



High Level Group *on* Innovation Policy Management

Report & Recommendations



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Foreword

by Deputy Prime Minister and Minister of Economy
of the Republic of Poland, Janusz Piechociński

Warsaw, June 2013

Between July and December 2011, Poland held the Presidency of the Council of the European Union for the first time. During its intense and productive Presidency, Poland did its best to move forward the European agenda in a demanding and uncertain context, marked by turmoil in financial markets and a public debt crisis in the Eurozone.

Despite this crisis, Europe remains strong. We are leaders in many sectors, and our research and technology capabilities, our education systems and our intangibles assets, are second to none. Yet, something is wrong when important technology breakthroughs are developed here, and then commercialised elsewhere. We are losing added value, something we cannot afford. Otherwise, Europe's growth will remain at best stagnant and our unemployment rate will grow further.

The so-called Euro crisis is also a governance crisis. It results from successful economic integration processes that lacked parallel adaptation of governance structure and methodology to manage new complexities of an increasingly integrated economy. In addition, divergent and uncoordinated national fiscal systems, welfare mechanisms and labour markets within the EU do not make things easier.

Europe currently lacks the proper governance tools to manage competitiveness and growth policies. It was never considered by its founding fathers. The governance methods given to the EU were designed primarily for building a common - later a single - market, which is something very different from the promotion of innovation and competitiveness, the key to growth and employment in today's globalized economy.

Innovation is a paradoxical process which requires a leap into the unknown and at the same time complex management processes and efforts for rigorous planning. How can we support innovative companies, both large and small, across all business sectors in Europe? How can we innovate our own governance structures? How can we create a culture of innovation and a permanent ecology of innovation? These are the challenges and questions that Europe urgently needs to address.

The acceptance by our citizens of the importance of innovation and the benefits it can bring to their daily life and to their future is equally vital. To achieve this, business, policy makers, education institutions and media must play a constructive joint role.

Previous efforts to stimulate out-of-the-box thinking and to create the necessary political environment to stimulate and improve innovation policy in Europe have not been very successful. If they had been, we would not be experiencing the present problems and our statistics would be more upbeat. The Aho Group, composed of four eminent Members, has been (to date) the most far reaching effort conducted at European level – yet, 6 years after, the implementation of its recommendations is still a pending task.

Against this background, and convinced of the potential of innovation to help Europe climb out of the crisis, the Polish Presidency of the Council of the European Union announced at the Competitiveness Council of 6 December 2011 an initiative to establish a High Level Group on Innovation Policy Management. In order to foster innovative thinking, an un-orthodox tripartite composition was brought together based on a public-private partnership between governments with different models of innovation, companies from different sectors, the European Commission (DG Research and DG Enterprise) and academic experts. It was an honour that the European Council President Herman Van Rompuy nominated a member of his Cabinet to be part of this Group.

The mandate of the Group was to prepare a series of concrete recommendations in absolute independence and to create out-of-the-box reflections, forward-thinking and perhaps even politically bold recommendations on how to redesign, develop and manage an encompassing innovation policy in the EU, to be directly addressed to the European Council, Council of Ministers, and Commission.

The Group held three sessions during a period of eight-months: in September 2012 (Ministry of Economy, Warsaw), December 2012 (Polish Permanent Representation, Brussels) and April 2013 (Polish Presidential Palace, Warsaw).

This report contains the final recommendations of the High Level Group along with two key documents (“How to innovation European innovation policies: getting the innovation ecosystem right” and “the Micro and macroeconomic benefits of innovation”) supporting the recommendations. This report represents a new step forward in the process of rethinking and improving innovation policy making in Europe by bringing original and daring ideas to the public arena.

It has been an honour for the Ministry to launch and support the High Level Group on Innovation Policy Management and we are grateful for the follow-up given to it by the Irish Government during their Presidency of the Council of the European Union. Nevertheless, the task is far from over, as further work needs to be done in order to deepen and widen these recommendations and produce more operational and tailor-made advice to governments and EU Institutions.

Janusz Piechociński,



Deputy Prime Minister and Minister of Economy of the Republic of Poland

Foreword

by Irish Minister of State for Research & Innovation Sean Sherlock

Dublin, June 2013

As part of its Presidency of the Council of the European Union, the Irish Government had the honour to host the presentation of the Recommendations of the High Level Group on Innovation Policy Management, which the Polish Presidency had initiated, during the informal and the formal Competitiveness Council meetings.

One of the largest societal challenges Europe currently faces is ensuring that innovation and technology are used to create jobs. This should not be a purely economic debate but also a social one. Life chances diminish considerably for those who enter poverty traps and long-term structural unemployment and these are matters that should concern policymakers in the research and innovation area.

The recommendations and work of the HLG on Innovation Policy Management have constituted a step forward in this direction by providing out of the box thinking and very specific policy recommendations to the Council of Ministers of the EU and the European Commission.

As the recommendations point out, the challenge for Europe is to optimize the benefits of research investment for European jobs, growth and society in a context of financial scarcity. Non-financial means to boost innovation are at least as important as research funding. The room for improvement in this area is still considerable in the EU and in Member States, not just within each institution or country, but on their mutual interactions and buy-in processes. Innovation policy must stretch from research to markets and should not shy away from governance and regulatory innovation in order to stimulate growth, competitiveness and employment.

The Polish Government needs to be congratulated for having launched this innovative public-private initiative during their Presidency of the Council of the EU. I was happy to work with our Polish colleagues to facilitate this important contribution to what is perhaps the key policy challenge for the Union - how to constantly renew our society and economy through innovation. The recommendations of the High Level Group on Innovation Policy Management will certainly encourage further discussions on how to improve innovation in Europe and how to ensure it delivers wealth, jobs and growth for European citizens. This innovative approach deserves to be continued.

Seán Sherlock, TD,

A handwritten signature in blue ink, consisting of a large, stylized 'S' followed by a horizontal line extending to the right.

Minister for Research and Innovation, Ireland

Introduction

by the Chairman and the Secretary General of the High Level Group

Nearly 7 years after the Esko Aho report on *Creating an Innovative Europe*, the initiative of the Polish Presidency could not have come at a better time. The global context is changing rapidly. Fundamental and incremental technological innovations combined with trade liberalisation and efficient economic management in a select number of developing countries have allowed transnational corporations to re-organise their supply, production and distribution chains on a global scale; even medium-sized enterprises nowadays often operate beyond their home market. New and dynamic economies continue to rise and they will continue to challenge Europe's past dominance in almost every sector of the economy and society.

To be sure, innovation policy is very much en vogue these days. But it is more than just in fashion: it is perceived to be the main source of boosting growth, productivity, job creation as well as social and economic prosperity. Moreover, and less well-known, it may be considered a non-financial means of stimulating, revitalizing and modernizing the European economies in the wake of the global financial crisis, beyond deficit spending on the one hand and austerity policies on the other hand.

Many countries in Europe have sought to maintain competitiveness through a push for more research and technology and labour market reforms. Others have sought to maintain their deeply rooted welfare state mechanisms through debt financing. However, political expediency has often preferred the latter to the detriment of long-term investments. Some emerging economies are catching up in research investments and technology development and debt financing has come crashing down as a sustainable governance method.

We are still strong in Europe, even leading in many sectors, and our research and technology capabilities, our education systems and our intangibles assets are second to none. Yet something is wrong when important technological breakthroughs and new product opportunities are made here and then realised elsewhere. We lose the added value. This cannot continue. While some governments and the Commission have recognised this and many initiatives have been taken, the results until now have been far too modest.

Indeed, over the past 10 years and more commitments have been made to stimulate and increase investment in knowledge and innovation but have never been met in full. Evidently creating innovation, commercialising innovation and leveraging innovation has been easier said than done. Theoretical and empirical research has gone from the recognition that innovation is decisive and the study of innovation mechanisms to the modelling of evolutionary and path dependant processes and the interplay of technology and institutions. Neither the process of innovation itself as an interplay between business, civil society, academia and public bodies nor the requirements needed for success have been determined conclusively.

An effective innovation policy needs to focus not only on stimulating inventions and incremental improvements, but equally on their successful application and introduction in the market. Such a comprehensive policy is an essential complement to the completion of the Single Market and the surest way to stimulate economic recovery. As an overarching objective of EU policies, innovation can create an attractive new narrative for European integration

However, as it stands, we are lacking the proper European governance tools to manage policies which were never considered by the EU's founding fathers. The governance methods given to the EU were designed primarily for building a Common, later a Single, Market which is something very different from the promotion of innovation and competitiveness today.

Breaking down a barrier to trade or investment in the Single Market can be achieved with a single regulatory act. But innovation is in fact a more complex governance challenge. Innovation is a paradoxical process, because it requires a leap into the unknown and at the same time it requires complex management processes, an effort for rigorous planning while knowing that innovation is by far not fully manageable. Very often, successful innovation results from extra-economic, even transcendental, motives. Different factors display different relative importance during different

phases of the technology innovation cycle: as a rule, there are several radical innovations competing in the initial phase of a new technology, until the point when a “dominant design” emerges. From this point onward, the innovation focus switches strongly from radical to incremental innovation and from product to process innovation as the new technology achieves mass market penetration, dominance and maturity. How can we in Europe support innovative companies, large and small, in all business sectors? How can we create a culture of innovation and strengthen a still embryonic innovation ecosystem? By definition an ecosystem is a complex system, which means we have to look at all the aspects. And that is precisely what this High Level Group has done.

It requires a radically new approach to exhaust our potential, to increase our dynamism, to take up the challenge of preparing for the future in a fearless fashion - fearless of Schumpeter’s “creative destruction” which often accompanies innovation processes and creates winners and losers in competitive markets.

A radical change in innovation policy seems indispensable, from fragmentation to coordination, from a narrow science and technology orientation to an all-encompassing, holistic and coherent strategy involving several policy areas, from a diffuse to a highly focussed division of labour between all the players and stakeholders involved. This is what the HLG calls the Innovation Ecosystem Approach.

The EU must make every possible effort to become the global innovation hub! The time has come to pave the way forward to be a global innovation leader.

But building an innovation-focussed economy does not only require economic processes and public governance innovation. Equally difficult is developing acceptance among our citizen. If they do not understand the benefits which it brings, and if they do not take a balanced view about perhaps some small associated risks, opposition will easily arise. One cannot just blame this on changing cultural patterns or on politicians who are supposedly not strong enough to defend a particular innovation or project. Companies themselves have to think hard how they can innovate their democratic participation, something very different from one-way communication.

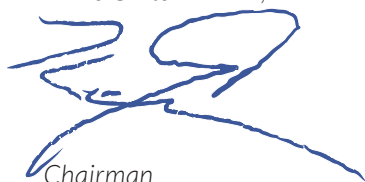
The mandate given to us by the Polish Government to develop this initiative was in itself innovative: ‘think outside the box, develop a new approach, make an original contribution to European innovation thinking’. We chose to invite experts from EU institutions, governments with different models, from different business sectors and from academia, working together in their own name, without restrictive mandates. We are very grateful for the time they spent on this project, for their brainstorming in group meetings and with us in bilateral meetings, for their dedication to the Common Good in Europe.

