Fellows, Science and Technology Promotion Fund, International Science and Technology Linkages Fund, Talented Young New Zealanders) - New Zealand Trade & Enterprise (funds a lot of business sector R&D) - NZ Venture Investment Fund - Tertiary Education Commission
Multi-level Governance	- Some governance at the local level (ex. The Canterbury Development Corporation (CDC)-provides business development services. The CDC's technology initiative works to promote Christchurch as a knowledge-based city - NZ Trade and Enterprise funds Regional Programmes (the central government works with regional governments in deployment) – Regional Polytechnic Development Fund, Regional Partnerships Programme, Cluster Programmes

2. Innovation Policy Strategic Intelligence	
- Growth and Innovation Advisory Board (GIAB) - In the context of GIF there was an interdepartmental working group: identified policy areas to further strengthen NZ innovation performance, business practices and performance survey, innovation survey, demand-side finance issues research, analysis of capital investment.	
3. Science Base, Public Research, Technology organisations	
Structural Funding	- CRI (Crown Research Institute) Capability Fund-provide CRIs with the ability to undertake long-term planning, capability maintenance and development in important research areas. - Funding through Vote Education to support core research activities - Funding through Vote Research, Science and Technology
Competitive Funding	- Funding from Vote Research, Science and Technology (ex. NERF-New Economy Research Fund-assists in building capabilities and knowledge is new areas of application where industries are emerging) - Performance-based Research Fund-funding allocated based on performance
Reform of Public Research Base	- Centres of research excellence (CoREs) (ex. Molecular bio-discovery, mathematics, Maori development)-provides incentives for NZ researchers to develop world class research projects/development of world-class clusters - In 2000, the government began a comprehensive programme of tertiary education reforms. In 2006 a move was made to ensure tertiary education focused on priority areas as determined by the government and region. Quality assurance mechanisms have been developed.
Human Resources for Public Research	- Bilateral science agreements with foreign countries - Science counsellors in Washington and Brussels - Universities and CRIs have funds for international linkages programmes
4. Public-Private Partnerships and Knowledge Transfer	
Structural Co-operations	- CRIs work with each other as well as with universities and businesses. Government programs such as the Centres for Research Excellence encourage joint projects. - Evidence of good cooperation between SMEs (OECD report) - UniServices-University of Auckland company that manages the university's commercial research, business ventures and consultancy work - Agricultural extension services (Meat and Wool NZ, Livestock Improvement Corporation)-aids with technology transfer
Clusters, networks, poles	- Clusters (ex. Marine industry cluster, ICT/software cluster)
Science Parks, Technopoles, incubators	- Incubators are present (ex. Canterbury Innovation Incubator and the Human Interface Technology Laboratory New Zealand (HIT Lab NZ)-a human-computer interface research centre) - Two small technology parks are present

Knowledge transfer incentives	- Incentives for university-industry interaction: Research Consortia and Technology for Business Growth scheme. ----The government provides funding for co-operation between the public and private sectors - Research consortia-they utilize at least two users of research (e.g. businesses and CRIs)
5. Private R&D and innovation activities	
Direct and indirect support for private R&D	- International Science and Technology Linkages Fund - International Investment Opportunities Fund - Funding through Vote Research, Science and Technology a programme of the Ministry for Research, Science and Technology - NOTE: No tax credits for R&D or low interest loans for high-growth firm s
Support for innovation: financial and non-financial	- In 2000, the government began a comprehensive programme of tertiary education reforms. In 2006 a move was made to ensure tertiary education focused on priority areas as determined by the government and region. - Rfi (Research for Industry) funds given to 10 research consortia-the consortia are long-term business contracts between the government and private companies/industry groups that utilize research and research organizations. - NERF-New Economy Research Fund-assists capabilities and knowledge is new areas of application where industries are emerging - Tech NZ-a group which helps businesses through innovation-offers targeted assistance programs (ex. Consultancy services, TBG-Technology for Business Growth-enhance firms technological capabilities)
Human resources for innovation	- International Science and Technology Linkages Fund - International Investment Opportunities Fund - World Class New Zealand programme-provide entrepreneurs with opportunities to learn from international experts - Tech NZ-provides scholarships for students to work with companies in developing products
Demand stimulation policies	
6. Entrepreneurship and New firms Creation	
Spin-offs and start-ups programmes	- There is a high number of spin-off companies from both universities and CRIs (although I wasn't able to find any information on specific programs to aid in spin-offs) - The science parks and incubators provide assistance to start-up companies

Entrepreneurship training	- World Class New Zealand programme-provide entrepreneurs with opportunities to learn from international experts - Enterprise Development Fund-help individuals to gain business skills via mentors and training - Enterprise Culture, Skills and Activity Fund-encourage enterprising skills through seed funds.
Risk and venture capital	- Few business angel investors/business angels have a low public profile and are not easy to identify -equity finance is a major challenge - In 2004, the government passed legislation removing a barrier to foreign venture capital - New Zealand Venture Capital Association-Venture Investment Fund (VIF)
7. Framework conditions for innovation	
Intellectual Property Rules	- High cost of acquiring and defending IPR is a problem
Innovation-friendly Rules and Regulations	- Commodities Levies Act-to eliminate the free-rider problem
Public awareness and readiness for innovation	- New Zealand was once a test market for technologies such as cell phones. NZ's infrastructure has not kept up with technology and the nation no longer serves as a test market. - The public's awareness of technology is greater than the capabilities of the nation's infrastructure to provide it.
Innovation and other policies	- Sectoral innovation-related strategies: biodiversity, biosecurity, biotechnology, climate change, energy, health, ICT, ocean and water

Appendix 2
Structural characteristics and capabilities for each country

Australia

(Source: "Venturous Australia" refer website - innovation.gov.au)

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

This is a large council, comprising mainly representational Membership. The Australian Government's 2008–09 Science and Innovation Budget Tables show budgeted Commonwealth expenditure on science and innovation for the 2008–09 year as totalling $6.37 billion. Of this, $4.36 billion is to be spent through the Innovation, Industry Science and Research portfolio, while over $2 billion is to be spent by ten other portfolios, the largest being Health and Ageing ($625 million); Defence ($394 million); Resources, Energy and Tourism ($324 million); and Agriculture, Fisheries and Forestry ($259 million). Within the 11 portfolios there is a multiplicity of agencies that deliver innovation programs including the ARC, NHMRC, Rural Research and Development Corporations, DSTO, Innovation Australia and numerous agencies delivering a growing number of programs related to climate change. Following the 2007 election the new Government created a portfolio for innovation and research, thus, we hope, signalling an intention to bring some much needed coherency into government decision-making on these issues. Currently each portfolio pursues its research and innovation agenda largely independently. Budget bids, funding allocations and delivery mechanisms are all addressed largely within agency silos. Despite a significant financial contribution to research in the former government's *Backing Australia's Ability* packages, they did not include effective institutional mechanisms to support a coherent whole-of-government approach. Mechanisms such as national research priorities were introduced but achieved only limited impact in ensuring coherence across the national government research effort.

1. Horizontal Coherence Mechanism

C the Prime Minister's Science, Engineering and Innovation Council (PMSEIC). This is a large council, comprising mainly representational membership that works essentially on an issues-based agenda, supported by ad hoc working groups and the Office of the Chief Scientist. As such it is not designed to inform strategic co-ordination and leadership functions across the whole of government. The IWG analysed industry innovation programs across Australia to inform the Panel about where support is being directed (see Box 7). It found that 69 percent of programs are delivered by the states and territories but 90 percent of the financial support is provided through Australian Government programs. Furthermore, it was found that most support was directed to research and development and funded by the Australian Government and that State and Territory programs were more tailored to the needs of local constituencies.

2. Vertical Agencies

3. Vertical Coherence Mechanism

Our major public sector research agencies (including CSIRO, the Defence Science and Technology Organisation (DSTO), ANSTO and AIMS are split across a number of portfolios and together have control of over $1.5 billion annually in government funds for research. There is currently no formal coordination of their activities and, while they do often work collaboratively, this largely happens on an ad hoc basis. The Panel believes that, as far as possible, there should be a bias against any proliferation of new program delivery bodies, and a consolidation where possible. As a general principle, industry facing programs should be administered within the Department of Innovation, Industry, Science and Research and through Innovation Australia in particular. This would promote a user-centric framework, and enable better bundling of support options around industry or firm needs.

