Quality of jobs and innovation generated employment outcomes

Quinne.eu

INNOVATION POLICY REVIEW

NATIONAL AND EUROPEAN EXPERIENCE

QuInnE Working Paper 1, revised draft

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Work Package 4: Policy Analysis

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QuInnE - *Quality of jobs and Innovation generated Employment outcomes* -is an interdisciplinary project investigating how job quality and innovation mutually impact each other, and the effects this has on job creation and the quality of these job.

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Quinne project brings together a multidisciplinary team of experts from nine partner institutions across seven European countries.

Project partners:

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INTRODUCTION

One of the main research activities carried out in the framework of the QuInnE project is systematically reviewing EU and national level policies aimed to boost innovation. The aim of this activity is to better understand which policies and modes of implementation produce positive innovation effects, especially in relation to job quality and employment under various national contexts. As QuInnE has a very strong focus on policy, this initial review has an ambition to give a first stage evaluation of the innovation policies implemented in the QuInnE countries, i.e. in France, Germany, Hungary, the Netherlands, Spain, Sweden and in the UK. In doing so, we try to find evidence of possible linkages to job quality and employment creation in these national innovation policies, as well as implicitly developing and applying a method of comparative analysis in this field.

Our work is based on an overview of existing policy evaluation literature and especially on the contributions of our project partners. Each partner involved in Work Package 4 prepared a short overview on their national innovation policies. We are more than grateful to them because this task required working with extremely tight deadlines at the very beginning of the project. This was achieved through the following steps:

1) After the kick-off meeting held in Lund on early April 2015, the Hungarian research team elaborated the draft template for the national reports on innovation policies.
2) This template was circulated among the project leaders and the relevant experts of the project's Advisory Board members.
3) The final version of the template was sent to the project partners on 24 April 2015.
4) The partners had 3-4 weeks to populate the country template.
5) The synthesis of this first stage policy evaluation report was elaborated during the last two weeks of May and revised in July 2015.

This extremely reduced amount of time of course poses substantial limitations to the depth and scope of this policy evaluation. This report can be regarded as a first attempt at developing a substantive approach to processing national innovation policies in a meaningful way in order to create possible linkages to job quality and employment creation. The first section presents

the theoretical foundations and outlines the main features of both narrow and broad approaches to innovation policies. In the second section of the report, EU-level innovation strategies will be analysed according to the theoretical framework elaborated in the first section. In the third section we will draw the most important lessons from the national innovation policy reviews and finally we will make some concluding remarks.

1. THEORETICAL FRAMEWORK OF INNOVATION POLICY EVALUATION

Although innovation policy is not a new phenomenon at all, it gained particular attention from the mid-1990s. Accordingly, the theoretical thinking about what innovation policy is and how can it be evaluated is still in its infancy. There is a consensus in the community of innovation researchers that there are two main approaches related to innovation policy. The broad approach considers all policies that influence innovation in a way or another. In contrast, the narrow approach deals exclusively with those policies that have been created with the intention of direct impact on innovation. Though effective policy making requires the broad approach, in this initial review we limit the scope of analysis to innovation policies defined in the narrow sense of the word.

As Fagerberg (2014) rightly observed the definition of innovation policy depends on the theoretical foundations of innovation. This means that all choices policy makers take in elaborating innovation policies have their more or less direct theoretical implications. In order to understand innovation policies in Europe at different (European, national or regional) levels we have to understand the theoretical choices and assumptions that are implicitly or explicitly made. On the basis of the abovementioned recent work of Fagerberg, we can sketch two stylized approaches to innovation policies. In the following we will briefly present these two approaches and complement this by the explanation of some basic notions of innovation theory.

In the more traditional narrow policy approach innovation is regarded as a linear process, where the source of all innovation activity is scientific research. The results of the scientific basic research are in turn transformed into engineering and manufacturing, while the new product is sold through marketing and sales activities. The directions in the process are unilateral, there are no feedback mechanisms in this system. An implicit consequence of this approach is that innovation is mainly regarded as something primarily producing radically new products or

processes, incremental innovations are seen as of secondary importance. It is also worth noting that the narrow approach puts particular emphasis on the emergence of new ideas, while their wider exploitation and diffusion remains a relatively neglected aspect of innovation. In the narrow approach, innovation is something very technological and thus the primary location where it occurs is the manufacturing sector. This approach also puts special emphasis on the generation of explicit knowledge. Policies therefore aim to improve both the quantitative and the qualitative aspects of the higher education system (e.g. by raising the number of PhD students) and the research base of the country.

All these characteristics of the narrow approach denote the main rationale of state intervention in the field of innovation. It is embedded in the neo-classical stream of the economic literature in which self-regulated markets would create the optimal resource allocation. According to this argument, innovation has 'public good' properties inhibiting firms to invest as much in innovation as the 'optimum level' would require. This is the so-called market failure argument (Fagerberg, 2014, p. 5.). Schienstock and Hamalainen (2001) gave an essential critic of the narrow (traditional) approach by underlining its following implicit assumptions: innovation is understood in the narrow approach as an exceptional event; innovation and the process of knowledge creation is seen as an isolated process; problems of uncertainty remain unsolved; R&D is supposed to be the main (if not the only) source of innovation; and the narrow approach also neglects collaborative elements of innovation (Schienstock and Hamalainen, 2001, p. 50.).

There is increasing volume of evidence in the research community that suggests that the linear model of innovation represents rather the exception than the rule (Edquist, 2014). Most of the times it is hard to find any direct casual link between new scientific knowledge and innovation. Schienstock and Hamalainen (2001) as well as Alasoini (2015) contrast the activity-based understanding of innovation to the science-based notion of innovation which can take place anytime and anywhere. Instead of being a single event, innovation should be rather seen as a continuous process related to everyday practices in the organisation. Thus they stress the importance of incremental innovations. Another basic feature of innovation concerns its ambiguous and uncertain character. In order to cope with this inherent uncertainty, they propose using the recursive model of innovation as opposed to the linear one: 'Because of this uncertainty, we cannot identify clear sequences of stages in innovation processes; instead, we

have to analyse innovation as a recursive process, in which particular innovation activities can become both cause and effect, consequence and prerequisite' (ib. id. p. 51.) In this model the triggers of innovation may vary depending of the given case, there are multiple actors involved in the process of innovation and there are 'complicated feedback mechanisms and interactive relationships' among them.

As this model stresses the importance of the socially embedded character of innovation, it is implied that instead of explicit knowledge, the tacit dimension of knowledge will be more relevant, with trust relations and collective knowledge playing a key role (Lundvall, 2009). Similarly Jensen et al. (2004) analysed the interrelationships between innovation activities and their knowledge base. They distinguished four types of knowledge and two main modes of innovation activities. The four types of knowledge are 'know what', 'know why', 'know who' and 'know how'. The former two types ('know what' and 'know why') refer mainly to explicit scientific knowledge, whilst the latter two ('know who' and 'know how') which are something closer to tacit knowledge: competence or (social skills). These types of knowledge are complementary, in most of the cases all of them are used during the process of innovation. However, they involve different types of learning processes and thus require different types of knowledge management systems (KMS).

The authors distinguish two types of KMS: the STI-mode and the DUI-mode. As concerning the former: 'The STI-mode of knowledge management and learning (Science, Technology, Innovation) implies that codified knowledge, and scientifically based ways of getting access to, producing and utilizing it are dominating the process of innovation. The STI mode most obviously depends on explicit know-why though, as we have argued, skills and interpretative frames also play a role' (Jensen et al., 2004, p. 14.). In contrast: 'The DUI-mode of learning and innovation (Doing, Using, Interacting) most obviously relies on know-how, which is tacit and often highly localized. This mode involves building structures and relationships, which enhance and utilize learning by doing, using and interacting. (…) The DUI mode of learning is characterised by on-going changes that continuously confront employees with new problems. Finding solutions to these problems enhances the skills of the employees and extend their

repertoires. Some of the problems are specific while others are generic ' (Jensen et al., 2004, p. 15-16.).[1]

The recursive model of innovation implies different policy making strategy compared to the linear model of the narrow approach. This is mainly because the interactive character of innovation, much emphasised in the recursive model, has to be taken into account. Trust relations, strong cooperation and intensive social interactions between the actors involved ensure the necessary flow of information and shape continuously the learning processes playing a central role in this model (Schienstock&Hamalainen, 2001 and Alasoini, 2015). This different approach in policy making is best reflected by the theoretical stream of national innovation systems. In this view each country represents a specific case with specific actors and institutions and with unique relationships among them. National systems of innovation evolve historically and show path-dependent character, i.e. resisting capacity towards the changes in the environment. It is also implied that there are no universal policy solutions or instruments that can be effectively implemented independently from the concrete context of the given country.