From meeting to meeting, we noticed a shift in perspectives, an opening up of minds, growing mutual understanding, development of a broad consensus about the essential requirements for innovation policy of the European Union and its Member States. Perhaps not all the recommendations can be easily or immediately implemented, there will probably be resistance from various ‘nomenclatures’, but the direction indicated is unequivocally clear and based on solid research and global comparisons of real innovation successes.

The recommendations are supported by two additional papers on what makes an ecosystem and what are the benefits of innovation, developed by a research team specially recruited to provide scientific back-up to the discussions and the ultimate outcome. We are very grateful for their hard work and motivation.

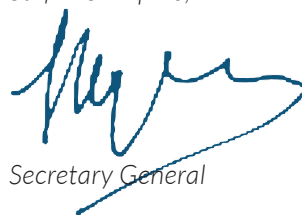
The recommendations presented in May to the Competitiveness Council are not the end, they are only the beginning of a thinking and discussion process, which ultimately should lead to a new grand policy approach, akin to the one during the building of the Single Market. They already invite the next step to detailing what needs to be done in the years 2014-2019.

Klaus Gretschmann,



Chairman

Stefan Schepers,



Secretary General

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Recommendations

by the High Level Group on Innovation Policy Management³

‘It always seems impossible until it is done’

(Nelson Mandela)

Vision: growth through a radical new innovation ecosystem

Innovation policy is the key tool to stimulate economic growth, strengthen competitiveness, and increase employment opportunities for Europe’s millions of unemployed. By re-ordering, upgrading and enriching decisive elements of the rudimentary approach of EU innovation policy, we suggest following a new and inclusive model. We’ve called this model the **innovation ecosystem** and it encompasses elements which contribute to an innovation-conducive environment.

The traditional model of innovation uses scientific research as the basis of innovation, and suggests that change is linear: from research via invention to innovation, to diffusion and marketing. Our ecology model provides a richer picture of how innovation works, and how it can be stimulated and fostered.

Using this model, Europe will improve its compet-

itiveness in a knowledge and digital economy and its societies will benefit. A **European Decade of Innovation** should be the new vision for the EU, a benchmark for its actions, as the Single Market or the Common Currency once was. A European Decade of Innovation will serve the European Common Good: the best living and working conditions for the peoples of Europe, and the modernisation and maintenance of its unique societal model.

To make this vision a reality, we need to focus on the complex interactions between all the factors and actors that make up a competitive economy. We will need a collaborative model of governance; an overarching steering authority; tailor-made policy and regulatory revisions, and continuity and perseverance. We will be successful when research leads to transformation in markets, and when GDP grows.

The rationale for comprehensive change

An innovation ecosystem is a set of ideas, institutions, policies, and regulations that will determine the direction, outcome, productivity and degree of competitiveness from innovations¹. An innovation ecosystem will ensure our innovations are successful in a global context. To prompt and promote innovation, we need to create an environment comprised of simple, efficient, competitive, and socially acceptable elements.

Innovation will therefore be addressed, as an interactive system for value creation, and EU institutions, governments, business, and centres of learning will need to be equally involved. Redesigning policies relevant for innovation and competitiveness in the European Union, the Member States, and their interface will need both leadership from the top and strong decentralized interaction amongst all stakeholders.

Removing obstacles to innovation is a priority in an innovation ecosystem. During the last 20 years, the European Union has developed a research and development (R&D) policy, and has tried to align it with the research and innovation efforts of the Member States. R&D² does not automatically lead to innovation in markets. Progress has been slow, and too limited to have a distinctive and lasting effect on Europe's growth and competitiveness. Challenging factors such as legal provisions, administrative support, entrepreneurial skills, risk propensity, and public opinion need to be addressed simultaneously in an innovation environment.

We are seeking non-fiscal ways to stimulate innovation. The quantitative target of the EU to invest 3% of its GDP into R&D has not been reached (save in one Member State), and the present post-crisis budgetary situation in most Member States does not allow for any increase in spending. A successful redesign of innovation policy management could

compensate for this budgetary scarcity without requiring additional public spending.

Our ideal outcome is a radical overhaul of EU innovation policy that will accelerate growth and competitiveness. We can achieve this without Treaty changes, but by thoroughly redesigning policies, regulation, and innovation management.

The Polish Presidency announced an initiative at the Competitiveness Council (6 December 2011) to establish a High Level Group on Innovation Policy Management (HLG). This High Level Group was to be composed of experts from business, governments and academia encouraged to propose forward-thinking, unorthodox, and perhaps even politically bold ideas. Their mandate was to prepare a series of concrete, independent recommendations for how to redesign, develop, and manage an encompassing innovation policy in the EU.³

Recommendations for unleashing effective innovation

Effective innovation requires a set of 7 key activities:

- ***Optimize the embryonic European innovation ecosystem***
- ***Improve policy coherence***
- ***Reduce regulatory complexity and rigidity***
- ***Eliminate obstacles and provide new funding to innovation***
- ***Facilitate industrial cooperation and re-interpretation of competition law***
- ***Take an encompassing and inclusive view of intellectual property***
- ***Increase the innovation potential through user and consumer drive***

This section examines each recommendation in detail.

¹ See section of this Report on "How to innovate European innovation policies: getting the innovation ecosystem right" on page 19.

² The EU Treaty makes explicit reference only to R&D policy. Innovation policy is not mentioned but can be derived from a wider interpretation.

³ The recommendations are based on advice from the members of the HLG at the meetings and in bilateral consultation processes. Their final formulation is the responsibility of the Chairman and Secretary General of the HLG.

1

Optimize the embryonic European innovation ecosystem

Our core recommendation is to optimize the embryonic European innovation ecosystem. Instrumental recommendations relating to policy and management below are derived from this core recommendation.

Europe still urgently needs refreshed efforts to change minds and practices about what stimulates or inhibits innovation, even though a lot has been done in recent years. Efforts need to move away from linear thinking towards dealing with the interactions of the various factors and actors. The world's most competitive economies show that it can be done.⁴

However, it requires the broadening of traditional R&D and the funding approach. Both need to involve products, processes and intangible innovations (such as design), and to cover industry and services, business models, management and public governance. Optimum governance and management of the innovation ecosystem is needed to ensure all available resources are used.

A temporary⁵, independent tripartite advisory group, composed of experts from governments, business, universities or national innovation bodies, is an indispensable tool. The advisory group will complete the innovation ecosystem by developing strong and unconditional relationships with the key stakeholders, and by encouraging action. It should provide advice to the responsible European and national authorities on:

- managing the complexities of innovation and the multiple interfaces;
- converting perspectives in a globalized economy;
- guarding strategic agility and a market oriented, bottom-up approach;
- redesigning governance tools;

- university-business, stakeholder cooperation, and peer review mechanisms;
- impact assessment for competitiveness;
- the transmission between the multiple levels of governance and between economic sectors;
- stimulating entrepreneurship;
- facilitating social acceptance of innovation.

The EU must adapt its emergent innovation policy to both generic and specific characteristics of each sector, and avoid applying a uniform approach to heterogeneous markets. It must also focus more on cross-sector innovation opportunities, and on digitalisation in all economic sectors (including government). Business strategies and public policy objectives need be mutually supportive and aligned, and particular attention needs to be paid to the innovation, competitiveness and employment resulting from these relationships. Critical factors that could undermine business success have to be eliminated quickly.

Independent peer review of regulatory simplification is necessary to reduce wasteful regulations, and to review excessively rigid application of these regulations. Peer-review will also help to simplify structures and institutional bodies of every kind, particularly those of little current value.

A determined effort for cultural change will result from the executive development of those involved, and from transparency and communication within relevant institutions. Revising human resource policies in institutions could also ensure more diverse recruitment, and a result-based promotion system may also help to encourage cultural change.

To achieve change, we need to focus on a few key policies, rather than focusing lightly on many. We need to ensure coherent policy-making through efficient coordination (from the top); to review the sometimes anti-innovative and/or politicized use of the precautionary principle; and to enable independent testing and assessment of the competitiveness of all proposals.

⁴ See section of this Report on "micro- and macroeconomic benefits of innovation" on page 26.

⁵ In the opinion of the HLG the period should not exceed one year.

The EU needs to rethink how societies can better recoup some of the multiple benefits from innovation, such as publicly funded innovation that has commercial use. Broadcasting the benefits of innovation, together with evidence-based policy-making and transparency, could encourage public acceptance of innovations (even those misunderstood or contested). The role of the Chief Scientific Advisor should be strengthened in alliance with national science advisory bodies to ensure more scientific input in policy-making and policy support.

Finally, we need to ascertain the public acceptance of innovations to avoid premature “death” of novel ideas and potentially useful developments. Social acceptance is determined by partnering, and by democratic consensus building mechanisms. Therefore, the public needs objective information about contested innovative ideas. This information needs to include in-depth, peer reviewed scientific analyses, detail about benefits and risks, and about risk management.

2 Improve policy coherence

In the view of all the HLG members, this is the most urgent requirement.

We need mechanisms to overcome fragmentation in innovation policy inside EU institutions. These mechanisms also need to address fragmentation among Member States and between them and EU authorities; between business and public authorities; and between administration and citizens. Therefore, there needs to be one overarching authority with full responsibility for innovation and competitiveness within the EU institutions and in each Member State. This single authority will guarantee overall coherence between countries, sectors, clusters, departments and their rules and actions. The authority will address the ecosystem in its entirety to ensure that the innovation-policy-mix is coherent.

To encourage cooperation between relevant stakeholders and actors, criteria need to be set for giving guidance for public governance; for exchange of

good practice; for independent peer review; and for adapting governance methods to new technologies. Governance capabilities need to be continually refined to meet present day needs and to adapt to new technologies (e.g. e-governance). Better framework conditions and alignment between European and national policies aimed at stimulating innovation requires observing key (global and trans-national) competitive elements by sectors, setting agreed benchmarks, and ensuring horizontal, vertical, temporal and systemic coherence.

We need an integrated approach, similar to the one that existed during the development phase of the Single Market: an explicit agreement, a kind of covenant, between all the relevant actors, public and private. This agreement will make fostering innovation, and its effects on competitiveness and employment, the overarching and imperative goal of EU policies. Achieving this goal requires a different mindset and policy toolbox from what we see in today’s regulation and policy design, and a fundamental overhaul of the government-business relations and consultation processes. Policy makers need to approach innovation competitively. To set the framework conditions right⁶, the approach needs a sector and cross-sector perspective to determine where the key competitive advantages of Europe may lay dormant. The approach then needs to focus on these advantages.

