PRO INNO EUROPE
INNO POLICY TRENDCHART

European Innovation Progress Report 2008

European Commission
Enterprise and Industry

Foreword

The present report was prepared by Lena Tsipouri (University of Athens, Greece) and Alasdair Reid and Michal Miedzinski (Technopolis Group, Belgium). Jacek Walendowski and Viola Peter (both Technopolis Group) supported on the analysis of the policy measure database. This European-level report is based on the work of the TrendChart policy monitoring network of national correspondents to whom recognition is due.

The content and views expressed in this report do not necessarily reflect the opinions or policies of the Member States or the European Commission.

European Innovation Progress Report 2008

"Top Performance is not a Coincidence"

INNO POLICY TRENDCHART

Table of Contents

LIST OF FIGURES

ABBREVIATIONS

ANVAR: Agence Nationale de Valorisation de la Recherche (National Agency for Research Exploitation)
AWS: Austria Wirtschaftsservice GmbH (Austrian Economic Services Ltd.)
AWT: Dutch Advisory Council of Science and Technology Policy
BBT: Federal Office for Professional Education and Technology
BBW: Federal Office for Education and Sciences
BDPME: Banque du Développement des Petites et Moyennes Entreprises (French Bank for SME Development)
BERD: Business Expenditures in Research & Development
BERR: Department for Business, Enterprise and Regulatory Reform
BMBF: Federal Ministry for Education and Research
BMUKK: Ministry for Education, the Arts and Culture
BMWA: Federal Ministry of the Economy
BMWF: Ministry for Science and Research
BSI: British Standards Institution
CEECs: Central and Eastern European Countries
CEKI: Committee for Economy, Innovation and Innovation
CIPE: Comitato Interministeriale per la Programmazione Economica (Interministerial Committee for Economic Programming)
CIS: Community Innovation Survey
CRUS: Rectors Conference of the Swiss Universities
CSF: Community Support Framework
CWTI: Committee on Science, Technology and Information Policy
DfES: Department for Education and Skills
DGE General Directorate for Enterprise
DIUS: Department for Innovation, Universities and Skills
DSCF: Department for Schools, Colleges and Families
DTI: Department for Trade and Industry
EDK: Swiss Conference of Cantonal Ministers of Education
EIPR: European Innovation Progress Report
EIRIPM: European Inventory of Research and Innovation Policy Measures
EIS: European Innovation Scoreboard
ERA: European Research Area
EZ: Ministry of Economic Affairs
FDI: Foreign Direct Investment
FGG: Finanzierungsgaraniegesellschaft (Austrian Funding Warranty)
FORFAS: Irish National Policy Advisory Board
GWF: Swiss Science Agency
HEIs: Higher Education Institutes
HSRT: Human Resources in Science and Technology
HSTC: High Council for Science and Technology
ICT: Information and Communication Technologies
IDA: Irish Development Authority

IP: Intellectual Property
IPR: Intellectual Property Rights
ITPS: Swedish Institute for Growth Policy Studies
K&I: Knowledge and Innovation
KTI/CTI: Innovation Promotion Agency
LOLF: Organic Law on Public Accounts
MAP: Ministry of Productive Activities
MAPs: Multi-Actor, Multi-Measure Programmes
MCYT: Ministry of Science and Technology
MEAC: Ministry of Economic Affairs and Communications
MEC: Ministry of Education and Science
MER: Ministry of Education and Research
MIT: Ministry for Innovation and Technology
MITYC: Ministry of Industry, Tourism and Trade
MIUR: Ministry of Education, University and Research
NASR: National Authority for Scientific Research
NESTA: National Endowment for Science, Technology and the Arts
NISTEP: National Institute of Science and Technology Policy
NRP: National Reform Plans
NTBF: New Technology-based firms
OCS: Office of the Chief Scientist
OCW: Ministry of Education, Culture and Science
OECD: Organisation for Economic Cooperation and Development
OMB: Office of Management and Budget
OSI: Office of Science and Innovation
PPA: Pret participatif a l'amorcage
R&D: Research & Development
RDC: Research & Development Council
REKI: Council for Economy, Knowledge and Innovation
ReNITT: National Technology Transfer and Innovation Network
RTD: Research and Technological Development
RTDI: Research, Technological Development and Innovation
RWTI: Council for Science, Technology and Information Policy
S&T: Science & Technology
SII: Science and Innovation Index
SMEs: Small and Medium-size Enterprises
SOFARIS: Société française de garantie des financements des PME (French Agency for SME warranties funding)
STPC: Strategic Training and Policy Communications Programme
SWTR: Swiss Science and Technology Council
TAFTIE: The Association for Technology Implementation in Europe
TEKES: Finnish Funding Agency for Technology and Innovation
TSB: Technology Strategy Board

TUBITAK: The Scientific and Technological Research Council of Turkey
UNDP: United Nations Development Programme
VC: Venture Capital

Executive Summary

The INNO-Policy TrendChart (previously TrendChart on Innovation), has been running since January 2000. Since early 2007 the project has been 're-branded' as part of the wider family of PRO INNO Europe projects offering a combined package of policy analysis, learning and development to policy makers in the European Union (EU) and associated countries. The main aim of the project still remains to track innovation policy developments in all 27 EU Member States, and 12 more countries (Iceland, Norway, Switzerland, Croatia, Turkey, Israel, Brazil, Canada, China, Japan, USA and India)[1] comprising the Network of National Correspondents.

The main objective of the INNO-Policy TrendChart exercise is to improve understanding at European level of how EU Member States design and deliver innovation policy in response to specific challenges inherent in their national innovation systems. The European Innovation Progress Report (EIPR) provides a synthesis of the work undertaken by the INNO-Policy TrendChart Network of national innovation experts during 2008.

Innovation policy: trends and challenges

Each year since 2006, the INNO-Policy TrendChart correspondents have identified and defined the three key challenges facing innovation policy in their country. The challenges are identified on the basis of a number of elements, with an initial input being the latest available comparative results of the European Innovation Scoreboard (EIS). The challenges identified may not match those of official national policy documents, as correspondents may decide that certain challenges are not well identified in policy statements, or adjust the prioritisation of challenges. Finally, it should be underlined that, logically given the time it can take for policy measures to take effect or major failures in the innovation system to be corrected, challenges do not necessarily change from year to year.

The previous EIPR (2006)[2] set out an analysis of key challenges facing the EU countries based on the strengths and weaknesses identified by the EIS. This approach, while assisting in highlighting what countries were doing to overcome specific weaknesses in innovation performance, tended to reinforce a focus on one or two key indicators rather than encouraging an identification of the roots of the under-performance.

This year's report analyses challenges and policy response from the perspective of a typology of failures in innovation systems (market, capability, institutional, network, framework, and policy failures, see section 1.2.3) with the aim to shed new light on the relevance of innovation policy objectives and responses in the EU-27 Member States.

The analysis suggests that institutional and framework failures are given more emphasis in innovation challenges than they are currently present in the actual innovation policy mix. The fact that these challenges have been constantly repeated in many countries over

[1] See: http://www.proinno-europe.eu
[2] See: http://www.proinno-europe.eu/docs/Reports/Documents/EIPR2006-final.pdf

time suggests that there is a need to understand them better and, if needed, adapt policy responses accordingly.

The comparison of innovation policy at the level of EIS country groups (innovation leaders, innovation followers, moderate innovators and catching up countries, see section 1.2.4) reveals differences both in their perceptions of challenges and their approach to policy design and targeting. The differences are even larger when one focuses on the recently introduced measures. The three key messages of this analysis of the policy challenges and responses (policy measures) of the EU-27 Member States are as follows:

Challenges for innovation policy (see section 1.3) differ across the Member States depending on the level of economic development, performance of their innovation systems and the 'maturity' of innovation policies. While challenges addressing 'capability failures' are the most dominant for the EU-27 as a whole, the Member States in the 'innovation leaders' group give much more emphasis to framework failures. This does not imply that the leaders have weaker frameworks for innovation, but rather a shift to a broader understanding of innovation drivers in their economies.

Concerning the policy-mix and the extent to which it targets specific market or innovation system failures (see section 1.4), the moderate innovators and catching-up countries give much more emphasis to direct support to companies ('capability failures'), including advisory services and technology diffusion; while the policy-mix in the more advanced countries gives much more emphasis to network failures (possibly reflecting the earlier shift to clusters and joint industry-academia research and development (R&D) cooperation programmes).

In terms of the correspondence between challenges and the policy response, it appears that while catching-up countries and moderate innovators recognise that they face significant 'institutional failures', the policy response in these countries with respect to this type of challenge remains rather limited.

Since the analysis is based on the number of measures rather than budgets for innovation policy measures, low numbers of new measures in the innovation leaders and followers should not be taken as a sign of generally lower policy activity, but rather as an accumulation effect; a stock of existing measures being currently implemented. Moreover, advanced countries tend to introduce a smaller number of larger more complex support measures. Hence, a future analysis, to be undertaken by the end of 2009, will overcome this limitation by refining the data on the budget of the measures.

Innovation Governance

The main lessons in terms of governance, coming from top performers, is that they are all doing very well in terms of gathering evidence and using it as policy input. They invest both in the physical and human resources needed for that. They also consult with stakeholders effectively. However, there seems to be a general dissatisfaction (except for Germany) regarding coordination mechanisms which have recently been reshaped to face increasing globalisation challenges. A common element in these reorganisation arrangements is an increasing emphasis on the autonomy (institutional or regional) of higher education and commitment to its excellence.

On the other hand, the distribution of power among ministries and the overall size of government differ from the directions of change. Academic literature has been quite critical to almost all of these changes, implying that stronger organisations discourage others from doing an effective job. Nobody is unanimously recognised as having struck the balance optimally.

One lesson top performers can teach other countries is how to best organise their system: stability and quality of the administration have created the required trust for the systems to operate "well enough" even if certain areas of coordination suffer. In the top-performing countries there is experimentation and they are self-critical but there is an element of respect between the public and the private sector. This fine borderline between being critical in order to improve or being negative and frustrated makes a difference. Selective ideas on lessons from other countries improving elements of their innovation governance structures are also included in the report.

If the lessons learned are to be summarised in one sentence, then it is that both innovation governance and innovation policy are more than just powering money and creating organisations; they are about constantly investing in evidence, experimenting with policy, benefiting from learning and raising ambitions.

Future challenges for European Innovation Policy

Policy makers across the EU-27 Member States (and in candidate and associate countries) are currently faced with the compounded challenge of the global financial crisis and climate change (and, more broadly, 'limits' to growth imposed by resource depletion). If the call to promote 'innovation everywhere' was not heeded before, then surely the imperative to mobilise all financial and human resources behind innovative responses to sustain socioeconomic and environmental well-being is now self-evident. This will require policy makers to change their approach to and their methods of designing, implementing and evaluating innovation policy. Much has been written in recent years about 'innovation everywhere', 'third-generation innovation policies', 'society-driven innovation', 'user-driven innovation', 'hidden innovation', etc. Yet in reality, innovation policy thinking still needs to take a leap forward from the time when the sole role of public authorities in supporting innovation was to hand out grants (often tied up in the strings of a costly bureaucratic procedure) as a way of motivating enterprises to invest by 'sharing the risk' and over-coming 'market failures'.

The authors of a recent United Kingdom (UK) report on innovation and the global crisis suggest that a total innovation strategy needs to draw together public and private, social and commercial innovation and entrepreneurship to search for new markets and opportunities. In this way, the global downturn and climate change could create a new platform of growth if business entrepreneurs emerge to seize opportunities in new growth industries and social entrepreneurs address emerging social challenges.

Indeed, much of the policy message broadcast by the European Commission and Member States in recent years has been about the need to shift the focus in innovation policy from direct public funding of enterprises (state aid) to actions implemented by a partnership of public and private stakeholders seeking to boost demand for innovation (e.g., pre-commercial public procurement, green public procurement, etc.) and support, and

strengthen 'lead markets'. Yet, still more could be done to shift resources towards these new emerging opportunities and demand-driven type policies that tackle 'system failures' rather than short-term reactions to long-term structural shifts.

1 Innovation Policy in Europe

1.1 A Systems' View on Innovation Challenges and the Policy Mix

The INNO-Policy TrendChart, previously TrendChart on Innovation, has been running since January 2000. It currently tracks innovation policy developments in all 27 European Union (EU) Member States, plus Iceland, Norway, Switzerland, Croatia, Turkey, Israel, Brazil, Canada, China, Japan, USA and India.

Improving understanding at European level of how EU Member States design and deliver innovation policy in response to specific challenges inherent in their national innovation systems is at the core of the INNO-Policy TrendChart exercise. The previous European Innovation Progress Report (EIPR) (2006) set out an analysis of key challenges facing the EU countries based on the strengths and weaknesses identified by the European Innovation Scoreboard (EIS). This approach, while assisting in highlighting what specific countries were doing to overcome weaknesses in innovation performance, tended to reinforce a position whereby policy analysts and policy makers mechanistically focus on boosting performance of one or two key indicators (for instance, relatively low rates of business expenditure on R&D) rather than attempting to identify and tackle the roots of the under-performance.

The analysis that follows is a first attempt to analyse systemic failures of innovation systems on a large sample of countries. This section has the following five objectives:

- To test a new approach to cross-country comparative analysis of national innovation systems (NIS), based on the classification of country groups defined by the 2008 European Innovation Scoreboard (EIS);
- To classify key innovation challenges according to specific 'systemic failures';
- To review innovation policy measures in response to the identified failures;
- To identify trends in the EU-27 in terms of the mix of policy measures;
- To analyse the relevance of (newly introduced) measures in relation to the identified challenges.

The analysis covers the EU-27 Member States since the policy measure database for the other countries participating in the network is still being progressively developed.

1.2 Conceptual Framework and Method of Analysis

1.2.1 The process of defining innovation policy challenges

Each year since 2006, the INNO-Policy TrendChart correspondents have identified the three key challenges facing innovation policy in their country. The challenges are defined on the basis of a number of elements, with an initial building block being the latest comparative results for their country produced by the European Innovation Scoreboard (EIS). The country correspondents, as experts in innovation policy, are however encouraged to make use of other indicators available nationally (government white

papers, evaluations, studies or surveys, etc.) that may lead them to temper the EIS conclusions.

Secondly, it is important to underline that the challenges identified in the annual country reports may not match those of official policy documents or other strategic documents produced by stakeholders in the country. Indeed, the correspondents are encouraged to make a critical appraisal and may decide that certain challenges are not well identified in policy statements, or adjust the prioritisation of challenges.

Thirdly, it should be underlined that, logically, given the time it can take for policy measures to take effect or major failures in the innovation system to be corrected, challenges do not necessarily change from year to year. Between 2006 and 2007, country experts for 15 of the 27 EU Member States selected challenges for innovation policy which were either entirely or partly the same as the previous year[3].

Figure 1: Stylised challenges based on 2006 country reports

Stylised challenge	No of challenges
Improving quality and availability of knowledge workers	22
Increasing intensity of investment in innovation	17
Diversifying range and modes of innovation across business sectors	14
Building stronger public-private partnerships for innovation	11
Improving management and exploitation of intellectual property	7
Boosting availability of innovation finance for young innovative enterprises	6
Internationalising innovation potential	4

Source: TrendChart Country Reports for the EU-27, 2006, analysis by Technopolis Group

The "challenge" in analysing these challenges is to group or identify 'mega-challenges' common to a number of countries. The previous EIPR (2006) discussed challenges based on challenges linked closely to EIS indicators leading to an over-emphasis on 'investment' or input-type challenges linked to business or public expenditures on R&D. Similarly, based on an analysis of the 2006 country reports for the EU-27, seven stylised challenges were identified (
Figure 1) in an internal working paper of the INNO-Policy TrendChart project. This approach, while offering interesting pointers to policy responses to specific stylised challenges for a group of countries, still tended to reflect weaknesses in specific indicators rather than developing a more holistic view of the real sources of problems in innovation systems.

[3] Eight countries keeping the same three challenges as in 2006; five others keeping two out of three the same; and two countries keeping one challenge from the previous year.

1.2.2 Understanding policy priorities through the support measures database

The INNO-Policy TrendChart has tracked developments in innovation policy measures throughout Europe since 2000 (and indeed even earlier as a pilot action). An innovation policy measure is defined as any activity that mobilises:

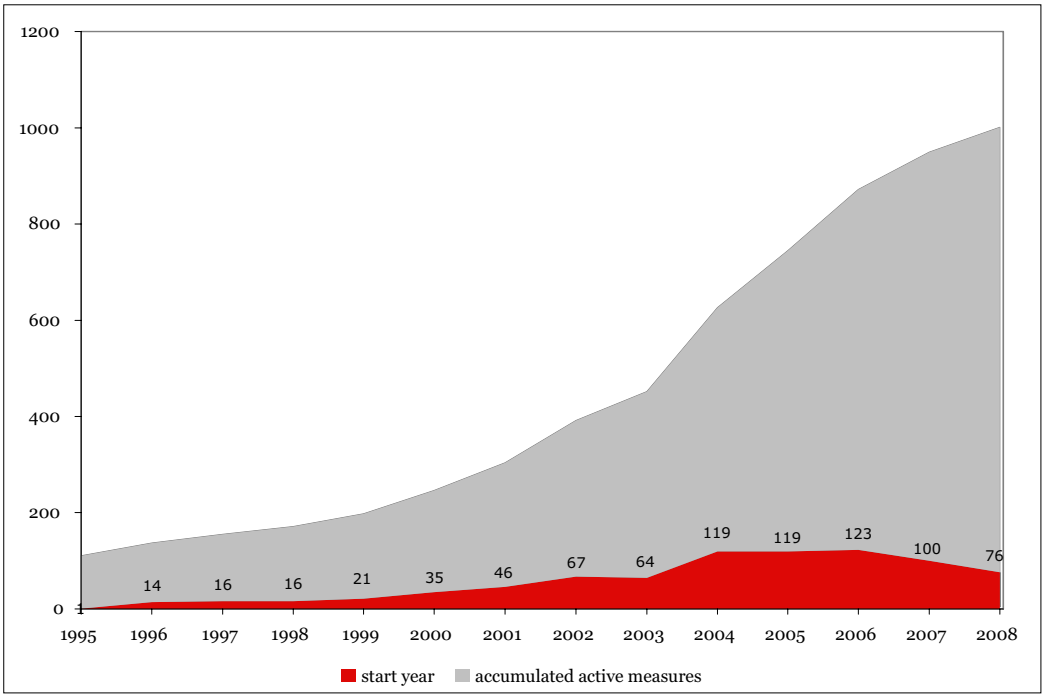
- resources (financial, human, organisational) through innovation orientated programmes and projects;
- information (road-mapping, technology diffusion activities, coordination) which is geared towards innovation activities;
- institutional processes (legal acts, regulatory rules) designed to explicitly influence environment for innovation.

A policy measure aims to achieve public policy objectives in the area of innovation:

- Through an allocation of (national) public funding;
- On an ongoing (multi-annual) basis (not a one-off 'event' or project);
- Where the target group (final beneficiaries) or organisation eligible for funding or support are enterprises.

By 2006, the INNO-Policy TrendChart database of policy measures had grown into a unique repository of information on innovation policy in an ever-expanding group of countries (initially the EU-15, now the database covers the EU-27 plus candidate and associate European countries as well as progressively non-European 'competitors'). The number of measures climbed steadily as more countries joined the policy monitoring exercise and as innovation policy grew in importance (notably as the Structural Funds began to offer financial resources in the 'new' Member States after 2004) (Figure 2).

Figure 2: Evolution of the support measures database



Source: TrendChart-ERAWATCH database of support measures; analysis Technopolis Group

Note: The numbers over the red area indicate the number of new support measures introduced to the TrendChart-ERAWATCH database in a given year. The grey area illustrates an accumulated number of measures. The chart includes only the measures that have not been archived by mid-December 2008. Building on this successful foundation, since 2007, the European Inventory of Research and Innovation Policy Measures (EIRIPM) has been created with the aim of facilitating access to research and innovation policies information within Europe and beyond. This joint inventory brings together national-level information on research and innovation policies, measures and programmes collected and presented by both INNO-Policy TrendChart and ERAWATCH. This information is collected and classified according to specific policy priorities as summarised in Figure 14.

The analysis that follows presents the frequencies (count of measures) and cross-tabulations for: the policy focus (policy priorities categorisation), market and systemic failures addressed (see section 1.2.3), target groups, sources of funding, thematic focus and aspects of innovation process addressed by the support measures. The time dimension is also addressed as the analysis compares recently introduced measures (2007 and 2008) to the overall innovation policy mix. The calculations are based on data downloaded from the TrendChart-ERAWATCH policy measures inventory on the 24th of November 2008.

An important proviso is that the analysed measures were not weighted according to the importance of their budgets. In order to make a future analysis more robust, efforts are being made to improve the data on the budgets in the EIRIPM database so to be able to introduce the weighting of measures based on their average annual budget to the analysis in the next EIPR.

1.2.3 Market and systemic failures

This report adopts a systemic approach to analysing rationale of public sector investments in innovation activities[4]. In this approach, the concept of market failure is not a sufficient explanation of why innovation systems under perform and why governments should intervene. **Market failure** occurs when market mechanisms are unable to secure long-term investments in innovation due to uncertainty, indivisibility and non-appropriateness of innovation process (Arrow, 1962). Typically, a market failure manifests itself in an insufficient allocation of funding for risky and innovative investments. In the field of innovation policy, the response to a perceived market failure is generally to provide 'direct' funding (grants, etc.) to enterprises in order to lessen the risk of longer term investments, or providing support for venture capital (VC) funds.

Beyond the market perspective, it has been argued that the analysis of innovation process also has to take into account key deficiencies of companies and failures in systems (Smith, 2000; Arnold, 2004). While not constituting the only conceptual categorisation enjoying acceptance, Arnold (2004) differentiates four **systemic failures**:

- **capability failures** – inadequacies in the ability of companies to act in their own best interests; for example, through managerial deficits, lack of technological understanding, learning ability or 'absorptive capacity';
- **failure in institutions**[5] – inadequacies in other relevant NIS actors such as universities, research institutes, patent offices and so on. Rigid disciplinary orientation in universities and consequent inability to adapt to changes in environment is an example of such a failure;
- **network failures** – problems in the interaction among actors in the innovation system such as inadequate amounts and quality of links, 'transition failures' and 'lock-in' failures (Smith, 2000) as well as problems in industry structure such as too intense competition or monopoly;
- **framework failures** – gaps and shortcomings of regulatory frameworks, intellectual property rights (IPR), health and safety rules, etc., as well as other background conditions, such as the consumer demand, culture and social values (Smith, 2000).

The support measures database also includes measures focused on improving policy-making capacity including activities such as policy advisory services or establishing consultative forums. It is argued that activities to enhance the policy process and to induce policy learning are a response to actual or potential policy failures. Hence, this analysis recognises **policy failure** as yet another systemic shortcoming in its own right.

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[4] Smith, K. (2000) Innovation as a Systemic Phenomenon: Rethinking the Role of Policy, Enterprise and Innovation Management Studies, Vol. 1 (1): 73-102.
Arnold, E. (2004) Evaluating research and innovation policy: a systems world needs systems evaluations, Research Evaluation, Vol. 13(1): 3-17.