Table 1: Narrow and broad approach of innovation

Dimensions	**Narrow Approach**	**Broad Approach**
Model of innovation	Linear	Recursive
Dominant form of innovation	Radical	Incremental
	Technological	Non-technological
Knowledge base	Scientific, explicit and individual	Practical, tacit and collective
Mode of innovation	STI-mode	DUI-mode
Sector	Manufacturing	No focus on specific sectors
Policy implications	Market failure approach	System approach

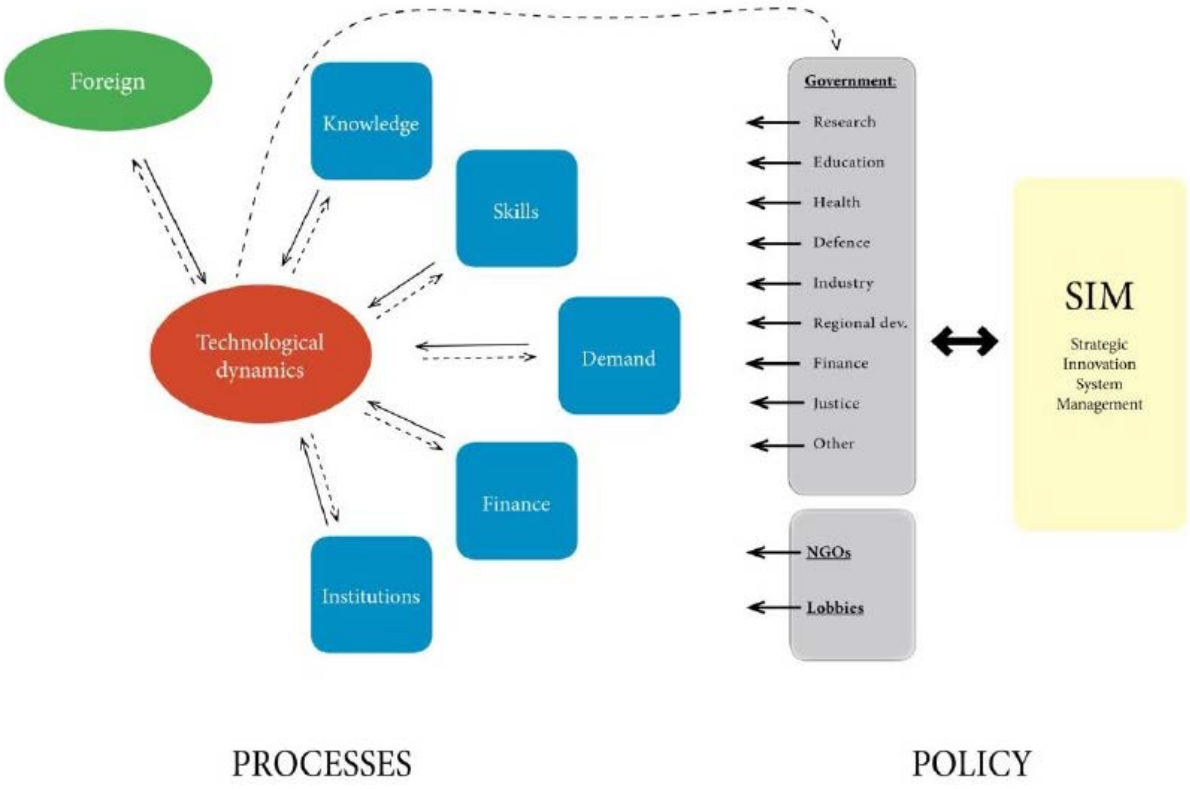
Source: own compilation

Fagerberg (2014) gives a stylized model of national innovation system, where the output of all innovation activities is labelled as 'technology dynamics'. These technology dynamics are influenced by both domestic and international processes. Fagerberg identifies five generic and

[11] Lundvall (2008) demonstrated that this distinction is not new at all and some its elements can be traced back to Adam Smith (Lundvall, 2008, p. 22-23.).

strongly interrelated processes which have decisive impacts on technology dynamics: knowledge, skills, demand, finance and institutions (possible feedback mechanisms are represented by dotted arrows). As Fagerberg rightly stresses, there is a strong complementarity in this dynamic system. If one element of these five processes doesn't function at an appropriate level, it negatively affects the outputs of the whole system. According to this model, policy making can only influence innovation indirectly, by shaping these five generic processes: 'Policy makers may influence the technological dynamics by helping to shape the processes that impact the dynamics. To do so they need to have access to an adequate supporting knowledge base and they may need to coordinate policies across different domains (see below). Their actions will also be motivated by goals they themselves set, i.e., strategic choices that they make and their "visions" for the development of society. Therefore we have labelled this process "strategic innovation system management".' (Fagerberg, 2014, p. 11.)

Figure 4: The National Innovation System: Dynamics, processes and policy



Source: Fagerberg, 2014:11

Note: The green circle with the label ‘Foreign’ denotes influence from abroad (for a detailed explication of the figure see Fagerberg, 2014:12).

Ramstad (2014) proposes a different policy approach within the broad-based and systemic stream of the literature. The expanded triple helix innovation-generating model differs from the national system of innovation approach in the four main aspects:

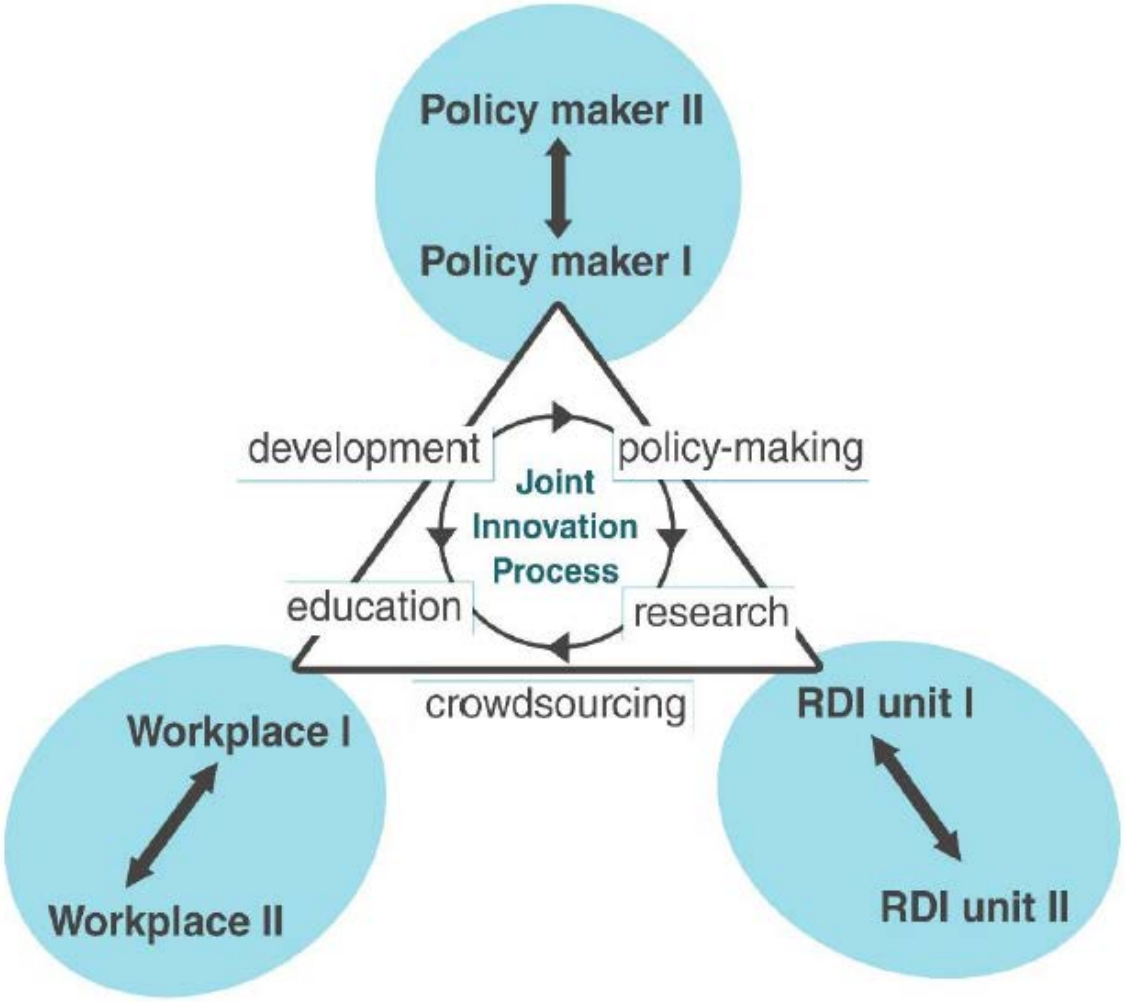
(1) it uses a much broader notion of innovation, including organisational, service and policy innovations;