3 Reduce regulatory complexity and rigidity

At the interface between the European and national levels, and in the various preparatory and decision making bodies, all officials need to:

- have a realistic understanding of how “naked” research results are transposed into markets;
- work on the basis of the evidence produced by internationally recognised and peer-reviewed science;

⁶ Where the Community method fails, much might be achieved between Member States (or groups of Member States) through the open method of coordination.

- have a comprehensive view of what innovation and competitiveness require;
- know which rules and regulations need urgent streamlining, a re-interpretation of their application, or even elimination.

While respecting the prerogatives of the institutions, it is imperative to set up an inter-institutional, independent EU Impact Assessment mechanism (ex-ante and ex-post). This mechanism will cooperate with national centres to assess the economic and social impact of proposals and amendments on innovation and competitiveness. In this context, benchmarking and comparing strengths and weaknesses with Europe's main global competitors should be standard practice for new regulations, and for revising or interpreting existing regulations. Growth and employment are too important to be blocked in the ice-sea of the status quo.

We need an end to the distortion of the Single Market through the additive regulation by regional governments. And we need an end to the anti-competitive side effects of advisory agencies or committees due to selective (if not populist) interpretations of science or of the impact of new technologies.

Regulatory simplification must be accomplished bottom-up, and concrete proposals from stakeholders should be mandatory to be considered by the EU Commission within a short timeline. Interpretations of regulations should take into account new research and technologies for innovative risk management and competitiveness, as well as speedy market access.

4

Eliminate obstacles and provide new funding to innovation

Many obstacles in Member States and in the EU itself still prevent or restrain innovation efforts and opportunities. These obstacles include:

- limited market access;
- lack of efficient intellectual property systems;

- prohibitive regulations;
- fiscal disincentives;
- lack of skilled labour force;
- lack of motivated and top-qualified researchers;
- lack of entrepreneurial spirit;
- discontinuity and absence of perseverance in R&D and innovation policy making.

The EU and national governments need to eliminate these obstacles. They can do this within their own areas of competence, but in close cooperation, and against the backdrop of an innovative eco-system.

Therefore, improved cooperation is needed between the public and private sectors. EU and Member States may be asked to encourage universities to spend a significant part of public research funding on public-private partnerships, or on business-university partnerships. The renewal of management education may also be necessary. New ways to stimulate closer cooperation are needed to align contrasting stakeholder agendas with a company's commercial objectives, and with government policy objectives. This cooperation will ensure effective knowledge transfer and rapid market use.

Best practices, as well as current and foreseeable problems in public-private partnerships (PPP), should be identified to help establish and operate national and transnational PPPs in innovation.

Cross-border cooperation between research centres should be based on intrinsic needs and desires, not artificially because of EU funding requirements.

To raise funds for innovation projects, we recommend creating a new mechanism for incubator and seed capital (rather than focus on venture capital which is less suited to the EU model of fund raising). This new mechanism requires public funding, depending on the risks involved. A fund which can spend a significant amount over a period of 5 to 10 years could be accumulated by bringing all EU R&D and innovation work under one authority, and will avoid fragmentation and waste. The budget for Horizon 2020 should not be fragmented over many innovation partnerships

without a single overarching authority and cross-sector objectives. The 7th and 8th RFP, Horizon 2020 and the Structural Funds financing mechanisms should be coordinated to optimize research and innovation processes. New funding should be considered for innovative forms of business-university cooperation, such as joint strategic knowledge centres which allow for cross-sector engagement.

Moreover, the existing funding possibilities should be redesigned in order to ensure a cumulative mix of funding throughout the chain, from research to pre-market access. Special attention must be given to cross-sector projects, and to the inclusion of small and medium sized enterprises for which simplicity of regulation and procedure is essential. In this context, the idea of innovation bonds should be examined again.

5

Facilitate industrial cooperation and re-interpretation of competition law

Clusters should focus on market and society-driven needs, but should also identify age-old indigenous skills, creativity, equipment, traditions and technologies. Innovation clusters can also rest upon these capabilities upon which innovation clusters can also rest. Locally successful clusters built upon models of “flexible specialization” in traditional home industry regions could serve as excellent examples. Such clusters should be identified and supported.

To concentrate innovation policy primarily on SMEs would be insufficient. The role of corporate “locomotives” must be recognized: in particular, their leverage in the supply and distribution chains, and the symbiotic relations with SMEs, although some may follow different trajectories to growth.

Unintended side effects of other policies which can be counter-productive for innovation must be eliminated. In particular, an overly strict and sometimes misguided application of competition law (though not its principles) must be revised and overhauled to facilitate and stimulate industry cooperation in the R&D and innovation chain.

6

Take an encompassing and inclusive view of intellectual property

The EU must go beyond a focus on patents, and ensure adequate protection of all forms of intellectual property: brands (including cultural and local brands); geographic indicators; trademarks; data; and copyrights. Intellectual property must be tailored to the needs and requirements of individual sectors. Particular attention must be paid to Europe’s competitive position in design, creativity, history and culture-based innovation and branding.

However, we must maintain a careful balance so as not to paradoxically hinder innovation. There needs to be a sensible balance between sharing information and building on ideas to allow innovation. Equally the rights of creators must be balanced against other commercial freedoms to allow for full economic potential.

The EU must eliminate the problem of counterfeiting and illegal imports at source by making it a key condition in trade agreements with third countries. It should enforce respect for all forms of intellectual property in the new media. This may help to protect innovations vis-à-vis imitation by international competitors.

Patents can be legitimately used to offer protection, but it should be examined if some dormant patents could still play a useful role in creating value.

Finally, the EU should seek ways to avoid asset stripping by financial operators that may destroy our intellectual properties and manufacturing basis.

7

Increase the innovation potential through user and consumer drive

Demand-driven efforts need to complement the up-till-now primarily supply-driven approach to innovation. Innovation processes can either be pushed or pulled. A pushed process is based on newly invented

technology that an organization has acquired, has access to, and seeks profitable applications for. A pulled process seeks areas where customers' needs are suspected, but are not yet met, and then focus efforts to find solutions to those needs.

The European Innovation Partnerships (EIPs) need to be reformed to make them primarily business-driven, which will ensure:

- a bottom-up and market relevant approach;
- coherence in the R&D and innovation chain;
- interaction between partnerships;
- participation of EU and national academic experts and business.

The EIP needs to be linked to the lead market's concept

and its development. This can be done before even creating an overarching authority for innovation.

A result-oriented control system needs to replace (within one year) the excessive bureaucratic mechanisms. All EIPs need to be brought under a single authority for innovation and competitiveness to ensure coherence and true innovation.

The number of partners in PPPs needs to be reduced to become more focused, and to ensure efficiency and effectiveness, and they need to be combined with a systematic demand policy.

Scouting for new ideas, projects and research needs to happen both locally in Europe and globally to create first mover advantages. Industries, even small and medium sized companies, need to operate in European and global markets. This must be the focus of all innovation policy efforts.

Conclusions

A new ecosystem approach needs to start by 2014, after the midterm evaluation of the 2020 Strategy, to ensure that no more time is lost on the way to strengthening the embryonic innovation ecosystem throughout the EU.

A temporary brain trust should be established to provide out-of-the-box thinking, based on the best practices in various countries worldwide, to EU and Member State governments. A blueprint for a new innovation policy approach needs to be developed,

and implemented from 2015 onwards. The blueprint needs clearly defined objectives and a schedule, as we saw in the successful realization of the White Paper on the Single Market.

A more daring approach will encourage new growth, competitiveness and employment.

Warsaw, Presidential Palace, 11 April 2013
written by Klaus Gretschmann and Stefan Schepers

How to innovate European innovation policies:

Getting the innovation ecosystem right

From Sclerosis ...

There seems to be general agreement in politics, business and academia that the economic future of the EU is tied directly to its capacity to innovate its economy and governance. As globalization continues and emerging market economies catch up, employment, welfare and public budgets will crucially depend on our ability to innovate.

So why is Europe far from reaching its 3% target of research investments? Why has it yet to make innovation work in all its policies? Why is there still confusion between R&D and what really matters, like the whole innovation chain to the market? Many initiatives do not make an innovation ecosystem and a systemic approach is needed to improve existing opportunities, now underdeveloped and not properly structured. A proper SWOT analysis is a good start for a widespread program of reforms.

The EU and its Member States have acknowledged this insight, and have developed policies, programs and projects to make innovation in Europe work. However, though many elements and components of an efficient innovation policy are already in place, its achievements are still not effective enough. Neglect for public governance innovation in recent years is partly to blame. Public governance innovation is vital because of the deep shifts in markets, and because of globalization. Value chains in business have largely separated from national and European governance.

A rethink of governance, rulemaking and business-government interface is therefore required in order to still ensure competitive advantage and employment. Employment rates will continue to decline in Europe if

globally connected value chains are not recognised for how they lead to a new division of labour.

Attempts to trigger non-conventional thinking and to open a new debate about policies that can address this drawback are still a desideratum. The precautionary principle, an excellent scientific concept, which has politically mutated into a dangerous populist tool—its application has become dogmatic rather than evidence-based. Risk is confused with hazard, and is used to extend the EU's grip over Member States. The result is extensive collateral damage, given the diversity of Europe's economic context, to the ability of citizens to appreciate science, and to enterprises' incentives to innovate.

Addressing the need for an innovative European Innovation Strategy is a priority. The strategy is not one that can theoretically be designed and implemented by EU institutions or those of the Member States. Rather, it must align the various components of the innovation ecosystem, and provide coordinated support for each component.

Innovation is the result of interaction among an “ecology” of actors. The “right” interaction between these actors is needed to turn an idea into a solution or a process, product or service on the market. Therefore, the European Innovation Strategy model focuses on connectedness, the dynamics and the context in which a complex interaction of actors and agents, factors, sectors and countries determining or hampering innovation is embedded.⁷

Whilst natural ecosystems either evolve under

⁷ *In the natural sciences an ecosystem is a complex of naturally interacting organisms, functioning with non-linear dynamics and feedbacks. An ecosystem of innovation aims to emulate nature in its organizational complexity and to create the dynamics, interactions and feedbacks that produce desired outcomes, spin-offs and cumulative effects. Paradoxically, it requires an effort of parallel construction and deconstruction and of creation of the right framework conditions, which can only be done through consistent holistic steering. Nevertheless, the effects may be at the start uncertain and apparently marginal before developing their full potential.*

pressure of contextual change or perish, ecosystems of innovation are driven by economic, social, cultural and political challenges. They provide answers, deliver arguments and ensure public acceptance of innovation as a generic resource and indispensable necessity.

The experiences of the most competitive countries (those that regularly top lists compiled by Eurostat, IMD or WEF, and the EU State of Innovation) also show the direction in which to go.