[5] In the literature on national innovation system (NIS), the term institution is taken to means rules and routines such as the legal system, informal rules and their enforcement characteristics. The approach adopted here is to adopt the more conventional practice of making institutions synonymous to organisations.

This report uses the concept of market and systemic failures as a conceptual framework for innovation policy analysis. The six types of failures do not constitute a strict categorisation and may overlap or prove difficult to interpret. Indeed, policy challenges and measures often address more than one failure. For example, a measure aiming at increasing innovation capacity of companies through technology transfer between companies and research institutes can be classified in terms of both capability and network failures.

1.2.4 European Innovation Scoreboard country groups

Based on their Science and Innovation Index (SII) scores over a five-year period, the EU-27 (plus associate and candidate) countries are divided into the following groups by the EIS 2008:

- Switzerland, Sweden, Finland, Germany, Denmark and the United Kingdom (UK) are the innovation leaders, with SII scores well above those of all other countries.
- Austria, Belgium, France, Ireland, Luxembourg and the Netherlands are the innovation followers, with SII scores below those of the innovation leaders but equal to or above that of the EU-27. Austria is close to moving from the innovation followers to the innovation leaders.
- Cyprus, Czech Republic, Estonia, Greece, Iceland, Italy, Norway, Portugal, Slovenia and Spain are the moderate innovators with SII scores below that of the EU-27, except for Cyprus. Recent improvements in innovation performance for Cyprus, Estonia, Slovenia and Iceland suggest that these countries could move to the innovation followers in the near future.
- Bulgaria, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Croatia and Turkey are the catching-up countries. Although their SII scores are significantly below the EU average, these scores are increasing towards the EU average over time, with the exception of Lithuania.

These groups are used to examine whether differences in levels of innovation performance (and indeed economic development) lead to differences in the challenges faced by policy makers in designing innovation policy, and the policy-mix of measures adopted.

1.2.5 Method of analysis – Classifying the challenges and the policy responses

As a first step, all the challenges from the 2008 country reports and all the measures in the joint TrendChart-ERAWATCH support measure database have been classified ex-post according to the market and systemic failures they address. This classification has been carried out on the basis of desk research and constitutes a first attempt to analyse the rationale for existing public policy interventions. A more thorough analysis should be based on empirical evidence stemming from the evaluation of policies against the failures intended to be addressed at their outset. Where relevant, more than one type of failure has been attributed to each challenge or measure. In order to illustrate the attribution of failures, the report includes examples of actual challenges and policy measures.

1.3 Key Innovation Challenges

The system failures approach is instructive in as much as it allows the construction of a more dynamic view than the 'traditional' market failure argument, on the policy rationale for government intervention. At the same time, it introduces a degree of complexity by classifying challenges by failures and therefore loses some of the explanatory power of specific challenges at a national level. Figure 3 below illustrates, for each group of EIS countries, examples of the challenges identified in the 2008 country reports in order to illustrate how the method has been applied.

An important comment to make about the table is that the wording of the "headline" for each challenge can be misleading. For instance, difficulties in obtaining innovation financing or in sourcing skilled people for innovation projects may be classified under institutional failures (if the description of the challenge suggests that the problems lie in ineffective organisations) or framework failures (if the issue lies more in the appropriateness of the legislative or regulatory functioning of the financial or education sectors).

Figure 3: Examples of challenges per type of failure

	Innovation leaders	Innovation followers	Moderate innovators	Catching-up
Market Failures	UK: "Boost relatively weak intensity of innovation activity in Enterprises"	IE: "Increase the level of innovation in the private sector"	CY: "Increase inputs and efficiency of business innovation"	BG: "Increase R&D expenditure (private and public)"
Capability failures	FI: "Broaden the base of innovative growth-oriented enterprises"	FR: "Increase non-technological innovation (organisational, design) innovation in SMEs"	EE: "Building competences and developing innovation management skills"	PL: "Stimulate and deepen innovation internal capacities of Polish companies"
Institutional failures	DE: "Increasing supply of highly qualified labour"	BE: "Innovation skills mismatch"	IT: "Innovation financing"	RO: "Improve innovation and business support infrastructure (business incubators, technology transfer offices, S&T Parks, etc.)"
Network failures	SE: "Centres of Excellence: creation of globally competitive research and innovation milieux"	LU: "Reinforce synergies, complementarities and collaborations between the public and private R&D centres"	CZ: "Cooperation between public R&D and industry"	SK: "Development of knowledge-intensive clusters across public knowledge poles"

	Innovation leaders	Innovation followers	Moderate innovators	Catching-up
Framework failures	SE: "Innovative public procurement – revitalising old models to transform knowledge to commercial value"	FR: "Foster intellectual property use by SMEs"	ES: "Decreasing availability of human capital and skills"	MT: "Sustaining enhanced investments in business R&D and encouraging innovation of SMEs"
Policy failures	FI: "Transformation of firm strategies and new innovation models"	n.a.	EL: "Low effectiveness and limited impact of the innovation measures on economy and employment"	SK: "Underdeveloped innovation governance"

Source: TrendChart Country Reports 2008; analysis Technopolis Group

The Italian case for institutional challenges reflects the type of complex challenge faced by policy makers; it is classified as institutional since the country report underlines the need to improve the functioning of both private and public sector organisations. Equally, the challenge could have been considered as a response to a failure in the legal framework for risk capital, etc., and potentially as a policy failure.

Figure 4: Institutional challenge – Italy

Innovation financing

Funds for innovative small and medium-sized enterprises (SMEs) from private banks and venture capital (VC) are rather scarce in Italy. In particular, the availability of early-stage/VC funding needs to be absolutely improved since the market is relatively young and underdeveloped. Yet, the theme of finance for innovation – often overlooked in the policy agenda in practical terms – is receiving increasing attention and is the source of intense debate among innovation stakeholders. In 2007, the government launched a Fund for Enterprise Financing to facilitate access to credit by SMEs and to rationalise the functioning of the public guarantee funds and risk (venture) capital funds. However it has not become operational yet.

A fund endowed with EUR 86 million for the public participation in risk capital of enterprises operating in high-tech sectors has been activated in the Mezzogiorno. At the regional level, several initiatives have emerged in recent years such as the Italian Venture Capital Pole launched in Piedmont which gathers 11 funds that cover all the stages of the VC, from 'angel investing' to 'late stage' and which has been endowed with EUR 1 billion.

Also, an alternative capital market for micro/small-sized enterprises (MAC) was launched at the beginning of 2007 to provide access to risk capital markets to micro and small-sized businesses, an initiative promoted by a cluster of banks and institutions managed by the Italian Stock Exchange.

TrendChart Country Report, Italy 2008

The case of the Netherlands in Figure 5 illustrates how problems arising in another 'policy field' such as education need to be taken on board and moved up the political agenda if such 'framework conditions' are not to become a barrier to the future innovativeness of an economy.

Figure 5: Framework challenge – the Netherlands

Higher levels of output and excellence in higher education and research

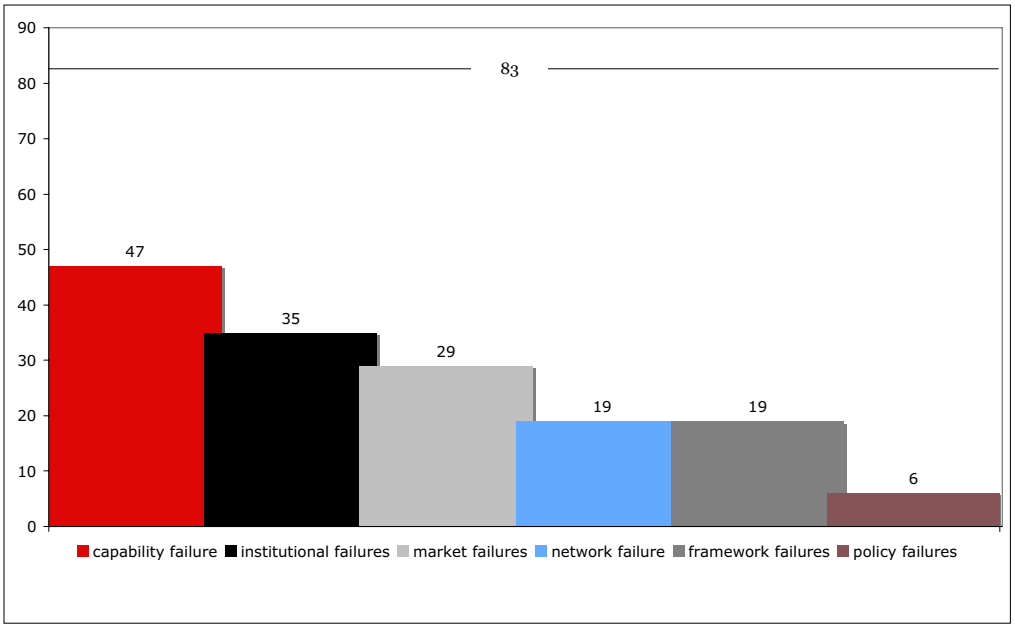
The challenge is to create a climate conducive for learning and research in order to become an attractive location for students, knowledge workers and investors in R&D, both from the Netherlands and abroad. Within this broad challenge, specific attention for students in science & technology (S&T) is required because of the looming shortages in this area; although recently, the negative trend appears to have been reversed. This first challenge is essential, because an excellent education, research and innovation system is a prerequisite for securing the future innovativeness and competitiveness of the Dutch economy.

The challenge requires responses from several policy domains. The policy response from innovation policy focuses on specific aspects: increasing the number of graduates, researchers and knowledge workers in S&T, making the career of researchers more attractive, and attracting and retaining talented knowledge workers, also by making the regulations for 'knowledge migrants' less strict. In 2007, a new taskforce 'Technology, Education and Labour Market' was established to address the looming shortages in human resources in science and technology (HRST). The existing Platform Beta/Techniek has already achieved some results in putting the issue higher on the political agenda. Recent figures suggest that more students are interested in studying technological and scientific studies.

TrendChart Country Report, the Netherlands 2008

Based on the challenges identified in the 2008 EU-27 country reports, the figure below summarises the relative weighting of innovation policy challenges across the six types of failures. As can be seen, capability failure is the most significant type of failure ahead of institutional and market failures. The recognition that capability failures (limited management skills, weak know-how on technological or organisational innovation, etc.) inside companies are a considerable impediment to intensifying innovation is significant.

Figure 6: Failures targeted by EU-27 innovation policy challenges

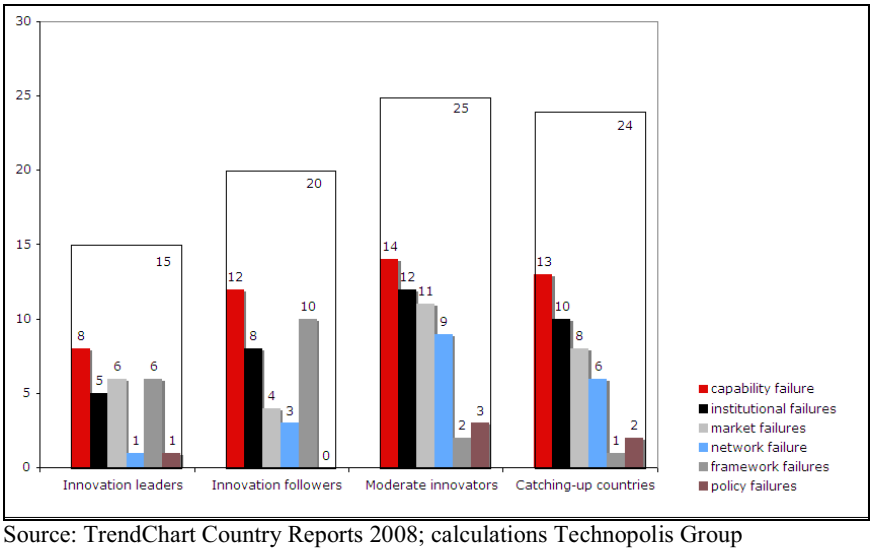


Source: TrendChart Country Reports 2008; calculations Technopolis Group

Note: The numbers over the vertical bars indicate the number of challenges addressing a given failure. One challenge can address more than one type of failure. There were 83 challenges defined in the 2008 country reports.

A general refrain for many years has been to point the finger at 'lack of financing' (captured normally under the market failure or framework failure categories) as a major barrier to more SMEs innovating. The focus of the challenges on capability failures suggests that more attention needs to be given in policy support to alleviating internal factors sapping innovativeness of European enterprises.

Figure 7: Challenges by type of failure and EIS group



Source: TrendChart Country Reports 2008; calculations Technopolis Group

Note: The numbers over the vertical bars refer to the number of challenges addressing a given failure. The numbers in the right upper corner of the black frames are total numbers of challenges in EIS groups. One challenge can address more than one type of failure.

Figure 7 distinguishes the importance of the challenges identified by the EIS group of countries. While capability failures are perceived as an important challenge across all four groups, the shortcomings of framework conditions are considered more significant in the innovation leaders and followers. This does not imply per se that framework conditions are weaker in these countries, but rather that they are more often identified as a policy issue; possibly because the basic conditions (internal capabilities of enterprises, innovation infrastructure, access to finance or innovation support services, etc.) are already better than in the lagging countries.

Figure 8: Framework challenge – Belgium

Improving the rate of patenting and intellectual property management know-how in Belgian enterprises

A challenge for Belgium is to improve the protection and exploitation of intellectual property (IP) created through investment in R&D and innovation in national firms. There is a need for a more concerted effort to improve rates of patenting in line with the levels of investment in R&D of leading technology-based sectors (e.g. pharmaceuticals). The low levels of patenting are in part due to the structure of the Belgian economy (lower-tech sectors or sectors which do not necessarily use patenting as a primary means of IP protection) and to the dominance of multinational firms in R&D activity and expenditure; however, there is also clearly a sub-optimal understanding of the importance of patenting and a number of barriers (cost, access to expertise, in-house knowledge on intellectual property rights (IPR) in firms, etc.) which reduce the propensity to patent.

TrendChart Country Report, Belgium 2008

The framework challenges in the more advanced countries also tend to be more 'sophisticated' focusing on issues such as novel ways of improving IP protection and commercialisation or demand-driven issues such as innovative public procurement.

Figure 9: Framework challenge – Sweden

Innovative public procurement – revitalising old models to transform knowledge to commercial value

The Swedish value creation has depended on public-private partnerships. Goods for public needs, such as communication, healthcare and energy, have been developed jointly by private companies, governmental agencies, and researchers at universities and industrial institutes. The products have been used both in the Swedish public sector and sold on the global market. As structural changes have decreased the efficiency for this model, Sweden needs to revitalise public procurement as a tool to spur business sector renewal without violating current European regulations.

The issue was addressed by policy makers in both 2007 and 2008, but appropriate measures have so far been limited.

TrendChart Country Report, Sweden 2008

Equally, institutional failures appear to be more present in the catching-up countries; something that seems to be intuitively correct, given their level of development, both in economic and governance terms. However, even within this group, it is clear that while some countries are struggling to put in place an effective network of innovation support services (see the case of Romania, Figure 10) others are more concerned about weaknesses in the higher education and research organisations in their country (Bulgaria, Greece, Latvia, etc.). The Romanian case also illustrates how the development of a well functioning network of innovation support organisations is reliant not only on making funding available to local stakeholders, but also on the creation of an effective coordination function nationally, enforcing strict project selection, monitoring and evaluation standards.

Figure 10: Institutional challenge – Romania

Improve innovation and business support infrastructure

This challenge is related to the need to improve the R&D absorption capacity of industry and enhance technology transfer. Business incubators are primarily managed by the National Agency for SMEs and Cooperation and funded by the United Nations Development Programme (UNDP), while innovation and technology providers are managed by the National Authority for Scientific Research (NASR) and are grouped in the specialised network National Technology Transfer and Innovation Network (ReNITT) funded both by national funds and EU Structural Funds.

The performance of the existing business incubators is generally perceived to be weak and many of the incubated firms do not achieve the expected growth or new jobs. Going bankrupt shortly after or even during the incubation period is not an unusual occurrence. Accountability for the funding received from the UNDP (for business operations) or from the EU Structural Funds (for the construction of the incubator) is also generally low, and the selection of firms to be incubated is often questionable.

In comparison with business incubators, S&T Parks focus more on strengthening technology transfer and partnerships among research institutes, economic agents and universities. Romania currently has four S&T Parks located in Bucharest, Timisoara, Iasi and Galati. The increased funding channelled through the 2007-13 National Research, Development and Innovation (RDI) Plan is expected to stimulate the number of R&D projects and partnerships undertaken within the S&T Parks, and the first signs of improvement are expected in the next two to three years.

TrendChart Country Report, Romania 2008

Perhaps surprisingly, network failures (industry-science cooperation, clustering, etc.), often highlighted in policy debates and academic literature as a weakness of many national innovation systems (NIS) in the EU, have been considered as a key challenge significantly less often than capability, institutional and market failures. Such network challenges were, however, relatively more present in the moderate innovators and the catching-up countries, suggesting that innovation cooperation and knowledge transfer remain more problematic in these 'less-developed' innovation systems.

Experts in the catching-up countries were particularly concerned about network failures. The Hungarian report points to "Low occurrence of cooperation in innovation activities"; the Bulgarian correspondent called for action to "To stimulate partnership and to increase cooperation between science institutions, enterprises and other institutions involved in the innovative process"; the Polish (see Figure 11), Romanian and Slovak reports highlighted the need to improve industry-science cooperation (as did the Czech report from the group of moderate innovators and the Luxembourg report from the innovation followers, reflecting the recent establishment of a university in this small Member State).

Figure 11: Network challenge – Poland

Improve science-industry cooperation

The weak science-industry linkages in Poland may be a collateral result of the current policies encouraging the research teams to publish their research results rather than supporting them to reach the market. The business sector confirms that it is difficult to build working relationships with the Polish research teams, although the ongoing cooperation is considered to be fruitful. In particular, the following points are worthy of mention. According to the Company Survey of the Ministry of Science and Higher Education, two-fifths of companies have never tried to establish cooperation with the research institutions and more than half of interviewed companies confirmed that they did not see cooperation with research institutions as a priority. As a result, 483 industrial enterprises concluded cooperation agreements relating to innovation activities with branch research institutes and 540 with higher education institutions (HEIs) in 2006. In nominal terms, this means that the business sector financed 15.4% of branch research institutes R&D expenditures and 5% of HEIs, which, given the size of these sectors, confirms insufficient science-industry cooperation.

TrendChart Country Report, Poland 2008

A number of network challenges were related to a broader concept of networking with the Slovenian report noting the "insufficient specialisation of innovation support network"; the Cypriot and Lithuanian reports highlighted the need to develop knowledge-intensive clusters (linked in the Cypriot case interestingly to "regional lead markets") and the Swedish report calling for the enhanced support for the "creation of globally competitive research and innovation milieux."

Figure 12: Network challenge – Cyprus

Challenges for lead markets, sectoral challenges and challenges related to innovation and knowledge clusters

The market in Cyprus is too small for lead markets. However, there is an interesting case in the area of water management and energy resources. The island is 100% dependent on oil for its energy needs and lacks water resources, which it partially imports. This is a common problem to the broader region of the Eastern Mediterranean, shared with Jordan, Israel and others. The newly created Technical University has used the skills of the academic staff to cooperate with the local construction industry for building/converting the whole infrastructure into bioclimatic structures. The University hopes that if this pilot is successful it can be adopted by the government and the business sector and lead to new procurement and even new standards, which may eventually make the local construction sector sufficiently competitive to export its knowledge to the broader region.

Cluster policies are not adopted on a broader scale, although the Research Promotion Foundation thematic calls are trying to create research networks. The cluster of financial services and off shore support services is developing by market forces because of the low taxation rate.

TrendChart Country Report, Cyprus 2008

Finally, while the correspondents focused on challenges from an enterprise-perspective, a number of country correspondents considered that "policy failures" were serious enough to be ranked as challenges. The Greek correspondent flagged "Low effectiveness and limited impact of the innovation measures on economy and employment"; the Portuguese correspondent drew attention to the need for "Fully exploiting the opportunities stemming from the implementation of the NSRF 2007-2013"; the Cypriot correspondent noted that there is a need to "Make innovation policy and support to innovation more effective"; the Slovak correspondent drew attention to "Underdeveloped innovation governance"; while the Maltese correspondent called for "Improving the national statistical framework to

better capture innovation progress." Interestingly, the correspondent for Finland, the country generally placed at the top of innovation performance and policy performance rankings, also drew attention to the need for policy makers to adopt "new innovation models" (Figure 13).

Figure 13: Policy challenge – Finland

Transformation of firm strategies and emerging new innovation models

It has become increasingly clear that the prevailing policy approach has adhered greatly to the traditional S&T policy perspective. There is a need to adjust policies to comply with changes taking place in innovation activity – innovation activity is ever more switching to customer-oriented, networked and open innovation ecosystems which are embedded in a global economy. Policies aiming to enhance and promote innovation can no longer be restricted to manufacturing and R&D intensive technologies, but have to take into account opportunities for innovation, such as in the services sector. In addition, there is an identified need to look at new ways to tackle challenges that public services face.
The new broad-based NIS aims, among others, to target these challenges. Broadening the scope of policy is also reflected in initiatives and existing policy measures which are geared towards promoting innovation and creating an environment that is conducive to innovation. For instance, Tekes, the Finnish Funding Agency for Technology and Innovation, has launched new programmes specifically targeting services development. The development of new innovative service concepts and solutions is also one of the cross-cutting topics in the 'Centres of Expertise' programme during the period 2007-13.

TrendChart Country Report, Finland 2008

1.4 Innovation Policy Responses

1.4.1 Policy priorities

1.4.1.1 Mapping the Science, Technology and Innovation (STI) policy mix

The policy priority most often addressed by science, technology and innovation (STI) policies in the EU-27 Member States is by far the '*support for R&D cooperation including joint research projects run by public-private consortia of business and research*'. Nearly one-third of all support measures currently in force have R&D cooperation as one of their key priorities.

The following most often addressed priorities include implementing strategic research policies such as long-term research agendas (17% of support measures), direct support for business R&D (17%), support to innovative start-ups (15%), measures targeting excellence and management of research in universities (15%), knowledge transfer (15%) as well as support for public research organisations (14%).