4. Stakeholder Involvement Mechanism
5. Business Involvement Mechanism
6. Mobilisation of Broad Spectrum of Actors
7. Dominant Public Research organisations (uni or PRI)
8. Strategic Mission of Universities or Public Research Institutes (strong or weak)
9. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

The Venturous Australia report has recommended that a number of national innovation priorities be established that complement the national research priorities

2. NIS View

In addition to having effective evaluation mechanisms, policy makers need to be well informed about the evolution of the national innovation system and how it compares with those in other countries. The Panel, in conducting this Review, was in man cases constrained by the lack of both data and research findings concerning the Australian innovation system. In other countries this shortcoming has been recognised and independent innovation research centres have been created to undertake research on the innovation system, provide independent advice to government and offer meeting places where private sector practitioners can interact with each other, policymakers and academics.1 The Panel sees merit in establishing such a centre in Australia. It would develop skilled researchers, comprehensive databases and cutting edge methods for research on both the innovation process, broadly defined, and specialised questions of key national importance.

3. Strategic Approach to Innovation Policy (M&E)

Of particular concern is the relatively low level of program evaluation and the small amount of online access for firms and others seeking access to program advice. should drive hard for improved frameworks for monitoring and reporting and, as set out earlier, should produce an annual Statement on Innovation to report on trends in the national innovation system. It is desirable that programs be evaluated not only against their specific policy objectives and program parameters, but also reviewed – within appropriate timeframe intervals – for their continued relative effectiveness compared with complementary or related programs.

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

6. Guidance for the Whole System
7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

Austria

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Ministry of Transport, Innovation and Technology (BMVIT) – applied research
- Ministry of Science and Research (BMWF) – basic research
- Ministry for Education, Arts and Culture (BMUKK) – educational matters and the universities
- Ministry for Economy, Family and Youth (BMWFJ) – application oriented basic research and responsible for fostering linkages among universities public research institutions and accompanies

2. Horizontal Coherence Mechanism

- The federal ministries in charge of innovation policy still have overlapping responsibilities, which leads to a simultaneous engagement of several actors in various fields, and in some cases the creation of more than one support programme aimed at addressing the same shortcoming.
- A major challenge from the governance point of view is the clarification of governance structures, as well as the involvement of the political level in order to provide an orchestrated, politically approved content driven approach.
- Certain degree of competition amongst ministries to develop new measures that the agencies deliver, especially in thematic fields
- Austrian Council for Research and Technological Development established in 200 – an advisory body only, no formal decision-making powers and its recommendations are not binding for the government
- Austrian Council formulated a Strategy in 2010

3. Vertical Agencies

- Agencies are owned by the ministries

4. Vertical Coherence Mechanism

- The division of labour between ministries and agencies is clearly laid out in legal documents but in practice the actual setting of agendas, and the development of strategies, occurs in a non-comprehensive way, since the different roles of stakeholders seem to be blurred.
- Ministries design policies and in some cases actively intervene into the operational implementation of new programmes.
- A division of tasks between the agencies and the ministries has often been suggested
- Direct grant system was reorganised after 2004. This reduced the institutional fragmentation of the system and improved transparency of programmes.
- There has been a recent proliferation of direct support programmes that some regard as excessive.

5. Stakeholder Involvement Mechanism

- There is an insider-outsider problem which has led to the creation of communities that aim at lobbying for programmes in their respective research area

6. Business Involvement Mechanism

- Josef Research Centres are designed as competence and cooperation centres between universities of applied sciences and SMEs
- Cooperation and innovation programme designed to stimulate and to increase innovation activities of companies and to promote their interactions with universities and research institutes
- JITU programme provides seed and pre-seed finance to start-ups
- COMET programme develops new expertise by supporting long-term research cooperation between science and industry in top-level research, and to establish and secure the technological leadership of companies

7. Mobilisation of Broad Spectrum of Actors
8. Dominant Public Research organisations (uni or PRI)
9. Strategic Mission of Universities or Public Research Institutes (strong or weak)
10. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- A major shortfall is the lack of a content driven, strategic vision, which defines the goals of the innovation system, the respective means to achieve the set objectives, their exact implementation procedure, and its relation to other fields, such as education system, health or the environment.

2. NIS View

- The intervention logic is dominated by the setting of single intervention programmes, and not by holistic approaches, which also encompasses the incentives set by the regulatory framework.

3. Strategic Approach to Innovation Policy (M&E)

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- shortage of human capital for firms approaching the technological frontier who have to adopt advanced technologies
- Austria's innovation performance is especially poor in venture capital and private equity support
- Direct funding system is demand driven and therefore insufficiently supports risky investments. It is also regarded as applying winner-picking strategies
- A major challenge from the governance point of view is the clarification of governance structures, as well as the involvement of the political level in order to provide an orchestrated, politically approved content driven approach.

Belgium

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- The federal government retains competence for a limited number of specific policy fields that can influence the innovation system
- Belgium is characterised by multi-level governance of research and innovation policy as the federal government and the three regional and three language community governments all have competence for certain matters relevant to science and innovation.
- Flanders – administration of Economy, Science and Innovation has two ministers responsible for different policy domains
- Wallonia – two senior ministers share competence for innovation policy matters
- Brussels Capital – one minister has competence for innovation policy matters

10. Horizontal Coherence Mechanism

- Inter-ministerial Conference for Science Policy provides a mechanism for coordination and cooperation
- The federal government resources are strongly focused on R&D cooperation, with a large fiscal facility for this, which supplements regional efforts in this area
- Flanders – recent reform has established a clear task description and alignment of several agencies
- Wallonia – new policy document will govern innovation policy over next few years
- Brussels Capital – objectives of policy are clearly around three priority sectors to improve competitiveness

11. Vertical Agencies

- Belgium Federal Science Policy Office is responsible for coordinating science policy at a federal level, with the regions and the communities – in the latter cases involving a cooperation agreement
- Federal Public Service Economy SMEs, Self-employment and Energy is responsible for supervising the activities of the collective research centres funded by the federal government
- Federal Public Service for Finance has responsibility for fiscal matters aimed at stimulating scientific research or innovation
- Flanders – several agencies under the administration of Economics, Science and Innovation to stimulate innovation
- Brussels capital – two agencies support the implementation of research and innovation and enterprise support policies
- Wallonia – a directorate of the Public Service manages most support programmes together with other specialised agencies

12. Vertical Coherence Mechanism

13. Stakeholder Involvement Mechanism

14. Business Involvement Mechanism

- All three regions have programme to support SMEs and start-ups as well as support university-industry linkages and the diffusion of technologies to industry for exploitation.

15. Mobilisation of Broad Spectrum of Actors

16. Dominant Public Research organisations (uni or PRI)

- Flanders – the academic system is relatively autonomous.
- Flanders – characterised by a culture that values pure science highly.

17. Strategic Mission of Universities or Public Research Institutes (strong or weak)

18. Dominant Business R&D performers (large or small or foreign firms)

- Belgium's research and innovation performance is characterised by high investments by the business sector, off-setting relative underinvestment by the public sector.
- These investments are precarious due to the dominance of a few large and foreign firms in the total expenditure.

B Capabilities

1. Vision

- There is no national policy framework. All three regions (and the communities) have close to full autonomy in managing their own regional innovation system and policies relating to a research, innovation and knowledge economy

2. NIS View

- In Belgium, at the federal level and at the regional level, the Lisbon objectives have been firmly embraced. At both levels, and in all three regions, the attention for the role of science and innovation has increased and government budgets are rising, and issues are addressed which involve bottlenecks of the business innovation system
- All three regions have extensive public support systems with a large variety of measures focusing on R&D cooperation and promoting entrepreneurship.
- The structuring of public-private research efforts in the form of strategic research centres, competitiveness poles, etc. Is a good step towards an embedding and attracting force for the large foreign players.

3. Strategic Approach to Innovation Policy (M&E)

Brussels Capital – no culture of evaluation of policies in the region.

Wallonia – the strategic plan for innovation has been evaluated (assessment of the impact and efficiency of the implemented measures).

Evaluations of the efficacy and efficiency of the Flemish public policy have become much more common. Apart from the overall evaluation of innovation policy by the Soete committee, IWT and EWI have evaluated a number of their programmes and organisations.

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- There is a low share of science and technology graduates
- There is a need to boost the attractiveness of starting up innovative businesses, and to foster new businesses. The reliance ona few large and foreign firms is a risk.
- Create a favourable environment for the exploitation of research results in Belgium.

Chile (OECD NIS Review)

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Ministry of Economy
- Ministry of Education
- Creation of Innovation Fund and National Innovation Council for Competitiveness (NICC) is opportune
- NICC could be the catalyst of an accelerated maturation of Chile's innovation system
- NICC will be an advisor to the President of the Republic on innovation policies
- NICC is tasked with proposing guidelines for a long-term national innovation strategy

19. Horizontal Coherence Mechanism

- Fragmentation of policy and failed efforts at coordination have led to overlaps and duplication

20. Vertical Agencies

- CORFO – under the Ministry of Economy
- CONYCIT – under the Ministry of Education
- These agencies have significant influence on policy making

21. Vertical Coherence Mechanism

- Some degree of coordination does exist at the programme level and to a lesser extent across agencies but this is not a good substitute for high level steering of the system
- Agency coordination especially between CONICYT and CORFO is weak
- A very important new tool for implementing a more coherent policy is the Innovation for Competitiveness Fund (FIC). This fund has the potential to be an "agent of structural change" that could induce deeper, dynamic structural adjustments in the system.