... To dynamism: create an environment where innovation thrives

The key objectives are to develop and promote an **ecosystem of innovation** that embeds innovation policies and activities into a flexible, dynamic, stimulating and **enabling environment**. This ecosystem is intended to create value for society. It should enhance the quality of life for its citizens and the competitiveness of its enterprises. It should foster intelligent interaction between a variety of stakeholders (whether companies, local/regional/national authorities, or international systems like the EU and its institutions) and centres of knowledge-creation such as universities and research organizations.

The **enhancement and advancement**, the fostering and maintenance of an innovation ecosystem, requires the “five Cs”: **complexity, cooperation, competition, competence and communication**. These elements can only be achieved if there is guidance, leadership and stakeholder engagement that go beyond traditional hierarchical procedures and established practices.

Innovation ecosystems need to be based on a broad concept of demand for innovation, from users or consumers or those responsible for public goods. This demand can come from industry, society, or public administrations:

- industry’s need to solve specific technological, financial or organizational problems in their value chains (e.g. resource efficiency);
- emergent societal needs (e.g. ambient assisted living of the elderly);
- social groupings or civil society which no longer accepts existing yet outdated procedures, products or devices and their constraints and drawbacks;

- public administrations facing external political pressure or internal needs to increase cost-effectiveness and efficiency.

Innovation and value creation require a specific set of abilities and activities:

- permanent strategic agility;
- scanning the global context;
- scouting for opportunities;
- attention to continuities or discontinuities in societies and economies;
- an “elevator” between global and local.

We must acknowledge that innovation results from a complex process, combining curiosity, creativity, rigorous scientific method and a suitable institutional framework of interaction. The emergence of novel concepts or processes, products or services, can only result from out-of-the-box thinking, improvisation, trial and error, and new tacit or explicit knowledge.

A well-designed and smoothly-working innovation ecosystem must support this. This requires a different focus than simply an “ever-closer Union” which can only lead to another round of institutional navel staring. We must start from the economic and social realities in the Member States and do everything possible to facilitate cooperation between Member States and cooperation with the companies, universities, and others who drive innovation.

The real challenges

If the EU wishes to promote and stimulate innovation, it needs to be innovation-bent itself – much more so than in the past. It will have to adapt to the fundamental and often irreversible external and internal challenges and changes which have become apparent for more than a decade.

However, it often appears as if the EU has become a prisoner of past successes, has fallen victim to organizational sclerosis and conceptual stand-still, and is today in urgent need of an escape from the status quo.

Europe does not lack the capacity to innovate; it has a broad fabric of innovation with certain elements already in place. But the framework conditions are lacking. It is confronted with problems of leadership and incoherence of vision and purpose. It struggles to create cumulative effects and critical mass. There is a rather inflexible culture of policy-making and regulatory application. It suffers from organizational fragmentation, with multiple barriers to innovation in markets, and there is no encompassing systemic approach. Worse still, some innovation that is developed in the EU is appropriated elsewhere due to a lack of favourable framework conditions.

Today, Europe's capacity to innovate lags behind its needs, because of a tendency towards incrementalism and a focus on procedure and control. As a consequence,

previous attempts to improve and reshape its innovation policy have not been successful. They have provoked harsh criticism – from proponents and opponents and from recipients and stakeholders of R&D and innovation policies alike. And despite the best intentions and efforts, new approaches will hardly fare any better without more substantial support from the general public. To unleash innovation requires a mind-set of decision-makers which is the opposite of bureaucratic standards and thinking, which are usually meant to ascertain stability, monitoring and control in hierarchical organizations. Rather, strategic agility requires exceptionally flexible leadership skills and organizational processes, which are more innate familiar to private sector than to public organizations.

Part of such business features may lend themselves to be taken up by bureaucracy if a powerful innovation ecosystem is to be achieved, in particular methods to manage complex systems. Consequently, it must be part of a culture of innovation to accept experiments and managed risk in order to allow innovation to succeed. More courageous and fearless radical reformism needs must be encouraged, connecting all EU policies to the innovation ecosystem. Innovation is not only about R&D policy; this is just the start of a long and complex set of actors and factors to be managed.

It is diversity that breeds creativity!

Unfolding an innovation ecosystem

Reconstructing the European innovation ecosystem will involve setting up:

- a **network of formal and informal** public and private sector actors whose activities and interactions initiate, import, modify and diffuse new technologies;
- the **communication flows and relationships** that determine the production, diffusion and use of new basic or applied knowledge;
- a set of **individual actors**, whose incentive structures and competencies determine the rate and direction of technological learning and the volume and composition of change generating activities;
- **devices to create, store and transfer knowledge**, skills and artefacts which define new technological frontiers;
- **rules and political arrangements** for the framework guiding the innovation process, with particular attention to rules or practices that could hinder an innovation ecosystem;

- **a set of workable regulations** where non-functioning elements are repaired and adjusted to foster creative thinking and invention;⁸
- **more space for regulatory interpretation** so rules are applied with a better basis in economic reality – less dogmatic and more flexible with regards to achieving desirable outcomes.

To be effective, the setup process must involve a “spring clean” through truly independent audits of institutions, associated bodies, rules and procedures and habits that have become outdated and no longer support innovation and competitiveness.

The elements outlined are constitutional if we wish to start reconstructing and reshaping our innovation ecosystem in the EU to work better. They concern not

only the EU institutions, in particular its policy initiator, the Commission, but also the Member States, regional and local governments, and business and academia. A powerful **Innovation Europe** cannot be only an island of innovation in Brussels, surrounded by national and local fortresses of the status quo. Therefore the ecosystem approach demands a collective new departure involving all European and national actors and both private and public radical reformers.

This restructuring will need clear and consistent leadership from the top, through coaching and mentoring, not steering and directing. This will facilitate other actors, primarily companies and centres of knowledge, to develop and manage the dynamic interactions that pave the way for useful innovation and creativity that adds value.

Challenge the status quo and accept new twists and turns

Innovation is a creative process. It needs a resilient environment that supports creativity, communication, transparency and learning from mistakes. **A “mandate to come up with novel ideas that work within the constraints of the established framework cannot succeed.**

Correctly assessing change and driving it intentionally and purposefully is a difficult task both in business and government. Unfortunately, there is a tendency to extrapolate from present trends and repeat past approaches despite changed contexts. Holding on to the status quo is a widespread attitude in public institutions. This habit stifles change and needs to be broken. Such change often requires a radical overhaul of human resource policies. In order to think about what might

possibly exist and to escape the trap of what de-facto exists, it is essential to develop new cognitive maps, outlining many possible avenues and alternatives.⁹

Comprehensive change is necessary to move beyond today’s culture of regulation and control and towards a culture of flexible and incentive-compatible mentoring and coaching of all stakeholders. For promoting a culture of innovation and change, stewardship tools are more suitable than traditional command and control models. Last but not least, it clearly requires a radical rethinking of the Horizon 2020 approach, and of aspects of the Commission’s human resource policy, consultation processes and implementation of rules.

Be inspiring by thinking the unthinkable

The objective is to develop unorthodox and innovative ways to overcome both the structural

and cyclical economic crises we have witnessed in the EU lately and the governance fault lines within

⁸ For example, consider antitrust laws, which were developed in the late 19th century in the context of the economic theories of the time. But today, many of those assumptions are irrelevant thereby disregarding the value of ubiquity or non-convexities in new economic theories. Or take of the idea of enacting short-term tax credits for research and development. R&D takes many years. If companies invest in a given year to take advantage of the R&D credit and 2 years later the tax code is changed, their investment may be lost. Therefore tax credits do have some influence on business decisions.

⁹ Inspiration and methodological examples can be found in the work of the International Panel on Climate Change, the World Economic Forum on Risk Interconnection and Convergence or the strategic outlook of the World Business Council for Sustainability.

the EU system. This clearly requires more than just incremental changes but rather a radical approach in order to change direction and reverse the trend. This holds true for all EU Member States – both for highly industrialised economies and for traditional economies based on agriculture or home industries and handicraft sectors. Those economies often lack rapid productivity growth but hold great potential. A differentiated policy to foster innovation – specialized and tailored to the respective economic structures through combinations of private and public forces – will be a way to overcome such lack of competitiveness.

At the core of any innovation ecosystem to tackle the above problems is what experts call “bold associational thinking.” Associational thinking is the way we process information through integrating patterns, seeing contextual relationships, and connecting seemingly unrelated elements. What characterizes this type of thinking is the rapid, fluid, cross-disciplinary ability to select and apply the appropriate thinking combination to solve each specific problem.

However, when associational thinkers are micro-managed, involved in minutiae that have little relevance, and are in an environment with many meetings and little evidence of meaningful input or work their effectiveness is drastically reduced. Associational thinkers need blocks of uninterrupted time to think and freedom to work in their own way. They thrive on big challenges and variety. In order to fuel deep, creative change, what are needed are innovation groups, stellar teams of young innovation-addicts with “innovators’ DNA” and a commitment to a common goal.

Any governance system, and notably those characterized by continuous infighting over competences and power, are hostile to associational thinking. Their entrenched

policy paradigm obstructs critical re-examination and blocks fundamental contextual shifts. Therefore, bold thinking is not possible without a zero-based approach. A zero-based approach ignores baselines and the status quo to start the analysis from scratch – challenging conventional wisdom about **who** should proceed, **how** so and **what** innovative results are we seeking. External, independent “braintrusts” (think tanks), which operate in most highly innovative systems, are a helpful tool.

The relationship between national governments, EU institutions, business, and centres of knowledge is central to this approach for making innovative economies work. One must depart from the top-down approach (inherited from the time of building a single common market) for a much more modern approach to governance. The new approach must stimulate inter-governmental cooperation instead of hindering it, on the condition that it is transparent and open to newcomers, variable geometry, and follows new forms of governance based on coaching instead of hierarchical controlling. Consultation processes need to become real, and not remain a fig leaf. In-house personnel policies need to incentivize creativity and entrepreneurship, with a focus on outcomes instead of on procedures.

Against this backdrop it is clear that revised and complementary roles of the EU and its Member States are imperative, as well as new methods of cooperation in a new innovation ecosystem. Indeed, the old EU governance system was designed to respond to the challenges of the post-war period and was once greatly innovative. But today it is in need of a courageous redesign to support a new and powerful innovation ecosystem. The system itself, not a lack of research capacities or entrepreneurship, is the key obstacle to an innovative and competitive economy.

Unfold strategic capability and ensure policy coherence

To make innovation “tick” requires dynamic strategic capabilities. These are the skills, processes, routines, organizational structures, and disciplines that enable firms and institutions to build, employ, and orchestrate intangible assets relevant to problem solving and not freely available to all actors.

Enterprises with strong dynamic capabilities are intensely entrepreneurial. They not only adapt to business ecosystems; they also shape them through innovation, collaboration, learning, and involvement. Such strategic capacity is also necessary inside those EU institutions which are responsible for stimulating and fostering a culture of innovation in Europe.