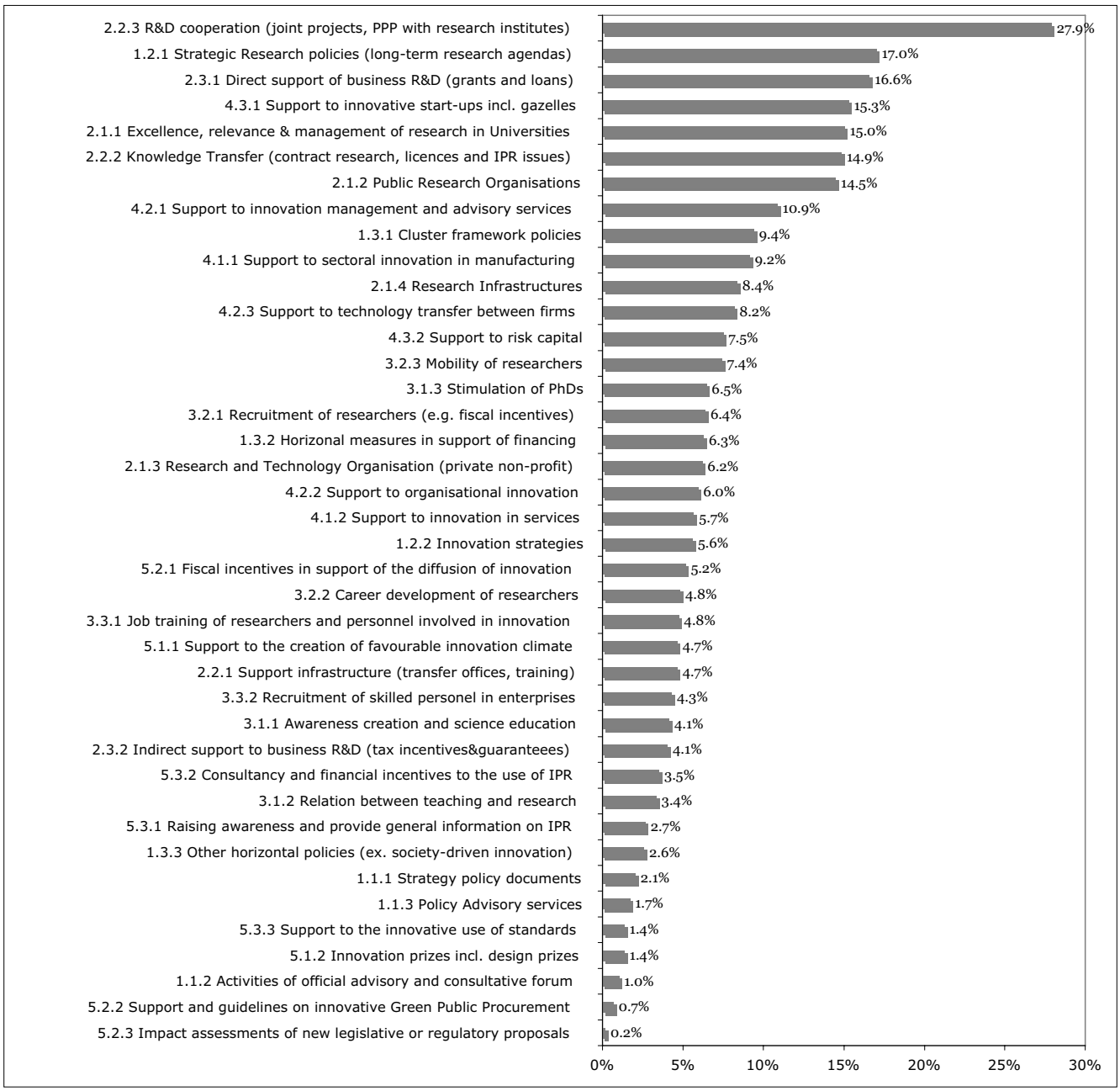
The key priorities within the measures most relevant to innovation policy include the abovementioned, direct support of business R&D (notably grants), support to innovative start-ups (including Gazelles) and knowledge transfer (covering contract research, licensing and IPR issues). Other typical innovation policy priorities in the overall STI policy mix are support to innovation management and related advisory services (11%), cluster framework policies (9%) and support to sectoral innovation in manufacturing (9%).

Support for risk capital was addressed by 7% of measures; however, the mix of measures supporting innovation financing is broader including also horizontal measures in support of financing (6%), fiscal incentives in support of the diffusion of innovation (5%) as well as indirect support to business R&D such as tax incentives and guarantees (4%).

A group of measures that seems relatively under-represented in the overall STI policy mix are measures addressing human capital. In this context, the policy measures notably mobility of researchers (7%), recruitment of researchers (6%) and skilled personnel in enterprises (4%), job training of researchers and other personnel involved in innovation process (5%), career development of researchers (5%) as well as, more generally, stimulation of PhDs (6%).

Figure 14 illustrates the overall EU STI policy mix in terms of priorities addressed by the support measures. As expected, the overall picture changes when the policy mix is analysed at a disaggregated level with a focus on countries with different levels of development. Analysis at the level of EIS country groups reveals some substantial variance in terms of policy priorities addressed by national STI policies (see Figure *15*).

Figure 14: Policy priorities in the EU-27 innovation policy mix

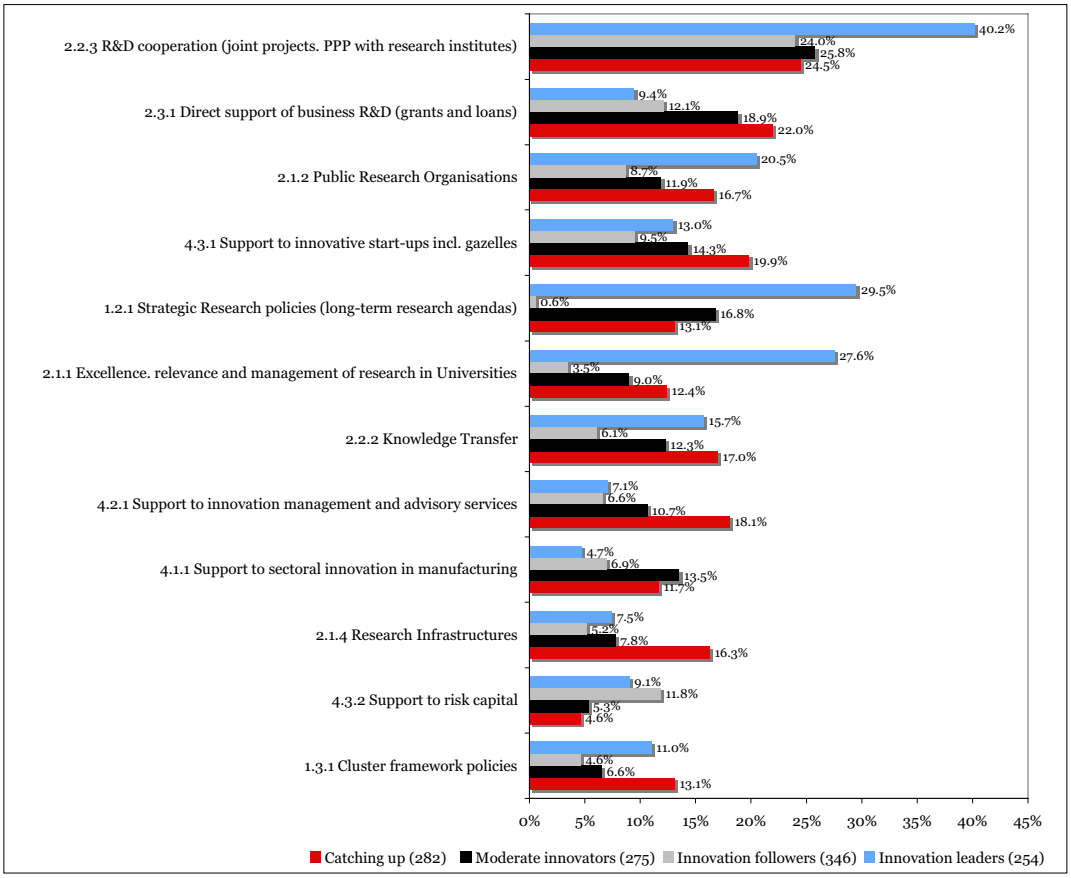


Source: TrendChart-ERAWATCH database of support measures; analysis Technopolis Group (N=1157)
Note: Percentages refer to the share of measures addressing a given policy priority in the overall EU innovation policy mix (N=1157). A single support measure can be assigned up to four policy priorities.

R&D cooperation is the key policy priority for all EIS groups. The concentration on this priority among innovation leaders (40% of all measures) is, however, significantly

stronger than in any other group. Similarly, the shares of other priorities related closely to science policy (such as strategic research policies, public research organisations and support to excellence and management of research in universities) are relatively much higher in innovation leaders.

Figure 15: Key policy priorities in the EIS country groups



Source: TrendChart-ERAWATCH database of support measures; analysis Technopolis Group (N=1157)

Note: Percentages refer to the share of support measures addressing a given policy priority within the EIS country group. A single support measure can be assigned up to four policy priorities. The numbers in the legend indicate the total number of measures belonging to the EIS group. The chart includes: (1) 10 policy priorities addressed by the highest number of support measures and (2) 10 priorities with the highest variance between the smallest and biggest share of measures between EIS groups. The most often occurring priorities are the top 10 priorities in the exhibit. The priorities with highest variance were (starting with a priority with the highest variance): 1.2.1, 4.2.1, 2.1.4, 2.2.2, 4.3.1, 2.3.1, 2.1.1, 1.3.1, 2.1.2 and 4.3.2.

On the other hand, innovation leaders focus much less on providing direct support for business R&D (9%) and support to innovation management services (7%), which are more present in the catching-up countries and moderate innovators (respectively for direct support to R&D 20% and 19% and innovation management 16% and 11%). As expected,

given their level of S&T development, catching-up countries give more emphasis to research infrastructures (15% of all measures) than any other group.

Interestingly, both innovation leaders and the catching up group give relatively the same emphasis to measures targeting knowledge transfer (respectively, 16% and 17% of their measures) and to the horizontal cluster policies (respectively, 11% and 13%). Followers and moderate innovators have much lower shares in these categories (apart from 12% share of knowledge transfer measures in moderate innovators).

Innovation followers stand out in their emphasis on the support to risk capital (12%) compared to 9% share of innovation leaders and significantly lower shares in case of moderate innovators and catching-up countries (about 5% each).

Moderate innovators behave similarly to catching-up countries with the exception of research infrastructures and cluster framework policies (8% and 7%) where they have less relevant support measures. On the other hand, they place more emphasis on research strategic policies (17% compared to 12% in catching-up countries).

In general, the analysis suggests that innovation leaders concentrate on a smaller number of STI policy priorities than other countries with four key priorities addressed by more than 20% of their measures. Innovation followers have the most diverse policy mix in terms of priorities addressed with just one policy priority above 15% share of all their measures. Moderate innovators and catching-up countries seem to have a more horizontal approach with a focus spread more evenly among different priorities.

1.4.1.2 Analysis of recent policy trends (2007-08)

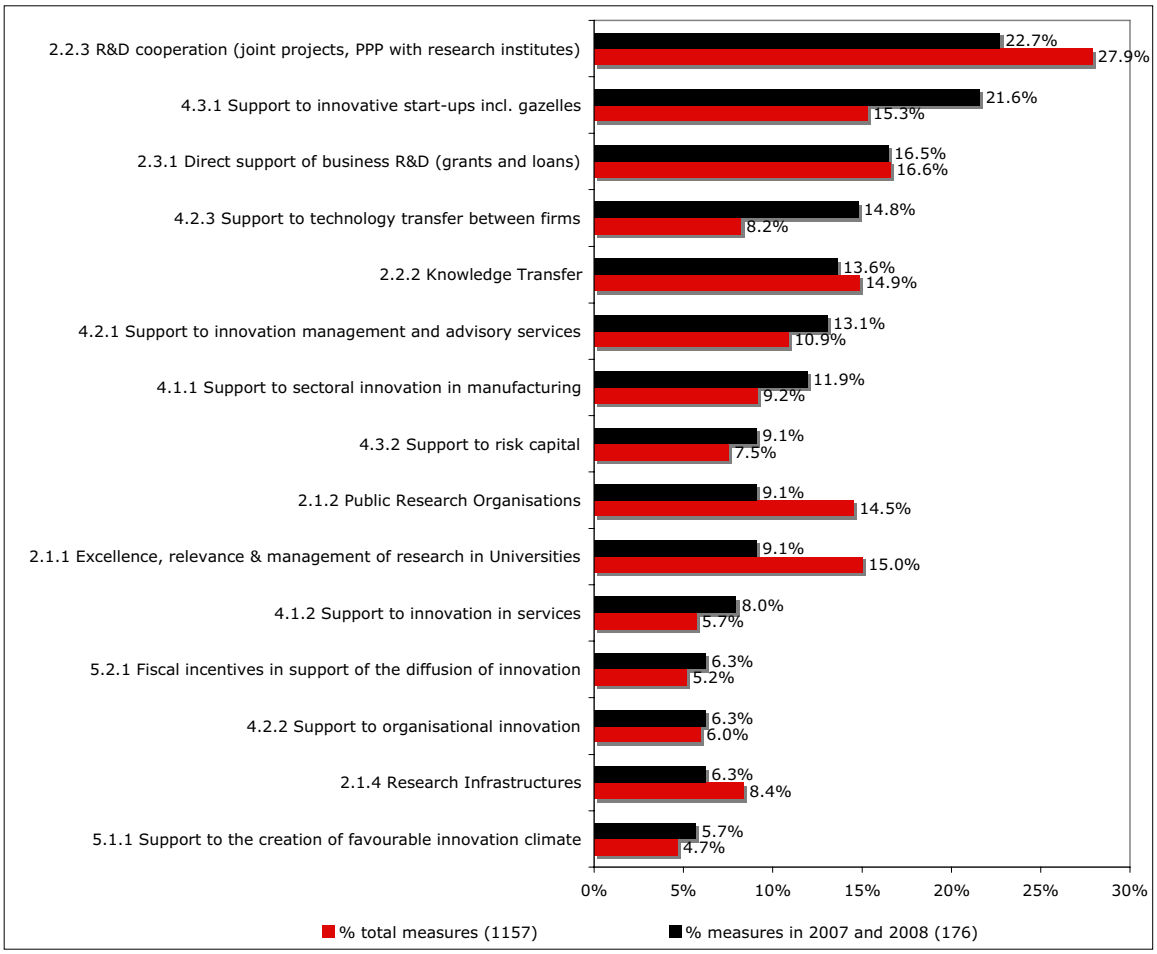
This section focuses on the policy priorities of the support measures introduced in 2007 and up to October 2008 as compared to the overall EU STI policy mix (Figure 16). The most often targeted priorities by the recent measures have been R&D cooperation (23% of recently introduced measures), support to innovative start-ups (22%) and direct support to business R&D (16%).

The share of the measures addressing R&D cooperation is relatively lower than in the overall policy mix (23% versus 28% of all active policy measures). This remains, however, the priority with the highest number of measures currently being implemented in the EU Member States (323 measures); therefore, a certain slow-down in additional new measures is not a surprise. The priorities with an even stronger decline in the share of new measures versus the total policy mix are actions supporting public research organisations and support for excellence and management of research universities (9% share each). Such a downturn in introducing these measures may be a consequence of reaching a desired level and sophistication of policy response, especially in the STI advanced countries. It may also be a sign of the shift towards introducing less, but more complex, support measures.

It is noteworthy that the shares of recent measures supporting innovative start-ups (22%) and technology transfer between firms (15%) have been significantly higher than their share in the overall policy mix (respectively, 15% and 8%). Along with a slight increase in the relative importance of measures supporting risk capital, this reflects the increasing

focus of innovation policy on supporting fast growing innovative SMEs, especially start-ups and spin-offs.

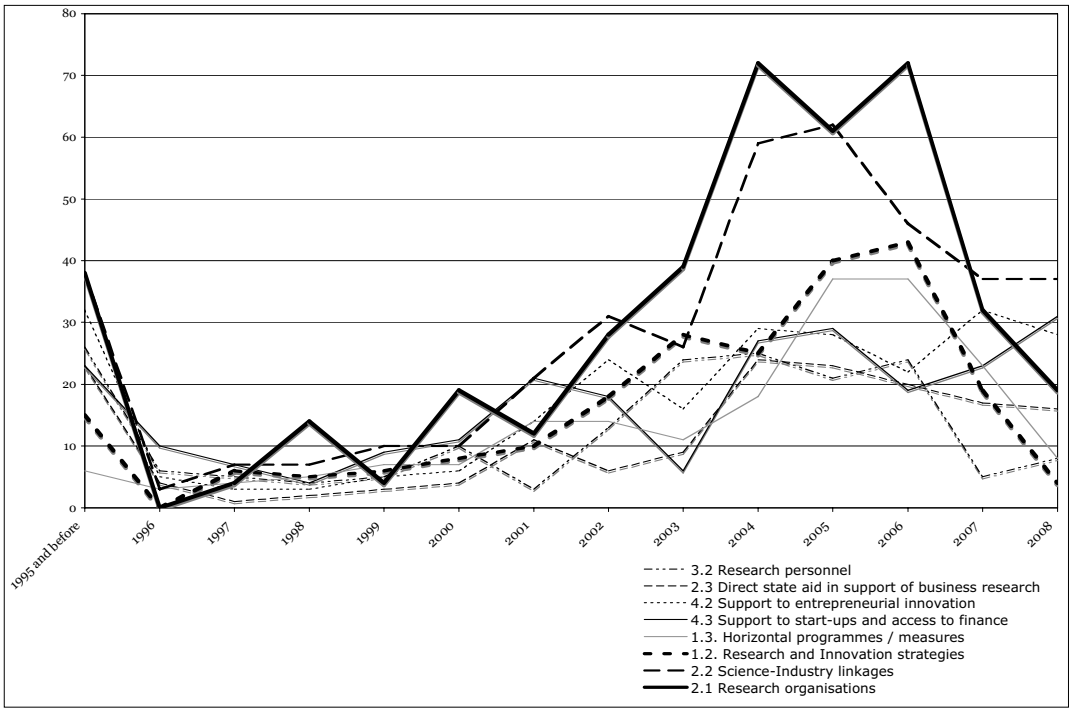
Figure 16: Policy priorities addressed by the recent support measures



Source: TrendChart-ERAWATCH database of support measures; analysis Technopolis Group (N=1157; n=176)
Note: Percentages indicate a share of support measures addressing a given policy priority. The exhibit presents 15 most often targeted policy priorities by the measures introduced in 2007 and 2008 (black bars). The red bars show the percentage of all support measures addressing the priorities. A single support measure can be assigned up to four policy priorities.

Figure 17 illustrates the evolution over time of measures addressing the most frequently selected policy priorities (based on launch dates from the mid-1990s till mid-2008). A glance at the time series suffices to trace shifts in the innovation policy agenda with, notably, an increasing number of measures supporting science-industry links at the beginning of the 2000s and measures targeting start-ups from 2006. The jump in the number of innovation policy measures from 2004 onwards is clearly due to measures introduced in the new Member States (generally co-financed by the Structural Funds).

Figure 17: Shifting agendas: evolution of the priorities of STI policies



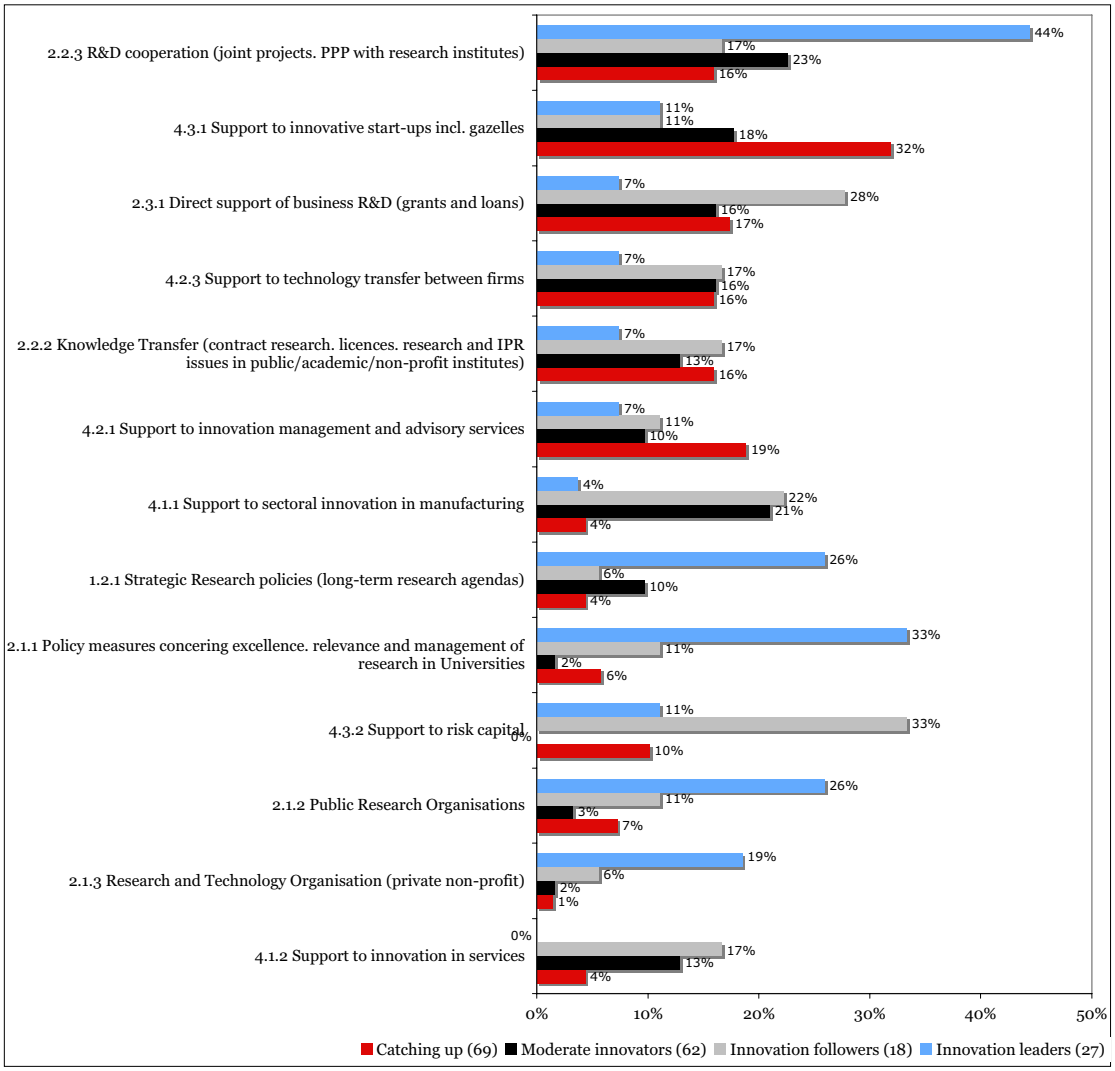
Source: TrendChart-ERAWATCH database of support measures; analysis Technopolis Group (N=1157)

Note: The absolute values on the vertical axis represent a number of new measures addressing a policy priority introduced in a year. The chart does not account for an accumulation of measures in time. The exhibit presents the priorities with 150 and more measures currently reported as web-published or draft in the support measure database. Archived measures are not included. A single support measure can be assigned up to four policy priorities.

The differences in relative importance of policy priorities addressed by the recent policy measures can be explained by trends in EIS country groups (see Figure 18). The recent relative increase in support to innovative start-ups has been caused notably by a growth of importance of these measures in catching-up countries (23 out of total 38 measures introduced in 2007 and 2008 targeting this priority in EU Member States). This approach also allows for explaining an upward trend in measures addressing technology transfer. The relative share of these measures in 2007 and 2008 has nearly doubled in all groups, except in the innovation leaders, as compared to the overall policy mix.

The drop in relative share of measures addressing R&D cooperation has been caused by the lower shares of this priority among catching-up countries and followers in 2007 and 2008. Strikingly, the relative importance of R&D cooperation has increased even more in the group of innovation leaders (44% of the recent measures compared to 40% share in the overall policy mix).