(2) does not limit key players in policy shaping exclusively to public sector institutions (including the representatives of employers’ association and trade union), generally speaking work organisations are seen as the main driver of innovation;

(3) intra-organisational relationships are just as much important as inter-organisational dynamics, a special emphasis is therefore put on high-involvement innovation practices (autonomous working teams, relationship between management and employees, employee-driven innovation, etc.) which can enhance both productivity and quality of working life;

(4) the innovation-generating model identifies players and process at both micro, meso and macro level and argues that changes at one level imply changes at the other levels, so it investigates the interrelated character of players and processes at different levels.

Figure 2: The expanded triple helix innovation-generating model



Source: Ramstad, 2014:1

2. INNOVATION POLICIES IN THE EUROPEAN UNION

This section has a twofold aim. On the one hand it will analyse the European Union's innovation strategy, summarises the main lessons learnt during the first years of its implementation process and shortly evaluate it according the principles outlined in the former section of this report. On the other hand it will briefly present the first analytical attempts to classify the existing innovation policies of the European Union's Member States.

2.1 The Innovation Policy of the European Union

Innovation is regarded as a primary source of competitiveness in the European Union and also a primary reason why the EU is lagging behind the US and Japan in the economic performance. Therefore it is not surprising at all that innovation became one of the seven flagship initiatives in the EU's Horizon 2020 strategy. The aim was to adopt a much more strategic approach to innovation: 'An approach whereby innovation is the overarching policy objective' (European Commission, 2010a:2). The so-called Innovation Union initiative is built around 34 specific commitments in five main thematic areas: strengthening the knowledge base and reducing fragmentation, getting good ideas to market, maximising social and territorial cohesion, pooling forces to achieve breakthroughs: European Innovation Partnerships, leveraging policies externally.

Innovation Union identifies three main weaknesses of the European innovation system:

1) Under-investment in our knowledge foundation. Other countries, like the US and Japan, are out-investing us, and China is rapidly catching up.

2) Unsatisfactory framework conditions, ranging from poor access to finance, high costs of IPR to slow standardisation and ineffective use of public procurement. This is a serious handicap when companies can choose to invest and conduct research in many other parts of the world.

3) Too much fragmentation and costly duplication. We must spend our resources more efficiently and achieve critical mass.' (European Commission, 2010a:2)

Instead of presenting all 34 commitments we will only outline the most important points of the strategy. One of the primary aims of the strategy is to increase the R&D&I investments to 3% as a share of the GDP in all Member States. This remains an important threshold to reach despite the financial and economic crisis. The strategy argues that investments in education, R&D, innovation and ICTs should be protected from budget cuts. Modernisation of the education system includes the creation of more world-class universities as well as attracting top talents from abroad. The strategy not only aims to increase the amount of investments but also wants

to use this money in a more effective way by tackling fragmentation in research & innovation systems at EU and national level. The European Research Area needs to be strengthened promoting cross-border cooperation of European researchers and innovators and ensuring a truly free movement of knowledge.

As concerning the EU's own R&D&I programmes, these have to be simplified and the access for them has to be guaranteed to everyone in an equal way. The leverage effect of public spending on private sector investments has to be also enhanced via for example Public Procurement for Innovation (PPI) which is: '…a very important demand-side innovation policy instrument' (Edquist, 2014:26). Obstacles to bring ideas to market have to be removed. Fast growing SMEs[2] are one of the most important target groups of these initiatives of easing access to finance, making intellectual property rights more affordable to enterprises and setting of interoperable standards.

The European Regional Development Fund should support projects that are based on smart regional specialisation strategies reflecting the special needs, strengths and weaknesses of the regions. Public procurements also have to be used in a more strategic way promoting innovation activities of the enterprises. The strategy also aims to link better research and innovation to each other in order to get out more value from investments in research on the innovation side.

In order to tackle societal challenges more effectively, the strategy launched a special programme called the European Innovation Partnership. The main societal challenges identified by the strategy are: 'life-threatening diseases, new solutions to improve the lives of elder people, ways to radically cut CO2 emissions and other sources of pollution in particular in cities, alternative sources of energy and substitutes for increasingly scarce raw materials, reducing and recycling waste and ending landfill, improvements in the quality of our water supply, smart transport with less congestion, healthy or high-quality food stuffs using sustainable production methods and technologies for fast and secure information handling and sharing, communication

[2] The 'SMEs represent more than 99 per cent of European business and about two thirds of private sector employment, policymakers at all levels need to understand the characteristics and needs of smaller firms in order to provide appropriate support for this backbone of the European economy.' Mandl, 2013:11

and interfacing' (European Commission, 2010a:22). These partnership initiatives must focus on one or two of these challenges, have to be accompanied by strong political and stakeholder commitment, clear added value for the EU, strong focus on results, outcomes and impacts with an adequate financial support. The strategy emphasizes the importance of design and creative activities, innovation in the public sector and social innovations.

The expectations concerning the implementation of the strategy are high. It is estimated that if the EU succeed in reaching the targeted spending of 3% of GDP on R&D by 2020, it would create 3.7 million new jobs and would increase the GDP by €800 billion annually five years later. Beside the share of R&D&I spending relative to the GDP, the EU continuously monitors the progress of innovation activities of the Member States by a set of indicators developed by the High Level Panel on the Measurement of Innovation established by Ms Máire Geoghegan-Quinn, former European Commissioner for Research and Innovation. The panel proposed five key indicators (European Commission, 2010b:4-6.):

1) Contribution of innovative-related trade in manufactured goods to the balance of trade of goods
2) Share of fast growing (or young?) and innovative firms in the economy
3) Percentage of employment in knowledge intensive activities
4) Patent applications weighted by GDP
5) Hourly labour productivity

Later the Panel proposed one single composite indicator to capture innovation performance which consists of four variables: number of patent applications filed under the Patent Cooperation Treaty per billion GDP, employment in knowledge-intensive activities in business industries (including financial services) as % of total employment, contribution of medium and high-tech products exports to the trade balance, knowledge-intensive services exports as % of total service exports, and employment in fast-growing firms of innovative business industries, excluding financial services (European Commission, 2013c:12).