22. Stakeholder Involvement Mechanism

23. Business Involvement Mechanism

- Industry-science relationships face the same problems as in other countries
- more acute in Chile because of shortage of vital human capital – eg engineers
- more acute in Chile because of lack of institutional frameworks – eg public private partnerships

24. Mobilisation of Broad Spectrum of Actors

25. Dominant Public Research organisations (uni or PRI)

- Most R&D is financed by the government and carried out in the universities

26. Strategic Mission of Universities or Public Research Institutes (strong or weak)

- Weak - the public research institutes play a minor role in pre-competitive R&D

27. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- Chile does not yet have a fully developed formal mechanism for defining an explicit strategy, translating it into priorities and guiding implementation

2. NIS View

- In the past 15 years Chile has undergone an accelerated learning process whereby a more complete portfolio of instruments, addressing a broader set of objectives, has gradually been built.
- Overall one of the main problematic features of the current mix of instruments is that it offers uneven support to the different phases of innovation projects in different types of firms.

3. Strategic Approach to Innovation Policy (M&E)

- An evaluation culture is not lacking in Chile, but evaluation frameworks are under developed and questions arise regarding the approach that should be taken to systemic evaluation

4. Positioning STI Policy in a Global Context

- Chile lags significantly behind comparable countries in terms of the number of foreign students received and of Chilean students who study abroad
- The Technology Transfer Programme of the Innova Chile Committee of CORFO is dedicated to fostering initiatives for prospecting, dissemination, procurement and adaptation of management or production technologies to Chilean firms
- Chile has signed many science and technology co-operation agreements with OECD countries.

5. Priority Setting Processes

- Priorities have always been defined in a decentralised manner by agencies such as CORFO, CONICYT and the FIA.

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- The modest role played by business in the financing and performance of R&D
- Most R&D is financed by the government and carried out in universities
- Public research institutes play a questionable role in the innovation system
- Shortage of specialised human resources
- Underdeveloped supporting financial market mechanisms
- A very narrow market for knowledge
- Insufficient networking and clustering of firms
- Industry-science linkages are weak
-

Denmark

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- The Ministry for Science, Technology and Innovation has the main coordinating role in all matters relating to Danish innovation policy, even though several ministries participate in the implementation.
- The Ministry provides the secretariat supporting the Danish Council for Research Policy, all research Councils, Danish Council for Technology and Innovation. It deals with innovation in the wider sense than science and technology
- The Ministry for Economic and Business Affairs is concerned with innovation issues in the traditional industrial sector, with the emphasis on supporting entrepreneurship and dealing with clustering policies and intellectual property rights issues.

28. Horizontal Coherence Mechanism

- Danish governance of innovation policy is characterised by strong political as well as administrative coordination, given the wide range of responsibility of the Ministry of Science, technology and Innovation
- Danish Council for Technology and Innovation
- Recent reform has led to stronger coordination and coherence of innovation policy initiatives as a major priority

29. Vertical Agencies

- As an overall assessment, it seems that the delivery process in the implementation of the innovation policies at the level of policy measures follows good practices, and in some cases, even best practices

30. Vertical Coherence Mechanism

31. Stakeholder Involvement Mechanism

- Danish innovation policy is characterised by a strong stakeholder involvement in policy formulation and a strong tradition of consensus. There is broad interaction with all key stakeholders and consultations and partnerships are increasingly included in the agenda.

32. Business Involvement Mechanism

- Danish measures normally demand some significant self-financing amongst receivers and/or public private partnerships.
- Financial support to start-up companies and risk capital in general involves rather large budgets, but the amounts are expected to be returned in cases of success. This means that these amounts are more like loans than subsidies
- In Denmark, the GTS system, Advanced Technology Groups, is an association of independent non-profit making Danish Research and Technology Institutions. They

support innovation in enterprises by technological service and constitute an important part of the Danish infrastructure in supporting innovation.

33. Mobilisation of Broad Spectrum of Actors

- Highly prioritised political vision and good stakeholder involvement in the formulation of innovation policy objectives

34. Dominant Public Research organisations (uni or PRI)

35. Strategic Mission of Universities or Public Research Institutes (strong or weak)

36. Dominant Business R&D performers (large or small or foreign firms)

SME, low-tech

B Capabilities

1. Vision

- Globalisation Strategy – a unifying factor – matching diverse policy domains, including innovation, education, energy and environment, etc
- National Innovation Policy Action plan (Innovation Denmark 2007 – 2010) in context of Globalisation Strategy
- Various associated strategies relevant to innovation under the Globalisation Strategy

2. NIS View

- The creation of a systematic and dynamic innovation policy support system are intended to be an adequate answer to emerging challenges
- Network failures are dealt with through, for example, the technological service providers in the Advanced Technology Groups, GTS
- The Danish innovation system actively seeks to incorporate interaction and dynamics into the system itself and so the NIS approach is intended to be a type of third generation NIS

3. Strategic Approach to Innovation Policy (M&E)

- Frequent evaluation of policy under the National Innovation Action Plan
- Continual analysis, monitoring and evaluation of innovation activities and performance undertaken from a central perspective by the Danish Agency for Science, Technology and Innovation and the Danish Council
- Since the current innovation support system is in its infancy, and effects of some of the indicators take a long time to realise, an overall evaluation at a meta-level, assessing the innovation support system as a whole has not been conducted

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- Social cohesion provides an important support for Danish innovation system
- relatively equal income distribution is another important support, arising as it does from the corporatist system of interactions amongst government, employers and trade unions
- mode of innovation is another important support, arising as it does from a domination of small and medium sized low-tech firms that in the main make local incremental innovations based on learning by doing, learning by using and a high degree of learning by interacting, especially with customers and suppliers combined with "efficient commercial ability" (Lundvall, 2005).

C Main Innovation Policy Challenges

- To transform innovation into competitiveness in the short to medium term
- To implement an increase of public grants tot research and development, to focus on major and long-term research projects and to increase privately financed research
- To continue to improve the framework conditions for entrepreneurs

Estonia

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Ministry of Education and Research
- Ministry of Economic Affairs and Communications.

2. Horizontal Coherence Mechanism

- Uncomplicated structure due to newness and small size of Estonia
- Research and Development Council – three ministries and Prime Minister – in 2000 business representatives given greater standing in this Council
- Two subcommittees – research policy committee coordinated by the Ministry of Education and Research and the Innovation Policy Committee coordinated by the Ministry of Economic Affairs and Communications.

3. Vertical Agencies

- Enterprise Estonia – under – Ministry of Economic Affairs and Communications – support for enterprises – financial, advisory, training for entrepreneurs and for institutions
- Archimedes Foundation - under Ministry of Education and Research – to coordinate EU research instruments
- Also Estonian Development Fund – public venture capital fund.

4. Vertical Coherence Mechanism

- New small NIS and so no apparent sign of inefficiency.

5. Stakeholder Involvement Mechanism

- Chamber of Commerce.

6. Business Involvement Mechanism

- Cluster programme launched to promote research-industry linkages and exports
- enterprise incubators.