Figure 18: Key recent policy priorities in the EIS country groups



Source: TrendChart-ERAWATCH database of support measures; analysis Technopolis Group (n=176)

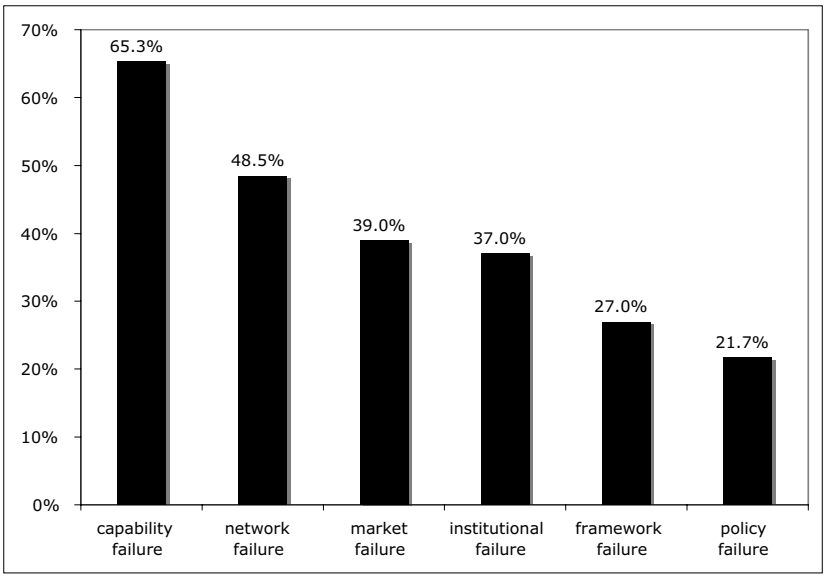
Note: Percentages refer to the share of measures introduced in 2007 and 2008 addressing a given policy priority within EIS country groups. A single support measure can be assigned up to four policy priorities. The numbers in the legend indicate the total number of 2007 and 2008 measures belonging to the EIS group. The chart includes: (1) 10 priorities addressed by the highest number of new support measures and (2) 10 priorities with the highest variance between the smallest and biggest share of measures between EIS groups. The most often occurring priorities are the top 10 priorities in the exhibit. The priorities with highest variance were (starting with a priority with the highest variance): 4.3.2, 2.1.1, 2.2.3, 2.1.2, 1.2.1, 4.3.1, 2.3.1, 4.1.1, 2.1.3 and 4.1.2.

1.4.2 Market and systemic failures

The type of failure most often addressed by policy measures was capability failure (65%), followed by network failure (48%). Market and institutional failures were addressed by, respectively, 39% and 37% of measures, whereas framework and policy failures were targeted the least often (respectively, 27% and 22%).

The relative shares of the measures addressing capability and market failure have increased recently, whereas institutional, framework and network failures have been targeted relatively less often (see Figure 19).

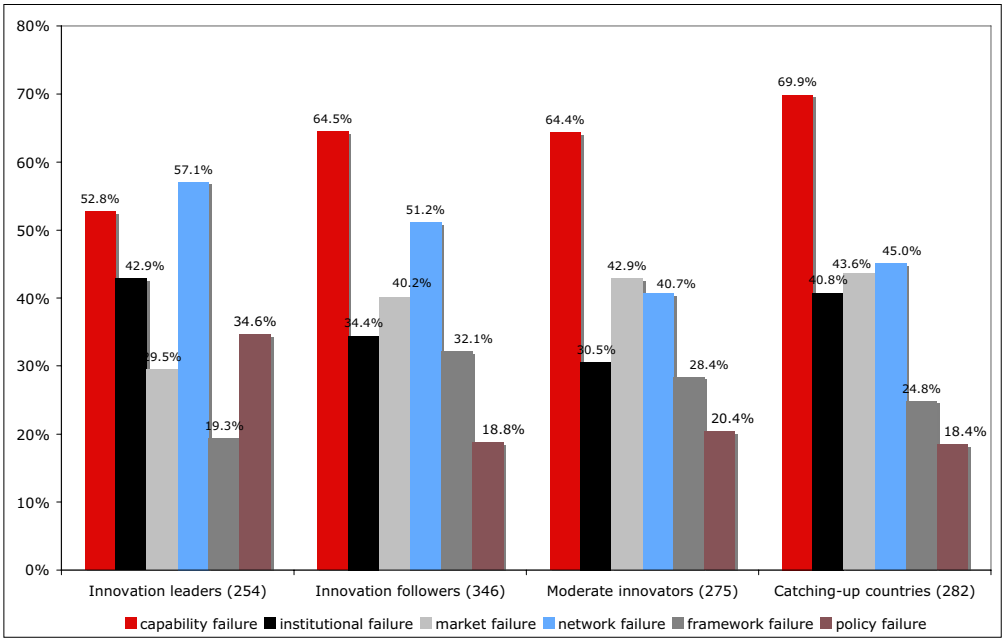
Figure 19: Failures addressed in the EU-27 innovation policy mix



Source: Technopolis group based on TrendChart-ERAWATCH database of support measures (N=1157)
Note: The percentages refer to the share of measures of the overall EU policy mix addressing a given failure. Measures can target more than one type of failure.

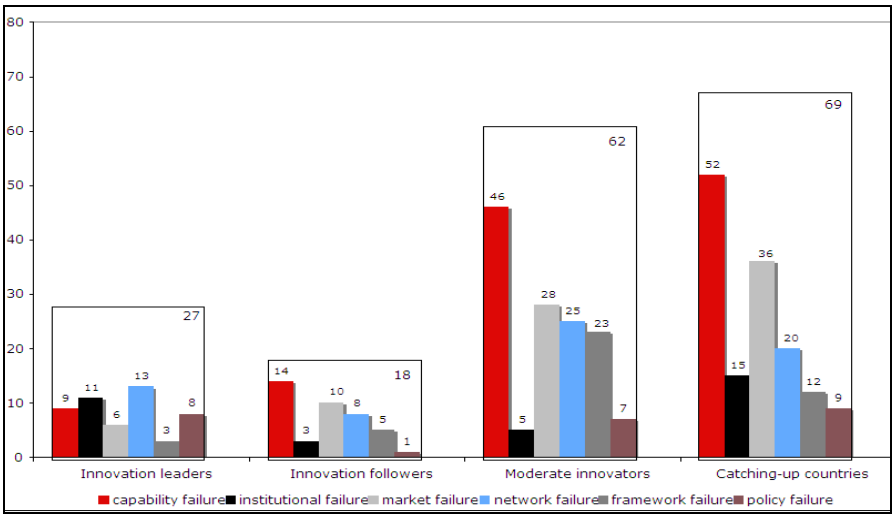
The analysis on the level of country groups reveals some differences in the policy choices. In relative terms, network and policy failures were targeted most often by innovation leaders and followers, whereas capability failures were addressed most frequently by catching-up and moderate innovators (see Figure 20).

Figure 20: Differences in failures addressed by EIS country group



Source: Technopolis group based on TrendChart-ERAWATCH database of support measures (N=1157)
Note: The percentages refer to the share of measures in of EIS country group addressing a given failure. Measures can target more than one type of failure. The numbers in brackets indicate a total number of support measures in EIS groups.

Figure 21: Failures addressed by recent measures by EIS country group



Source: Technopolis group based on TrendChart-ERAWATCH database of support measures (n=176)
Note: The numbers over the bars refer to the number of measures addressing a given failure. The numbers in the right upper corner of the frames are total numbers of measures introduced in 2007 and 2008 in the EIS country groups. Measures can target more than one type of failure.

As Figure 21 illustrates, the recent 2007-08 trends in the introduction of new measures suggests that the major changes are a reduction in measures addressing network failures in all the EIS country groups except for innovation leaders, while new measures addressing

market failures were more prevalent in innovation followers. In general, measures addressing capability features remain dominant.

In order to illustrate the attribution of policy measures to specific types of system failures, Figure 22 below provides examples for the two extreme groups of EIS countries.

Figure 22: Examples of policy measures addressing system failures

Examples of measures addressing capability failure	
Innovation leaders	*Catching-up*
Denmark Gazelle Growth Programme (DK 33) The Gazelle Growth program is a three-year measure which runs from 2007. It aims at strengthening innovation and growth in knowledge-intensive SMEs through targeted advisory and educational activities. The objective of the Gazelle Program is to accelerate the growth of 40 Danish companies with high potential for international growth.	Czech Republic ICT in SMEs (CZ 60) The main goal of this programme is to support the competitiveness of SMEs through enhancing their potential in the sphere of purchase and dissemination of information systems. The aim is to stimulate the demand for information systems for the sake of increase of effectiveness of SMEs.
Examples of measures addressing network failure	
Innovation leaders	*Catching-up*
Denmark (DK 34) Open Fund In order to strengthen the research and innovation cooperation between SMEs and the world of research and education, a new programme with so-called "open" funds, has been established for the period 2007-10. Funds will be awarded to projects that do not fall under the category of already known forms of cooperation. In order to strengthen collaboration on research and innovation between companies and the research and academic community, the funds for current collaboration schemes are to be gathered in a single grant pool. The pool is to contain, among other things, "open" funds which are to be allocated to projects that do not fall under the category of already known forms of collaboration.	Slovenia Promoting the establishment of Slovene technology platforms (SI 27) The cooperation between public research institutions and the business sector has been traditionally weak in Slovenian R&D and innovation system. Following the example of ERA technology platforms, the Ministry of Higher Education, Science and Technology introduced a specific measure to support the establishment of technology platforms. The main goals are to support cooperation in R&D in the area of selected technology of both business R&D units as well as public research and thus enhance productivity and knowledge transfer as well as enable Slovenian participation in European technology platforms.
Examples of measures addressing market failure	
Followers	*Catching-up*

France Participatory Priming Loan (FR 69) The participatory priming loan (PPA-Pret participatif a l'amorcage) is a tool developed by OSEO to provide SMEs with funding at the early-stage phase of innovation projects. The loan can reach EUR 75000 and even EUR 150000 with the financial supports of the regions.	Poland New investments with high innovation potential (PL 47) The measure supports private investment in highly innovative organisational and technological solutions, including those leading to reduction of an adverse impact on environment. The measure supports investments in purchasing technologies that are no older than three years.

Source: TrendChart country reports for 2008; analysis Technopolis Group

The exhibits below introduce examples of the measures addressing the most frequent combinations of failures; these are capability and network, market and capability and capability and framework failures.

Figure 23: Examples of measures addressing two and more failures

Measure addressing capability and network failures
Hungary, INNOTETT (HU 110) The programme for facilitating the development of innovation management and technology transfer (INNOTETT) sets out to develop the services of technology transfer centres, business incubation connecting R&D performing organisations and firms utilising their results, and to strengthen their market-oriented attitude. The main goals are to: support technology transfer, speed up the process of the utilisation of research results and assist in devising technology utilisation and market strategies of start-up companies and SMEs. The scheme consists of two components. The first aims at creating a pilot innovation management centre in order to establish good practices in innovation management suited for local conditions. The objective of the second component is to promote technology transfer activities of publicly financed research organisations through the development of their services and (human) resources.
Measure addressing market and capability failures
Portugal, FINCRESCE (PT 57) The Portuguese financial system is risk-averse. FINCRESCE is aimed at improving the financing conditions for firms following consistent growth strategies and enhancing their competitive capabilities. The rationale for FINCRESCE is the following: companies' financing needs change along their lifecycle. Therefore, specific measures should be designed to respond to such differentiated needs. FINCRESCE is addressed to companies at the middle stage of their life cycles, exhibiting good performances and risk profiles. More specifically, the measure intends to encourage company strategies that fit economic policy priorities, following growth strategies in international markets, as well as the consolidation of sectoral leaderships. FINCRESCE is also aimed at improving financial intermediation effectiveness and at encouraging medium-sized companies to enter capital markets. It is also concerned with promoting the adaptation of those companies to the financial management requirements stemming from Basel II.
Measure addressing capability and framework failures
Lithuania, Direct support for TQM implementation and certification of production (LT 45) This initiative is planned by the government to increase the number of businesses able to compete internationally and to strengthen the competitive advantages of the national industrial base. Support for TQM implementation and certification of production is planned in the Programme for the Innovation and Competitiveness Development. The goal of the Programme is to increase the effectiveness and

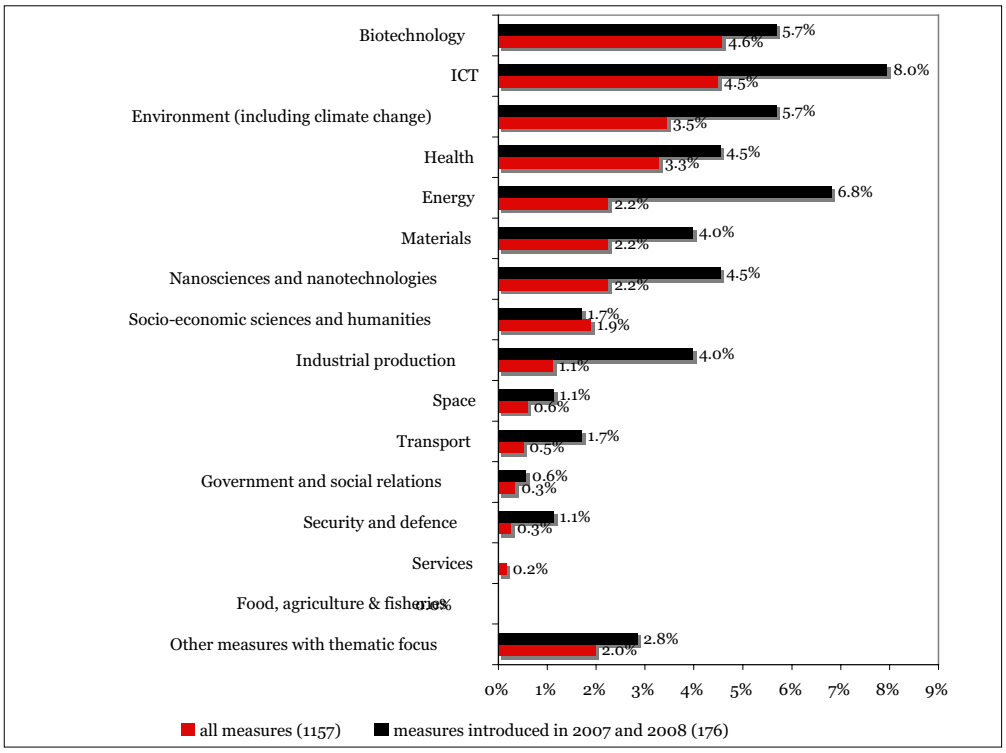
international competitiveness of enterprises. The special task of the Programme is to improve juridical and administrative environment of enterprises that could ensure safe and quality products placing on the market.

Source: TrendChart country reports for 2008; analysis Technopolis Group

1.4.3 Thematic focus of the support measures

Only some 12% of support measures in the overall STI policy mix had a focus on a specific theme or technological area. The most often targeted thematic areas have been biotechnology (4.6% of all measures) and information and communication technology (ICT) (4.5%), followed by environment (3.5%) and health (3.3%). The recently introduced (2007-08) support measures appear to have a stronger thematic focus with a trend towards measures targeting ICT (8% of measures introduced in 2007-08) and, notably, energy (6.8% compared to a mere 2.2% share of all support measures). Also the relative importance of measures targeting biotechnology, environment and health has increased (see Figure 24).

Figure 24: Thematic focus of support measures



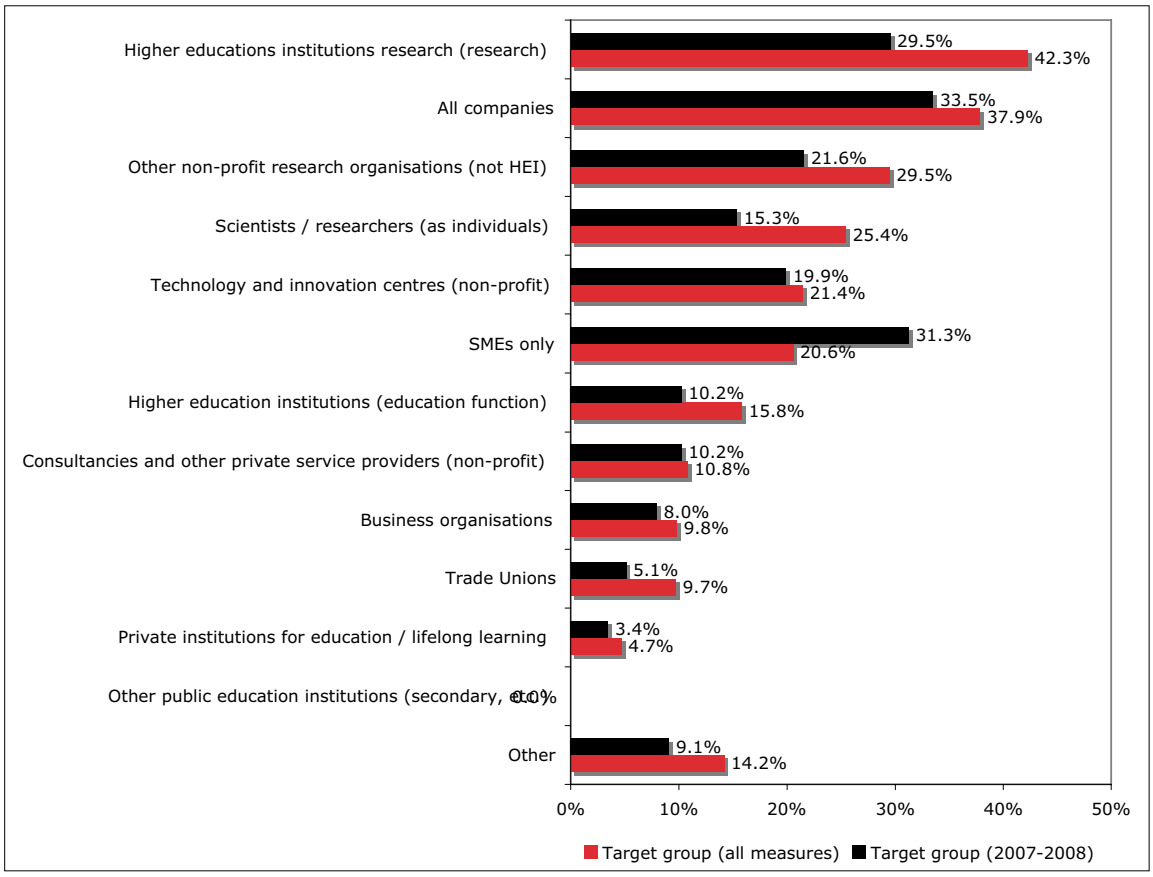
Source: TrendChart-ERAWATCH database of support measures (N=1157; n=176); analysis Technopolis Group

The increased importance of ICT can be explained by the measures recently introduced in the group of catching-up countries and moderate innovators. These are mostly measures aimed at improving the use of ICT in SMEs. Energy and environment measures appeared in all groups and are a policy response to the recent concerns linked to the global warming and energy crisis.

1.4.4 Target Groups

STI policies are concerned above all with companies and research performers. Other actors in the innovation system are targeted less often. Nearly 65% of measures target companies, with 31% only targeting SMEs. More than 42% of all support measures have as a target HEIs performing research. Individual scientists and researchers are targeted by every fourth measure (see red bars in Figure 25).

Figure 25: Groups targeted by the support measures



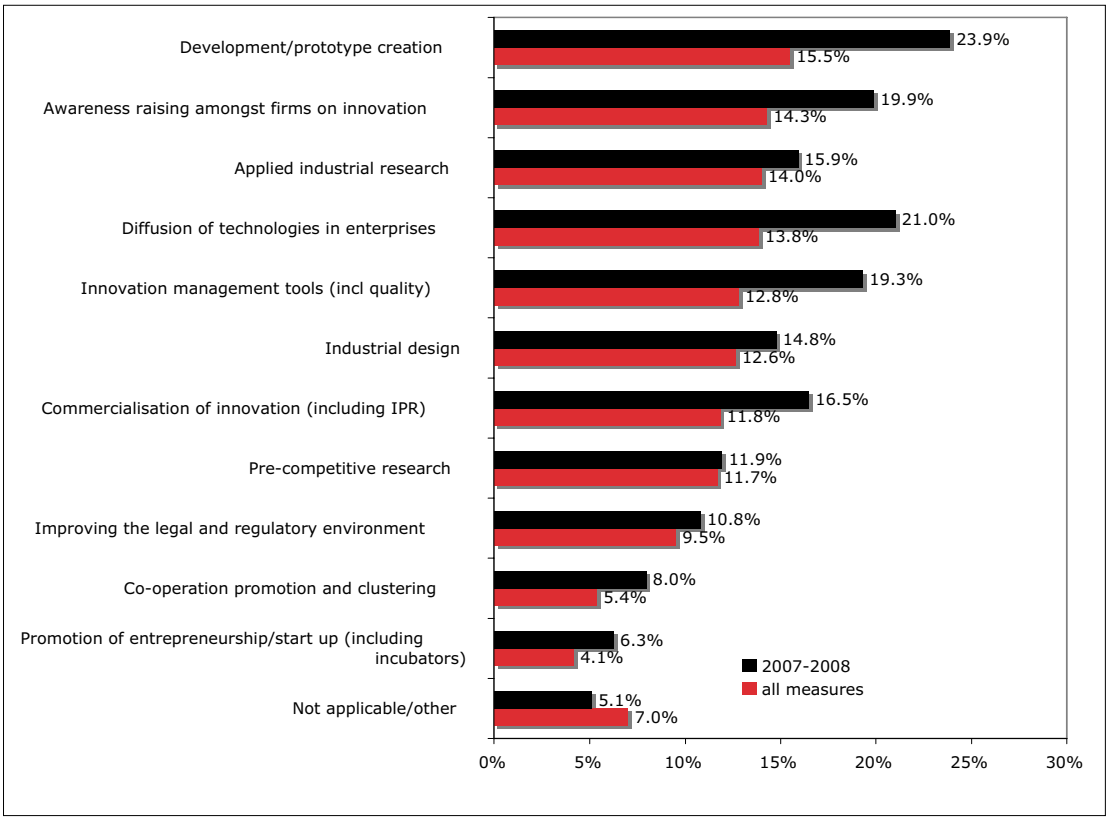
Source: TrendChart-ERAWATCH database of support measures (N=1157; n=176); analysis Technopolis Group
Note: A single measure can address more than one target group.

The recently introduced measures target SMEs much more strongly (31% compared to 21% in an overall policy mix). This is consistent with other findings presented previously on the increasing focus of the measures supporting innovative start-ups. Less than one-third of the recent measures target HEIs performing research, which also reflects the previously discussed trend. This does not, however, influence substantially the overall policy mix in which more than 40% of active measures target research performers.

1.4.5 Aspects of innovation

In addition to considering the targets in terms of organisations of the measures, the TrendChart correspondents assess the relevance of each support measure with respect to the different possible stages of the innovation process (not all stages are obviously relevant for all innovation projects, nor should the stages be viewed from a linear "research to product via a prototype" perspective).

Figure 26: Aspects of innovation process targeted by the support measures



Source: TrendChart-ERAWATCH database of support measures (N=1157; n=176); analysis Technopolis Group
Note: A single measure can address more than one aspect of innovation.