The interests of public authorities are often hidden or in conflict with those of all other stakeholders. It is necessary to develop a learning mind-set both for individual actors and institutions and for stakeholders. Cross-disciplinary research and multi-experience inputs, as well as open-mindedness and incentives, and finally tolerant handling of failures, will be necessary elements in the process of unfolding strategic innovation capacity.

Reducing conflicts in priorities is a key ingredient for creating positive cumulative effects in any innovation ecosystem. It demands an overall bird's eye perspective, especially when inertia and the status quo risk undermining the need for radical new

departures. Innovation must be framed strategically and top-down. Only then can we:

- ensure coherence and a focus on the innovation ecosystem;
- create serendipity and avoid the danger of being absorbed in policy-as-usual;
- keep an experimental, risk-taking attitude in the face of uncertainty.

Only this approach can guarantee that innovation will become an overarching policy goal to which all others must converge.

Ensure stakeholder commitment

To properly assess paradigm shifts and to align various agendas, it is essential to involve business leaders and other economic actors together and in close cooperation with the centres of knowledge creation, to contribute their understanding of markets and marketability. To make use of different perspectives and different modes of thinking and probing, we will need to establish a culture of deliberation and discourse. We will need tools that go beyond the technocratic and mechanistic stakeholder consultations which are the routine in Brussels. It is necessary in order to bring about a shared vision and mutual understanding and cooperation.

Of course, opposing interests and diverse preferences

may prevail. However, research and centuries of experience have shown that there is a positive correlation between a society's degree of tolerance for the independent, unorthodox, creative and entrepreneurial minded and its social benefit and economic success. Therefore, malign attitudes of sceptical and innovation-critical stakeholders may result if their worries and concerns are taken seriously. A strictly scientific and internationally accepted approach to the assessment and management of risks resulting from product and process innovations is a prerequisite for achieving stakeholder acceptance and ease. Positions not validated by scientific peer review should be resisted and not become politically validated because of some electoral expediency.

Implement and evaluate according to new standards

To make the most of our innovation ecosystem, we must address:

- the relations between different administrative units within government as much as between EU institutions and Member States
- the different interfaces between politicians and civil servants in Member States

- the governance capacity problems in several Member States.

We should consider seriously which minimum standards of governance should be demanded in each and every Member State (eg. statistics, civil service training, etc.). This requires attention to ensuring equal capabilities throughout the Union's governance systems, and a re-think of personnel policy in the EU institutions to bring back qualities diminished by the reforms a decade ago.

Regular peer review, scrutiny of process and evaluation of achievements by independent multi-stakeholder groups of experts is essential to ensure firmness of purpose and agility of methodologies. Experimenting with fundamentally new methods, and abandoning or modifying programs when they appear not to move fast enough towards tangible results, must be a full part of an innovation ecosystem.

Included in evaluation approaches must be tolerance for failure. Without some risk tolerance there will not be enough innovation. This will be a radical departure from existing bureaucratic culture. It requires strong leadership support, transparency and communication with stakeholders.

Evaluation is not only part of constant learning under circumstances of uncertainty. It will also help to develop a more constructive approach to risk management in the broader sense. Learning capacities and risk acceptance are major characteristics of an innovation ecosystem. They provide the basis for adjustments and often lead to additional innovativeness, hence to better value creation and competitive advantage.

Section based on discussions of the HLG, written by Klaus Gretschmann and Stefan Schepers

The micro and macroeconomic benefits of innovation

Many experts point to a potentially lost decade for growth in Europe if the bottlenecks to reforms are not properly and soon addressed (World Economic Forum 2012a). Policy-makers and academia acknowledge that research and innovation policy can be a very useful stimulant for economic development and social well being (EU 2020 Strategy; OECD 2007).

Progress has been made over the decades, and almost half of EU’s innovation gap with the US and Japan has been closed since 2008 (Innovation Union Scoreboard 2013). But progress has been too slow to significantly improve Europe’s growth and competitiveness. This background note calls for challenging policies based

on a traditional paradigm, and advises to embrace the new “innovation economics” way of thinking. This stresses that the interplay of knowledge, technology, investments and innovation should be placed at the centre of an economic model.

This paper links the background papers addressing the redesign of EU’s innovation policy management to its economic impacts. It explores the benefits of well-designed innovation strategies at the macro and microeconomic level. It shows that only a holistic and ecosystem-oriented approach can radically enhance innovation, promoting competitiveness, employment and value creation, and addressing major societal challenges.

Cross-study findings on national innovation and competitiveness

In this section, we compare cross-study findings on innovation and competitiveness. We assess not only the countries that systematically invest in innovation, but also the link between innovation-friendly country systems and economic performance (such as GDP growth, employment, and level of social welfare).¹⁰

Starting with the rankings on innovation, we have comparative assessments of countries’ innovation

performance from the Commission’s Innovation Union Scoreboard 2011, INSEAD’s Global Innovation Index 2012 and WEF’s Global Competitiveness Report 2012-2013. The findings are compared in table 1.

Turning to competitiveness rankings, both the World Economic Forum’s Global Competitiveness Report 2012-2013 (WEF 2012b) and the International Institute for Management Development’s World

Table 1: Overview of innovation rankings

Rank	INSEAD’s Global Innovation Index World 2012	WEF’s Global Competitiveness Report 2012-2013	Innovation Union Scoreboard 2013
1	Switzerland (68.2)	Switzerland (5.78)	Sweden
2	Sweden (64.8)	Finland (5.75)	Germany
3	Singapore (63.5)	Israel (5.57)	Denmark
4	Finland (61.8)	Sweden (5.56)	Finland
5	United Kingdom (61.2)	Japan (5.54)	Netherlands

¹⁰ Considerations on the measurement of innovation are provided in annex 1.

Rank	INSEAD's Global Innovation Index World 2012	WEF's Global Competitiveness Report 2012-2013	Innovation Union Scoreboard 2013
6	Netherlands (60.5)	United States (5.50)	Luxembourg
7	Denmark (59.9)	Germany (5.42)	Belgium
8	Hong Kong (58.7)	Singapore (5.39)	United Kingdom
9	Ireland (58.7)	Netherlands (5.31)	Austria
10	United States (57.7)	United Kingdom (5.17)	Ireland
11	Luxembourg (57.7)	Belgium (5.09)	France
12	Canada (56.9)	Denmark (5.08)	Slovenia
13	New Zealand (56.6)	Austria (5.07)	Cyprus
14	Norway (56.4)	Taiwan (4.99)	Estonia
15	Germany (56.2)	Norway (4.96)	Italy
16	Malta (56.1)	Korea. Rep. (4.94)	Spain
17	Israel (56)	France (4.91)	Portugal
18	Iceland (55.7)	Luxembourg (4.82)	Czech Republic
19	Estonia (55.3)	Qatar (4.71)	Greece
20	Belgium (54.3)	Iceland (4.68)	Slovakia

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Source: Drawing on INSEAD (2012), Global Innovation Index World 2012, WEF (2012), Global Competitiveness Report 2012-2013 and European Commission (2012b), Innovation Union Scoreboard 2011.

Competitiveness Yearbook 2012 (IMD 2012) have undertaken comprehensive studies of countries' performance along a wide range of parameters. Their findings are compared in table 2.

Subjective elements and differing views on criteria and weights, as outlined in annex 2 and 3, lead to different rankings by the IMD, INSEAD, IUS and WEF.

Table 2: Overview of competitiveness rankings

Rank	WEF's Global Competitiveness Report 2012-2013	IMD's World Competitiveness Yearbook 2012
1	Switzerland (5.72)	Hong Kong (100.000)
2	Singapore (5.67)	Unites States (97.755)
3	Finland (5.55)	Switzerland (96.679)
4	Sweden (5.53)	Singapore (95.923)
5	Netherlands (5.5)	Sweden (91.393)
6	Germany (5.48)	Canada (90.289)
7	United States (5.47)	Taiwan (89.959)
8	United Kingdom (5.45)	Norway (89.673)
9	Hong Kong (5.41)	Germany (89.257)
10	Japan (5.40)	Qatar (88.475)
11	Qatar (5.38)	Netherlands (87.158)

Rank	WEF's Global Competitiveness Report 2012-2013	IMD's World Competitiveness Yearbook 2012
12	Denmark (5.29)	Luxembourg (86.052)
13	Taiwan (5.28)	Denmark (84.876)
14	Canada (5.27)	Malaysia (84.217)
15	Norway (5.27)	Australia (83.185)
16	Austria (5.22)	United Arab Emirates (82.486)
17	Belgium (5.21)	Finland (82.467)
18	Saudi Arabia (5.19)	United Kingdom (80.142)
19	Korea. Rep. (5.12)	Israel (78.565)
20	Australia (5.12)	Ireland (78.465)

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Source: Drawing on WEF (2012b), Global Competitiveness Report 2012-2013 & IMD (2012), World Competitiveness Yearbook 2012.

Among innovation rankings, the reports by INSEAD and WEF stand out for their broad scope concerning country selection and indicators. The WEF also gives relatively high attention to soft data in the form of executives' perceptions. The IUS has a strong focus on European countries, but may not fully capture the crisis's impact given a lag in data availability. The IUS may also not fully grasp the impact of newly introduced policies, as it will take some time before they impact on performance.

Looking at competitiveness rankings, the IMD draws on 246 criteria, gives equal weight for all variables and mainly relies on quantitative data. The WEF study uses 117 criteria, attaches specific and unequal weights to each indicator, and emphasizes survey data with around 70 % weighting. This suggests the WEF has strengths in its up-to-date perceptions and forward looking indicators. In contrast, the IMD values static and objective indicators higher.

Despite the differences in the exact ranking positions, the studies by the WEF, IMD, INSEAD and IUS found many similarities in their findings on innovation and competitiveness. We can see that a number of EU member states, including Finland, Germany, the Netherlands and Sweden, are consistently ranked among the most competitive countries. This is in line with the recently published Innovation Union Scoreboard 2013.

When we assess factors enabling a strong competitive performance, there is a corresponding strong tendency among the most competitive countries to perform either

in the very top or well above average in innovation factors. The IMD, INSEAD and IUS all place countries such as Finland, Germany, the Netherlands and Sweden among the most innovative countries.

These findings are also supported by evidence from IMD's assessment of public and business expenditure on R&D – the mentioned countries all belong to the group of countries with the highest total expenditure on R&D as a percentage of GDP in 2010. But although R&D funding enables innovation, it still needs to be supplemented by ensuring its transformation into markets, ex-post evaluations of investment outcomes and the removal of key bottlenecks to innovation.

Although INSEAD's study shows differences between the input and output-indices in terms of comparative country performance, the data and rankings still underline that the efforts which countries undertake (input) are also rewarded in terms of improved innovation outputs (INSEAD 2012, p. 16). This also accounts for job creation, as the EU countries facing the largest economic impacts of innovation also had higher employment rates (Commission 2013, p. 13).