The EU also constructed a separate tool to measure and compare the performance of their higher education institution called 'U-Multirank'. This helps not only policy makers and other relevant stakeholders to compare two or more universities across Europe but also students to select the university that fits the best to their needs (http://www.umultirank.org/#!/home?trackType=home&section=entrance). This is based on a broad set of indicators capturing general data, teaching and learning, research activities, international orientation, regional engagement, and knowledge transfer.[3]

As concerning the monitoring of the implementation of the strategy, a first internal evaluation was prepared in 2014 and another is currently under preparation by external experts from Ernst & Young, Open Evidence, Matrix and Wuppertal Institute. According to the internal evaluation, great efforts have been made in reducing fragmentation and overlapping in the European research system, researchers' mobility increased to a considerable extent. Achievements have been reached in the field of unitary patent regulation as well as in the public procurement directives. Availability of finance became also easier to enterprises boosting venture capital and other risk-sharing schemes particularly in the SME sector. Five programmes have been launched within the framework of the European Innovation Partnerships in the areas of active and healthy ageing, water, agriculture, raw materials and smart cities: 'An independent evaluation of the overall performance of the EIPs has concluded that there are sound reasons for the EU to continue promoting the EIP approach, provided that the EIPs target systemic innovation with a strong focus on diffusion of innovation.' (European Commission, 2014a:10) Empirical data show that EU succeeded to reduce the innovation gap between EU-27 and its main competitors, the US and Japan by almost 50% (European Commission, 2014a:11).

Further improvements are needed in eliminating inconsistencies in rules and practices making innovation activity less burdensome and risky, especially by creating a real European single market. Another gap identified is the weak innovation culture which could be only improved by a closer involvement of stakeholders. Although major achievements have been reached concerning public sector innovation, significant reserves remained unused in this field. The

[3] For a full description of variables used, please visit: http://www.umultirank.org/#!/measures?trackType=home&sightMode=undefined&section=undefined

strategy puts a special emphasis on promoting the inclusive character of innovation, that is on equal access to both development capacities and the benefits of innovation, and further steps need to be taken in order to strengthen this inclusive dimension. The evaluation also identifies considerable skills shortage and mismatches: 'It does not only concern sector-specific skills, but also numeracy and literacy skills, as well as the '21st century skills' for creativity and entrepreneurial spirit' (European Commission, 2014a:11). As the authors note, in order to fully exploit the potentials residing in the strategy, it is necessary to continue its implementation using the experiences gained during the first 4-5 years.

Overall, we can say that the European innovation strategy represents a significant shift from the narrow to the broad approach of innovation policy although it is far from its full application and can be placed somewhere on the halfway mark between the two. In this relation it is necessary to stress that the EU launched other important initiatives as well. The European Commission's publication 'Employment and social development in Europe 2014', in its chapter 3 deals with the '... future of work in Europe: job quality and work organisation for a smart and inclusive growth...'. The DG GROW (the former DG ENTR) of the European Commission is supporting the diffusion of workplace innovation created in 2013 the European Workplace Innovation Network – EUWIN '...to exchange good practices and promote workplace innovation'. (Pot, 2015: 4-5.)

Using the criteria developed by Ramstad to characterise the expanded triple helix model, it can be said that:

(1) Although the strategy uses a broader notion of innovation, recognising the importance of organisational, social and public sector innovation, it however remains very much technology-oriented. The same is true for the implicit innovation model which reflects the linear mode of innovation, overemphasizing the importance of research activities compared to everyday practice within firms.
(2) The strategy also recognises the importance of stakeholder involvement in the innovation process. It tries to identify a wide range of actors and build effective partnerships around important topics.

(3) Intra-organisational dynamics are poorly represented in the strategy partly because of its technological focus and the linear model of innovation applied.
(4) The strategy represents a top-down approach and the interrelated character of players and processes at micro, meso and macro level is poorly recognised.

2.2 Innovation policy mixes: Country Group Differences in the EU

A recent analysis (Izsák et al., 2014) of types of innovation policy instruments established five country clusters in Europe. The authors adopted the following definition of policy instruments: 'A policy instrument is an intervention into a dynamic and ever-changing system of actors, institutions, networks and knowledge in a certain period. The combination of policy instruments together with complementary framework policies (such as fiscal policies, education, regulatory framework etc.) forms the innovation policy mix.' (Izsák et al. 2014:4) According to the authors in analysing policy instruments and policy mixes one has to answer four key questions: why to intervene, how, where and when (ib. id. p. 4.). They also argue that a good policy mix responds to the actual needs of the country, universal solutions rarely work. The policy mixes thus are continuously changing in time and are shaped according to the policy learning mechanisms which are therefore of crucial importance.

This analysis was based on the database produced by Erawatch and INNO Policy TrendChart initiatives of the European Commission (referred to as 'TrendChart database' in the followings). This database gathered more than 2000 policy measures launched at national level among the EU-27 member states plus Norway and Switzerland (for a detailed description of these policy measures see EC 2013b:90-92). Izsák and her colleagues classified these policy instruments into 6 main categories as follows:

1) Public R&D including Competitive research and Centres of excellence;

2) Industry-Science Collaboration including Collaborative research, Cluster policies and Competence centres where both industry and academic sector is involved;

3) Knowledge and Technology Transfer including Technology transfer and Spin-off measures;

4) Business RDI including direct support to business R&D and business innovation;

5) Tax incentives and

6) Venture capital funds (state-backed).

The cluster analysis was looking for similar patterns of innovation instruments and policy strategies across countries independently from their real innovation performance. The results show significant stability over time among the country groups: ‘The relative stability of policy mixes is quite a robust feature of the EU27 countries, which suggests that policy mixes are shaped either by durable structural features and/or by equally persistent policy philosophies or policy approaches.’ (Izsák et al. 2014:10)

This stability can be interpreted in many different ways. It could be seen as an indication that these policies are impervious to change – that ideas and philosophies are durable in policy circles – regardless of changes in governments (i.e. there is broad national consensus on these issues). Another possible interpretation was given by Edquist (2014) who called the attention that there exists a visible knowledge gap between research community and stakeholders involved in policy making processes. In relation to the linear vs. recursive or holistic approaches of innovation, he rightly notices that the former has been completely replaced by the latter in the last couple of decades in the research literature. However, at the level of policy making, this shift remained almost unperceivable. The majority of the Member States: ‘strive to develop into a more holistic one, but only a few use demand-side policy instruments to any considerable degree, i.e. innovation policy is dominantly linear and far behind innovation research.’ (Edquist, 2014:26) A third possible interpretation for these stable patterns in policy mixes, is that national innovation environments are so stable that policies to interact with them are equally stable. The impacts of the abovementioned interpretation schemes varies by countries and measuring their validity requires further research.

In relation with these explanatory factors, we intend to stress again, the key driver role of various types (e.g. structural, ideological and cognitive) of path dependencies in line with the national innovation system approach: ‘As a result national systems of innovation may differ greatly, (…) and a policy mix that works in one context may be totally inadequate in another. Adopting an innovation system approach, therefore, leads to a sceptical attitude towards policy advice that advocates the same solution everywhere independent of contextual differences (for

example, the European Union's stated goal of raising R&D investments as a percentage of EU GDP to 3%).' (Fagerberg, 2014, p. 9.)[4]

In order to measure the variability over longer periods of time, the authors distinguished policy instruments launched between 2004-2008 and those implemented between 2009-2012. The country groups remained the same with the only exception of Germany moving from its own cluster to Group 2 of countries. Therefore we will only present here the results referring to the period 2009-2012. The five clusters identified during the analysis were as follows:

Table 2: Country clusters according to their implemented innovation policy mixes (2009-2012)

Country groups	Description of group following a qualitative analysis
Group 1: Ireland, Malta, Poland, Slovenia	Focus on competitive R&D programmes with increasing share of business innovation support measures and the use of R&D tax incentives
Group 2: Estonia, Finland, **Germany**, Greece, Latvia, **Sweden**, Switzerland	Focus on collaborative R&D, support to loan and venture capital funds, no use of R&D tax incentives
Group 3: **France**, Italy, **Netherlands**, **UK**	Focus on technology transfer mechanisms, strong support to entrepreneurship, loans and venture capital and extensive use of R&D tax incentives
Group 4: Austria, Belgium, Czech Republic, Denmark, **Hungary**, Norway, Portugal, **Spain**	Focus on direct business R&D and business innovation, use of R&D tax incentives
Group 5: Bulgaria, Cyprus, Lithuania, Luxembourg, Romania, Slovakia	Focus on competitive R&D programmes, no use of R&D tax incentives