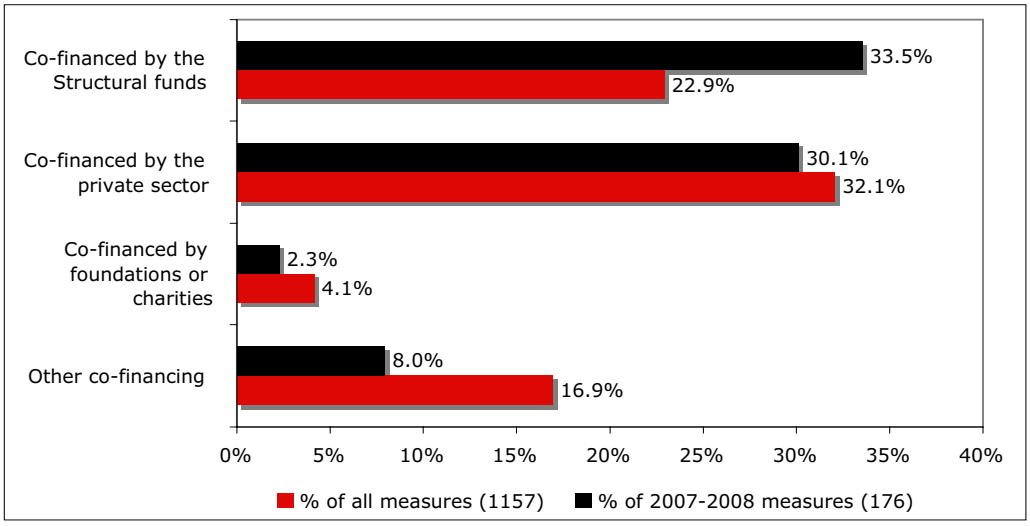
As can be seen from Figure 26, the ranking of importance of the different aspects of the innovation process has changed in 2007-08 compared to the ranking for all measures in the database. Diffusion of technologies in enterprises, innovation management and commercialisation of innovation (including IPR) appear to be given more emphasis by recently introduced support measures. The aspect of the innovation process targeted most often remains development and prototype creation, whereas applied industrial research suffered a relative slip down in the ranking.

Some of these changes can be explained by notable differences in the importance given to different aspects across the EIS country groups. The majority of the 176 new measures were introduced by the moderate innovators and the catching-up countries in 2007-08 and these countries give a strong emphasis to innovation awareness, diffusion of technologies and innovation management. The moderate innovators also give more emphasis than other EIS groups to improving the legal and regulatory environment and commercialisation of innovation (including IPR).

1.4.6 Sources and forms of co-financing

This section gives a snapshot of the sources and forms of co-financing of the support measures. There are two significant sources of co-financing of the STI measures: private sector (33% of all measures) and EU Structural Funds (23%). The funding from non-profit organisations has not been significant (see Figure 27).

Figure 27: Sources of co-financing of support measures

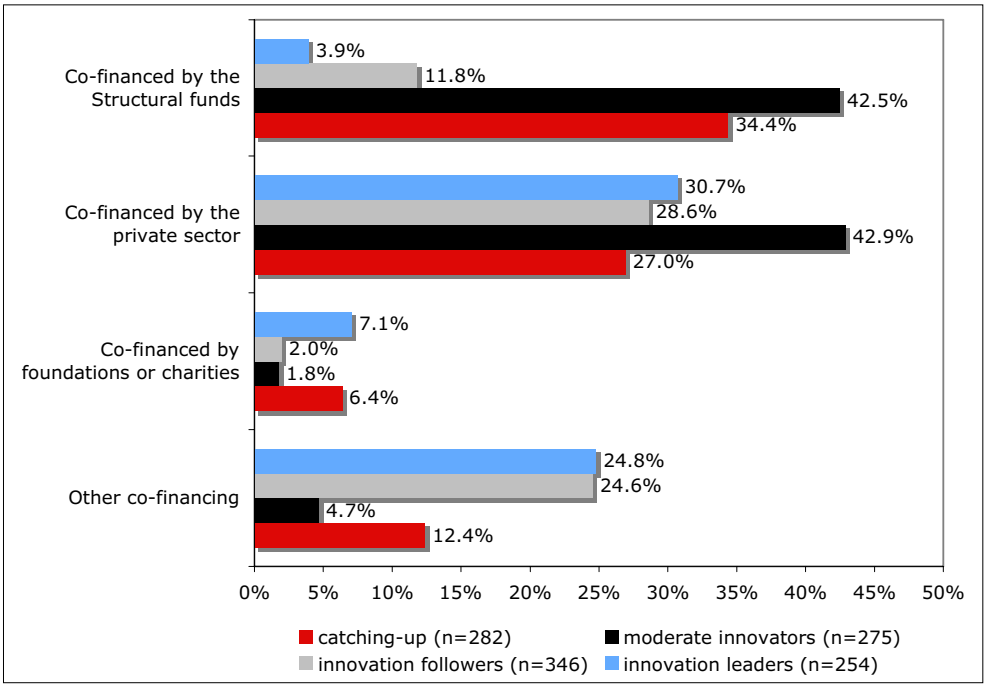


Source: EIRIPM database (N=1157; n=176); analysis Technopolis Group

The high share of measures co-financed by the Structural Funds is mainly due to the measures introduced in the new EU Member States. Four out of ten STI measures in moderate innovators and every third measure in catching-up countries have been co-financed by Structural Funds (see Figure 28). This confirms the argument brought up in many reports that the Structural Fund Operational Programmes (OPs) have played a very important role in implementing innovation policies in these countries.

On the contrary, innovation leaders and followers with more mature STI policies are not so dependent on Structural Funds contributions. Only 4% of all STI measures in innovation leaders and 12% in innovation followers have been co-financed by Structural Funds.

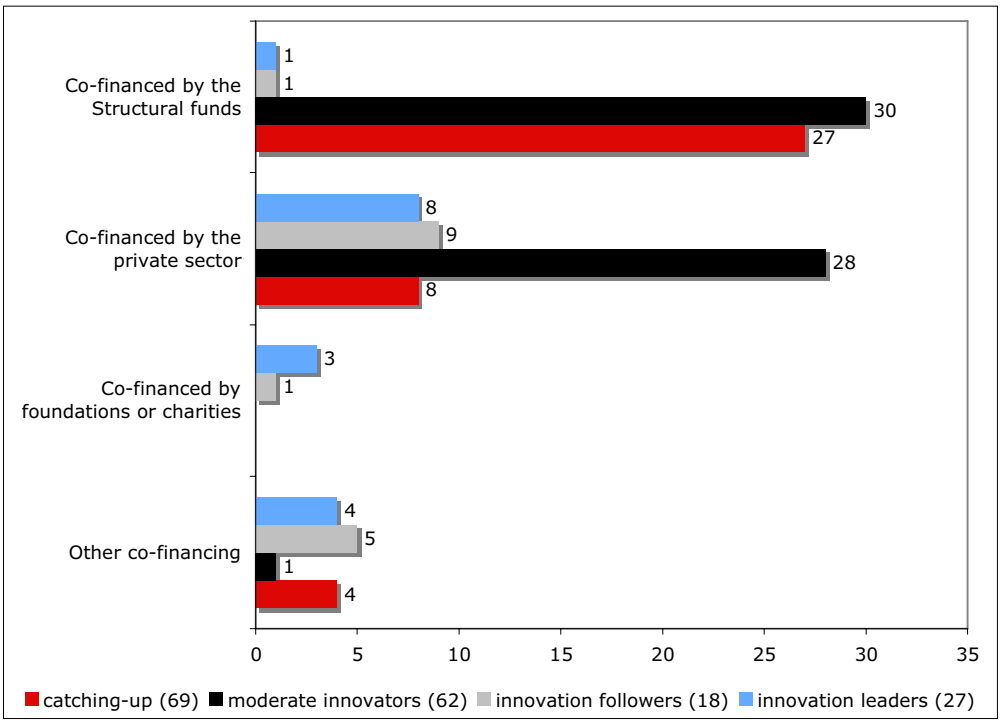
Figure 28: Sources of co-financing by EIS group (all measures)



Source: EIRIPM database (N=1157); analysis Technopolis Group
Note: Percentages indicate the share of all measures co-financed from a given source introduced by EIS groups. The numbers in the legend indicate the total number of measures reported for EIS groups.

Thus, the share of the measures co-financed by the Structural Funds has grown substantially over the last two years due to the measures introduced in the new EU Member States. Over the last two years, 57 out of 59 measures co-financed by the Structural Funds were introduced in catching-up and moderate innovators. Over the last two years, Poland and the Czech Republic alone have reported 16 and 13 measures, respectively, co-financed by Structural Funds. It could be expected that the trend will be even stronger with further measures launched during the 2007-13 programming period.

Figure 29: Sources of co-financing of 2007-08 measures by EIS group

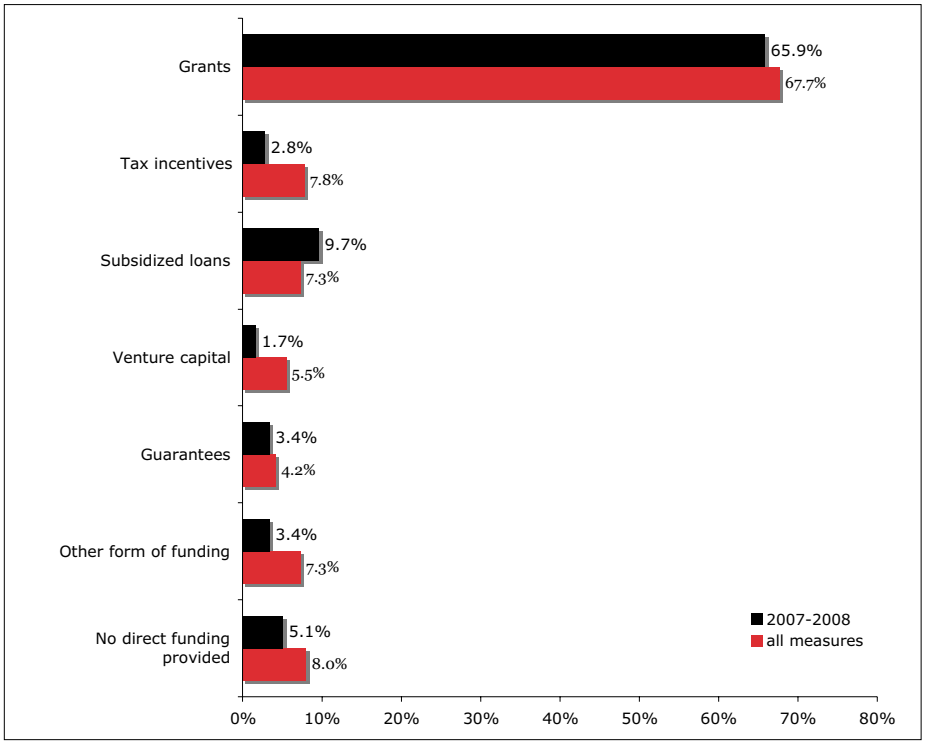


Source: TrendChart-ERAWATCH database of support measures (n=176); analysis Technopolis Group

Note: Numbers indicate the measures co-financed from a given source introduced by EIS groups in 2007 and 2008. The numbers in the legend indicate the total number of measures reported for EIS groups over the last two years.

Finally, the dominant form of funding of the STI measures is a direct grant. Nearly 68% of all reported measures have been funded in this way. The following forms of funding include tax incentives (8%), subsidised loans (7%) and VC (5%). In the recently introduced measures, a direct grant has remained the most often used approach. Over the last two years, there have been relatively less supporting measures introduced using tax incentives and more instruments using subsidised loans (see **Figure 30**). Grants are used in all EIS groups. Subsidised loans have been most often used by moderate innovators.

Figure 30: Forms of funding



Source: TrendChart-ERAWATCH database of support measures (N=1157; n=176); analysis Technopolis Group

1.5 Key Conclusions from the Policy Analysis

The three key messages of this analysis of the policy challenges and responses (policy measures) of the EU-27 Member States are as follows:

Challenges for innovation policy (see section 1.3) differ across the Member States depending on the level of economic development, performance of their innovation systems and the 'maturity' of innovation policies. While challenges addressing 'capability failures' are the most dominant for the EU-27 as a whole, the Member States in the innovation leaders group give much more emphasis to framework failures. This does not imply that the leaders have weaker frameworks for innovation, but rather a shift to a broader understanding of innovation drivers in their economies.

Concerning the policy mix and the extent to which it targets specific market or innovation system failures (see section 1.4), the moderate innovators and catching-up countries give much more emphasis to direct support to companies ('capability failures'), including advisory services and technology diffusion, while the policy mix in the more advanced countries gives much more emphasis to network failures (possibly reflecting the earlier shift to clusters and joint industry-academia R&D cooperation programmes).

In terms of the correspondence between challenges and the policy response, it appears that while catching-up countries and moderate innovators recognise that they face significant 'institutional failures', the policy response in these countries with respect to this type of challenge remains rather limited. For innovation leaders, there seems to be a discrepancy between the importance given to network failures in the identified challenges and the actual policy response (where it is the most prevalent policy failure)[6].

As a last 'footnote', it should not be forgotten that this analysis is based on a count of the number of measures; advanced countries tend to introduce a smaller number of larger, more complex support measures addressing diverse groups of stakeholders (so-called 'MAPs')[7]. An additional analysis, to be undertaken by the end of 2009, will overcome this limitation by refining the data on the budget of the measures. The work to improve the budgetary information available in the European Research and Innovation Policy Inventory has already begun.

[6] For more information on the correspondence between challenges and the policy response, see the TrendChart Country Reports at : http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=263&parentID=52

[7] MAPs (Multi-Actor, Multi-Measure Programmes). See: Baumann, B., Bührer, S., Greer, H., Hochreiter, H., Mayer, S., Simmonds, P., Stampfer, M. and Sturn, D. (2004) Road MAP - Good practices for the management of Multi Actors and Multi Measures Programmes (MAPs) in RTDI policy, STRATA.

2 Innovation Governance

2.1 Developments in Innovation Governance

In the country reports, which are synthesised here, the definition of governance relies on the MONIT study (OECD, 2005) addressing it as "policy coherence and integration, co-ordination, stakeholder involvement and innovation policy learning". In a similar approach Braun looks at governance as leadership, strategic intelligence, and ministerial external and internal coordination (Braun, 2008a). In all the literature on the topic it is practically taken for granted that good governance is a prerequisite for good policy, enhanced innovation activity and eventually welfare.

Hence, this synthesis agrees that it is almost a tautology to say that good governance matters. But there are no general norms on how to design appropriate governance and even when good designs are agreed, competing rationales, short-termism in resources allocation, different perception and different personal ambitions intervene. In other words, routines are heuristic, and history and culture matter. So what one can address here is not what is the optimal/best or even good innovation governance, but what do we learn from studying innovation governance in European countries and, beyond, over recent years? What is really good governance and how can it be approached, described, assessed or even measured, so that countries can learn from each other and improve their internal coordination and their own, tailor-made intelligence that will allow them to adopt and implement better innovation policies?

Addressing these issues includes the additional challenge that the world is not static and governments need to adapt their institutions and innovation policy making in light of emerging pressures arising from more dynamic and more complex economic and social developments. Good governance has to be reflexive.

For the purpose of our subsequent comparisons and conclusions, we address the complex notion of governance, as defined above, in a practical and pragmatic way, by subdividing it into two components, inherently interlinked, but possible to observe separately for analytical purposes. This distinction is obviously utilising North's approach to institutional development (North, 1990):

1. The organisational set up, which is the formal superstructure: what kind of organisations exist and how they interact with each other. This in a sense is the "hardware" of governance, the tangible, descriptive element that is discernible in each system. As tangible one can use proxies to quantify them, like budgets and human resources.
2. The institutional element, the formal and informal rules and their enforcement characteristics, which determine coordination of the hardware elements and their ability (or not) to generate evidence and utilise it as strategic intelligence for constantly adapting and improving innovation policy. This "software" is path dependent and strongly determined by overall public management routines and even national cultures. It is thus much more difficult to quantify it and it can only be tackled with case studies.

Over the years the TrendChart methodology has crystallised in a number of dimensions for assessing the quality of innovation governance: coordination, stakeholder involvement and the use of evidence to assess and redirect policies, evaluation and benchmarking being the most prominent among them. Certain conditions appear necessary for considering innovation governance to be good, whereas others may lead to seeing it as 'good enough'. More importantly, in this context time is a crucial parameter as governance is a social process and, hence, changes only gradually. This applies more to the soft elements in it, but even changes in organisational set-ups need to be carefully designed, agreed/endorsed by participants and be given the means to function, otherwise they risk inhibiting learning and destabilising the system.

The comparison that follows tries to identify different practices, their trends and merits based on the above remarks and using the groups created based on their Science and Innovation Index (SII) scores over a five year period:

1. Studying the governance patterns of the innovation leaders (Switzerland, Sweden, Finland, Germany, Denmark and the United Kingdom [UK]) can suggest necessary conditions for good governance deriving from common elements in their organisational set-ups, forward looking policies and similar behavioural routines. The latter are clearly a lot more difficult to copy and adapt.
2. Among the innovation followers (Austria, Luxembourg, Ireland, France, Belgium and the Netherlands), one may find selected actions of interest, demonstrating ways to deal with concrete governance topics rather than lessons for overall good governance. In that sense they offer selective lessons on how to improve.
3. As for innovation followers, one can draw selective interesting lessons from the individual countries from the moderate innovators group (Cyprus, Estonia, Greece, Slovenia, Iceland, Czech Republic, Norway, Spain, Portugal and Italy) and not from the whole group.
4. The catching-up countries (Malta, Hungary, Slovakia, Poland, Lithuania, Romania, Latvia, Bulgaria, Croatia and Turkey) are in need of learning rather than offering tested ideas on good practices. What is interesting in terms of governance is to see to what extent their catching up relates to improving governance and policy or whether it is merely a combination of a low starting point and increased financial support for innovation from the Structural Funds, and what they need to do in order to maintain momentum.

The conclusions in this chapter are based mainly on the national country reports (prepared by the network of independent experts and published for reference on the PRO INNO Europe website[8] and are complemented by academic papers critically assessing governance models in selected countries.

2.2 Essential Lessons from the Past

Over the past years, annual reports were synthesised by trying to link innovation governance with competitiveness, or at least with innovation performance. The single most important lesson from these endeavours is that there is no mathematical formula to enable this; nevertheless, there is very strong evidence that certain elements are common

[8] See: http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=263&parentID=52)

to the highly performing groups, whereas others are shared among moderate innovators and catching-up countries. Hence, before analysing lessons from progress and events in 2008, it is interesting to summarise these essential messages from the past.

In terms of **organisational set up**, there are very different models, thus there are unlikely to be any significant lessons on how to structure the system. However, although not confirmed by each and every case, it seems that separation of the design and the implementation of policies helps effectiveness, while a certain scale of integration helps efficiency.

What appears to matter a lot more are the institutional elements of the system:

1. **Coordination** is imperative for systems to work. It takes different forms, either hierarchical or inter-organisational with more or less powerful committees and consultative bodies acting as bridges between different ministries and agencies. Coordination can be more or less ambitious, ranging from a simple transparency exercise to efforts for avoiding duplication and, ultimately, to real content coordination, such as the parallel development of infrastructure and skills, common long-term visions of different organisational forms and complementary activities. Based on the past system of quantitative scoring, the top performers and innovation followers led in terms of their efforts to coordinate, while overall coordination has improved for all countries. Needless to say, some systems remain much more fragmented and uncoordinated than others.

   Coordination takes a different dimension in the context of geopolitical space: Self-governance of the regions ranges from the full autonomy of the three Belgian regions, to quite centralised structures in Greece, Portugal and some of the new member states, to different degrees of state-federal interaction in others. In this case, the division of responsibilities is politically determined and goes beyond the influence of innovation agendas.

2. **Stakeholder involvement** is recognised as a determinant of success in any governance system, be it public or corporate. As such, it is fully embraced by all European innovation administrations, at least in terms of rhetoric. In reality, however, the degree of involvement differs considerably and from two points of view, as it is a two-way process. In part, policy makers are reluctant, too concerned, cautious or even sometimes simply too busy, to organise the necessary consultation processes. By the same token, however, stakeholders themselves often act as lobbyists, without providing themselves with the necessary resources to produce evidence which would allow them to corroborate their position and influence consensus building. Involvement can be institutionalised or ad hoc, deep or shallow, but the essential lesson is that building up effective stakeholder involvement is a shared responsibility of both the administration and the stakeholders. Formal consultations are increasingly launched in all member states of the European Union (EU), but their usage and effectiveness for building up trust and reducing transaction costs vary.

   In both cases discussed above, internal coordination in the public sector and the involvement of actors beyond the administration, sometimes operates quite well on an informal basis, particularly in smaller member states.

3. **Evidence-based policy making** as an input to informed agenda setting and policy adjustment is relatively weakly represented in many European countries. One would expect that a quest for an improved knowledge base would appear to be instinctive for decision makers. However, evaluations, benchmarking, foresight and other support studies are not as frequent and generalised as one would expect. One argument may be that there is a reluctance to spend scarce resources on intelligence gathering; another that there is an inherent reluctance to be evaluated; and a third still that internal knowledge is thought to be sufficient. In previous years, country correspondents were asked to assess evidence of the production and utilisation of evidence in the countries studied by giving scores for a number of topics reflecting evaluation, benchmarking and learning. While this scoring process suffers methodologically from subjective assessments and although it is difficult to compare countries with any degree of statistical significance, it can be used to measure progress, stability or retrogression over time, as one can assume that the same correspondent uses the same interpretation criteria and scores in a coherent way. Comparison over time suggests some interesting features: "Openness of the process of designing innovation policy measures", "Quality of inputs to policy making (application of evidence-based techniques, use of evaluation results)" and "Regularity and transparency of policy monitoring and review processes" have improved over the years for both the European average and for individual countries. Similarly, evaluation practices demonstrate a clear, if not very significant improvement, for both overall average European scoring and the majority of countries. Correspondents systematically raised their annual scores on the aspects relating to evaluation culture and the transparency of the results of evaluations.

4. **Trans-European learning** is now taking place at various levels but only "formal mechanisms for policy learning (studies, innovation observatories, study visits, joint events with other countries, etc.)" have a high and increasing score, whereas the application of foreign experience in designing measures (e.g. involvement of foreign experts in the design phase) is increasing, probably due to initiatives like ERA and PRO INNO Europe. Other, less conventional, mechanisms of transnational policy learning are not systematically applied, nor is their use increasing over time.

Keeping these essential lessons in mind, the analysis hereafter focuses on the 2008 evolutions in governance, putting them in the context of the four European Innovation Scoreboard (EIS) groups mentioned above and the general assumptions of the need to look into organisational set-up and the particular relevance of soft elements for good innovation governance.

2.3 Baseline Characteristics and Forward-looking Experimentation: Lessons from Top Performers

2.3.1 What do we learn from top performers? Methodological remarks

The top performing countries, notably Switzerland, Sweden, Finland, Germany, Denmark and the UK can be divided into two large diversified states (Germany and the UK) and four smaller, export-oriented and more specialised countries (the three Scandinavian and Switzerland). All six share very high rankings in international benchmarks, including the EIS, consider innovation policy as the cornerstone of their future competitiveness and systematically dedicate means for the maintenance of evidence bases, allowing them to review policies that maintain their positions and, if possible, forge ahead. Above all, they recognise that their status is not stable and that globalisation challenges call for constantly adjusting governance. For these reasons, most of them experiment with changes in their organisational set up and all of them ensure the full utilisation of all tools available for intelligence gathering.