There is no single way to achieve top innovation performance, and each country has its own specificities, but the IUS report also found similarities among the most innovative countries (Commission 2012b, p.8). These include strengths in national research, university-business cooperation and public-private partnerships, business R&D expenditures, commercialization of technological knowledge facilitating knowledge transfer and rapid market use, and patent revenues from abroad.

On the basis of the study rankings and criteria, and keeping the general conclusions of the linkages between innovation and competitiveness in mind, the following sections will first explore the link between

innovation and governance systems before it turns to the role of innovation in terms of its impact on macroeconomic and microeconomic performance.

The need for efficient governance to steer innovation

Due to the complexity of factors and relationships necessary for a successful innovation strategy, there is an urgent need for efficient governance and the adaptation of governance methods to new technologies. The Worldwide Governance Indicators project constructs aggregate indicators of broad dimensions of governance:

- (1) voice and accountability
- (2) political stability
- (3) government effectiveness
- (4) regulatory quality
- (5) rule of law
- (6) control of corruption.

The six aggregate indicators are based on 30 underlying data sources reporting the perceptions of governance of a large number of survey respondents and expert assessments worldwide. Again, similarly to the innovation and competitiveness rankings, we can observe the same countries scoring high among the top twenty: Sweden, Finland, Netherlands and Germany

(World Bank 2011). This shows a strong correlation between the quality and efficiency of public services, rule of law, accountability, and countries benefiting from economic growth. The Commission's study (2013) also supports this by proving a strong link between government effectiveness and the economic impacts of innovation.

In this context, the necessity of strong leadership for steering overall governance needs to be emphasized. Kakabadse's (2012) "ten steps" suggest how a change towards a better leadership can be pursued. Similarly to the way a new vision needs to be communicated at company level, it also requires the use of strong ideas to engage stakeholders and gain their enthusiasm. This is followed by establishing a recognisable and effectively-monitored programme of change, measured against achievable objectives. A sustainable change requires "designing a 'strategic talent plan' which enables transformation and allows for 'bedding down', post transformation". The problem is that there is "no generic leadership recipe 'that works and only 'outstanding leaders get the balance right between aligning and engaging stakeholders". Yet, Kakabadse concludes that the one thing all the successful leaders have in common is their continuous willingness to learn.

The effects of innovation on macroeconomic performance

The output of an economy can grow by (1) increasing the number of inputs entering the productive process, or by (2) increasing how much output you get from the same number of inputs. Since the 1970s, Europe has experienced a transformation from extensive growth (relying on capital formation and the existing stock of technological knowledge, and subject to diminishing returns) towards intensive growth relying much more heavily on innovation (Eichengreen 2007).

The OECD (2007) has predicted that innovation

will be "a crucial determinant of the global competitiveness of nations over the coming decade". Some nations seized the opportunities offered by globalization and new technologies, through efficient private sector and governance methods. These nations are predicted to increase their competitiveness and domestic progress. In general, successful innovation enables countries to make full use of resources. By turning innovative ideas into new products and services, better conditions are created for sustainable growth and competitiveness,

quality jobs, and addressing European societal challenges (EC 2010; EURP 2010). In order to meet global competition challenges, countries must excel in innovation and research by fostering the development of firms and institutions that are global leaders in their fields (Veugelers 2010).

Entrepreneurship turns innovative approaches into productive economic activity. The benefits of innovation within one country are expected to lead to the diffusion of new technology, which contributes to increased knowledge and productivity enabling growth in GDP per capita. Yet, in addition to the role of research, development and the application of scientific or technology advances, innovation processes are also shaped by market needs, marketing, networking, partnerships and users amongst others (see e.g. Chesbrough 2003). Innovation processes may also be characterized by multiple feedbacks and loops that influence and shape potential outcomes and their transformation into markets (Godin 2006). Given the complexity of factors and relationships necessary for a successful innovation strategy, it urgently needs support from the governance toolset, regulatory environment and framework conditions to enhance innovation and its potential for economic growth.

Since the mid-1990s, many nations have increased

their efforts to integrate innovation-based economic growth by boosting jobs in key technological and manufacturing sectors. According to Atkinson & Ezell (2012), it leads to a race for 'global innovation advantage' whereby countries compete by "innovation chasing" in order to grow and attract high-value added economic activities. To fully understand the relationship between innovation and the evolution of industries, Malerba (2005) points to several aspects of this link: "During its evolution an industry undergoes a process of transformation that involves knowledge, technologies, earnings, the features and competences of actors, the types of products and processes, and the institutions."

Although entrepreneurs have a vital role in driving innovation, the constellation and coherence of European and national policies can also support or restrict innovation performance. Advancing innovation to the forefront of economic policy requires efficient innovation strategies, framework conditions, modes of funding, reducing regulatory complexity and rigidity, facilitating industrial cooperation and public-private cooperation, and moving into next-generation industries that are supportive of a nation's innovation ecosystem. The central claim is that innovation has become the most important factor for countries' ability to thrive in the global economy (Atkinson & Ezell 2012).

R&D investments and innovation performance

Science is closely linked to innovation activities, not only by providing inspiration for business, but also by framing guidance for policy-making. Since the mid-1990s, investments in knowledge have increased more rapidly than investments in equipment and machinery across most OECD countries, and have exceeded the investments in equipment and machinery in Finland and the United States (OECD 2005).

The economic crisis has led to a decline in expenditure on R&D in many EU countries, although with significant differences between countries, sectors and actors (IUS 2013). The EU has recognized that it may damage Europe's innovation performance and endanger future competitiveness, and that both public and private R&D investments are an important element in enabling Europe to exploit any rebound in

the economy (ibid). But R&D investments must also be converted into market value by complimentary reforms of the settings relevant to country's innovation model.

Case study: Finland

Focusing specifically on the relation between R&D and economic performance, our cross-study findings revealed that Finland, as an example, has consistently ranked at the forefront of innovation investment and innovative performance. Finland had the second highest R&D intensity among OECD countries (3.88 % GDP) in 2010 (OECD 2012). Central to its innovation system is a collection of business accelerators funded by the government and private enterprises and strong public-private partnerships

facilitating knowledge transfer and rapid market use.

Tekes, the innovation agency in Finland, and the venture-capital fund Finnvera, aim to find and support early-stage companies. They have funded over 60 % of well-known Finnish innovations between 1985 and 2007. In 80 % of cases the funding had a significant impact on companies' performance (Hyytinen et al. 2012). Of the 49 million Euros they contributed in 2011 to innovative companies seeking rapid growth, one third was directed to firms in Vigo acceleration programme, from which around 130 companies are currently receiving funding. The cumulative turnover of these companies increased from 10 to 250 million Euros in four years. In terms of the growth company ecosystem in Finland, several attributes define these firms such as being younger (less than 10 years), smaller (less than 20 employees), ICT and knowledge intensive, and being targeted by venture capitalists.

When assessing the efforts to improve innovation policies on research and technological performance,

we can observe that Finland is among the top performers in producing scientific articles and triadic patents per capita (OECD 2008). The entrepreneur-friendly Finnish environment has supported a significant number of start-ups and new clusters. This is also reflected in companies' performance in new-to-market product innovations. Since the 1990s, Finland has systemically outperformed the OECD and EU15 average performance in labour productivity growth (Tekes 2012).

Germany's experience echoes that of Finland. Fornahl, Broekel and Boschma's study (2011) found evidence that German biotech firms' performance, including their patent activity, were enhanced through public modes of funding such as R&D subsidies to joint R&D projects with two or more partners, network partners and close cognitive distance of collaborative partners within a cluster. Although a country's specific policy and framework conditions makes it difficult to transfer experiences that worked under certain conditions, these lessons can be applied in other contexts.

Innovation and the employment effects

As innovation in advanced economies through decades and centuries has been followed by employment growth, it points to a positive long-run economic impact of innovation on employment.

Innovation and entrepreneurship satisfies the two conditions for a public good: (1) The benefits of entrepreneurial activities extend throughout the economy; and (2) it is impractical and not cost effective to collect money from those benefiting from initial entrepreneurial activities.

Several studies, including Audretsch et al. (2001), Baumol (1993), Carree and Thurik (1998), and Shumpeter (1912), have outlined the spillover benefits of entrepreneurial activities. Like other public goods, entrepreneurial activities may be underproduced. This provides a strong case for reorienting public policies and funding towards supporting the entrepreneurial activities. After all, it is not just the entrepreneur, but the entire society which gains from these activities.

McDowell (2004) estimates that the direct and indirect effects of small business formation accounts for more

than half of GDP and around sixty to eighty percent of the new jobs created in developed countries. In this context, a study by the Commission (2012b) found that 85 % of the net new jobs in Europe between 2002 and 2010 were created by SMEs. In a recent study, the Commission (2013) has also underlined that employment growth heavily depends on high-growth innovative firms as the jobs they create, directly or indirectly, is disproportionately large.

Audretsch et al. (2001) emphasized that entrepreneurs create employment opportunities with secondary and tertiary employment effects in the economy. Using the data from 23 OECD countries, they show that an increase in the number of business owners per unit of labor force leads to lower levels of unemployment. Entrepreneurs not only create employment opportunities, but they may also employ individuals who might otherwise remain unemployed given age, lack of education or missing experience (Headd, 2000).

Entrepreneurs have a vital role in the early evolution of industries by introducing new products or processes. In the long term, they enhance productivity by increasing

competition. New entrants in the market also create knowledge about what is technically viable and what consumers prefer by introducing variations of existing products and services. Knowledge spillovers play an important role in this multi-faceted and complex process (Audretsch, Aldridge and Oettl, 2006; Audretsch, 2007).

Framework conditions, the level of regulatory complexity and rigidity, and the access to public and private modes of finance are all important factors for businesses creating new jobs. They allow businesses to spend less time and money on dealing with the anti-competitive side effects of additive regulations or policies and chasing after scarce sources of finance. Instead, the businesses use their energies to produce and market their goods.

Another benefit is that governments spend fewer resources regulating and more providing basic social services. Sweden, a top 10 country on the ease of doing business, spends \$7 billion a year, or 8% of the government budget, and employs an estimated 100,000 government officials to deal with business regulations. The UK spends \$56 billion a year, or nearly 10% of the budget, to administer business regulation. The Netherlands spends \$22 billion or 11% of its budget (Kingombe et al. 2010).

The long-term view is also critical for realizing the benefits of innovation. Many studies fail to find a significantly positive relationship between entrepreneurship and growth – but the studies that covered ten and more years provide clear evidence on the this relationship (Nystrom, 2008).

Innovative activity is not only a consequence of a push effect of (the threat of) unemployment but may also be the result of a pull effect produced by a thriving economy full of opportunities (Parker, 2004; Thurik et al., 2008). Entrepreneurship is also a response to previously unnoticed profit opportunities (Kirzner, 1973). This may lead to more consumer satisfaction at lower cost, hence to economic growth and lower levels of unemployment.