[4] It is important to note here that the path dependency approach is not a static one, but always accompanied by threats of lock-in situations as well as by opportunities of path unlocking and new path creation. Analysing the transformation of the Finnish economy, Schienstock identified four main factors helping the process of new path creation: 'A window of new opportunities opened up by a new knowledge paradigm, economic pressures to adapt to the new paradigm, change events that trigger and support the transformation process as well as courses of action that steer techno-economic development into a new direction.' (Schienstock, 2007:28) Beside these external factors, the author stresses the importance of internal learning processes, as well as institutions and actors actively engaged in the transformation: 'A fundamental reorientation of business strategies, an anticipatory institutional change as well as a new policy approach have to be considered as important factors contributing to Finland's shift towards a knowledge-based economy more successfully than almost all other industrialised countries. It is also important to mention that maintaining the highly developed welfare state has contributed significantly to the smooth development of the Finnish knowledge-based economy.' (Schienstock, 2007:43)

Source: Izsák et al., 2014:14-15. Countries in **bold** are sampled in QuInnE.

After establishing five country clusters, the authors confronted the results by the innovation performance of the countries. The innovation performance was measured by the Innovation Union Scoreboard (IUS). This Scoreboard is composed by 25 indicators measuring the enablers (such as human resources; open, excellent and attractive research system; finance and support), the firms' activities (e.g. investments, linkages and entrepreneurship, intellectual assets) and the outputs (e.g. share of innovative firms and economic effects of innovation). The IUS 2013 distinguished five country clusters based on their innovation performance. These were the followings:

Table 3: Country clusters based on Innovation Union Scoreboard's Summary Innovation Index (2013)

Country clusters	**Countries**
Innovation leaders	Finland, Denmark, **Germany, Sweden**
Innovation followers	Estonia, Cyprus, Slovenia, **France**, Ireland, Austria, **UK**, Belgium, Luxemburg, **Netherlands**
Moderate innovators	Lithuania, Malta, **Hungary**, Slovakia, Greece Czech Republic, Portugal, **Spain**, Italy,
Modest innovators	Bulgaria, Romania, Poland, Latvia

Source: European Commission, 2013:5. Countries in **bold** are sampled in QuInnE

Izsák et al. demonstrated that very similar policy mixes can lead to very different results in the Scoreboard ranking. The only exceptions are countries belonging to the category of innovation leaders. However, it is worth noting that in the case of countries represented in the QuInnE project, there is a considerable overlap between the two country groupings. In terms of innovation policy mixes, Sweden and Germany belong to the country cluster focusing on collaborative R&D, support to loan and venture capital funds, and no use of R&D tax incentives. This goes hand in hand with top ranking in the Summary Innovation Index as both countries are innovation leaders. In the case of the Netherlands, France and the UK, the focus is on technology transfer mechanisms, strong support to entrepreneurship, loans and venture capital and extensive use of R&D tax incentives. This policy mix results on the output side in a weaker innovation performance, as each of these countries are innovation followers. Spanish and Hungarian innovation policy mixes can be characterized by a focus on direct business R&D

and business innovation, use of R&D tax incentives and this is coupled with the weakest innovation performance reflected by the country cluster of moderate innovators.

3. Lessons from the Comparison of the National Policy Review in the QuInnE countries

After reviewing the characteristics of the innovation policy measures and instruments in the EU-27 countries, in this section we turn our attention to the content analysis of innovation policies in the QuInnE countries, that is in Sweden, Germany, the UK, the Netherlands, France, Spain and Hungary. Although the comparison of the Member States elaborated by Izsák et al. is of great value, the aspects they investigated (i.e. public R&D; industry-science collaboration; knowledge and technology transfer; business RDI; tax incentives; and venture capital funds) reflect very much the so-called narrow approach of innovation policy. It seemed therefore necessary to widen the focus fitting better to the broad concept of innovation policy.

As we mentioned earlier in the Introduction, all partners participating in Work Package 4 were asked to write a short report on the existing national innovation policies. The Hungarian research team as work package leader prepared a guideline to identify the following main characteristics of the national innovation policies:

1) **What features innovation in the policy document(s):** if there are explicit or implicit references to different types of innovation, with a special focus on the classification of the Oslo Manual, the radical vs incremental dichotomy of innovation, broad or narrow approaches, sectorial distinctions, etc.
2) **Drivers, motives and priorities of innovation policies**: triggers of innovation, to what extent are these policies evidence-based, top three priorities (if any), linkages between innovation policies and the EU innovation policies or other national level policies (e.g. policies aimed to foster education, employment, economy, science and technology, etc.)
3) **Stakeholders**: main actors involved in the processes of design and the implementation of the innovation policy.

4) **Implementation:** main instruments of the policy, sources of funding, territorial scope of the policy (e.g. regional aspects), mechanisms through which the policy document was adopted (i.e. a top-down or bottom-up approach)
5) **Monitoring and evaluation:** what are the expected outcomes of the policy and how are these monitored and evaluated with a special focus on the mechanisms of policy learning.

In what follows we will briefly synthetize the results of these national reports according to the following structure: first it will be surveyed whether the national policies adopted a narrow or broad approach of innovation, second we will give an overview on the top policy priorities, thirdly the main actors and stakeholders will be identified, then we will focus on the policy tools implemented by the policies and finally we will analyse the learning mechanisms set up by these policies.

3.1 Innovation in policy documents: dominance of the narrow approach and recent shift to broaden it

Policy makers in all countries participating in the QulnnE project emphasized the key role science and innovation play for both the economic future (i.e. sustainable growth) and well-being. For example, the main UK policy document 'Our Plan for Growth: Science and Innovation' elaborated by the UK Department for Business, Innovation and Skills (UK BIS) states that 'firms with high innovation intensity grow twice as fast as non-innovative firms; far better during periods of economic turmoil; and are more likely to still be active after eight years." (Our Plan for Growth, 2014:17)

It is not surprising that in all countries parliaments (legislative assemblies) approved a bill for innovation strategy and governments developed several key policy documents for the countries' innovation strategy. For a list of key laws and strategy documents see Annex 1 at the end of this report.

The majority of the government innovation strategies are shaped by the narrow, technology-focused approach and reflect the STI mode of innovation. However if we look at the debate surfacing in the policy analysis, we may say that in **France** a debate has been recently started on how to change the existing top-down 'dirigiste' industrial and innovation policy and implement a 'new industrial policy'. Until the 2010's there was no discussion of the various models of innovation, 'France hesitates between the American model of the Silicon Valley, where radical innovation are introduced by start-ups, the German model of the well-established industrial "Mittelstand", highly successful in terms of incremental innovations, and the French tradition of industrial planification in key state-led sectors. This hesitation blurs the representation of innovation in France, as it does not make a distinction between radical innovation, incremental innovation, strategic innovation policy.' (Beylat&Tambourin, 2013:6). ln the **Netherlands**, there were some attempts using the European Social Fund to support workplace innovation. However the Dutch government did not integrate this scheme into the national innovation policy, the innovation policy of the Dutch government is mainly focused on technological innovation without making clear differences between product and process.

Similarly, in the **UK**, while the need for innovation is discussed throughout the policy document, it makes reference to a narrowly defined, science based approach of innovation. The policy largely reduces innovation to R&D. However the Scottish and other local authorities initiatives such as 'Local Enterprise Partnership' (LEP) programmes are aiming to exploit impacts of both technological and non-technological innovations and training on the development of SMEs. (Devins, 2013: 8-9.)

Similar pattern could be identified in **Hungary** too, where the background report the Bill on the 'National Research – Development and Innovation Strategy (2013-2020)' is based on did mention the importance of non-technological or adaptive innovation only in the public service sector where '... the great majority of adaptive innovations are as follows: organising, marketing, service innovations relying on ICT to improve productivity and quality in both private and public sectors.' (IF, 2013:38) ln the case of **Spain**, from the innovation policy review, it is difficult to identify the implicit approach of innovation behind the Spanish strategy of science, technology and innovation for the period 2013-2020.