7. Mobilisation of Broad Spectrum of Actors

8. Dominant Public Research organisations (uni or PRI)

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

10. Dominant Business R&D performers (large or small or foreign firms)

    Most Estonian firms still innovate through embodied foreign technology and productivity remains low and commercial bank loan potential is weak

B Capabilities

1. Vision

- Innovation policy is recent (10 years)
- Knowledge-Based Estonia 2002-2006 was first innovation policy strategy

2. NIS View

- Sophisticated policy mix created through policy learning from other EU nations

3. Strategic Approach to Innovation Policy (M&E)

- Relatively limited expertise in managing the complexity of its NIS

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- Banking sector is controlled by Swedish banks
- Some 65% of FDI originates in Sweden and Finland.
- Energy system is dominated by oil shale – not used on such a scale anywhere else in world

C Main Innovation Policy Challenges

- Increase productivity, especially in manufacturing industry
- Need to develop champions in sectors in which a small scale economy can be truly competitive
- insufficient supply of educated workers, especially in science and technology

Finland

(Source Pro Inno Reports 2009)

A Structural Division of Labour/Policy Domain

1 Horizontal Agencies (main)

- Research and Innovation Council (2009) (RIC) replaces the former Science and Technology Policy Council. The RIC is responsible for the strategic development and coordination of Finnish science and technology policy as well as of the national innovation system as a whole.
- Ministry of Employment and the Economy (MEE) – matters relating to industrial technology and innovation policies
- Ministry of Education and Science (MES) – matters relating to education and training, science policy, institutions of higher learning, and the Academy of Finland

2. Horizontal Coherence Mechanism

- Compared to the past it seems that MEE has taken a more pro-active stance in formulation of the policy and aims towards a more coherent policy approach within its administrative field.
- By merging functions from three different ministries some cultural clashes have been avoided

3. Vertical Agencies

- Tekes (under MEE) - the Finnish Agency for Technology and Innovation – plays a key role in the formulation and implementation of technology and innovation policy
- TEKES is also a principal government financing and expert organisation for research, technological development and innovation
- The Academy of Finland, which includes four national research councils, is responsible for the financing and strategy formulation of the basic research, research training and science policy.
- Diverse other public agencies involved implementing innovation policy also
- Public research and education system plays a prominent role in implementing Finnish innovation policy. It includes a Higher Education sector that covers all 20 universities and a network of polytechnics (26 in Jan 2009) as well as the state research institutes (19) spread out into 8 policy sectors.

4. Vertical Coherence Mechanism

5. Stakeholder Involvement Mechanism

- Confederation of Finnish Industries, EK, whose members cover a wide variety of business sectors and all sizes of companies, is a primary stakeholder organisation representing an industrial view towards innovation policy making.
- Information on sources of co-financing of support measures shows that over 30% of the Finnish policy measures are co-financed by the private sector.

6. Business Involvement Mechanism

- Probably the most ambitious innovation policy development projects in Finland in recent years have been the establishment of Strategic Centres for Science, Technology and Innovation (SHOK). In Strategic Centres, companies and research units work in close cooperation, carrying out research that has been jointly defined in the strategic research agenda of each Centre.
- Each SHOK is coordinated by a non-profit limited company, jointly owned by the shareholders (including companies, research organisations, funding agencies and different interest groups)

7. Mobilisation of Broad Spectrum of Actors

8. Dominant Public Research organisations (uni or PRI)

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

10. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- National Innovation Strategy (2008)
- From a policy making perspective the national innovation strategy discerns three complementary dimensions of innovation promotion, namely know-how (science and technology), demand and users.

2. NIS View

- highly advanced NIS approach

3. Strategic Approach to Innovation Policy (M&E)

- Evaluation of science, technology and innovation policy instruments, programmes and organisations has become a systematic practice in Finnish policy making

4. Positioning STI Policy in a Global Context

- International evaluation panel identifies Finland as having moved from “catch-up” status to the technology and productivity frontier during the last two decades. Hence the panel stresses a need to re-focus policies on capturing global knowledge spill-overs more than they do today by concentrating on human capital, education and other less mobile factors.
- A move from closed to open innovation is one of the facets of this change as are globally networked innovation processes
- Systemic challenges identified in the national innovation strategy include the relatively low level of internationalisation of the Finnish innovation system

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- Transformation of firm strategies and emerging new innovation models – to rethink innovation policies in terms of goals, focuses, design and implementation
- Increase and enforce Finland's attractiveness for investments
- A need to broaden the base of innovative growth-oriented enterprises

Iceland

A Structural Division of Labour/Policy Domain

1. Federal or State Governance Bias

- Federal

2. Horizontal Agencies (main)

- Ministry of Education
- Ministry of Industry

3. Horizontal Coherence Mechanism

- Inter-ministerial Science and Technology Policy Council (STPC) defines strategic orientations for sets objectives for innovation policy periodically (3 years)
- Composition of Council is cumbersome and not sufficiently representative of industry
- STPC does not have autonomy and power needed to lead and to take decisions autonomously
- STPC does not fulfil the role of policymaker
- Ministries themselves are autonomous and give effect to high-level policy
- some lack of connection between main ministries and insufficient coordination of innovation policy with other crucial policy areas.

4. Vertical Agencies

5. Vertical Coherence Mechanism

- although innovation policy support system appears to be transparent – indications are that it is difficult to access by companies in Iceland.

6. Stakeholder Involvement Mechanism

7. Business Involvement Mechanism

- formalised programmes to stimulate industry-science linkages remain relatively under-developed
- the Icelandic Innovation Centre (a merger between the Technological Institute of Iceland and the Building Research Institute) fulfils the primary function of transferring technology and expertise to business and industry and helps companies to innovate successfully.

8. Mobilisation of Broad Spectrum of Actors

- STPC is chaired by PM and consists of four ministers

9. Dominant Public Research organisations (uni or PRI)

10. Strategic Mission of Universities or Public Research Institutes (strong or weak)

- Within the universities there is potential for further professionalising technology transfer policies and new company creation

11. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- 2009 national taskforce to think about future of education, research and innovation policy

2. NIS View

- Compared to EU-27, Iceland places more emphasis on commercialisation of innovation and application of research. Less emphasis is placed development/prototype creation, the diffusion of technologies in enterprises, industrial design and the improvement of the legal and regulatory environment

3. Strategic Approach to Innovation Policy (M&E)

- Many key agencies (within or outside the ministries) are understaffed and/or do not have the capabilities needed to implement, monitor and evaluate policy
- Centres of excellence have been introduced as result of foresight exercise carried out in 2007 to 2008
- decision-making bodies at present lack essential evidence in order to make well-informed decisions.
- evaluation is not systematically practised

4. Positioning STI Policy in a Global Context

- Internationalisation and international collaboration should be emphasised and stimulated on various levels

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- small nation
- banking industry collapse in GFC
- over past decade economy has been transformed from resource-reliant to more financial services reliant

C Main Innovation Policy Challenges

- government to work closely with industry to develop new growth paths
- creating real value from innovation
- maintaining and improving the functioning of the venture capital market
- build coherence between two main ministries
- tax incentives for R&D should be carefully considered

Ireland

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Ministers with STI responsibilities now report to a new Cabinet Committee on Economic Renewal, which is chaired by the Taoiseach (Prime Minister). The Cabinet Committee will be supported by the work of the National Economic and Social Council (NESC) and through regular analysis by the National Competitiveness Council (NCC)
- A high-level Interdepartmental Committee of senior civil servants coordinates the work of civil servants and public servants in the government departments responsible for implementing it.
- DETE is the Department of Enterprise, Trade and Employment. Its main objective is to grow quality employment and national competitiveness
- The Office of Science, Technology and Innovation (OSTI) Under DETE is responsible the development, promotion and coordination of national STI policy in Ireland, the EU and internationally.
- Forfas assists OSTI and is Ireland's national policy advisory board. Forfas provides policy advice to the government on enterprise, trade, science, technology and innovation. It operates under DETE
- DES is the Department of Education and Science. It is a significant factor in the NIS and funds the third-level sector and two research councils
- A Chief Scientific Adviser to the Government exists and reports to the Cabinet Sub-Committee
- The National Competitiveness Council (NCC) produces an annual competitiveness report comparing Ireland to 15 other countries.
- The Advisory Science Council provides policy advice to the Irish government on medium and long-term STI issues and contributes towards the development and implementation of a coherent and effective national strategy for STI.

2. Horizontal Coherence Mechanism

- OSTI is the overall coordinator for the Research technological Development and Innovation (RDTI) measure in the National Development Programme and is the overall coordinator for the efficiency of the NIS.
- There is very strong cohesion throughout all parts of the industrial National Innovation System and there are adequate measurement processes in place.

3. Vertical Agencies

- Enterprise Ireland – development of indigenous business sector
- Industrial Development Authority – inward investment promotion agency
- Science Foundation Ireland – main research investment agency - invests in academic researchers and research teams who are most likely to generate new knowledge, leading edge technologies and competitive enterprises in the fields of science and

engineering underpinning three broad areas: (i) biotechnology; (ii) ICT; (iii) sustainable energy and energy-efficient technologies

- Higher Education Authority – has wide advisory powers throughout the whole of the third-level education sector. It is the funding authority for teaching and research in the universities, institutes of technology and a number of designated higher education institutes.
- Inter TradeIreland – to boost North-South economic cooperation.

4. Vertical Coherence Mechanism

- When times are good there is a tendency to develop new agencies to solve each new major issue.
- In general the division of labour works reasonably well, although sometimes it can lead to excessive monitoring and control at the centre rather than a full transfer of responsibility to the agency.

5. Stakeholder Involvement Mechanism

- Two key bodies are active members of the social partnership of the government, employers and employees – the Irish Business and Employers Confederation and the Irish Congress of Trade Unions. The social partnership was a key actor in moving away from a damaging recession in the late 1980s/early 1990s, helping to create the Celtic Tiger.