Two interesting lessons emerge from the point of view of the top performers:

1. One may assume that their shared features are very likely to be directly linked to effective innovation policies and competitiveness. These can thus be reported as 'baseline characteristics of good governance'. In other words, they appear as necessary conditions for good governance and the formulation of effective policies leading to competitiveness. This, of course, does not prevent other successful models from being encountered elsewhere.
2. Switzerland and Germany are characterised by a more stable system, less prone to radical experimentation. Changes tend to take the form of internal restructuring and smaller adaptations. In the last five years, major organisational changes and experimentation are observed almost exclusively in the Scandinavian countries and the UK. And these are not without criticism, both from TrendChart correspondents and from the academic literature. Hence, there are no conclusive remarks on the best direction for the future. It is, however, interesting to attempt to identify the basic elements of these indicative forward-looking strategies, although these attempts should be viewed as experimental as there has been insufficient time to appraise them fully.

2.3.2 Main Conclusions

As an initial remark it is important to stress that the country reports, as policy documents, have a rather positive flavour regarding the governance models of the top performers, expressing only cautious challenges and doubts. Academic literature is far more critical in all cases. The **baseline characteristics** are primarily behavioural and address the soft side of governance. The lessons suggest that it is feasible and desirable to invest in evidence creation, as it is neither a waste of funding nor any kind of threat but a way in which the system can be reinforced.

1. The most visible common feature in top performers is that they all *invest heavily in seeking evidence*, identifying strategic intelligence and utilising it. The use of evaluation, the production of policy documents in compliance with major strategy reforms, intelligence gathering outside the country and benchmarking are common practices in all top performers. The involvement of foreigners in appraisal processes is common practice and guarantees the objectivity of the exercise. Timeliness of the production of relevant information for use in the policy cycle is an important attribute. Policy intelligence is (at least partly) gathered outside the ministries by organisations with the necessary expertise.
2. All top performers address the significant *broadening of innovation policies* to include higher education, professional education, research and innovation. While the level of responsibility and the degree of coordination among them differs, their emphasis on the quality of human resources is evident in different ways. An increasing autonomy in the university system, in terms of its level of self-governance, is also a visible trend.
3. The top performers also tend to separate policy design and policy implementation, exhibit efficient coordination (both more formal as in Finland and more informal as in Germany) and increased stakeholder involvement. Sweden and Switzerland appear as models for the latter. While the organisation of ministries themselves differs from one country to another, they all utilise strong agencies with highly skilled personnel. Ministries and agencies are respected by their respective constituencies, which builds up a kind of *social capital* that enables the system to function. Despite some inevitable complaints, the public sector and the business sector rely on *mutual trust* - something that typically takes a long time to build up.
4. This trust is further helped by elements of *continuity and stability*. Even countries that have implemented larger-scale changes have applied these systematically, with a medium-term horizon and a certain degree of consensus. There is a minimum (if any) discrepancy between rhetoric and implementation, while structural changes are by and large supported by the means to implement the planned reconfigurations.

Forward looking, experimental changes tend to take an organisational rather than a behavioural approach. They are triggered by the need to forge ahead and face competitive pressures in high value added products and services and this suggests a need for a more encompassing coordination of the whole spectrum of the knowledge space (Braun, 2008). All three Scandinavian countries are currently preparing their innovation organisation to face globalisation challenges. While all share an element of concentration, each utilises a different approach: Finland has created a super-ministry to assure coordination, Sweden wants to concentrate on "less for more" … and Denmark has increased concentration in one ministry (a move that is, however, questioned [Koch, 2008]). The UK, on the other hand, has engaged in a major reshuffling of ministerial organisation and responsibilities: The Department for Trade and Industry (DTI), and the Department for Education and Skills (DfES) were replaced by a new Department for Business, Enterprise and Regulatory Reform (BERR), Department for Innovation, Universities and Skills (DIUS)

and Department for Schools, Colleges and Families (DSCF) thus illustrating the opposite direction to hyper-concentration.

2.4 Lessons from Innovation Followers and Moderate Innovators

2.4.1 What do we learn from innovation followers and moderate innovators?

If the premise that innovation governance relates to performance and welfare is correct, then the countries that are closely following the top performers can offer interesting lessons when they adopt changes with the justification of changing gear and improving their competitive position. While not all ideas are by definition a good lesson, they may contain inspirations for change for other countries. By analogy, moderate innovators can offer some insight as to why they (and not the other new member states) appear more advanced.

Since both these groups are composed of non-homogeneous countries and many of them demonstrate features of stability that are close to stalemate, only lessons from a subset of countries were taken into consideration, namely:

- Countries considered to be mature and close to moving to a group with higher average score, as indicated by the SII, namely Austria, Cyprus, Estonia, Iceland and Slovenia;
- Countries where a broad-based encompassing change has recently occurred and which appears sufficiently interesting/original to report on (e.g. Estonia);
- Countries with other performance characteristics that have been significantly involved in the debate for innovation governance (e.g. the Netherlands).

With this analysis, the following conclusions and suggestions are put forward:

1. When more countries are reviewed, patterns inevitably become less discernible. Although some countries from this group comply with the top performers' trends towards the use of larger umbrella organisations for coordination, others go in exactly the opposite direction by splitting ministries, as in the case of Austria.
2. Changing long-established routines by the adoption of a rigorous policy to produce evidence and use it for more effective policy was a course followed by Austria, with the evaluation platform, and by Ireland, which over its growth years, laid the foundations for a dense organisational set-up that is systematically investing in studies, benchmarking and foresight.
3. Ireland and Iceland show that investment in change can pay off.
4. Innovation governance improves best in the context of broader change of the national administration, as in the case of France.
5. Small countries need coordination structures much less than bigger ones; the absence of the additional layer of complexity by the regional authorities (federal structure) and the informal linkages within the public sector facilitate interaction and help promote change more rapidly.
6. Selected cases to study are the Evaluation Platform in Austria and the Innovation Platform in the Netherlands. In addition, the Knowledge & Innovation (K&I) initiative indicates an interesting way to improve overall coordination.

7. Both Cyprus and Estonia demonstrate that it is feasible for new member states to create the necessary organisational set-up in a short period of time.
8. Finally, an interesting lesson from Estonia is that bilateral, close relationships between individual agencies can sometimes make up for national deficiencies.

2.5 Lessons from the Catching-Up Countries

The catching-up countries[9] (HR, PL, LT, SK, HU, MT, BG, TR, LV and RO) are all new member states, with the exception of Turkey. However, one should not imply that the degree of adaptation reflects the time of accession as some of the new member states have joined the "moderate innovators'" group.

The whole "catching-up" group is characterised by very low initial SII values and eight out of the 10 countries of the group are for the first time receiving massive funding for modern innovation policies, thanks to the European Structural Funds. Hence, one main reason behind their ability to catch up rests on the increasing returns of this new funding. Moreover, in addition to the actual funds, the cohesion instruments request the adoption of at least a basic organisational set-up and the introduction of rudimentary soft elements for monitoring and assessment of the Structural Funds' financial contributions. Hence, there has been a rapid adaptation within the hardware of governance in the last years. A few remarks demonstrate where these countries stand on average and how they can benefit from the TC-triggered policy learning process:

1. The "basic essentials" now exist throughout the group of countries, with at least one responsible ministry, elaborate programming documents (with the National Reform Programme and the Programming Documents playing a prominent role), adoption of the innovation agenda by at least two basic ministries and formal mechanisms of coordination and stakeholder involvement. However, in many cases stakeholder involvement and coordination are seen as deficient and still nascent. Stakeholders do participate in monitoring committees but the relationships are not at the level of maturity found in Sweden, Switzerland or Spain (as an example of a more recent success), where the catching-up countries could look for new ideas. This is one area that needs additional effort both from the administration and the stakeholders.
2. Some of these countries consider that shifting the coordination responsibility to a higher level will lead to better results. While this may be the case under certain circumstances, evidence does not suggest that it has worked in the past.
3. Soft elements are hardly developed with the exception of the basic obligations vis-à-vis the Structural Funds, i.e. ex ante evaluation and monitoring, which take more of an auditing than an impact assessment form. There are different degrees of progress with rhetorical announcements and even the adoption of evaluation as a legal obligation. However, there is no country where intelligence gathering is systematic and timely, let alone organised with foreign assistance. This element differentiates the new member states in the catching-up group from those characterised as moderate innovators, who at least demonstrate fragmented but

[9] Croatia, Poland, Lithuania, Slovakia, Hungary, Malta, Bulgaria, Turkey, Latvia and Romania

visible efforts to use more evidence. This is another area where emphasis is necessary and could soon lead to improved policies.

4. All this leads to a certain lack of trusting relationships and social capital that distinguish this group. In other words, as funding becomes less of a barrier, the organisation of funding does not generate a virtuous circle. Ministries and agencies in this group do not enjoy the respect of stakeholders to the extent that TEKES, CWA, Vinnova or NESTA do. This problem touches directly upon the overall administrative capabilities in each country and raises the question of the extent to which it is possible to improve innovation governance significantly more than the average level of governance in the country. The follow-up of policy announcements is more erratic than in the other groups.

Lessons for this group exist everywhere, from the top performers to selected cases in innovation followers and moderate innovators. It is their choice from whom they want to learn, and what and how to implement it. The question is whether the challenge for them is to adopt organisational set-ups and routines that resemble groups 1 and 2 more closely, with the goal of leap-frogging (assuming that governance will eventually lead to improving SII indictors) or to limit themselves to incremental adaptations by learning how "moderate innovators" have embedded the necessary changes to allow them to progress rapidly but continuously.

2.6 Can Europe Learn from Innovation Governance in the Non-EU Countries?

The Triad, namely the USA, Japan and the EU, have traditionally been the main competing blocks for the lucrative high and medium/high-tech segments in international trade, Canada following. While economies like Korea and Taiwan are increasingly competing for these segments of the market, benchmarks and indicators are mainly used to measure the respective positions and the evolution of performance within the Triad. In addition, learning from the governance system of these main competitors still makes sense: how do countries that are by all measures in similar competitive positions with the EU organise, coordinate and deliver public intervention in favour of innovation?

More recently however, competition has been mounting from big, rapidly growing economies as well, namely China, India and Brazil. The innovation systems in these countries are still significantly lagging behind those of leading economies, but monitoring their evolution is relevant from at least three points of view: their performance increasingly attracts foreign direct investment (FDI) and thus they become potential competitors for new ventures; they invest heavily in education and skills in an effort to shift their competitive positions in more innovative segments of the global market; and, last but not least, as they benefit from different path dependencies and lock-ins they may offer some new insight into innovation governance and policy.

This section outlines what Europe can learn from its main competitors, whether there are practices or routines that can be imitated or to enrich our own understanding of innovation governance. An additional dimension for moderate innovators and catching-up countries is to look at emerging competitors less with an imitating stance and more as a way to understand how these systems are shaping and trying to convert to new routines that will

help them reduce their reliability on cheap labour and upgrade in the international division of labour.

2.6.1 Lessons from the main competitors

The USA, Japan and Canada are technologically advanced countries, with EIS average scores above the EU average and with long traditions in research, technological development and innovation (RTDI) support. The main features of their individual systems are briefly outlined below:

2.6.1.1 USA

The USA's innovation system is quite stable: It is characterised by its size, number and diversity of government, academia, private sector, and non-profit organisations involved. At the federal level, the executive, congressional and judicial government branches operate through a system of checks and balances. The Office of Management and Budget (OMB), which carries out annual budget reviews and performance assessments of agency programmes, is a much more powerful organisation than correspondent agencies in the EU or most member states. In parallel to the OMB, dedicated agencies, foundations, academia and consultants produce a huge literature on evidence, intelligence and new hypotheses regarding the role of innovation governance and policy, which is a reference to the international RTDI literature.

The federal government provides support for innovation through infrastructure development and framework measures such as intellectual property (IP), financial market regulation and interstate commerce. It also sponsors select initiatives directly related to innovation, though federal support for innovation is more often indirect.

The USA's system, being the largest in the world, has a very dense organisational set-up, with many federal agencies having interests in innovation policy and programmes. In addition to federal agencies, state organisations and non-profit foundation initiatives have a prominent role in advancing research and policy related to the innovation process. The US Department of Commerce is one of the main federal focal points for innovation initiatives, although other agencies also organise innovation activities (including the Department of Defence and the US Department of Energy). The role of the US Congress with respect to innovation include introducing innovation-related legislation, authorising and appropriating budgets, holding hearings and receiving testimony from stakeholders on innovation-related issues, and carrying out oversight of executive agencies.

States have a very high degree of autonomy in areas of state fiscal, education, innovation and other structural policies. In terms of innovation, their policies differ significantly with some states (such as Massachusetts and Pennsylvania) being pioneers in the area. Coordination mechanisms between states through non-profits and inter-agency mechanisms have evolved to present more information about research in innovation in addition to its regular information sharing about technology-based economic development best practices, and the like. The federal government does not prescribe to individual states what their innovation policy or funding should be, although federal government programmes also provide funding to the states and the federal government sets the overall regulatory and economic framework.

This type of system has resulted in strong performance to date and allows the development of innovation initiatives from many organisations at different levels, but also highlights the need for coordination and learning mechanisms. The America COMPETES Act fulfils this role in certain areas. It restructures the management of innovation programmes within the Department of Commerce, eliminating the Technology Administration and creating a President's Council on Innovation and Competitiveness to serve as a coordinating and advisory body for the national innovation agenda. The Council's functions include (1) monitoring laws and legislation in terms of their impact on research funding, taxation, immigration, trade and other aspects of the innovation enterprise; (2) advising the President on issues of competitiveness and innovation and appropriate policy responses; (3) development of metrics to assess the impact of proposed policies in cooperation with the OMB; (4) recommending improvements to executive agencies on the implementation of innovation initiatives, monitoring and reporting; (5) developing metrics to assess the innovativeness of the US federal government; and (6) submitting an annual report to the President and Congress.

2.6.1.2 Japan

The Japanese policy making system is also quite stable: policy is set by the Council for Science and Technology Policy, with five specialist policy advisory committees, while the Council on Economic and Fiscal Policy in the Cabinet Office produces a number of innovation-related policy reports and outlines. The Ministry of Education, Culture, Sports, Science and Technology is the main provider of public expenditure for R&D (focusing mostly on universities and national labs), followed by the Ministry of Economy, Trade and Industry, which has a greater industry focus. Other quasi-governmental organisations, such as the New Energy Development Organisation, also contribute to policy development and implementation in the Japanese research and innovation system. Sectoral ministries, like the Ministry of Defence and the Ministry of Health, Labour and Welfare are increasingly interested in innovation and a number of new initiatives have also been introduced with regard to human resources, regional innovation systems, national projects, space policy, taxation for angel investors, innovative technologies and other aspects of IP management and use. Coordination mechanisms are considered appropriate, with incremental improvements over the years and recently some debate over the management systems and role of the independent administrative organisations. Large Japanese companies are often consulted and have prominent pathways in presenting their views to government in industrial, innovation or other policies that affect them, although in recent years.

On many levels, Japanese policy makers are highly committed to policy development for science, technology and innovation (STI), and this has become a heightened priority in the country's many coordinating councils. The National Institute of Science and Technology Policy (NISTEP) supports the system with systematic search for evidence. Regional innovation is increasingly taken into consideration but support is designed centrally. From November 2007, the Cabinet Office developed proposals for a regional revitalisation body regarding innovation policy that will provide financial support to medium-sized firms and public-private ventures. Concrete measures to be taken are currently under negotiation. Some regional innovation policy-related initiatives have emerged including working groups in the Council for science and technology (S&T) Policy to regularly review policy issues in detail, through consultation with relevant actors before developing policy outlines for the main committee.

There is ongoing public debate on the quality of services delivered by the national innovation system (NIS). Although there is a dedicated organisation for evidence production, the OECD has raised for a number of years expressed concern over how Japan should obtain higher return on investment in innovation, repeated in the annual review in 2008.

2.6.1.3 Canada

The federal government is responsible for developing broad national innovation policies and funding the various national agencies involved in the innovation system. The Prime Minister and Cabinet, made up of all federal departments, is the high level decision-making organisation that makes general policy decisions. Industry Canada is the department responsible for developing general STI policy options for consideration by the Cabinet, consistent with the overall economic policy of the Department of Finance. Once approved, these policies are implemented by a variety of departments and agencies as appropriate.

Canada does not have a formal national innovation governance system. It relies on a complex network of formal and informal relationships between the public, not for profit and private sectors. One major issue has been the distributed responsibility for STI policy and programmes among many science-based departments and agencies, each operating within its own mandated area of responsibility. Previously, the federal government had two high-level groups to advise the Prime Minister and Departments. A new Science, Technology and Innovation Council is being formed to improve coordination; however, there are no details yet available about mandate or membership. In addition, the Department of Finance is playing an increased role in setting high-level innovation policy. These new policies are closely linked to economic policy.

The country is a federation, with a distribution of powers between the federal and provincial governments. For example, provinces have jurisdiction over health, agriculture and forestry. As a result provinces have some control over innovation in those sectors. They also have jurisdiction over education, which underpins innovation.

Policy design and implementation is supported by significant investments in the creation of policy documents, intelligence gathering, evaluations and assessments.

2.6.1.4 Common patterns in the innovation governance of global top performers

The common elements of the three major competitors of the EU consist of the size of their innovation system, increasing emphasis on innovation, stability of the overall system combined with constant experimentation for incremental improvements, as well as investments in intelligence gathering and emphasis on institutions. Worries for efficient management are observed everywhere. All three benefit from higher federal authority than the EU, but the centralisation of power differs significantly with the US and Canada giving full authority to states, while in Japan regional support is centrally planned. Differences arise from their overall political organisation and path dependencies. In a short overview, their governance can be plotted as follows:

	USA	Japan	Canada
Government bodies and their coordination	Very rich organisational set-up, decentralised, ongoing process of improving coordination	Rich organisational set-up and powerful central coordination at a very high level	Rich organisational set-up, recent (unknown and untested) changes to improve high-level coordination.
Central-regional government articulation	High autonomy, networked coordination	Central responsibility and increased concern on the regional level	Significant autonomy of the provinces in key sectors that underpin innovation.
Stakeholder involvement	Broad involvement, including through congressional procedures	Strong influence of big business in policy making	Broad stakeholder involvement
Evidence-based policy	Diverse performance measurement and evaluation approaches, high investments in strategic intelligence	Increased attention to formal evaluation; high investments in intelligence gathering	Well organised structures for evidence-based policy

In short, for each one of them one may address specific features of interest for Europe:

- The US shares with the EU top performers a sense for organisational set-up and institutional maturity. It distinguishes itself positively with the very prominent role of the US Congress and the OMB playing a significant role in assuring intelligence gathering and evidence-based policies. The USA confirms the idea suggested by studying European innovation governance in that it very much reflects the general quality of governance in a country. The USA is also distinguishing itself in the more prominent role played by private foundations. However, they share with Europe the need for better coordination, which they are in a process of redesigning through the America COMPETES Act; and they also share a very diverse innovation governance at the state level, which depends more on the abilities and capabilities of individual states and less on the formal federal rules on autonomy.
- Japan presents very idiosyncratic features, being more centralised than most OECD economies but with good results in terms of competitiveness. It shares investments on intelligence gathering and a sense for stability and some experimentation with the EU top performers. The role of sectoral ministries is increasing with health and energy becoming integral parts of the innovation governance.
- Canada is in a process of change, as it did not have an explicit innovation policy in the past but has announced more emphasis on it. Coordination mechanisms are expected to improve. However, even without an explicit policy in the past, elements of innovation support were very much present, under different policy areas and were coordinated in a more informal but well networked scheme.

2.6.2 Monitoring innovation governance in emerging economies

2.6.2.1 China

China is a unique case. After two decades of spectacular gross domestic product (GDP) growth derived from low-tech exports relying on cheap labour policy, it is now gradually shifting and innovation is becoming one of the central themes in its development strategy. An innovation-oriented plan prioritises since 2005 industries of high value added and low energy consumption. Innovation governance is adapting to this development model, however slowly, carefully and with a mentality that differs significantly from that of Europe.

Governance is gradually adapting to comply with the increasing emphasis on innovation. Although it remains centralised, there are visible signs of emphasis on better coordination. Overall coordination of innovation strategies across ministries is assured by the National Steering Group for S&T and Education in the State Council, which only meets two to four times a year. The Ministry of Science and Technology takes a leading position in innovation policy making and coordinates with other ministries, such as the Ministry of Finance and the Ministry of Personnel to formulate fiscal taxation and human capital related policies. A large number of ministries, commissions and academies are involved in the system. One major decision (not yet implemented) refers to the formation of a new Ministry of Industry and Information Technology, including many previous actors. This is not specific to innovation governance but in line with the overall decision to reduce the number of ministries. The newly created ministry is expected to play an important role in regulating major industries and examining industrial investments.

There is also some evidence of evolving towards more decentralised governance. Instead of being a manager of research and development (R&D) projects, the primary role of the central government has shifted to being a coordinator of innovation activities at a macro level. Top S&T scientists and policy scientists from universities and research institutes are often invited to give advice to the decision makers on key issues, and the transparency of decision making is also improving. Provincial and municipal governments are granted more autonomy in making policies, including those on human resources, finance and taxation which are better fitted to their circumstances. Regional and municipal actors also participate actively both in national programmes and in developing their own initiatives.

Despite these improvements, the development of governance system is imbalanced, if differentiated by policy stages. The implementation and evaluation of innovation policy and practices are far behind the development of policy formulation. Evidence-based policy analysis is relatively new in China.

2.6.2.2 India

Like China, India has enjoyed a considerable growth and export record over the last years, but it distinguishes itself in that it has from the beginning relied more on innovation in high-tech sectors. FDI and national conglomerates are the main driving forces behind that. Innovation governance is characterised by a decentralised approach, strong stakeholder

involvement and some emphasis on the production of the necessary evidence to improve policies.

India does not have a formal national innovation policy, an agency or a body which governs the innovation system. Much of the structure of the innovation system, as it exists, functions and relies on informal or natural interaction between different actors: government science agencies, policy making bodies such as the Planning Commission, business enterprises and their associations, foreign firms operating in India, universities and non-governmental organisations. It is a networked system that is more reminiscent of the Canadian governance. In the absence of a formal national or centrally coordinated body for governing innovation, the responsibility and the process of innovation governance takes place more in a decentralised networked form, through various science agencies, ministries and knowledge-related bodies. One can easily characterise this development as 'decentralised innovation policy networks'. Many ministries have become proactive in the formulation, coordination and implementation of innovation-related policies in high-tech areas. Each of these ministries have high-level expert bodies constituted and represented by personnel from government, business enterprises, technocrats, R&D laboratories, and science agencies and universities. The National Knowledge Commission advises the prime minister and coordinate programmes for the 21st Century knowledge-based economy producing influential reports and recommendations.