An important warning however needs to be put forward. If the innovative entrepreneurial-driven firms cannot fill the new job openings with European workers – mainly because of lacking skills – there will not be any positive effect on European employment. Any profit-oriented private company has an incentive

to search for the best employees, even if this means off-shoring their production. Thus, the Member States need to ensure that their citizens are equipped with the right set of skills and popularize technological topics.

Country examples of the employment effects of innovation investment

In the following, some country examples on the employment effects stemming from innovation investments will be addressed. Although the role of large firms and corporate 'locomotives' in job creation is essential, jobs are increasingly generated by new, surviving growth firms. Gazelles, i.e. young firms with a minimum of 20 percentage annual growth, have had a considerable impact on job creation relative to their absolute numbers (Nordic Innovation 2012).

Between 2006 and 2009, 214 Norwegian and 92 Finish gazelle firms increased employment by respectively 10594 and 8447 (without considering the indirect employment effects) (Nordic Innovation 2012). Between 2006 and 2009, 691 growth companies were found in Finland. On average they grew by 74 people during the period, and in total generated more than 51,000 new jobs, accounting for almost half of the new jobs created in Finland during this period. Here it should be kept in mind that innovation programmes take time to realize.

German industry is committed to making the sort of high-quality, high-performance, innovative products for which the world will pay extra. The backbone of German manufacturing is small to mid-sized firms. These families are in many cases committed to keeping factories at home. Though they aim for the highest profit possible, they are not under the same pressure from shareholders to show consistently growing profits each quarter (Schuman 2011). This allows them to take a long-term view and find ways of staying profitable while still manufacturing in Germany.

Many of those countries (e.g. Germany, Finland and Sweden) who strengthened their innovation strategies and R&D investments prior to the economic crisis have experienced recovery and employment growth (Commission 2013; OECD 2007). The countries with relatively high economic prosperity, but lagging in building a knowledge-based productive economy or in simplifying the regulatory burden, are those that

have suffered the most in terms of employment. In other words, prosperity in Europe seems unlikely to be sustained over time without high levels of competitiveness (WEF 2012a).

Many jobs can also be created through fully enabling the Single Market to operate, which is for example the case of infrastructural investments in energy. Investing in innovative infrastructure is money well-spent on long-term sustainable development, taking the example of interconnectors these can be perceived as huge investment projects creating employment. However, the trend in publicly spent money is unfavorable to infrastructure investment. The cuts made to the next EU budget will most likely hit areas such as the Connecting Europe Facility, Project Bonds and the digital agenda, despite the

strong positive impact that those programmes would have on job creation.

A number of barriers exist for innovative approaches to job creations: lacking framework conditions, regulatory complexity and rigidity, anti-competitive side effects of policies, funding possibilities, and the skill quality of workers (World Bank 2012). Also, employment is likely to increase in more productive firms, whereas employment in less productive firms tends to decrease. It therefore seems that innovation and employment creation are strongly coupled in the long run, although innovation may imply shifts in employment across sectors. This will in turn require a well-designed labour market and policies aiming at helping displacing movers find new jobs.

The effects of innovation on microeconomic performance

Here we assess how innovation affects the microeconomic performance, and in turn a country's prosperity. It has to be taken into account that reporting data on innovation is not the same as reporting accounting data. Thus, in the mentioned Eurostat's Innovation Community Surveys, it is realized that "Turnover from innovation" is an estimate, which depends on local accounting standards. No financial accounting standards separate non-innovative and innovative expenditures. Market share and profits are often used as indicators for analyzing employment and growth.

The rankings of the most innovative industries are often heavily skewed towards technology and telecommunications. However, this does not take into account the high volatility of these sectors and any one-sided state support cannot lead to a well-balanced economy.

The rankings that utilize a more comprehensive methodology include, for example, the Forbes's World's Most Innovative Companies. MIT produces a list of the most "disruptive" companies – those businesses whose innovations force other businesses to alter their strategic course. What is interesting about the Forbes ranking is the use of "Innovation Premium", which compares the net present value of cash flows from existing businesses with a current

market capitalization. Put another way, it's the premium the stock market gives a company because investors expect it to launch new offerings and enter new markets that will generate even bigger income streams (Forbes, 2011).

From the company point of view, new knowledge is used for efficiency increases, sustainability improvements and profit boosting. Thus, supporting growth from within an organization leads to sustainable above-average profits. This bears in mind that "the issue of harvesting gains from asset appreciation is only relevant if an innovation will influence the value of some of its constituent assets" (Jacobides, Knudsen, Augier, 2006).

Jacobides et al. (2006) also deters from focusing excessively on value appropriation as it may impede value creation given scarce resources. In any case, innovative firms can provide much more than just profits to their owners. By bringing innovation to the market, they improve the conditions for economic growth and in turn employment, and significant improvements to people's lives (Baumol, 2004; Baumol and Strom, 2007; Christensen and Raynor, 2003). Steady economic growth generated through innovation significantly affects increases in per capita income. The reason why innovation is so crucial for society is that even small upward shifts in the growth rate lead to important

differences over time (Ahlstrom, 2010). Similarly, even small reductions in growth diminish the potential benefits to the society (Barro and Sala-i-Martin, 2004; Baumol and Strom, 2007).

In order to serve the common goal of a growing economy, innovation should be seen as an instrument of entrepreneurship leading to competitiveness. Romer (1990) concludes that innovation is indispensable in an “entrepreneurial economy” where wealth creation is directly derived from innovation. In addition, “innovation can be presented as a discipline to be learned, and practiced” (Drucker, 1985).

Innovation in hard times

In an era of business volatility, growth is an urgent priority. Thus, it is not only enough to be innovative; we have to be innovative all the time and perceive it as a way of being. Despite many common beliefs, when the business cycle enters recession this provides the best time for era-defining innovations to emerge.

Cramer (2013) identifies six principles of innovation for the post-crisis rebound:

1. smart functional product definition focused on customer essentials;
2. high-quality design yet cost-effective and in-use cost-efficient;
3. synthesis of the best state-of-art technologies (as opposed to making new technologies from scratch);
4. design that allows for fast and easy extension of the product range when post-crisis growth return;
5. simplicity, economies of scale and modularity leading to lower manufacturing costs;
6. high unit margins as the new lower-cost product is shielded by the higher cost of the previous generation product still in the market.

Peter Drucker (1985) identified four internal impetuses for innovation (unexpected occurrences, incongruities, process needs, and industry or market changes) and three external ones (demographic changes, shifts in perceptions, and new knowledge). Identifying the

elements enhancing exposure to risk should be seen as a way of identifying new business opportunities. Technological advances, regulatory uncertainty, macroeconomic trends, environmental concerns, and demographic shifts can provide great opportunities for capitalizing on these adverse conditions.

Innovation also enables companies to transform themselves into completely different type of business. Hobcraft (2012) argues that warning signals are often ignored because they would threaten the existing core of the business. The ability to write off the existing core – or part of it – as a sunk investment represent a more evolutionary approach, which in turn enables transferring into a new core.

Innovation as a strategy for survival

In the 20th century the gradual speeding up of the technological advancement together with opening up of markets through trade agreements and WTO motivated companies to create new products and services. Consequently, innovation has become a crucial part of corporate strategies from companies that wish to keep their market share and do not wish to lose to new more innovative competitors. To facilitate this, companies need not only the technology, but also the management skills and corporate vision that represents more than fancy words. To help identify factors that lead to innovation culture, US researchers began to study creativity during the mid-1900s. Many CEOs of successful companies have since then argued that it is constant change and ongoing innovation that distinguishes them from their competitors. This in turn helps the company attract funding from external investors as well as enhancing stakeholders’ confidence. In this way, innovation becomes a part of value proposition for market capitalization.

Employee roles in innovation

As a part of brand-building, innovation enables differentiating in a crowded, highly competitive field. In order not to become just a one-time innovator, companies typically need a deep customer understanding, responding quickly enough to market changes by being able to analyze the demand and supply dynamics. They need to engage all employee levels while ensuring top management commitment, and allocate projects to cross-functional groups. Innovation decisions are often made on the basis

of “gut feel”, which implies the need for strong and sustained leadership from the top.

In general, the US evidence shows that companies score higher in innovative rankings when their employees get enough of – in rough order of importance – freedom, risk taking, idea support, time to generate ideas, freedom to debate and challenge, and trust (Bessant, Tidd, 2011).

As Rasmussen (2012) concludes, the benefits of a company innovation culture are lower costs, faster processes, and higher ROI. He supports the idea that innovation is not a result of the extreme creativity of one employee, but rather an output of a tremendous team effort bringing both R&D, design and marketing perspectives together – facilitated by the surrounding policy environment.

The reason why these two cultures often do not sufficiently cooperate is that marketing people typically tend to see the big picture, are motivated by insights that can give them immediate answers and are rewarded based on short-term goals. In contrast, R&D employees are often functional specialists, focused on details, motivated by insights that can give them questions and puzzles and rewarded on long-term goals. A lack of cooperation can lead to situation that technology is produced “because it can be done” but is not demanded by the market.

Innovation beyond product development

The changed nature of innovation means the concept is no longer confined to product development. Nowadays, companies need to be innovative in several dimensions simultaneously (new services, business models, partnerships, and customer experiences) to keep the competitive edge. Among the many types of innovation (such as new business model, new process, new customer interaction model, advanced product system, new sales channels, differentiated services etc.), the new paradigm is an unique customer experience.

The most innovative companies strive not only to gain the customer but keep the existing ones entertained. This active shaping of these relationships takes innovation to a new level. A successful combination of different innovation types enables companies to dominate the market – as temporary monopolies – for about 5-10 years (Rasmussen, 2012). This is closely correlated with a

changing role of R&D expenditure, when the link between the investment in R&D and business performance have weakened. Thus, R&D funding has switched from being perceived as the primary source of innovation to one of the (many) important interlinked sources.

Collaboration between differing organisations

Another important benefit lies in a successful combination of small and large firms’ advantages in innovation. The relative strength of large firms lies mostly in resources, while those of small firms are in terms of behavioural characteristics. Here, the question is not who is better at innovation but finding a mutually complementary relationship (Vossen, 1998). Strategic partnerships between smaller and bigger companies, industrial cooperation and university-business are based on mutual success.

Engaging a wider range of partners caters for more extensive opportunities. Having vested interests among partners also leads to more binding commitments and motivation as they are mutually dependent. The roles in innovation of multinational corporations, compared to SMEs, can also vary over the industry cycle in a “dynamic complementary” (Noteboom, 1994). Thus, smaller firms are on average better at innovations where effects of scale are not (yet) important, while larger firms utilize their economies of scale when designing innovations with large scale application (Cohen, Klepper, 1992). Both process and product innovation are further enhanced by customer orientation (SMEs strength) and close cooperation with suppliers (MNCs strength).