6. Business Involvement Mechanism

- Emphasis in Ireland tends to on creating awareness in firms and promotion of entrepreneurship.
- Linkages between the third-level sector and industry are too few

7. Mobilisation of Broad Spectrum of Actors

- Innovation Taskforce (after the GFC) to advise government for positioning Ireland as an International Innovation Hub. It has 21 members 13 from industry, six from academia and is chaired by the Secretary General of the Prime Minister's Office

8. Dominant Public Research organisations (uni or PRI)

- Until the 1980s Irish industry was primarily traditional industry and small scale. Consequently, Ireland has very few public or private research institutions.
- Ireland had no technological university characteristic of the education landscape in continental Europe and the United States. In the 1960's and 1970's, Ireland established two new technological universities and a network of regional technical colleges, now called Institutes of Technology (IoT). The latter are mainly third-level teaching institutions with a growing research capability.
- Approximately 90% of fundamental research is performed in the third-level sector
- Neither indigenous industry nor foreign owned industry (in their Irish operations) performs basic research.
- The Irish Innovation System is heavily dependent on industry and the third-level sector to achieve its Lisbon Agenda goals and to create a knowledge economy.

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

Strong. All the higher education institutions now have a strategic research plan and the smaller institutions are specialising in niche areas that are relevant to their skill base and in most cases to national needs.

10. Dominant Business R&D performers (large or small or foreign firms)

- Large foreign firms.

B Capabilities

1. Vision

- The Irish government's vision on science, technology and innovation is set out in its 2006 Strategy for Science, technology and Innovation.
- This Strategy is set within the context of its National Development Plan.

2. NIS View

- There is very strong cohesion throughout all parts of the industrial National Innovation System and there are adequate measurement processes in place

3. Strategic Approach to Innovation Policy (M&E)

- The national strategy agreed to in 2006 is being monitored and within the agreed programme adjustments are being made regularly to improve the outputs from the main support measures.

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- To ensure that the Higher Education sector achieves its performance targets
- To maintain the level of innovation in the private sector
- To build the internal capacities of companies to innovate

Italy

A Structural Division of Labour/Policy Domain

1. Federal or State Governance Bias

- Federal and regional programmes - eg some overlap in technology transfer programmes

2. Horizontal Agencies (main)

- Ministry of Economic Development
- Ministry for Education, Universities and Research
- establishment of National Innovation Agency (Milan) in charge of promoting innovation in the country.

3. Horizontal Coherence Mechanism

- innovation policy mix characterised by a high number of instruments and measures that are sometimes fragmented, overlapping and uncoordinated
- at the regional level the duality between the central government and the regional authorities' intervention is still affecting the Italian system

4. Vertical Agencies

- there is a tendency to appoint specific agencies with the role to implement, monitor and follow-up policy instruments that are running

5. Vertical Coherence Mechanism

- Innovation support measurements suffer from fragmentation and short-termism
- Policy delivery entities often overlap or barely interact to implement programmes at the national level but also among the national and regional level

6. Stakeholder Involvement Mechanism

- NRA was drafted taking into account the views of all stakeholders (ministries, industrial associations, regions)

7. Business Involvement Mechanism

- National Innovation Agency will be an instrument for the transfer of know-how from universities and PROs to public and private actors, also through training and IP assistance
- Confindustria – the leading organisation representing the manufacturing and service industries also influences policy
- Cluster policies account for about 20% of government innovation policies
- In recent years there has been an intensification of research-industry links reflected in support measures that foresee such collaboration

8. Mobilisation of Broad Spectrum of Actors

9. Dominant Public Research organisations (uni or PRI)

10. Strategic Mission of Universities or Public Research Institutes (strong or weak)

- Weak – the university system has often been accused of being self-referential and closed to the market

11. Dominant Business R&D performers (large or small or foreign firms)

- large

B Capabilities

1. Vision

- National Research Plan – main strategic priorities, with instruments, programmes and measures to achieve the goal set.
- Objectives in NRA are complemented and reinforced in other national plans

2. NIS View

- Italian system has traditionally supported public research of universities and public research institutes and centres
- Measures to promote entrepreneurship and the creation and growth of innovative enterprises are rather limited
- Most of current measures that target all firms seem, in many cases, more suitable for larger enterprises
- Public operators are not usually inclined to adopt a strategic management approach to R&D, going beyond a specific sector/activity and better integrating policies into the wider national system

3. Strategic Approach to Innovation Policy (M&E)

- Still missing in the Italian system is a structured monitoring system of implemented measures that support an improvement process of the policy mix through policy learning
- (in future) National Innovation Agency will be responsible for the evaluation of innovation projects
- (in future) National Innovation Agency will carry out studies, collect statistics and do forecasting
- creation of specialised agency (ANVUR) to evaluate the results of research activities carried out by universities and research centres
- Institute for Industrial Promotion also supports the Ministry of Economic Development in monitoring and evaluation activities

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

- In line with wider public management ethos in recent years, strategic guidelines, both for research and innovation policies have focussed on selected thematic fields

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- north – south divide

C Main Innovation Policy Challenges

- Innovation financing – mainly venture capital
- Mobility of talents – especially brain drain
- Improvement of technology transfer mechanisms

Japan

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Council for Science and Technology Policy (CSTP) - located in the Cabinet Office. It has 14 members, being the Prime Minister, six Cabinet Ministers and other experts from industry, universities and public research institutes
- Ministry of Education, Culture, Sports, Science and Technology (MEXT) – major sponsor of science and technology – 65% of total Govt. Investment in R&D
- Ministry of Economy, Trade and Industry (METI) – 14% of total govt. R&D budget

2. Horizontal Coherence Mechanism

- CSTP sets high level policy and is the most important document for understanding the objectives of Japan's science and technology policy
- CSTP's role in policy setting and design is limited - hence although the CSTP acts as a watchtower over the system, it very rarely outlines its own detailed policy initiatives and is reliant on ministries for policy support

3. Vertical Agencies

- NEDO – New Energy and Industrial Development Organisation - funds various technology and national projects
- JST – Japan Science and Technology Agency – funds basic research with future technological significance

4. Vertical Coherence Mechanism

- The process of delivery in Japan is very much centralised, with central government taking the initiative up with other agents, then implementing policies in accordance with rules and programmes
- Implementation is, by and large, effective, efficient and transparent
- Insufficient university-industry-government linkages at the local level, in particular with regard to large-firm participation in cluster initiatives

5. Stakeholder Involvement Mechanism

- 47 technology licensing organisations attached to universities in order to foster university-industry linkages

6. Business Involvement Mechanism

- GERD is dominated by large firm R&D

7. Mobilisation of Broad Spectrum of Actors

8. Dominant Public Research organisations (uni or PRI)

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

10. Dominant Business R&D performers (large or small or foreign firms)

- Large - main player in R&D system is industry – performing over 70% of R&D
- About 80% of BERD is performed by largest firms with capital above JPY 10 billion
- Large firms outsource many R&D requirements to new technology-based firms.

B Capabilities

1. Vision

- Third Science and Technology Basic Plan will run until 2010

2. NIS View

- Overall trends in Japan are for an increased emphasis on innovation related measures rather than specific science and technology measures. This involves greater emphasis on fostering technologies through collaborative mechanisms between universities, industry or government laboratories, with many firms increasingly using these as part of their technology development process

3. Strategic Approach to Innovation Policy (M&E)

- Data and evidence for new policy are provided by the National Institute of Science and Technology Policy which provides analytical reports on specific subjects, foresight exercise results, policy evaluations

4. Positioning STI Policy in a Global Context

- Japan's innovation system is not internationalised and many initiatives are in place such as those to establish top class internationally recognised research centres at universities
- Japan has replicated apparently successful policies from other nations such as the Bayh-Dole Act policy and the SBIR policy

5. Priority Setting Processes

- The CSTP oversees science and technology budgets, sets priorities in terms of budget allocations, and regularly reviews and outlines innovation related policies

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- Human resources for innovation
- New technology development and exploitation
- Regional revitalisation

Korea (OECD Reviews of Innovation Policy: Korea)

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Two super ministries have been formed to create better coherence in innovation policy
- Ministry of Education, Science and Technology (MEST) – which is responsible for the public science base and education
- Ministry of Knowledge Economy (MKE) – which is responsible for industrial technology and cluster policy

2. Horizontal Coherence Mechanism

- An important challenge for the Korean government is to improve coordination among the many ministries and agencies with a stake in innovation
- National Science and Technology Council exercises a coordinating role
- An important challenge for the Korean innovation system is to improve he coordination amongst the many ministries and agencies in innovation.
- MEST – policies and programme for all science and technology policies – MEST has two wings – one dedicated to the education system and the other to science and technology – each headed by its own vice-minister
- MKE – has put in place a number of strategies to enhance the development and commercialisation of advanced technologies as part of its industry policy

3. Vertical Agencies

- Three (previously five) research councils are designed to provide vertical lines of control and accountability

4. Vertical Coherence Mechanism

- Potentially, vertical coherence can be improved by reorganising the research councils along disciplinary lines or by consolidating them into one research council

5. Stakeholder Involvement Mechanism

- As Korea science and technology moves towards knowledge frontiers it takes on new responsibilities and challenges that will require a dialogue with society
- This should be embodied in a new form of participatory governance, in which scientists and governments engage in a genuine dialogue with citizens in science and technology developments.