Only in the cases of **Sweden** and **Germany**, we found clear and decisive governmental action to make distinctions between strategies of Research and Development and Innovation. For example, the Swedish Ministry of Education prepared the bill on research and innovation (2012) and the Ministry of Business produced the National Innovation Strategy (2012) The situation is very similar in Germany, where the Federal Ministry of Education and Research is responsible for research policy, while the Federal Ministry of Economics and Technology is in charge of the innovation policy. This more differentiated approach of the Swedish policy makers was the result of the application of the system approach and the refusal of the linear mode of innovation in the community of researchers. A direct consequence of abandoning the linear model would be to down-play the role of academic research as the primary source of innovation and turn serious attention to the other components of innovation systems; and breaking the policy link between research and innovation and seeing and dealing with them as two separate policy areas. In Germany the federal government went further very recently, and approved the 'New High-Tech Strategy' in 2014. This is a core document for German innovation policy designating 6 key priority areas where government should primarily intervene. Five of them respond to global challenges such as climate change, digital society and economy, but the sixth one aims to promote 'innovative world of work' representing a clear rupture with the narrow approach.

Another source of a slight shift in the policy orientation can be observed in countries where the state is organised on a federal basis. The innovation policy itself is geographically fragmented allowing states or regions to implement autonomous innovation policies at a subnational level. This is true for the **UK, Spain** and **Germany**. This fragmentation paves the way for innovation policies with an alternative approach at the regional level. This is especially true for the UK, where Scottish, Welsh and Northern Irish administrations approved their own innovation policies echoing much more the key notions of broad-based innovation approach like 'systems-based approaches to innovation', and 'non-science-based forms of innovation' with the aim to promote some kind of incremental and organisational and social innovation.

Similar trends can be observed in **France** where an 'Action plan for innovation in service activities' was adopted in 2011 emphasising the importance of non-technological and incremental innovations. Along the same lines, the recent 'New Deal for Innovation' (2013) adopts a new vision and definition of innovation, much broader than in previous policies. It refers explicitly to the Oslo Manual, in particular to break with the narrow view of exclusively "R&D technological based" innovation. Whereas previous policies were mainly focused on start-ups (innovative entrepreneurship, the Silicon Valley model), and, at the other extreme, on big firms ('national champions' of the strategic industrial policy), more focus is put in the new policy on medium-sized firms. The document presenting the law mentions (implicitly) job quality as a precondition of innovation. What is more: since 2012, public funding has been extended more explicitly to non R&D based and/or technological innovations, with the introduction of an 'innovation tax credit', and the broadening of the criteria of Bpifrance[5] to provide financial support to innovators.

It is too early to assess the real impact of these initiatives, but a broad-based orientation has been clearly emerging in these countries in the recent years.

3.2 Priorities in the innovation strategies: focus on sectors, intelligent infrastructure and on their combination

Reviewing priorities identified in the various national innovation policy reviews is giving more insights into the thinking of policy makers on the various types of innovations. In the **French** case, knowledge transfer between public research and business, innovative entrepreneurship and promotion of young technology companies are mentioned. In addition we have to note that due to the strong regional dimension of the French economy, regional and local actors are playing visible role in promoting 'competitiveness clusters'. In the **Hungarian** case, the three prioritised or pull sectors for the 2013-2020 innovation policy are the following: pharmaceutical, automobile and ICT industries. In the **Netherlands** the path-dependent history of industrial policies and science & technology policy worth highlighting: 'Focus and mass' in 'key areas' of (research) capacity provided a rationale during the first decade of the 21st century for a strategy to strengthen the sector orientation of science, technology and innovation policy in the Netherlands and is the predecessor of the top sector policy since 2011. The following

[5] Key French institution for the promotion and financing of innovation

main priorities are underlined in the Dutch policy documents: focusing on technological innovation, improving cooperation between the public and private sectors (i.e. better collaboration between the knowledge institutions, firms and government), promoting entrepreneurship and improve workers skills by training and education.

In the **Swedish** case globalization is the key determinant when selecting priorities. The push sectors are the following: sustainable health care, pharma-biotech, energy systems, IT/communications, construction and transportation. 'These are the areas that Sweden feels it can capitalize on a frontrunner position and invests in already established research and innovation rich environments. Here we see an emphasis on science, technology and engineering, but the presence of the social and welfare sectors indicates an interest in more organizational and (public) service activities.' ln the case of the **UK**, the main targeted sectors and technologies include big data, satellites, robotics and autonomous systems, synthetic biology, regenerative medicine, agricultural science, advanced materials and energy storage. In the **Spanish** case, primary attention will be paid in the 2013-2020's state plan to the following fields: promotion of talent and employability, stimulus of scientific and technical research excellence, promoting entrepreneurial leadership in R&D&I. In addition, there is no explicit reference to key sectors or technologies, instead they defined priority areas where the Spanish government should intervene more actively. These are the followings: promotion of talents and employability, stimulus of excellence, boost of entrepreneurial leadership, promotion of R&D&I addressed to the challenges of the society.

In **Germany**, the six key priority areas laid down in the 'New High-Tech Strategy' are: Digital economy and society; sustainable economy and energy; healthy living; intelligent mobility; civil security and innovative world of work. Beside these, the policy defines four cross-cutting activities, that is: 'support of clusters and networks between science and industry; increasing participation of SMEs in the innovation process; innovation funding and provision of venture capital; education and training policies, and regulatory policies with regard to standardisation, property rights, innovation-oriented public procurement, as part of the creation of innovation-friendly framework'. As we can see, some of the countries clearly identify key sectors and/or technologies, others define key thematic areas, but most of them combine the two. The following table summarises the main findings.

Table 4: Priority areas in innovation policies in QuInnE countries

Country	Sectors or technologies	Thematic priorities
United Kingdom	1) Big Data 2) Satellites 3) Robotics and autonomous systems 4) Synthetic biology 5) Regenerative medicine 6) Agri-Science 7) Advanced materials and energy storage	1) Nurture scientific talents 2) Invest in scientific infrastructure 3) Support research 4) Participate in the global sciences and innovation
Sweden	1) Health care 2) Pharma-Biotech 3) Energy systems 4) IT/Communication 5) Aviation and space technology	
Netherlands	1) Agri-Food 2) Horticulture and propagation materials 3) High-tech systems and materials 4) Energy 5) Logistics 6) Creative industry 7) Life sciences 8) Chemicals 9) Water	1) Knowledge exchange 2) Entrepreneurialism 3) Enhance skills of workers
Spain	1)Health 2) Agriculture 3) Energy 4)Marine and Maritime research 5) Digital society 6) Intelligent, sustainable and integrated transport 7) Security, protection and defense	1) Promotion of talents and employability. 2) Stimulus of excellence. 3) Boost of entrepreneurial leadership. 4)Promotion of R&D&I addressed to the challenges of the society
Germany	1) Digital economy and society 2) Sustainable economy and energy 3) Healthy living 4) Intelligent mobility 5) Civil security 6) Innovative world of work	1) Networking and transfer 2) Innovation amongst SMEs 3) Innovation funding and provision of venture capital 4) Innovation-friendly framework
France	no explicit sector or technology focus	1) Knowledge transfers 2) Innovative entrepreneurship 3) Governance of innovation policy
Hungary	1) Pharmaceutical industry, 2) Vehicle/auto industry,	

	3) ICT industry	

3.3 Role of stakeholders in designing innovation strategy: coexistence of asymmetric and more balanced patterns of stakeholders' involvement

Without exception, all national innovation policy reviews stress the need for the strategic or value added partnership between knowledge institutions (universities, research and training institutes), business community and government organisations (triple-helix model). However, in the design and development of the innovation strategy policy (i.e. preparation of bills, developing evidence materials) – besides general rhetoric on the importance of wide consultations with the actors of these communities during strategy preparation – only two countries, **UK and Sweden** (and – to a lesser extent – **Germany**) were able to implement it in practice[6]. In the UK, the list of stakeholders participating in the policy formation is impressive:

- Innovate UK; Innovation NI, Innovation Wales, Scottish Enterprise;
- UK Research Councils;
- Catapult Centres (7 specialist centres aimed at bridging academia and businesses to support commercialisation of new technologies the specific areas of High Value Manufacturing, Transport Systems, Digital, Cell Therapy, Offshore Renewable Energy, Satellite Applications and Future Cities);
- UK Intellectual Property Office;
- ln England, four University Enterprise Zones (local partnerships between universities and business in Bradford, Nottingham, Bristol and Liverpool),;
- ln England,39 Local Enterprise Partnerships (LEPs via City/Growth Deals) with LEJT Network
- research and technology organisations;
- UK companies including start-ups, SMEs and large companies;
- Employer peak bodies including the Confederation of British Industry (CBI);

[6] In relation to Hungary, however, it is worth noting that, according to the former officials of the National Innovation Agency, so-called 'road shows' were organised in order to ensure a wider consultation for the national innovation strategy, but it is impossible to identify the scope and type of stakeholders involved in these consultation forums, nor the impact of this process can be evaluated.

- (British) Trade Union Council (TUC) (51 affiliated unions and eight regional offices in England, Wales and Scotland), Scottish TUC, Welsh TUC, lrish Congress of Trade Unions – Northern Ireland Congress
- NESTA (UK innovation charity)
- Banks including the British Investment Bank (BIS, 2014a:51).

ln **Sweden**, there is a Swedish tradition of basing legislation on a variety of parliamentary commission reports (SOU reports) and then sending draft legislation out for comments to a wider range of organizations and agencies, the so-called remiss process. There is a list of commission reports that this bill is based on, and then final 50 pages of the bill consists of annexes that summarize the commentaries received on various draft initiatives. These usually include state agencies and authorities, universities, civil society and environmental groups, unions and employers organisations, charity and religious organizations, and branch or sector organisations.

In **Germany** the Federal Ministry of Education and Research (BMBF) is primarily responsible for research policy, while the Federal Ministry of Economics and Technology (*BMWi*) is in charge of the innovation and technology policy. These policies and their implementation is evaluated on a yearly basis by a national expert commission (EFI) which is a central advisory board consisting of 20 experts from the areas of science, industry and civil society. This body is charged with developing proposals for the strategy‘s further development and implementation. In contrast to the previous advisory boards, the newest commission also includes representatives from civil society (e.g. trade unions). Recently the government also seeks to initiate a broad social dialogue on the risks and opportunities associated with the digital economy which will serve as an input for a white book in 2016.

3.4 Implementing innovation strategies: policy tools and policy learning

In **France** the most important policy tools are the fiscal ones, for example, different tax credits for research. This is a longstanding tradition in France, it was first introduced in 1981 and has been recently extended by an innovation tax credit system, which is available for non R&D-

based and non-technological innovators also. Above these financial instruments, institutions to facilitate knowledge transfers from public research to business (such as the 'Carnot Institute', the 'societies for the acceleration of transfers'), or to help start-ups (such as 'incubators') have also been put in place by the State. From 2004, competitiveness clusters were created to bring together private firms, research laboratories and educational establishments. The state plays an important role in the financing of innovation, the share of public spending in the total R&D is 37% and reaches 50% if research tax is included.

Tax reduction is an important policy tool in the **Netherlands** also, but 'governing innovation networks' can be seen as the primary role of the government in the implementation of national innovation policy. This is achieved on the basis of the so-called innovation contracts signed by the main stakeholders involved in the innovation process (enterprises, universities and research institutions and other public bodies). Different ministries are the leading and coordinating partners in these contracts. The innovation budget consists of three main parts: national funds on knowledge and innovation (57%), sector contributions from ministries (40%) and European funds (3%).

Germany represents a unique case in Europe in many respects. The share of R&D spending has practically reached 3% of the GDP (2,97%), a target defined already by the EU Lisbon Strategy in 2000. On the other hand, Germany is among those few countries in which there are no tax incentives to promote innovation. Instead, the Federal Ministry of Education and Research (BMBF) and the Federal Ministry of Economics and Technology (BMWi) and the federal states launch direct R&D programmes which are the main channel to provide financial means to companies. These include financial supports for start-ups , subsidies for 'Business Angels' providing venture capital; financial aid for spin-offs from universities; public loans for high-tech-based start-ups. A new element of the innovation policy was the turn towards a 'mission-oriented' approach by defining a number of 'forward looking projects' on which future research, innovation and technology development should target.

In **Sweden** there are two main channels of the funding mechanisms of innovation. The first is a direct funding to certain prioritized areas and projects including block funding for universities.

The second channel is allocated by four main research agencies: Swedish Research Council, The Swedish Research Council for Environment and Nature, Agricultural Sciences, Animals and Food, and Spatial Planning, Sweden's Innovation Agency, and the Swedish Research Council for Health, Working Life and Welfare. As a business sector research institution, Research Institutes of Sweden Holding A/B aims to support commercialization of research findings. Another mechanism of promoting collaboration is to reward universities monetarily for engaging in collaboration with research money or block grants.

The **Spanish** innovation policy ('Strategy of Science, Technology and Innovation 2013-2020') defines four priority areas where state intervention is needed the most. The strategy assigns state programs and subprograms for each of these priority areas as follows:

Table 5: Priority areas, programs and sub-programs in the Spanish innovation strategy

Spanish Strategy of Science, Technology and Innovation 2013-20	*State Plan of Scientific, technical and Innovation 2013-16*
Promotion of talent and employability	State Program for the Promotion of talent and employability
Stimulus of excellence	State program of stimulus of scientific and technical research of excellence
Boost of entrepreneurial leadership	State program of entrepreneurial leadership in R&D&I
Promotion of R&D&I addressed to the challenges of society	State program of R&D&I addressed to the challenges of society

The different projects are run by the Centre for Industrial technological Development, CDTI, based at the Ministry of Economy and Competitiveness. In each of these subprograms there are different types of participation and financing instruments (grants and subsidies, financial credits, capital risk instruments, and others such as tax incentives).

In the **UK**, targeted financial support (business loans, co-investment schemes and grants, advice to firms on how to access finance and the provision of tax incentives for investment in R&D)

play a crucial role in promoting innovation primarily among SMEs and high growth firms. Priority is also given to funding and supporting a wider research base by encouraging multi-partner collaborations between researchers and business. The implementation of the policy is the responsibility of multiple actors, including collaboration between research institutions (primarily Research Councils [UK research councils and universities, but not limited to UK and University Enterprise Zones], networks [in particular the 7 Catapult Centres], private sector businesses [including SMEs] and charitable organisations). The role of the UK government agencies is largely conceived as one where their role is to create an environment conducive to businesses to innovate.

In **Hungary**, the government plays a very similar role to that in the UK, i.e. its primary aim is to create an innovation-friendly environment and framework. The innovation policy document distinguishes three types of policy tools as follows.

Table 6: Main Types of Innovation Policy Tools in Hungary

Direct instruments promoting RDI	**Indirect instruments promoting RDI**	**Other instruments**
Supply side tools (e.g. grants)	Financial tools (e.g. tax incentives)	Various types of risk capital (e.g. seed capital)
Systemic state intervention	Systemic state intervention	Systemic state intervention
Demand side tools (e.g. public procurement)	Other regulations (e.g. quality control)	State guarantee (e.g. new market development)

4. SUMMARY

Innovation policy has a relatively young tradition and came into the focus of policy makers only during the 1990's. To understand the priorities and policy tools of the various innovation policy strategies – both at EU and national level – it is necessary to identify their theoretical and methodological background. It is not a surprising coincidence that the first innovation policies in Europe were launched at a time when the first edition of the OSLO Manual (1990)

was published – this theoretical and methodological guideline aims to supply innovation policy makers with scientifically proven evidence.