There are three main actors who initiate the policy setting for R&D agenda, lay down priorities in S&T sectors and coordinate R&D: the Planning Commission (generally represented by an educationist or a scientist with the rank of a State Minister); the Office of the Principal Scientific Advisor to the Government of India; and the Ministry of Science and Technology, as represented through various science agencies and departments. Industry associations and chambers of commerce representing the broad sections of industry and enterprise; civil society groups and the academic community through media and other means are incorporated into the overall R&D and S&T policy agenda by the three main actors. With the rise of Indian business enterprises in the last five years, their associations or chambers of commerce (the Confederation of Indian Industry, the Federation of Indian Chambers of Commerce and Industry and the National Association of Software Companies) are centre-stage in decision making.

The governments of states and union territories are relatively autonomous in formulating and implementing state-level research- and innovation-related policies. Such policies are articulated generally through state-level S&T councils, in coordination with various state-level ministries, local state-level industries (both private and public), and knowledge institutions (universities and R&D laboratories). While the central government takes the main responsibility for innovation-related policies for strategic sectors, the states and central government share responsibility for civilian R&D to the extent of about 8 % to 10 %.

2.6.2.3 Brazil

Rhetorically, innovation has moved to the forefront of the government agenda with new visions and tools. Organisations are becoming more dense as new actors like technology transfer centres are being implemented in public universities and research centres; the IP-granting institution is being reformed, revamped and staffed; and seed capital financing

programmes are being implemented. Coordination efforts and increased collaboration among key ministries are also being observed; however, innovation governance is still characterised by intense bureaucratic competition amongst agencies, ministries and development banks. There is a density of ministries, supported by agencies and a broad spectrum of research establishments.

Regional autonomy is recognised but states perform according to their own political maturity and means: The federal innovation law created incentives for the states to develop policies to promote technological innovation and procure state resources for such action. More developed states with a strong base of stakeholders behind the innovation agenda are still designing and seeking approval from their legislatures regarding state innovation laws. A few smaller and STI outlying states have already launched theirs.

The key research and innovation policy institution is the Ministry of Science and Technology supported by an innovation agency. The Ministry of Development, Industry and Foreign Trade is responsible for formulating the definition of Brazil's industrial policy through the recently created Brazilian Agency for Industrial Development. High-level coordination of the emerging innovation policy was in the hands of the Ministry of Science and Technology until the establishment in January 2005 of the public-private inter-ministerial industrial policy making advisory National Council for Industrial Policy and of the programme design and implementation monitoring agency. The industrial policy priorities and programmes set by these bodies feature an innovation policy component, which is coupled with the infrastructure and strategic goals. An effort to establish an innovation policy coordinating structure has been resisted by the responsible ministry.

An important step forward was the establishment of a Permanent Committee for Articulated and Systematic Monitoring of Actions in January 2008 (decided as early as 2004), to set up a forum with legitimacy to debate experiences in the Innovation Law area, besides making suggestions for new policy interventions and application of the law. Despite all progress in organisation and intelligence gathering, the Ministry of Science and Technology 2008 is not being given the means to implement the necessary changes.

Overall, the structure of the national innovation governance system is young, evolving and featuring some positive elements of progress. At the same time, some of its main components remain amorphous, with poorly defined mandate, responsibilities and scope of action; and some of its main inter-linkages are opaque. In addition accountability is not clearly distributed and assigned across the system partners.

2.6.2.4 Common patterns in the innovation governance of emerging economies

The common element of the three emerging competitors is their huge size, increasing emphasis on innovation and more emphasis on the hard side of innovation governance. In that sense they resemble the European moderators and catching-up countries, in that the change of routines and evidence-based policy is recognised to be difficult. Only China, with a very strong political system, can impose changes easily, and even there the informal rules do not change. Brazil is an excellent case that demonstrates how difficult it is to impose new coordination mechanisms and intelligence gathering.

Differences among them are significant and shaped by their history and current political system. In a short overview, their governance can be plotted as follows:

	China	India	Brazil
Government bodies and their coordination	Centralised, in process of creating a super-ministry; slight increase of regional participation	Very decentralised innovation policy networks	Significant efforts to coordinate a dense organisational set-up
Central-regional government articulation	Increasing autonomy of the regional level	High autonomy of the regional level	In principle autonomous regional policies, implemented by certain regions only
Stakeholder involvement	Where it occurs, is often informal	High business level involvement (especially from larger national companies)	Only in certain cases
Evidence-based policy	Very limited	Emerging slowly	Efforts for progress but with limited results

In short:

- Innovation governance in China is adapting to the new target of competing internationally for more innovative products and services than in the past. In this spirit, it is characterised by efforts to improve coordination and increase regional participation. The country is in the process of giving a new powerful ministry a more prominent role (like some of the European top performers) but appears to be lacking investment in intelligence gathering.
- In India the model is totally different, with limited coordination among a variety of networked actors, with some elements of evidence-based policy and a very strong role by the major national corporations. Stakeholders play a crucial role, but it is mainly bigger influential actors and the information and communication technologies (ICT) industry only.
- Finally, innovation governance in Brazil resembles to a large extent features identified in some of the European moderate innovators and catching-up countries: rhetoric is in place and there is progress in the organisational set-up; less but not inexistent are efforts to invest in policy intelligence. The regional level enjoys autonomy but only a few regions are in a position/have as yet exploited it to adopt an explicit innovation policy.

2.7 Can We Really Synthesise Innovation Governance and Learn from it?

Governance is an abstract and complex concept, difficult to quantify and compare. Whether it is corporate or public, governance needs to be analysed with in-depth case studies. These studies suggest that there are too many parameters to examine, including not only structures but also path dependencies, organisational and personal abilities. Moreover, this complex system of organisations and routines changes slowly but needs to constantly adapt to a dynamic environment. Hence, any assessments and comparisons result more as models and suggestions that act as stimulation for discussion than as normative suggestions.

This also applies to innovation governance. Organisational set-ups and routines differ significantly among the countries observed. Despite many efforts to identify what is a most appropriate constellation, different models emerge. These models either evolve, following internal system dynamics, or they are changed, top down, in an effort to improve and/or adapt to changes in competitive pressures. No general lessons can be drawn about the best composition of organisational elements: how many ministries, how evenly powers should be distributed among them, whether the separation of policy design and implementation is an absolute imperative, etc. Both successes and failures are reported for all kinds of set-ups. However, the study of governance is precious because it helps "intelligent benchmarking" (Lundval and Thomlinson, 2004), an ability to form a more informed view of one's own system through comparison. Hence, although there is no absolute model, there are stories of models and changes that have worked better and others that have not.

It is easier to venture recommendations about the soft elements of governance. The way organisations and people operate, behave and take decisions offers inspiration on what to do and how. It is the institutional element of governance, the formal and informal rules and their enforcement characteristics, which eventually determine the effectiveness of coordination of the hardware elements and their ability (or not) to generate evidence and utilise it as strategic intelligence for a constantly adapting and improving innovation policy.

Looking at the governance characteristics and evolution of all European countries, with the above remarks in mind, the main lessons that can be drawn include a set of apparent baseline conditions for good governance, known from the literature but also observed in the top performing countries; there are also some selective ideas on ways used by other countries to adapt their national routines into more demanding features of governance. This should not be read as a linear set of recommendations from the Group of Top Performers down to the Group of Catching-up Countries. All countries need to learn and adapt, and top performers in particular appear, at the moment, concerned over global pressures and express this concern through articulated changes in their coordination mechanisms.

Top performing countries are all doing very well in terms of gathering evidence and using it as policy inputs. They invest both the physical and human resources required. They also effectively consult with stakeholders. However (with the exception of Germany), they appear unsatisfied with their coordination mechanisms and have recently re-adapted them to face increasing globalisation challenges. A common element in these re-organisational arrangements is an increasing emphasis on the autonomy (institutional or regional) of higher education and a commitment to its excellence. The distribution of power among ministries and the overall size of government differ in terms of the directions of change. The academic literature has been quite critical about almost all of these changes, implying that stronger organisations discourage others from doing an effective job. Nobody is unanimously recognised as having struck an optimal balance. So, from top performers one can learn how to best organise the system: stability and the quality of the administration have created the necessary trust for the systems to operate "well enough" even if certain areas of coordination suffer. In the top performing countries there is experimentation and self-criticism but there is an element of respect between the public and the private sector.

This fine borderline between being critical in order to improve or being negative and frustrated makes a difference.

Thus, from these countries one can imply a baseline scenario, the *sine qua non conditions* for effective operations:

1. *Invest heavily in creating evidence*, identifying strategic intelligence and utilising it. Ideally evidence gathering has to be entrusted to independent institutes or, at least, autonomous units of bigger organisations.
2. *Broadening the scope of innovation policies* to include higher education, professional education, research and innovation.
3. *Involve stakeholders* and do it effectively. Their role is not to lobby but to contribute to the debate and help create long-term shared visions.
4. In the case of doubt, separate design from implementation, but give the implementation agencies the means to implement whatever rhetorical promises have been made. Only through continuity and stability can *social capital* be built and allow the system to function.

From the other countries, many interesting lessons can be learned on how to accomplish some of the baseline elements. Innovation followers and moderate innovators show how to pave the way for changing long-established routines. Selected cases refer to the Austrian evaluation platform, to the creation of the dense organisational set-up by Ireland, and to France, which improved innovation governance in the context of broader change of the national administration. The rotating presidency of the Council appears a good opportunity to increase emphasis on innovation, in order to comply with the increased obligations of the country.

Turning to the new member states and the former cohesion countries, it is clear that some of them proved that progress can be rapid, while others are only converging because of their very low starting position. While the Structural Funds, the National Reform Plans (NRP) and even the FP_7 and CIP programmes act as incentives and help them to improve some basic features of governance, there is a stalemate in terms of the progress of evidence-based policy. Their challenge at the moment is to organise internally in a way to assure the funds and create the culture of creation of evidence and its utilisation as intelligence for constant improvements in policies.

Overall, one can observe visible progress in innovation governance in European countries over the years. Synthesising government trends is only possible if looking at a longer time span, two to three years at least. Looking into European averages over the last three years, it appears that coordination has improved and formal consultation with stakeholders is now established everywhere. *Evidence-based policies* as an input to informed agenda-setting and policy adjustments remain relatively weak in many European countries. However, *trans-European learning* is now taking place at various levels and has contributed to better governance. EU support has been one of the driving forces behind the right direction to change: through financial incentives from the Framework Programme (FP) and the Structural Funds, through the OMC and the adoption of the NRPs or through the organisation of exchanges of learning experiences (or a combination of all the above), all countries have increased their emphasis on innovation governance. Nevertheless, there is still a long way to go: Cross reference ambitious academic in-depth

case studies, use innovative methodological approaches to capture new quantitative proxies and link governance policy and performance.

As far as innovation governance in the main European competitors is concerned, this can be characterised as diverse as within Europe and even more. If anything, these examples confirm that good governance is not one best model and global top performers are anything but self-indulgent: they are constantly trying to improve, experiment without hurting stability, and improve and adapt to the changing conditions of international competition. By contract, global challengers need to adapt more, to create organisations long-established in top performers and appear, as in Europe, to deal less with institutional change, looking for evidence-based policy and changes of informal rules, and focusing more on the formal aspects of institutional change. Their stakeholder involvement is often selective and they value continuity and stability less; in some cases rhetoric and implementation divert.

Hence, to a large extent, the conclusions based on European governance in the sections above are confirmed when turning into global comparisons:

- Top performers can have very diverse organisational set-ups, but they share focus in coordination, stakeholder involvement (one way or another) and investment in intelligence gathering fuelling evidence-based policies.
- Countries trying to improve their competitive positions by upgrading their innovation performance struggle to perk up their innovation governance, starting with the establishment of organisations but hardly focusing on the necessary changes to influence routines of policy making.

However there are also differences and idiosyncrasies that may be read as lessons for improvement:

- The US has a system of checks and balances that can inspire better involvement of national parliaments.
- The US and Canadian systems benefit from much larger foundations influencing innovation positively. The way foundations function and interact with public bodies and their degrees of freedom by national legislation are worth investigating further.
- Japan has an autonomous institute for evidence creation, which is fuelling interested government ministries and agencies with the necessary intelligence.
- Japan demonstrates also that regional innovation may be a concern of the central government and acts as a counterexample to the EU trend of rising autonomy of the regions.
- The networked coordination structures of Canada and India may inspire informal coordination in cases where central elements are not imposed.
- China and Brazil demonstrate cases where an effort to increased centralisation is in the process of trying to achieve better coordination results.

3 Overall Conclusions on Innovation Policy and Governance

3.1 Innovation Challenges and the Policy Mix: An Adequate Response?

Some 13 years ago, the Green Paper on Innovation[10] heralded the arrival of innovation as a new topic on the policy makers' table. The Green Paper laid out a set of areas for policy action that, even today, remain highly relevant: intellectual property rights (IPR), legal and regulatory environment, an early emphasis on the knowledge triangle of education (training), research and innovation. Significantly, the last 'action point' of the Green Paper called for a new approach to the role of public authorities in supporting innovation.

Figure 31: A (new) role for public action on innovation

"In most fields the role of the authorities is changing: they have to teach, persuade, involve, stimulate and evaluate rather than order. Public action needs to be modernised and become simpler […] the State should become a moderate but effective regulator. This is also true in the case of innovation. If it is to be fully effective, public action also needs to be stable (involving regulations, but also financial support, especially for research and training where efforts need to be long-term) and it needs to be geared to satisfying collective needs. Public authorities must also contribute, through forecasting and consultation, to indicating the path forward for those involved and to facilitating the emergence of common if not consensus views.

The promotion of innovation also requires the coordination and alignment of the efforts of many people, and especially the consultation of the social partners. Public authorities need to develop new thinking with greater emphasis on consultation and partnership with the private sector".

Source: Green Paper on Innovation, December 1995

Yet, the EU as an entity (through enlargement, the introduction of the Euro, etc.), the global economic and environmental challenges and the innovations required for tackling them, and our understanding of what drives or hinders innovation in our innovation systems have radically evolved. A significant amount of recent work, theoretical, empirical and policy research, should be inciting innovation policy makers and decision makers, and those responsible for implementing public action, to think even further out of the box. The need for 'innovation everywhere' is becoming self-evident and should be pushing policy makers to change their approach to and their methods of designing, implementing and evaluating innovation policy. Much has been written in recent years about 'innovation everywhere', 'third-generation innovation policies', 'society-driven innovation', 'user-driven innovation', 'hidden innovation', etc. Yet in some aspects, innovation policy thinking still needs to take a leap forward from the time where the sole role of public authorities in supporting innovation was to hand out bundles of cash (usually tied up in the strings of a costly bureaucratic procedure) as a way of inciting enterprises to invest by sharing the risk and over-coming market failures.

In this context, this report has attempted to adopt a fresh approach to analysing challenges and policy responses for European innovation policy. It has done so from the perspective of innovation system failures with a view to shedding new light on our understanding of the adequacy and relevance of innovation policies in the EU Member States.

[10] See: http://europa.eu/documents/comm/green_papers/pdf/com95_688_en.pdf

A main contribution of the analysis of this report is that it goes beyond the logic of market failure[11]. The evidence suggests that in practice innovation policy is driven by a much more diverse set of issues. This is important in terms of the need to explore alternative frameworks into thinking about policy interventions and their impact.
A second important contribution is that there is an absence of analysis and in-depth understanding of how different types of failures influence different 'innovation systems' (or more simply national or regional economies or even enterprises) given their different positions in relation to the technological frontier.

As noted above, the shortcomings of framework conditions are considered more significant in the innovation leaders and followers. However, this raises the issue of whether framework failures are really more important in countries closer to the technological frontier? Are systemic problems (framework and networks) more important for innovation and technology development as the economy develops. In countries further from the frontier, enterprises have weaker capabilities in terms of innovation and hence policy is (or should be) more focused on these aspects.

In short, the lessons from this review of innovation policy in Europe suggest the need to look at policies with new analytical tools and more ambitious targets.

3.2 Governance and Performance: a Fundamental Link

The main lessons in terms of governance, coming from top performers is that they are all doing very well in terms of gathering evidence and using it as policy inputs. They invest both the physical and human resources needed for that. They also consult with stakeholders effectively. However, with the exception of Germany, they appear dissatisfied with their coordination mechanisms and have re-adapted them recently to face increasing globalisation challenges. A common element in these re-organisation arrangements is an increasing emphasis on the autonomy (institutional or regional) of higher education and commitment to its excellence. But the distribution of power among ministries and the overall size of government differ from the directions of change. Academic literature has been quite critical of almost all of these changes, implying that stronger organisations discourage others from doing an effective job. Nobody is unanimously recognised as having struck the balance optimally. So, from top performers one can learn how to best organise the system: stability and the quality of the administration have created the necessary trust for the systems to operate "well enough" even if certain areas of coordination suffer. In the top performing countries there is experimentation and they are self-critical but there is an element of respect between the public and the private sector. This fine borderline between being critical in order to improve or being negative and frustrated makes a difference. Selective ideas on lessons from other countries improving elements of their governance structures are also included in the report.

If the lessons learned are to be summarised in one sentence, then it is that both innovation governance and innovation policy are more than just powering money and creating

[11] We acknowledge comments received by Slavo Radosevic (UCL) on an earlier draft of these conclusions.

organisations; it is about constantly investing in evidence, experimenting with policy, benefiting from learning and raising ambitions.

3.3 The Global Financial Crisis and Innovation: A Taste of Challenges to Come?

This European Innovation Progress Report (EIPR) is based on a set of country reports produced in the months leading up to September 2008. The events since the country level analysis was wrapped up have significantly changed the economic outlook and undoubtedly placed new constraints on enterprises seeking to innovate. How many enterprises have put off plans to develop and launch a new product or service faced by the credit restrictions biting in the financial sector? How many have been forced by falling demand to lay off personnel involved in R&D or product design viewed as 'non-essential' from a short-term 'crisis response' perspective? How many have put off recruiting a keen young S&T graduate? How many have slashed contract research budgets and put on ice plans to contract university or public research centres to carry out applied research work? How many have cut back on budgets related to protecting their IP portfolio?

The answers are neither so easily forthcoming nor self-evident. Ask a manager of a regional (seed) venture capital (VC) investment fund and they may tell you that since the crisis more enterprises or entrepreneurs have been coming to see them to pitch their projects, faced by even tighter commercial bank credit practices. Equally, faced by falling demand for their current products, certain entrepreneurs may seek to innovate more, while others may see opportunities emerging from 'creative destruction' (à la Schumpeter) even as 'recession bites'; or to paraphrase Sombart (1923), "again out of destruction a new spirit of creativity needs to arise".

Above all, the global financial crisis may only be a foretaste of major shifts in our socioeconomic system. Capital restrictions today will seem like a drop in the ocean when climate change whips up a storm of damage, and even without rising sea levels or an increase in tropical storms, resource exhaustion (water, minerals, oil) will put strains on our economies and put an even greater onus on our innovation systems to provide effective and flexible responses. Yet as a recent report on eco-innovation carried out in the framework of Europe INNOVA has argued[12], there is little or scant evidence to date that the current innovation policies, even in the innovation leaders, are contributing to an improvement in resource productivity (i.e. a reduction in the resources used to produce a unit of value in our economies).

In short, the innovation policy response will increasingly need to be at a societal level, involving major changes in consumption and consumer behaviour (mobility, housing, land use). Indeed, a recent paper, from NESTA in the UK, suggests that the best response to the global challenges putting pressure on EU economies is a "total innovation strategy"[13].

> *The biggest gains for society will be found in those sectors that both offer the most immediate growth potential, drawing on…existing strengths, and help*

[12] Miedzinski, M. and Reid, A. (2008), Eco-innovation. Final Report of the Sectoral Innovation Watch. Available at: http://www.europe-innova.org

[13] Leadbeater, C. and Meadway, J. (2008) Attacking the Recession: How Innovation Can Fight the Downturn. Discussion Paper, NESTA. See: http://www.nesta.org.uk/

> *meet long-term challenges: green energy, environmental services, biotechnology, and services for an ageing society. These need to form part of an economic strategy able to set long-term goals, and with the political credibility to help deliver them.*

The authors of this report suggest that a total innovation strategy needs to draw together public and private, social and commercial innovation and entrepreneurship to search for new markets and opportunities. In this way, the global downturn and climate change could create a new platform of growth if business entrepreneurs emerge to take opportunities in new growth industries and social entrepreneurs address emerging social challenges.

Indeed, much of the policy message broadcast by the European Commission and Member States in recent years has been about the need to shift the focus in innovation policy from direct public funding of enterprises (state aid) to actions implemented by a partnership of public and private stakeholders seeking to boost demand for innovation (e.g. pre-commercial public procurement, green public procurement, etc.) and support and strengthen 'lead markets'. Yet, clearly still more can be done to shift resources towards these new emerging opportunities and demand-driven type policies that tackle 'system failures' rather than short-term reactions to long-term structural shifts.

4 Thematic Foci

4.1 Support for Innovative Start-ups, Including Gazelles

4.1.1 Introduction

Empirical evidence is unanimous in that innovative start-ups are important vehicles for economic growth. New technology-based firms (NTBFs) are significant employers of scientific and engineering personnel and key actors in the innovation process. One of the reasons Europe lags behind the USA in terms of competitiveness are the lower entry and exit rates, as well as the much lower number of companies that grow very rapidly to become national champions within a decade or two. These companies are known as Gazelles in the literature. Because of this lagging behind, policies supporting entrepreneurship in general and NTBFs in particular are of paramount importance for Europe. Most Member States adopted both regulatory and financial support measures for start-ups, high-growth small and medium-sized enterprises (SMEs), NTBFs and Gazelles. Others do not distinguish measures: they support start-ups, expecting innovative firms to emerge; they encourage the creation of NTBFs in general, assuming that from a higher population of NTBFs Gazelles will appear automatically. In other words, they believe in a pyramid design whereby fast growing companies are a statistical phenomenon and a share of NTBFs grows by definition at spectacularly high rates.

The 2008 PRO INNO TrendChart country reports focused on the theme of "Innovative start-ups and Gazelles". An analytical synthesis of these themes was undertaken in the context of INNO Views (Cunningham, 2008[14]) and INNO Learning Platform (Tsipouri et al., 2008[15]). While these two reports analyse the phenomenon in general, the present section investigates how entrepreneurship and innovation policies are shaped in the four European Innovation Scoreboard (EIS) groups of countries in relation to the specific topic.

4.1.2 Do different EIS groups support innovative start-ups in a different way?

As pointed out in the thematic approach of the country reports studied, there are three different ways of supporting entrepreneurship:

1. Entrepreneurship in general, by reducing bureaucracy and offering grants or tax breaks for company creation and growth, complemented by coaching and training in all management topics. These are measures that do not distinguish the degree of innovativeness and all companies are eligible to get support.
2. As innovative companies and NTBFs in particular are found to contribute significantly more to competitiveness and welfare than the rest of new enterprises, there is a broad scope of policies supporting innovative start-ups only; eligibility criteria in this case are not very clear and the definition is not unanimous: some

[14] See: http://www.proinno-europe.eu/admin/uploaded_documents/Thematic_Report_July_2008_-_High_Growth_SMEs.pdf

[15] See: http://www.proinno-europe.eu/admin/uploaded_documents/Mini-study_6_final.pdf

countries use year of foundation (companies up to three and a half or six years old), size of enterprise (less than 10, more than 20 employees and others), evidence of new technology (patents, commercialisation of research and development (R&D) results), export success and others. Measures supporting innovative start-ups in particular include high-tech incubators, technology parks, specific support for early stage venture capital (VC), technology audits, specialised services, innovation awards, etc. All these measures create an enabling environment addressing all companies and expecting the market to select the best.