6. Business Involvement Mechanism

- The Korean government provides generous tax credits to firms that conduct R&D
- More than 50% of government research spending in the public sector is directed at industrial development – one of the highest levels in the OECD.

- The government is also active in implementing programmes that deal with a broader range of innovation issues, such as venture financing, skills development, industry-academic collaboration, and cluster agglomeration.

7. Mobilisation of Broad Spectrum of Actors

- There is a strong commitment from successive governments and a national consensus on the importance of technological progress for economic development

8. Dominant Public Research organisations (uni or PRI)

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

- Lack of understanding government research institutes and universities inhibit development of linkages
- With a few notable exceptions, universities are comprehensive rather than specialised.
- Many higher education institutes are now increasingly working with firms and local governments on the redesign of curricula and all should be encouraged to do so.

10. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- Vision 2025 Development of Science and Technology – includes provision for the formulation of mid and long-term strategies
- It is the legal basis for inter-ministerial coordination of science and technology policies
- Based on the Framework Law under the Vision, Science and Technology Policies have been formulated
- The first had five policy goals with 14 strategic targets
- Other plans are targeted at specific parts of the innovation system
- In addition, several roadmaps have been drawn up that further operationalise this vision

2. NIS View

- While the NIS concept has been adapted to frame Korea's innovation policy, many policies and programmes remain mission-oriented.
- Need to shift NIS model away from catch-up mode to a more creative mode by supporting more fundamental research in diverse domains.

3. Strategic Approach to Innovation Policy (M&E)

- There appears to be a degree of lock-in in Korean R&D, as evidenced by the large role played by ICT and physical engineering in research specialisation and scientific publication
- This situation is aligned with and contributes to Korea's current industrial strengths.

- However, Korea needs to diversify its competitive advantage through investments in new knowledge-intensive fields with high-growth potential

4. Positioning STI Policy in a Global Context

- Very little R&D carried out in Korea is financed from abroad, linkages between foreign firms and institutions are relatively weak and relatively few foreign students come to Korea. This suggests that Korea could improve its exploitation of global knowledge stocks.

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- Unique geopolitical position between two superpowers
- Continuing division of the Korean peninsula influences psyche and creates a sense of independence
- Korea has few natural resources and is heavily dependent on imports

C Main Innovation Policy Challenges

- The main strategic task for innovation policy is to achieve convergence with the more advanced OECD nations.
- Therefore Korean innovation policy needs to accelerate the shift of the innovation system away from a catch-up mode to a more creative model.

Netherlands

A Structural Division of Labour/Policy Domain

1. Federal or State Governance Bias

- Federal Bias.

2. Horizontal Agencies (main)

- Ministry of Economic Affairs (EZ) - industry
- Ministry of Science, Culture and Education (OCW) – science, research and education

3. Horizontal Coherence Mechanism

- Inter-departmental Knowledge and Innovation programme department where all ministries collaborate on joint issues in innovation policy, but more coherence needed as two distinct governance cultures have arisen
- Several independent (some ad hoc) advisory bodies

4. Vertical Agencies

- Two main delivery agencies
- Delivery agency SenterNoven (now called Agency for International Business and Cooperation) advices on policy development and instruments, design of policy instruments, etc.
- Delivery agency NWO allocates resource for knowledge dissemination and research for benefit of society

5. Vertical Coherence Mechanism

- Closer alignment of innovation agency SenterNoven and Min of Econ Affairs

6. Stakeholder Involvement Mechanism

- Some private public consortia manage research funding

7. Business Involvement Mechanism

- Other private sector organisation also influence policymaking

8. Mobilisation of Broad Spectrum of Actors

- A higher level of political commitment to increase investment is needed plus stronger sense of urgency an closer coordination at highest political level

9. Dominant Public Research organisations (uni or PRI)

- No info refer policy mix data

10. Strategic Mission of Universities or Public Research Institutes (strong or weak)

- Weak, universities need more strategic direction

11. Dominant Business R&D performers (large or small or foreign firms)

- large
- considerable foreign financing of R&D

B Capabilities

1. Vision

- Long-term strategy for knowledge and innovation (2008)

2. NIS View

- Based on proper systemic analysis of strengths and weaknesses

3. Strategic Approach to Innovation Policy (M&E)

- SenterNovem's activities include evaluation and measurement of effects of policy

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

- Annual budget of Ministry of Economic Aff, plus many strategy documents for higher education, research and science policy, sustainable productivity etc.

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Challenges

- Raise number of innovative SMEs
- Make Netherlands attractive to foreign R&D-intensive firms
- Create an excellent climate for learning and research to retina skilled people
- Improve coordination, cohesion and continuity in policy design and implementation

New Zealand (at time of OECD Review 2007)

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Ministry of Research, Science and Technology (MoRST) –science and technological progress
- Ministry of Economic Development (MED) - industry support development
- Ministry of Education (MoE) – tertiary education and tertiary research

2. Horizontal Coherence Mechanism

- Cross-ministry teams and working groups in the development of overall government policies
- Guidance from strategies formulated in each ministry – various science strategies, economic transformation agenda; tertiary education strategy
- OECD Review 2007 – a fragmented system of government support to R&D and innovation, combined with a lack of coherence across the full range of innovation-related policies

3. Vertical Agencies

- Foundation for Research, Science and technology (FRST) –applied science and technological progress
- Marsden Fund Council (basic research)
- Health Research Council (health research)
- New Zealand Trade and Enterprise (business development and export support)
- Tertiary Education Commission (delivery of a performance based research fund to tertiary education institutes (TEI))

4. Vertical Coherence Mechanism

- Top-down high-level priority setting by ministries with funding agencies having significant discretion to develop portfolios of research
- OECD Review 2007 – too strict an application of new public management principles that has resulted in time-consuming vertical relationships imposed by the "purchaser-provider model" at the expense of horizontal coordination
- As at November 2010, a new ministry being the Ministry of Science and Innovation will be formed and will replace both MoRST and FRST. This is designed, in part to improve vertical coherence – clarity of priority setting responsibilities and clarity of directions about priorities for investment.
- The government is implementing the recommendations of the CRI taskforce report and is establishing policies to provide greater involvement of the public research institutes (the Crown Research Institutes (CRIs)) in setting research priorities at the programme level

5. Stakeholder Involvement Mechanism

- OECD Review 2007 - Funding agencies undertake appropriate consultations.
- OECD Review 2007 - Many stakeholders do not understand the terminology and find the complexity f the support system and its changes difficult to follow
- In recent years to 2010, the government has developed a number of roadmaps for science investment in consultation with diverse stakeholders

6. Business Involvement Mechanism

- OECD Review (2007) – New Zealand's strong public sector research is well-placed to assist industry and there are examples of public research organisations' very effective contribution to industrial innovation
- OECD Review 2007 - Finding suitable research and business partners is a significant problem for universities and CRIs
- OECD Review - Research consortia programmes and technology for business growth scheme support industry-science linkages
- OECD Review - All New Zealand universities have an office or company charged with managing intellectual property and contract research
- A business-government liaison group has been established as the Commercialising Research Advisory Group.

7. Mobilisation of Broad Spectrum of Actors

- At the time of the 2007 OECD Review, the Prime Minister was advised at a high-level by a Growth and Innovation Advisory Board, which itself had no decision-making authority
- As at 2010 Ministers, including the Prime Minster, have demonstrated strong commitment to science and innovation.
- As at 2010 – A Chief Science Adviser reports directly to the Prime Minster on current science issues.