Innovation in business models

Innovative business models can also partially solve the issue of breaking patent law in emerging economies. In line with a more encompassing and inclusive view of intellectual property, the trend is towards a strategic IP – as opposed to patents – based on a business model that enables licensing of the company’s core technology. It is much more complicated to copy a business model than a product or a service.

In this context, it is interesting to note that the conventional wisdom is that innovations originate in rich countries and the resulting products are sold horizontally in other developed countries and later

in developing countries. Yet, over the past decade a reverse approach has developed – products originally targeted at developing markets have made a breakthrough in developed economies. Further to this, Ahlstrom (2010) says that innovative firms can supply vital goods to consumers who could not afford them otherwise.

Measuring the return on innovation investment

Computing the exact return on investment (ROI) on a particular innovation is difficult even within one company. In-house visionaries often struggle with answering the question, especially when crisis further toughens decisions regarding allocating company's resources. However, a better way of seeing this problem is by answering a different question. What are the opportunity costs of not innovating?

Put simply, the cost of not innovating is the estimated value that the company failed to capture and the competitors have gained. Thus, the avoidance of innovation leads to not attracting new customers, new markets, and consequently new revenue streams. Furthermore, it also leads to losing current customers, market shares and revenues (Hobcraft, 2012).

So, without dismissing the importance of quantifying and qualifying ROI on investments, it should be taken into account that ROI on innovation is more complex.

Traditional methods of assessing financial viability are one of the biggest barriers to innovation. It is only by having different key performance indicators that organizations can understand the different elements of risk and reward in innovation and how they relate

to investment levels and financial viability. Standard managerial accounting methods are strongly in favour of products as opposed to innovating processes and educating staff. The latter represents a long-term benefit for the company but in the short-term it is only seen as a cost that cannot be directly linked to revenue streams. Thus, the trap for many companies lies in satisfying their shareholders by short-term positive results. Steady return on investment is best achieved by sacrificing more knowledgeable (and thus more expensive) employees, divesting in assets that do not yield immediate return, and attempting geographical expansion without adapting the products to local markets. As a result, investments into the future disappear. Uncertainty and risk-taking management should become an automatic part of managers' thinking at all levels.

Transferring organizational innovation models to the state level

An ineffective company innovation model is usually due to a slow and bureaucratic innovation process, a high failure rate of larger innovation projects, a lack of clear priorities and criteria for selecting projects, and a lack of excitement around newness. This draws a potentially inspiring parallel to how an efficient state innovation model should be designed including the need for policy coherence, benchmarks and strategic agility.

Another skill the official agencies might learn from successful companies is overcoming the skepticism any new innovation agenda is met with. Both the employees and citizens need to see commitment in action. Thus, the leaders need to ensure the citizens this is not just another "weird campaign that will blow over in two weeks time" (Rasmussen, 2012).

Conclusion

Through three interlinked steps, the paper has identified country systems performing well in innovation and policy management and proves the importance of innovation for micro and macroeconomic performance.

- The main finding is that a **more radical approach is required**, which should be rooted in a **holistic and ecosystem-oriented** approach, to achieve the main

goal of innovation-policy management: the **best living and working conditions** for the European citizens.

- The cross-study comparison found a **strong correlation between innovation and competitiveness** – the most innovative countries were also among the most competitive. Evidence also suggests that efforts which countries undertake (input) are

rewarded in terms of improved innovation outputs and activities that create value.

- There is no single way to achieve top innovation performance, but **similarities** were found among the most innovative countries: **efficient governance toolsets, well-designed framework conditions, innovation strategies, and funding modes**, strengths in national research, **public-private partnerships**, and commercialization of technological knowledge.
- Evidence from the best innovation systems indicates that **R&D expenditure and well-targeted business accelerators** had a significant impact on research output and quality as well as on companies' growth, job-hiring and new-to market product innovations. But there is a need to integrate ex-ante and ex-post evaluations and to ensure that R&D investments are transformed into the market context.
- The top performing countries in innovation and competitiveness had some of the highest R&D expenditures, but a simple increase in R&D spending may not necessarily lead to growth and quality jobs creation. Similar to companies, **countries should constantly innovate** along several

dimensions to differentiate in a crowded, highly competitive field. An ineffective innovation model proves to be due to lack of **priorities, criteria and benchmarks** for selecting projects, low **excitement around newness and change**, and unintended side-effects resulting from policies and **regulatory complexity**.

- Despite many common beliefs, when the business cycle enters recession this provides **the best time for era-defining innovations to emerge**. Innovation enables companies to transform themselves into a completely different type of business, and by bringing innovation to the market, firms facilitate economic growth. The spillover effects – **direct and indirect employment** – of this process extend throughout the entire economy. The economic impacts provides a strong rationale for a system redesign which **reorient policies, funding modes, and regulations and their application, towards fostering the growth of innovative firms and giving European innovation a new momentum**.

Section based on discussions of the HLG and available research, compiled and written by the research team of the HLG

Annexes

Annex 1: Measurement of innovation

Innovation surveys	Several methods have been developed to measure innovative activities. It can be measured through innovation surveys whereby innovating firms are asked about their activities. However, this kind of measurement finds it hard to distinguish between genuine innovative activity and the introduction of best practice, which already is in place in other firms; i.e. is it new to the world or new to the firm or market.
Input indicators	Another way of determining innovation is through input indicators such as the recorded level of R&D expenditure. Yet, although this indicator indicates broad differences among market actors in terms of the rate of innovation, it is less capable of assessing the exact timing or level of innovation.
Output indicators	Output indicators such as IPRS, including trademarks, designs and in particular patents, have also been analysed to measure innovation. The advantage of using patents as an indicator is firstly that they in many cases can be a forerunner to innovative activity and secondly that much data are available on patents. These patents might however only indicate inventions, which not turn into innovation or become commercialised.
Innovation indexes	Lastly, innovation indexes, such as the European Innovation Scoreboard addressing the country level, have been applied to take into account the different measures of innovation. It can be based on a weighted sum drawing on the specific value which each input, output or survey measure has been given.

Annex 2: Overview of Key Innovation Criteria

	INSEAD's Global Innovation Index World 2012	WEF's Global Competitiveness Report 2012-2013	Innovation Union Scoreboard 2013
Methodology	The Global Innovation Index 2012 (GII) analyses the innovation performance among 141 economies.	The WEF's Global Competitiveness Index (GCI) focuses on 144 countries' competitiveness, but is in this section only related to innovation.	The Innovation Union Scoreboard (IUS) provides a comparative assessment of the relative strengths of European innovation systems.
Criteria	The GII is structured around 2 sub-indices. The <i>Innovation Input Sub Index</i> draws on: (1) institutions; (2) human capital; (3) infrastructure; (4) market sophistication; and (5) business sophistication. The <i>Innovation Output Sub-Index</i> consists of: (6) knowledge outputs; and (7) creative outputs.	The innovation pillar, which belongs to the <i>Innovation and sophistication index</i> , captures: (1) capacity for innovation; (2) quality of scientific research institutions; (3) company spending on R&D; (4) university-industry collaboration in R&D; (5) government procurement; (6) availability of scientist and engineers; (7) PCT patent applications and (8) intellectual property protection.	The IUS assessment distinguishes between three main types of indicators: (1) <i>Enablers</i> focusing on human resources, attractive research systems, and finance and support; (2) <i>Firm Activities</i> capturing firm investments, linkages and entrepreneurship, and intellectual assets; and (3) <i>Outputs</i> drawing on respectively innovators and economic effects.
Weight	The overall GII score is the average of the Input and Output Sub-Indices, which both has the same weight in the calculation of the overall GII scores.	The computation of the score is based on aggregations of scores from the indicator level. The survey asked for responses on a scale from 1 and up to 7 which is the best possible outcome.	The performance is measured using a indicator obtained by an aggregation of the 24 IUS indicators ranking from lowest possible performance of 0 towards the maximum of 1.
Data Collection	59 hard date variables and 16 composite indicators from international sources. Data stems mainly from 2009/2011.	The calculation of the innovation performance draws almost entirely on soft data from the WEF's annual Executive Opinion Survey.	The IUS uses statistics from Eurostat and international sources. Indicators rely mainly on data from 2009/2010, but also from 2007/2008.

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Source: Drawing on INSEAD (2012), *Global Innovation Index World 2012*, WEF (2012b), *Global Competitiveness Report 2012-2013* and European Commission (2012a), *Innovation Union Scoreboard 2013*.

Annex 3: Overview of Key Competitiveness Criteria

	WEF's Global Competitiveness Report 2012-2013	IMD's World Competitiveness Yearbook 2012
Methodology	The WEF applies the Global Competitiveness Index (GCI) measuring the microeconomic and macroeconomic foundations of national competitiveness in 144 countries.	The WCY assesses and ranks 59 countries' ability to create and maintain an environment which stimulates firms' competitiveness.
Criteria	The GCI assesses 12 factors grouped into 3 sub-indexes: (1) the <i>Basic requirements subindex</i> covering institutions, infrastructure, macroeconomic environment, and primary education; (2) the <i>Efficiency enhancers' subindex</i> covering higher education and training, goods market efficiency, financial markets, technological readiness and market size; and (3) <i>Innovation and sophistication factors subindex</i> covering business sophistication and innovation.	The WCY analyses 246 ranked criteria linked to 4 factors: (1) an macroeconomic evaluation of the domestic economy; (2) the extent to which government policies are conducive to competitiveness; (3) the extent to which enterprises are encouraged by the national environment to act in an innovative, profitable and responsible manner; and (4) the extent to which firms' need of technological, scientific and human resources are met
Weight	The GCI score presents a weighted average of the various factors and the computation is based on aggregations of scores from the most disaggregated level to the overall GCI score. The GCI takes stages of development into account, by giving a higher weight to the subindexes deemed more relevant for a given economy based on which stage it is located in.	Each of the 4 competitiveness factors are further divided into 5 sub factors which, independently on the number of criteria they contain, are given the same weight in the overall consolidation of results. The overall ranking of the WCY thus stems from aggregating the results of the 20 sub-factors.

	WEF's Global Competitiveness Report 2012-2013	IMD's World Competitiveness Yearbook 2012
Data Collection	The WEF cooperates with over 160 partner institutes worldwide and relies on quantitative data from internationally recognized agencies and from the WEF's annual Executive Opinion Survey, when a more qualitative assessment is required or quantitative indicators are deemed insufficient. A total of 14.059 surveys from executives were used, which represents an average of 100 respondents per country.	IMD cooperates with 54 partner institutes and draws on hard data from international organizations when measuring competitiveness (e.g. GDP). Soft data from IMD's Executive Opinion Survey of 4.210 respondents in 2012 integrates business executives' perceptions of competitiveness. Hard data represents a weight of approx. 2/3 in the overall ranking; the survey data is given a weight of 1/3.

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Source: Drawing on WEF (2012b), *Global Competitiveness Report 2012-2013* & IMD (2012), *World Competitiveness Yearbook 2012*.

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