3. Gazelles are increasingly emerging in the debate of innovation and growth policies. However, there are theoretical as well as practical problems when discussing/adopting policy measures in this direction: theoretically identifying Gazelles ex ante suggests a danger of replicating mistakes criticised by the "picking winners" policies of the 1980s (C. Pitelis, European Industrial and Competition Policy – Perspectives, trends and a new approach, December 2007); but even if these theoretical objections are dealt with by more horizontal approaches, practically it is very difficult to offer Gazelles what they need, as they have very customised needs. Specialised consulting, networking and access to international markets are additional features to the overall innovative start-up measures.

The overview of policy measures in European countries and their main competitors can be summarised as follows:

	Entrepreneurship in general	**Innovative start-ups**	**Gazelles**
Top performing countries: Switzerland, Sweden, Finland, Germany, Denmark and the UK	All countries have a favourable environment to new firm creation	All countries in the group support innovative start-ups through VC, private equity, coaching, incubators, etc. For Germany, Sweden and the UK this is the only way used at the national level	Denmark focuses on the high growth debate and links Gazelles to internationalisation In Finland the debate has matured and led to a "Growth Enterprise Policy" soon to be followed by specific schemes In Sweden and the UK regional schemes address high growth specifically
Innovation followers: Austria, Luxembourg, Ireland, France, Belgium and the Netherlands	All countries have a favourable environment for new firm creation	All countries in the group support innovative start-ups, through VC, private equity, coaching, incubators, etc.	France and the Netherlands have explicit schemes supporting Gazelles; in Flanders the target is set but with no specific measures; Ireland supports "high value-added" innovative start-ups
Moderate innovators: Cyprus, Estonia, Slovenia, Iceland,	Basic support measures and efforts for improving	All countries in the group have put or are in a process of putting in	Only Spain has a specific fund for high growth companies

Czech Republic, Norway, Spain, Portugal, Italy and Greece	entrepreneurship in general	place support for innovative start-ups; incubators, technology transfer and grants are more often encountered than VC, private equity and coaching	Norway has announced a dedicated scheme for the near future
Catching-Up: Finally Malta, Hungary, Slovakia, Poland, Lithuania, Romania, Latvia, Bulgaria and Turkey	There is evidence that all countries are trying to improve the framework conditions for entrepreneurship	All these countries are in the process of organising support of innovation and using Structural Funds for intermediaries supporting innovative forms	No country has an explicit Gazelles' policy
Non-European countries	Although path-dependent and hence different from one to the other, in all countries entrepreneurship is now a main target	All non-European countries focus on innovative start- ups; Japan and the US with more ambitious and specialised support measures than the others	No explicit measures reported

4.1.3 Lessons Learned

Looking at the different groups of countries the following conclusions are clear:

1. As suggested from the generic lessons, only top performers and innovation followers go beyond the classic support of innovative start-ups and experimenting with specific incentives for Gazelles. At the national level, measures from Denmark, Finland and the Netherlands are reported to be studied, while at the regional level, the UK and Sweden. These measures differ among themselves in terms of criteria, target groups and delivery, but they seem to agree on one specific point: Gazelles need the global market; hence, any support has to be linked to internationalisation.
2. Top performers, innovation followers and moderate innovators all have a wide spectrum of support of innovation policies in place, which help innovative start-ups. The usual instruments are adopted practically everywhere. However, as pointed out by the INNO Views Study (Cunningham, 2008) given the overall lack of specific high-growth SME support policies or their newness, evaluations and other evidence are more limited and the lessons that may be learned from them are often context-specific.
3. Catching-up countries are often still struggling to put in place the overall system of new firm creation. This may be due to their appreciation that the overall economic climate does not generate Gazelles, hence more ambitious measures need to wait for the market conditions to improve, or because of lack of policy experience and adequate resources to address the whole bundle of measures at the same time. This "lower ambition" finding is compatible with the overall findings in governance and policy evaluation and it is recommended to investigate it more explicitly when adopting new policy mixes.

Generally, most SME support measures tend to be integrated with the wider innovation policy mix. In terms of content for both generic and high growth targeted measures, there is often an explicit sectoral or thematic emphasis on supporting SMEs that are technology or knowledge-intensive on the assumption that such firms are more likely to exhibit high growth potential. Thus, firms in areas such as information and communication technology (ICT), biotechnology and nanotechnology are frequently targeted. The same is also true for start-up and spin-off support. Even in cases where such programmes are intended to be of a horizontal, non-sectoral nature, a majority of the recipients of support are from the 'new technologies' as they tend to offer high growth and innovative potentials (Cunningham, 2008).

In terms of lessons learned, the debate suggests that it is time for countries with a favourable macroeconomic environment to adopt some measures that address the needs of the growth phase of companies; generic measures are not enough. For such measures to succeed in smaller countries or markets (such as the Baltic Republics, Cyprus, Luxembourg) they need to be combined with strong export orientation. A medium-sized country or market, of the order of magnitude of the Scandinavian countries or Ireland, represents a critical mass. The eligibility criteria can be either subjective (based upon company declaration and business plan), or based on any kind of objective measures (targeted turnover, past growth trends). There are obvious advantages and disadvantages that have been explained above. What should be avoided are general public perceptions as these are most likely to lead to the 'picking winner' policies, with negative consequences for the competitive climate. Measures addressing gazelles should primarily target whatever is associated with skill hiring or skill creation, including both entrepreneurial and technical skills. Measures addressing gazelles could consider to support all kinds of interaction: with foreign markets (internationalisation), with capital providers (business angels, venture capitalists, banks) and among themselves.

4.2 Creativity: What Place in the Innovation Policy Agenda?

2009 has been designated European Year of Creativity and Innovation (EYCI)[16]. The purpose is to increase awareness of the importance of creativity and innovation for personal, social and economic development throughout Europe. In particular, the interconnection between creativity, the innovation process and entrepreneurial attitude is highlighted as a crucial component of maintaining prosperity and finding paths to sustainable development.

The relevance of encouraging enterprises to invest more in creativity, in general, and design, more specifically, has been underlined by research done in the UK which shows that firms with higher design intensity have a greater probability of carrying out product innovation and that design expenditure has a positive association with firm productivity growth[17].

[16] See: http://create2009.europa.eu/

[17] Swann, P, . and Birke, D. (2005) How do creativity and design enhance business performance ? 'Think piece' for DTI Strategy Unit. Quoted in INNO-Policy TrendChart UK Country Report 2008.

In 2008, the TrendChart country experts were asked to investigate if and how Member States are implementing policies in support of innovation and creativity[18]. This review was not about the creative industries[19] or policies in support of artistic creativity per se, but rather about horizontal policies, such as: awards for design and innovation; measures to unleash the creativity of user groups; initiatives in support of design or trademarks; general awareness-raising on creativity and innovation; and policies in support of urban creative clusters and entrepreneurship in creative industries and industrial design. This section of the European Innovation Progress Report (EIPR) takes stock of the evidence gathered in the 2008 country reports.

Adopting the EIS four country groups as a framework permits an appraisal of the extent to which EU-27 Member States with different levels of innovation performance:

- Put greater or lesser emphasis on creativity and its link to innovation in their policy agendas;
- Have developed national or regional policy measures to support links between creativity and innovation.

The EIS grouping of EU-27 countries does not necessarily correspond with creative (cultural, artistic, musical, etc.) performance per se. Thus, a few countries usually perceived as outstanding in cultural performance are classified in groups with countries less renowned for their creativity. Hence, the table is a tool for an aggregate analysis of policies with a bearing on innovation and creativity in the EU, i.e. despite some (likely) omissions. Generalisations with respect to the place of creative industries in the innovation policies of EU-27 countries should nevertheless not be drawn.

Figure 32: Overview of innovation and creativity by EIS country group

EIS country groups	Innovation & creativity: challenges addressed in innovation policy	Types of measures launched/planned
Innovation leaders: Sweden, Finland, Germany, Denmark and the UK	- Early recognition of importance of design and more recently creativity in fostering innovation - Design as driver of innovation in industry - Creative industries sector seen as vector of employment growth - Creativity in education given	- Strong emphasis on funding and support for industrial design (national programmes) (UK, Germany) - Need for multi-disciplinary centres recognised (e.g. UK, Sweden) - City-regional level emphasis on creative industry clusters and more recently living labs

[18] In addition, the correspondents gave input to a thematic report on creativity and design, available at : : http://www.proinno-europe.eu/Creativity_and_design_Thematic_Report_July_2008_final.pdf

[19] The concept of creative industries cannot be unambiguously defined, but usually it refers to the segment of economy which is highly skill-intensive and innovation-driven, but not exclusively in the technological or academic sense, such as business with a strong artistic component such as architecture, design, multimedia, and entertainment. According to various estimates, creative industries constitute up to 10% of many modern economies. For more information on this topic , see: http://www.european-creative-industries.eu.
An informative overview also making an attempt to sort out definitions is: Kolmodin, A. (2008) "'Creative Industries – A growth sector?" in *Growth Policy Outlook*, Issue 6, September 2008, available at:
http://www.itps.se/Archive/Documents/Swedish/Publikationer/Tillv%C3%A4xtpolitisk%20utblick/TpU_nr6_2008_eng_webb.pdf

	increasing attention	
Innovation followers: Austria, Belgium, France, Ireland, Luxembourg and the Netherlands	- Importance of industrial design acknowledged but typically more recently - Strong accent on creative industries and branding design sector (B, IE, NL) - Effort to link creative industries and science/other industries (Ö, NL)	- Disparate approaches: comprehensive policy in NL versus focus on funding (industrial) design in others - Regional design centres (but effectiveness questioned, F) - Internationalisation of design potential (B, NL)
Moderate innovators: Cyprus, Czech Republic, Estonia, Greece, Italy, Portugal, Slovenia and Spain	- Weak acknowledgement of link between creativity and innovation in policy - Initial efforts to promote and structure support for design (even in countries with strong design tradition, IT) - In some cases, creativity even considered as negative trait (ES) or as a problem in education system (GR)	- Initial plans for design centres or councils (CY, IT, PT) - Inconsistency in policy intervention (e.g. CZ design programme discontinued) - Focus on raising innovation-awareness and creativity in that context (EE, SI) - Initiating studies or support for creative industries/sectors (PT)
Catching-up: Bulgaria, Hungary, Latvia, Lithuania, Malta, Poland, Romania and Slovakia	- Sporadic attempts to put design issues on policy agenda, creativity basically absent as issue - Hungary and Poland more advanced in policy thinking due to tradition in industrial design	- Few measures for design in place currently (except in HU, LV, PL) - Some efforts to support IPR protection of design - Potential of creative industries/clusters being investigated (LT, LV).

Source: INNO-Policy TrendChart Country Reports 2008; analysis Technopolis Group

4.2.1 The place of creativity in innovation policy

Looking across the findings for all the country groups, it appears that the innovation leaders along with some countries in the innovation followers group have developed earliest as part of their innovation policy mix, measures focused on creativity, and in particular, the (industrial) design elements and their relationship with innovation performance. The traditional Nordic strengths in design (notably in Denmark and Sweden) have been recognised as key elements in boosting innovation and business competitiveness. The German and UK approaches have been traditionally focused on industrial (engineering) design, particularly in the former, allied to support for creative industries both nationally and in major urban centres. However, only Denmark (2000), Finland (2006) and the UK (2005, 2008) have actually prepared government-level reports or reviews of "creativity and business" or a national creativity strategy. The other country reports, even in the innovation leaders and followers groups, highlight the quasi-absence of a structured debate on creativity (as opposed to the creative industries or design) at policy level. The Swedish report notes that the favourable social disposition towards soft values such as tolerance, openness and equality (often considered to promote creativity) has not led to a policy response designed to promote innovation. Indeed, the report highlights that this design-orientated country, lacks even a coherent design policy.

The Danish report suggests that a difficulty may arise when policy makers try to add a focus on design and creativity to 'traditional innovation' policy. In Denmark, there is a

strong tendency to use the notion in relation to all types of innovation without any clear distinction between innovation and creativity. This leads to a "lip-service" in relation to policy interventions including the original artistic sense of the term. This tendency is very clear from the German report, where the correspondent argues that research and development (R&D) per se is akin to creativity and therefore draws the conclusion that while there is no federal-level policy paper addressing creativity and innovation, there is "however, a direct link between creativity and innovation" through funding of R&D programmes. This 'technology is creativity' approach stands in sharp contrast to the proposals of the Finnish 2006 national creativity strategy, which concluded that there were '11 steps to a creative Finland' covering areas as diverse as education, culture, value, built environments, working life, industrial policy and public administration. This holistic approach to creativity and its role as a driver of innovation (or more generally, the capacity of society to evolve and change and not become dominated by oligopolies or reactionary modes of thinking) is also visible in the UK's recent efforts to promote creativity in education highlighted in the UK country report.

The situation in the innovation followers group is broadly comparable to that of the innovation leaders group, albeit with none of the countries having an explicit strategic policy focus on creativity. However, the Flemish Government in Belgium has promoted Flanders as a 'district of creativity' and considers "the creative processes of innovation, entrepreneurship and internationalisation as the foundation of an innovation driven economy". Moreover, while most of these countries are not recognised as bastions of a strong design tradition (with the exception of France), all of the countries (excepting Luxembourg) have integrated design as a concern linked to industrial and innovation policies, and in some cases, such as Ireland, this has been done relatively early.

One particular pattern that emerges is that policy attention towards innovation and creativity (especially design) tends to be most conspicuous in countries of West and North Europe, while some larger countries famed for their cultural heritage or (fashion) design prowess (France, Italy, Spain) have been less prone to link this 'creative potential' to innovation. Indeed, the Spanish report even stresses that creativity is viewed negatively and given low importance in society and hence in policy. In Italy, in contrast, "creativity is the new buzz-word" yet to date, policies supporting creativity are lacking, although in 2008, the Ministry of Culture launched a White Paper on Creativity consultation process; and, surprisingly, given Italy's famed designers, even policies and institutions in favour of design are only relatively recent.

Considering the other moderate innovators and catching-up countries, it can be concluded that the new Member States (those acceding in 2004 and 2007) lack a particular policy focus on creativity and innovation. The reason for this may be largely due to the legacy of the previous 'socialist' regimes. During four decades, creativity and, at least the commercial elements of, design were left more or less underdeveloped while a strong focus was given to engineering. This was one main reason products of socialist countries faced an uphill struggle in Western markets. To remedy this has proven a challenging task despite significant improvement over the past two decades. Moreover, creativity as such (and not only design) was discouraged, which left a development gap from which the countries in question still suffer[20]. A number of these countries (e.g. Estonia, Slovenia)

[20] This should under no circumstances be interpreted as applicable to the cultural heritage of the countries in question, neither as a statement on what preceded the socialist period.

concerned have taken steps to promote innovation-awareness in general, and hence, indirectly, creativity.

In conclusion, policy makers in the EU-27 appear to give more emphasis to design as a specific element of creativity and increasingly recognise the contribution of improved (industrial) design capabilities in enterprises. Even the Finnish country report noted "that there are identifiable shortcomings in innovative commercial exploitation of opportunities which is a question of marketing, brand sharpening and design". Secondly, the creative industries sector, was mentioned as a specific focus of policy making attention in the majority of country reports; policy makers consider that by enhancing entrepreneurship in the creative industries sector, competitiveness in other industries will also be boosted. Hence, an emerging line of thought is how to link the reasonably 'tangible' ways of targeting creativity in the economy with a wider range of enterprises and innovation processes in the economy.

4.2.2 Specific measures in favour of creativity in national innovation policies

Given the above summary of the place of creativity in innovation policy, it is hardly surprising that specific measures in favour of creativity and innovation are few and far between. Indeed, it is worth stressing that even the three countries highlighted as being ahead in policy-thinking (Denmark, Finland and the UK) have only started to implement specific measures in favour of creativity, or creative innovators, very recently. Even in these countries, there is a heavy emphasis on design as a locomotive for creativity in the innovation process, with many other countries also giving most emphasis to support measures of various types for suitability. Examples include:

- National programmes supporting small and medium-sized enterprises (SMEs) to integrate design, such as the UK's Designing Demand service (where the Design Council and Regional Development Agencies have rolled out a mentoring programme that uses design to transform business competitiveness), Finland's industrial design technology programme, Enterprise Ireland's Design Service, Spain's Design Support programme 2007-13 or DesignMalta launched in 2007.
- The creation of (national or regional) centres, platforms or associations promoting design (Austria, Belgium, Cyprus, France, Ireland, Italy). However, the effectiveness of such design platforms is sometimes questioned as is the case in France with the regional network of design centres.
- Various efforts to promote improved intellectual property rights (IPRs) protection of non-technological innovations and the output of creative people are also highlighted in a number of reports including the Dutch, Greek, Hungarian (see box) and Polish. However, the impression to be drawn from the reports is that this is an area where more emphasis could be given by innovation policy in favour of creativity.
- Design-related awards (such as the Polish Product of the Future) or national years of design (e.g. 2007 in Estonia) are common throughout the EU-27. However, the awards vary not only in pecuniary terms but also in terms of the national or international prestige they provide. However, whether the existence of such awards has any significant impact on design resulting in enhanced innovation performance would require a comprehensive study based on particular cases.

The Hungarian Design Terminal functions as a meeting point on the web and a provider of information with the aim of stimulating Hungarian design and other aspects of the creative industries. The Design Terminal is a public company established in 2004 by the Ministry of National Cultural Heritage and the Hungarian Patent Office. The Design Terminal provides consultation, information, professional training and "match-making" between professionals and customers. Moreover, the Design Terminal organises exhibitions and conferences. Judging from available information, this measure is proving to be a (little) money well-spent.

An interesting trend is the increase in efforts to create forums or 'meeting points' where representatives of the creative industries, education, research and other business sectors can share ideas and concepts related to creativity and design. Such initiatives include the Austrian Design Forum, the Swedish KK Foundation's support for the experience industry (tourism, digital media and entertainment) through small money for eight meeting points and 'FUNK' model for creating public-private partnerships. The UK's multi-disciplinary centres proposed by the Cox Review are in the same vein (see box).

The 2005 Cox Review on Creativity in Business recommended that a nationwide network of multi-disciplinary centres of excellence be established where business, technology design and science could combine and collaborate, so that future business leaders could be taught to understand creativity and methods to manage innovation. Two years on, the first of these centres has been announced. 'Design London' is a partnership between the Royal College of Art, Imperial College's engineering faculty and Tanaka Business School. Backed with GBP 5.8 million (EUR 7.7 million) in public investment, 'Design London' will teach MA, M.Eng and MBA students how to integrate design with engineering, technology and business.

Based on the TrendChart reporting, only Portugal has explicitly coupled a policy towards creativity with an important industry – textiles, in this case. It is, however, likely that other countries have taken similar steps, albeit in other frameworks. There is for instance no doubt that all car producers acknowledge the importance of design, but this may either be, as in the German case, an integral part of "R&D support" or not considered directly as an element of innovation policy, and therefore not reported on.

Design as an integral part of the required portfolio of skills for business competitiveness is on the rise in secondary and tertiary education throughout Europe. In most cases it is certainly too early to evaluate the results, but it seems obvious that this symbiotic relationship will become increasingly important. In particular, countries like Denmark, the Netherlands, the UK and Finland stress the connection between design, business and higher education. The ease with which it is possible to introduce "room for creativity" into primary and particularly secondary school syllabuses is illustrated by the case of Greece, where the country report underlines that an emphasis on learning "homogenised knowledge" at secondary level undid plans to boost creativity. In general, there remains a tendency to equate creativity in the innovation process with industrial design. The importance of design as an integrated part of any production has always been acknowledged alongside quality. However, the emphasis placed on design may vary due to a number of reasons, such as, for instance, the importance given to engineering skills at the expense of design.

The second main 'element' of a policy fostering creativity and innovation reported is support for the creative industries. An increasing emphasis on supporting creative industry entrepreneurs is evident from many of the reports for the innovation leaders and

followers (see for instance the range of new initiatives in the UK or in the Netherlands). In larger countries, national efforts are often complemented by regional or city-level actions. Indeed, in Germany there is no federal policy in place; instead, policies are implemented by Länder. A good example of a structured approach to promoting not just creative industries but creativity in general is the Flanders District of Creativity initiative (see box).

The Flemish Government created in 2004 the competence pole Flanders District of Creativity. Flanders DC is part of an international network of Districts of Creativity and organises, with its partners, an annual conference on entrepreneurial creativity (The Creativity World Forum, every second year in Flanders). With the same partners, international projects are set up (e.g. exchanges of young designers, joint programme development on creativity stimulation, etc.). Other activities are monthly creativity talks, brainstorming sessions, training sessions in creativity for entrepreneurs, presentations by creative entrepreneurs in companies and schools, trend watch activities, etc. In partnership with the Vlerick Leuven Gent Management School, the Flanders DC Knowledge Centre was set up to conduct research into entrepreneurial creativity, innovation and international entrepreneurship. The results range from macro-economic insights and policy advice to concrete tools to help business organisations; for example, a Composite Index of the Creative Economy was developed and tested for the DC regions.

The sort of openness and tolerance associated with creativity can of course not emerge overnight and is rarely the result of a few policy measures, but rather a long-term broad social commitment. As these attributes are perceived as virtuous in today's Europe, regions or cities may be unwilling to acknowledge that this is an issue they need to deal with. At the regional or local level, the 3Ts of economic growth (technology, tolerance and talent)[21] may be so strongly entrenched in a number of major European cities that particular policy measures are perceived as superfluous, while other cities may have more policy measures in place in order to strengthen their reputation[22]. For instance, in the Netherlands, a platform called "Creative Cities Amsterdam Area" is actively promoting the attractiveness of the area for talent, the take-up of creative ideas, while strengthening the presence of international companies. In Germany, several cities have actively been promoting creative enterprises in the media sector, such as Cologne, Hamburg, Munich and Berlin. In Italy, Milan has acknowledged the importance of working on creating connections between excellence (firms and individuals with worldwide recognition of creative leadership) and the rest (firms and individuals working in the creative sector with just a local outcome) to preserve and develop its image. In this context, the Living Labs approach was cited in a number of reports (Finland, Portugal, Sweden, etc.) as highly applicable in supporting creative industries and the development of links with more traditional business sectors.

In conclusion, design is an established concept and to some extent measurable, while creativity is far more elusive. Indeed, developing specific policies for creativity may be considered as contradictory and the aim of policy should perhaps be instead to guarantee

[21] This concept stems from Richard Florida's "The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life"' from 2002.

[22] Ranking cities on the basis of dynamism and openness is close to impossible. However, a well-substantiated choice was presented in August 2007 by *Der Spiegel International*, according to which the five leading European cities with respect to creativity were Copenhagen, Barcelona, Dublin, Amsterdam, and Tallinn. See: http://www.spiegel.de/international/europe/0,1518,502297,00.html

the free flow of ideas and people, an attractive and welcoming framework for creative ideas (including through education). Public interventions, on the contrary, carry with them the risk of squeezing out genuine creativity. Such an insight may be reflected in the rather cautious policies of the EU Member States towards creativity identified in this report. It is also evident that boosting creativity is a policy concern spanning a range of traditional 'sectoral' ministries (economy, research, education, culture, etc.) and hence creativity in public policy management is required as well.

5 Annexes

5.1 References

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