8. Dominant Public Research organisations (uni or PRI)

- Expenditure data indicate that investment targeted at higher education approximately matches that of investment in public research institutes

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

- OECD Review - Competitive funding environment creates uncertainty for long-term research programmes of CRIs (crown research institutes)
- OECD Review - CRIs should be provided with more non-contestable core funding
- OECD Review - CRIs should be provided with a proper statement of mission statements, objectives and performance indicators
- OECD Review - These should be used as a basis for regular evaluations of the CRIs' performance
- As at 2010, Stable Funding Environment policy established to reduce the proportion of contestable funding
- As at 2010, government implementing recommendations of CRI taskforce to address recommendations of OECD Review (above)

10. Dominant Business R&D performers (large or small or foreign firms)

Large , medium sized firms

B Capabilities

1. Vision

- OECD Review 2007 - in recent years New Zealand has developed a number of sectoral strategies in which science and innovation are expected to contribute to policy goals
- As at 2010, science and innovation policy is guided by government priorities, especially government priorities for economic growth
- Prime Minister and Cabinet Ministers acknowledge the importance of science and innovation in being a key driver of economic growth

2. NIS View

- New Zealand interacts with OECD forums and is guided by the policy advice from the OECD on matters of science, technology and innovation. This includes the 2010 OECD Innovation Strategy
- OECD Review 2007 - The various strategies all address issues of particular importance to New Zealand. However, it is noteworthy that they do not cover important sectors of the economy, such as manufacturing and services.
- As at 2010, government priorities have become more targeted at more specific and tangible outcomes than previously, and less on systemic outcomes for the innovation system

3. Strategic Approach to Innovation Policy (M&E)

- OECD Review 2007 - Need to adopt a more systematic approach to ex ante appraisal and monitoring and ex post evaluation of researchers, research institutions and public policy programmes
- As at 2010, many of recommendations of CRI taskforce that are being implemented call for improved ex ante evaluation of programmes together with better evaluation of performance of institutions for non-financial as well as financial outcomes

4. Positioning STI Policy in a Global Context

- New Zealand has a number of science and technology cooperation with many nations
- The government has a number of science counsellors in major capitals to enable better linkage of researchers with international counterparts

5. Priority Setting Processes

- The government regularly consults stakeholders on high-level priority setting
- As at 2010 a new set of priorities for research and science funding has been established

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- Historic major role played by exploitation of natural resources to produce exports
- Recent development of exports from tourism, agro-food biotechnology and the making of films
- In the past two decades New Zealand has undergone a far-reaching process of economic reform.
- A solid macroeconomic framework with well-functioning markets including a flexible and responsive labour market and a generally favourable business environment, have created the necessary conditions for economic growth.

C Main Innovation Policy Challenges

- Greater exploitation of value-adding innovation in the primary and associated sectors
- Continued and more extensive exploitation of the opportunities for innovation to raise productivity and growth in emerging industries
- More efficient exploitation of New Zealand's environmental advantage
- Improvement of international connectivity and access to global innovation networks

Norway

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- The Storting (Norwegian Parliament) is the highest political authority for innovation policy. It has no single forum focusing exclusively on innovation policy issues. Such issues are dealt with in several Parliamentary Committees.
- At government level three ministries in particular play a key role in the development of national innovation policies
- The Ministry of Trade and Industry (MTI)
- The Ministry of Education and Research (MER)
- The Ministry of Local Government and Regional Development (MLG)

2. Horizontal Coherence Mechanism

- Coordination of sector innovation policies is the responsibility of the Ministry of Trade and Industry
- Coordination of sector R&D policies is the responsibility of the Ministry of Education and Research
- OECD addresses the issue of "the fragmented governance system", pointing to the needs "to reinforce the institutional mechanisms for discussing and strategising about research and innovation policy and setting broad directions" (p167).

3. Vertical Agencies

- Research Council of Norway (RCN) (under MER) – promotes basic and applied research within all scientific and technological areas
- Innovation Norway (IN) (under (MTI and MLG) – administers and develops business-oriented policy instruments – organised as a state owned company
- Industrial Development Corporation of Norway (SIVA) – a network organisation which offers an infrastructure for entrepreneurship and innovation nationwide
- Vertical Coherence Mechanism

4. Stakeholder Involvement Mechanism

- The active involvement and collaboration of social partners – labour, industry and government – is a key structural characteristic of the policy process in economic and industrial policy ("the Nordic model") and these procedures apply in innovation policy as well.

5. Business Involvement Mechanism

- The Norwegian policy measures address all aspects of innovation including development/prototype creation, diffusion of technology in enterprises, applied industrial research, awareness raising amongst firms about innovation as well as other aspects.
- The FORNY programme is the main policy instrument for supporting commercialisation of publicly funded research. A recent evaluation concluded that the

programme has not seen to have struck an appropriate balance between putting a lot of resources into a few spin-offs expected to have significant growth on the one hand, and spreading resources to support the creation of a large number of companies on the other.

6. Mobilisation of Broad Spectrum of Actors

7. Dominant Public Research organisations (uni or PRI)

8. Strategic Mission of Universities or Public Research Institutes (strong or weak)

9. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- 2008 white paper – An Innovative and Sustainable Norway – the first comprehensive innovation policy document that a Norwegian government has published for discussion in the Storting (Norwegian Parliament)

2. NIS View

- OECD Review 2008 – Norway is, in comparison with other countries and in addition to what is available in the international research market, well-provided with national sources of strategic intelligence on the research and innovation system."
- OECD Review 2008 –Norway has supportive framework conditions for innovation and Norway has a fairly complete set of instruments to support research and innovation
- The White paper – An Innovative and Sustainable Norway adopts the concept of "innovation systems" using it in a very wide sense.
- The White paper is based on a very wide definition of innovation

3. Strategic Approach to Innovation Policy (M&E)

- All three main delivery agencies are subject to extensive evaluations
- The OECD evaluation indicates that an alternative "preferable approach" to the current prevailing focus on aggregate quantitative targets of R&D expenditure, is to put qualitative "mobilising goals" at the centre of STI policy (ie common goals supported by a broad social consensus).
- By emphasising the cross-sectoral and systemic scope of innovation policy, the White Paper encompasses policy objectives within several areas.
- A key and recurring formulation of the government's framing of the overall goals of its innovation policy is the following: "a holistic and effective innovation policy

depends on seeing the various areas that influence innovative capability as being inter-connected."

4. Positioning STI Policy in a Global Context

- The White Paper frames the challenges and globalisation in terms that emphasise opportunities rather than threats, noting that "Norwegian industries are well accustomed to international division of work, and to adapting to the effects of international competition."

5. Priority Setting Processes

- The innovation strategy focuses on a number of specific economic sectors where Norway is seen to have competitive advantages - marine sector; maritime sector; tourism; environmental technologies; services.

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- The Nordic model of collaboration see "stakeholder involvement" above)
- Norway derives significant revenue from resource based industries including oil and gas production
- However, the mainland economy (national economy, oil and gas revenue excluded) remains very strong and companies within this sector are generally knowledge intensive, making extensive use of advanced knowledge, technology and machinery

C Main Innovation Policy Challenges

- OECD Review indicates that the major overall challenge of Norwegian innovation policy is: to add momentum to the shift towards a more knowledge-based economy. This is recognised by the White paper, and that objective may be seen to be reflected in a large number of its discussions and its priorities.

Portugal

A Structural Division of Labour/Policy Domain

1. Federal or State Governance Bias

- Federal

10. Horizontal Agencies (main)

- Ministry of Economy and Innovation (Mecl) - enterprise
- Ministry for Science technology and Higher Education (MCTES) – research and higher education

2. Horizontal Coherence Mechanism

- MCTES defines research direction, assigns funds, promotes internationalisation, and evaluates research organisations performance
- Mecl develops enterprise policy
- Still some divide exists between two agencies
- Coordination needs to be improved on policy design, inter-measure relationships and national-regional responsibilities
- Differences of perspectives and tensions still exist among these and other ministries
- There are few integration devices to promote dialogue

3. Vertical Agencies

- IAPMEI under Mecl supports large firms and SMEs
- FCT is the main agency under MCTES – acts as research council, assigns funds for research and education and performs evaluation
- Adl – the Innovation Agency is a joint venture between Mecl and MCTES to promote innovation – main role is on bridging universities and industry

4. Vertical Coherence Mechanism

- FCT plays a dominant role in allocation of funds which is not conducive to promoting diversity in the science system
- Lack of strategic thinking about funds allocation
- Limited involvement of stakeholders in policy design

5. Stakeholder Involvement Mechanism

- Main weakness of NIS is low density and depth of linkages between players in the system

6. Business Involvement Mechanism

7. Mobilisation of Broad Spectrum of Actors

- Wide spectrum of players

8. Dominant Public Research organisations (uni or PRI)

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

10. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- Technology Plan - knowledge, technology and innovation – the basic document on innovation policy
- (wider) National Strategic Reference Framework (not policy, just a framework) – human potential, territorial enhancement, competitiveness factors

2. NIS View

- NIS approach is followed where policy measures are designed to respond both market and systemic failures.

3. Strategic Approach to Innovation Policy (M&E)

- EC processes have led to the beginnings of an evaluation culture
- Insufficient policy evaluation activity

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

- Priority selection is not based on consistent strategic intelligence approach – very limited mechanisms for collecting and analysing information as well as for eliciting contributions from stakeholders

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

- very high share of SMEs
- Portugal is not a regionalised country

C Main Innovation Policy Challenges

- strengthening human capabilities particularly at graduate and undergraduate level
- promote employment in knowledge intensive activities
- strengthen SME in-house capabilities
- develop cluster policy further
- improve policy coordination, delivery and medium term consistency

Slovenia

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Ministry of the Economy – with advisory bodies – for entrepreneurship and innovation activity of businesses, especially SMEs
- Ministry of Higher Education, Science and Technology – promoting R&D and technology development of businesses

2. Horizontal Coherence Mechanism

- Overall coordination of research and development and innovation policies is led by Office for Growth
- In spite of formal entities for coordination- still deficiencies in overall coordination of strategic policies and priorities
- Need for complementarity between measures for business R&D and measures for public R&D

3. Vertical Agencies

- delivery agencies implement policies under both main Ministries which have decided on the division of tasks for these
- including SRA focuses on financing long-term research programmes
- including TIA allocates new resources for business R&D.

4. Vertical Coherence Mechanism

- While NIS is comprehensive, many programmes are unknown to businesses and are administratively very demanding.

5. Stakeholder Involvement Mechanism

- National Science and Technology Council – advisory body to Government on R&D, and has members from research, industry
- Competitiveness Council seeks to improve coordination among government, researchers and firms in the area of policy development for technology development
- Competitiveness Council has 10 development groups, each with 16 members, representatives of the research and higher education sector and the business sector.

6. Business Involvement Mechanism

- complex and numerous programmes – nine regional technology centres; 15 technology and innovation hubs; at least 10 subjects of innovative environment and ten centres of excellence and support for sixteen technology platforms

7. Mobilisation of Broad Spectrum of Actors

8. Dominant Public Research organisations (uni or PRI)

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

10. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- Slovenian Development Strategy
- National Research and Development Programme
- Other national plans

2. NIS View

- Long-term policy documents are seen as adequately addressing the challenges of research, development and innovation
- R&D seen as a key input to increased competitiveness and economic growth
- more attention should be given to coordinating the diverse programmes in a coherent and transparent manner

3. Strategic Approach to Innovation Policy (M&E)

4. Positioning STI Policy in a Global Context

5. Priority Setting Processes

- complex system due to influence of establishing diverse policy measures observed in neighbour EU nations
- many of the policy instruments are co-funded with EC "Structural Funds"

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- maintain level of R&D investment in both public and private sector
- better coordination and transparency of the innovation support network for SMEs
- low innovation activity of SMEs

Sweden

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- Relatively small ministries
- Ministry of Enterprise, Energy and Communications –handles most innovation policy issues
- Ministry for research and Education – handles most issues concerning universities, the backbone of public-funded R&D in Sweden
- Swedish Research Council – funds curiosity-driven research

2. Horizontal Coherence Mechanism

- horizontal coherence – the OECD MONIT case study observed that the view of what innovation policy is, and the interpretations of its importance differ widely even within the same ministry

3. Vertical Agencies

- functions held by ministries in other countries fall under the responsibility of government agencies in Sweden
- VINNOVA – Swedish Government Agency for Innovation Systems – executes innovation policy on a national level through financing of needs driven research, development and demonstration as well as strengthening networks that are a necessary part of innovation activities.

4. Vertical Coherence Mechanism

5. Stakeholder Involvement Mechanism

6. Business Involvement Mechanism

- Responsibility for executing policy concerning business development is distributed among several actors.
- The Innovation Bridge handles commercialisation of research and provides (limited) pre-seed funding.
- ALMI Business Partner supports the creation of (non-R&D) businesses
- The Industrial Fund is a public venture capital investor
- Invest in Sweden Agency promotes inward investment

7. Mobilisation of Broad Spectrum of Actors

8. Dominant Public Research organisations (uni or PRI)

- Strong university research system

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)

- Under Research and Innovation Bill 2008, new funding for university research will be allocated based on a new quality assessment system, and one third of the new funding will be allocated to a number of strategic areas, based on a competitive process
- Innovation offices will be set up at a number of higher education institutes for commercialisation. The so-called third task of universities, cooperation with industry and society, should be seen as an integrated part of teaching and research, and not as a separate activity.
- The institute sector is also to be strengthened, although this atrts fom a historically low level. The government stake in industrial research institutes has been consolidated, with the ambition to develop the current structure dominated by small sector-focussed institutes into stronger and larger institute blocks with the potential of becoming internationally competitive.

10. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- Sweden does not have an explicit innovation policy. Most policy measures which directly address innovation fall under either the research policy budget umbrella or the enterprise policy budget umbrella while many framework conditions are set under other policy areas.

2. NIS View

- According to Lundvall's analysis, it appears as if VINNOVA's programmes are inspired more by triple-helix and Porter's cluster analysis than by innovation system theory.
- Sweden's science and innovation system and its governance structure have been shaped to a large extent by history. Interaction between public sector users and private industry has accounted for a major share of the impressive growth of large firms and private R&D spending in Sweden. Strong infrastructure investments by the government in the post-war years contributed to close relations between Swedish public utilities and manufacturing firms, sometimes including joint long-term research and development.
- This experience also led to a strong political belief that only large firms had the capacity to invest enough in R&D.
- The success of big business also meant that there has been little apparent need for innovation policy, which may explain the strong hold the linear model retains in the Swedish debate.

3. Strategic Approach to Innovation Policy (M&E)

4. Positioning STI Policy in a Global Context

- Globalisation is recognised to have a strong impact on Sweden, because of its historical reliance on a small number of highly successful “flagship” industries.

5. Priority Setting Processes

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- Strong dependence on a small number of large globalised firms
- Dealing with the impact of the GFC, in particular uncertainty about the viability of the auto industry
- Lack of policies for supporting non-technological forms of innovation, innovation in services, etc.

Switzerland

A Structural Division of Labour/Policy Domain

1. Horizontal Agencies (main)

- State Secretariat for Education and Research (SER) – in charge of general education and research policy
- Federal Office for Professional Education and Technology (OPET) – is responsible for professional education and innovation policy

2. Horizontal Coherence Mechanism

- Some potential for disharmony is given on the level of the ministries
- There are some bridging institutions
- EDK (Swiss Conference of Cantonal Ministers of Education) which coordinates the cantonal universities

3. Vertical Agencies

- Swiss National Science Foundation (SNSF) – implements research policy
- Innovation Promotion Agency (KTI/CTI) – implements innovation policy

4. Vertical Coherence Mechanism

- Due to this clear split of responsibilities (above) and the dominating role of the bottom-up approach, there is very little friction and conflict between the implementing agencies

5. Stakeholder Involvement Mechanism

- Dominating role of bottom-up consensus in policy development

6. Business Involvement Mechanism

- In recent years KTI/CTI has taken several actions that intend to foster entrepreneurship in Switzerland
- Among the most important non-financial innovation policy measures are Venturelab and CTI Start-up, both of which intend to foster entrepreneurship

7. Mobilisation of Broad Spectrum of Actors

8. Dominant Public Research organisations (uni or PRI)
    - Strong university bias

9. Strategic Mission of Universities or Public Research Institutes (strong or weak)
    - Weak – universities are focussed on basic research

10. Dominant Business R&D performers (large or small or foreign firms)

B Capabilities

1. Vision

- Statement to the Promotion of Education, Research and Innovation 2008-2011 – the government's proposal to Parliament for a four-year plan for education, research and technology at the federal level
- A number of associated medium-term plans exist also

2. NIS View

- Swiss innovation policy focuses on the improvement of framework conditions rather than on direct innovation policy interventions (through, for example direct R&D funding to private businesses.
- Loosely speaking, the Swiss position is that innovation and competitiveness are the business of the private sector
- Hence the role of innovation policy is relatively small

3. Strategic Approach to Innovation Policy (M&E)

4. Positioning STI Policy in a Global Context

- The Swiss economy is a small open economy with a large GDP share of exports and imports and substantial international investment flows.
- From a longer term perspective, the development of trade in knowledge-intensive goods and services is of prime interest, in particular from the point of view of innovation policy.

5. Priority Setting Processes

- Long-term research agenda is the most important target (60% of budget) followed by policy measures concerning excellence of research in universities (19%)
- It is not the production of "radical" innovations that characterises the Swiss innovation system, but the ability to rapidly and efficiently absorb and further develop new knowledge to create significant incremental innovations.

6. Guidance for the Whole System

7. Socio-Economic and Cultural Biases

C Main Innovation Policy Challenges

- Further development of framework conditions
- Internationalisation of the innovation system
- Development of human capital

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