Literature dealing with innovation policies makes a distinction between policies based on narrow and broad approaches. Both of them have strong theoretical implications. For example the narrow approach to innovation policy is focusing on technological innovations and non-technological innovations (i.e. marketing, organisational etc.) have secondary or residual importance. In addition, the radical nature is the decisive character of innovation. Knowledge management – in this narrow view of innovation – is dealing mainly with scientifically supported and codified knowledge where the interpretative frame and skills are required (STI mode of knowledge management). In the narrow version of innovation policy, the market failure syndrome justifies and triggers state interventions (policy measures) to keep investment in R&D&I at the necessary level.

The broad innovation policy view stresses the co-evaluation of both codified and non-codified (tacit in nature) practical knowledge. Due to the uncertain and fluid nature of innovation, this approach indicates the interactivity (recursive character) of the innovation process characterised by complicated feedback mechanisms between numerous actors and institutions. In this case non-codified and localised knowledge have crucial role (DUI-mode of knowledge management). Collective – organisational – learning process associated with this innovation approach varies from company to company, from region to region and even from country to country and is shaped by different kind of capitals (e.g. human, organisational, relations, social) resulting in differing learning capacity of social and economic actors. In this logic, the performance and quality of innovation policy is shaped by the historically evolved national innovation system. This system is embedded into the historical, social-ideological and economic environment and reflects various forms of path-dependencies (i.e. structural, ideological and cognitive ones). In the centre of the stylised model – elaborated by Fagerberg (2014) – of the national innovation system is the ‘technology dynamics’ which is the outcomes of five – locally and globally influenced – processes of knowledge, skills, demand, finance and institutions.

Review of the EU-level innovation policies indicated a relative stability of policy mixes. This result is based on the analysis of the following five categories of policy instruments: 1. Public R&D, 2. Industry-sciences collaboration, 3. Knowledge and technology transfer, 4. Business R&D&I, 5. Tax incentives, 6. State backed venture capital funds. However, it is interesting to see in some QuInnE countries (e.g. France, UK and Netherlands) a shift from collaborative R&D&I into the direction of "commercialization of public R&D to speed of the transfer of innovation into the practice.

Analysing the national innovation policy reviews, this working paper presents the lesson on the issue such as:

1. Dominant innovation concept reflected in the national innovation documents.

2. Drivers/priorities in the innovation strategies.

3. Stakeholders' role in preparing innovation policy for the law makers.

4. Policy tools of the national innovation strategies.

The narrow, technological and radical form of innovation views are reflected in the various national innovation policies with the exception of Sweden and Germany. In relation to the priorities of innovation strategies, the patterns of sector versus intelligent infrastructure focus and their combinations were identified. In the majority of countries, sectors were prioritised. However, in the cases of Spain, Germany and the UK combination of sector, intelligent infrastructure developments were stressed by the innovation policy makers. Without exception, all national policy reviews made remarks on the important role of stakeholders. However, only in three countries – UK, Sweden and Germany – described the complex practice and the forms of involvement of the stakeholders. In the case of the UK, varieties of stakeholders were supplied with evidence-based background analyses. In Sweden, wider communities of organisations/agencies have opportunities to comment on the draft legislative proposals – this is the so-called "remiss" process in the legislation procedure. In Germany, the so-called 'National Expert Commission' (EFI) includes even representatives from civil society (e.g. trade unions).

Evaluating the forms of policy tools described in the national innovation policy reviews, two main categories were mapped. Firstly the combined use of the fiscal tools (i.e. tax incentives) and direct government programs, and secondly a variety of government programs without significant incentives. France, Hungary and Netherlands belong to the first country group, where differential tax incentives are used to create innovation friendly financial environments. In France, a special institution was established to speed up the knowledge transfer from pubic to business community (e.g. Carnot Institute) together with the creation of the 'competitive clusters'. In the Netherlands, beside the tax incentives the special 'innovation contracts' between the key stakeholders (i.e. firms, universities-research institutes and other public bodies) are the vehicles to improve the innovation performance of the firms. In Hungary too, both direct instruments (e.g. grant to stimulate the supply side and public procurement to attract demand side etc.) and indirect tools (e.g. tax incentives) are used together with the other tools (i.e. various types of risk capital, state guarantee to get access into the new market, etc.)

In the second country group – represented by Germany, Sweden, Spain and UK - a variety of government programmes and agencies are operating with the ambition to increase the intensity of the innovation activity in the countries concerned. Germany represents the highest R&D spending and the federal government relying on the tools of direct R&D programs to improve innovation performance of the firms (e.g. supporting in general start-ups, but especially high-tech start-ups, university spin-offs etc.) In addition it is worth mentioning the so-called 'forward looking projects'. In Sweden, beside the direct government funding targeted to certain projects (e.g. block funding for universities) four national research agencies together with business sector research facilities are used to speed up the innovation activities. In Spain, the state selected four priority fields and numerous sub-programs within these priority areas.

We will also summarise the national innovation policies according to the criteria of extended triple helix model developed by Ramstad (2014). This approach reflects clearly the indicators of a broad-based innovation approach, focusing on its four core distinctive elements: broad-based concept of innovation (including organisational and social innovation); acknowledging the importance of business organisation and non-public bodies in shaping innovation policy;

focusing on both inter-organisational and intra-organisational relationships (this latter includes high-involvement innovation practices); instead of applying a top-down approach it emphasises the interrelated character of actors and processes at macro-, meso- and micro levels. The analyses of different national innovation policies provide evidence mainly on the first point, while the remaining three aspects remain discussed in a fragmented way. Therefore the summary analysis is forced to reflect these imbalances.[7]

As concerning the concept of innovation applied, all national innovation policies acknowledge the importance of the high-quality knowledge-base and they all make more or less explicit reference to narrow version of the triple helix model, promoting the strategic or high value-added partnership between business, universities and public bodies which is of course a crucial element of improving innovation performance. Another common characteristic is linking innovation and research. Innovation is rarely emerging on its own right but most of the time it is coupled with science, research and development or technology. This is best reflected by the fact that there is no innovation strategy as such, national policies target to improve research and innovation or R&D&I. However, there are some national variations in the approaches national policies apply.

4.1 Varieties in national innovation policies: mixed practices instead of clear shift into the direction of more open and broad approach

In the **UK** there has been a shift away from a knowledge-transfer and institution-focused approach towards an open and collaborative system with government, partner organisations and individual citizens as integral partners. Further, there are also innovation strategies for **Scotland, Wales, Northern Ireland** as well as local growth strategies for the 39 Local Enterprise Partnerships (LEPs) in **England**. These local innovation strategies show much more open and broad concept of innovation. For example, in Wales the new innovation strategy moves away from a traditional technology-based definition to one that instead recognises that

[7] A further methodological limitation is due to the fact that the innovation generating model was elaborated for systemic analysis purposes encompassing all key elements of a national innovation system. In contrast, the present analysis is based upon a short analysis of national innovation policies in the QuInnE countries which is only a small and maybe even not the most important part of an innovation system.

innovation can be achieved everywhere and anywhere and by anyone. Research and innovation are strongly linked in the **Swedish** policy as well, reflecting the old-fashioned linear model of innovation processes. However, innovation and social and welfare issues are also tightly linked, which is a unique feature of the Swedish innovation policy. In contrast, in the case of other countries social relevance of innovation only appears through increased economic competitiveness. Although this holds mainly true for Sweden also, in the case of social and welfare service delivery, the logic is reversed: the explicit aim of the strategy is to renew these services and innovate new service models and then to become international service providers in this field.

The case of **Germany** illustrates well that policy learning is a rather complex and time-consuming process. The current 'New High-Tech Strategy 2020' adopted in 2014 represents the third stage of (research and) innovation strategy launched originally in 2006. But this is the first time that the elements of a more open, broad-based approach to innovation are emerging, recognising the importance of social and organisational innovations. The strategy emphasizes that in order to enhance competitiveness, value creation and employment, the simple implementation of technological innovations in production processes is no longer sufficient. Instead, innovation policy has to confront the necessity of achieving sustainable consumption patterns and behaviour and to address societal change processes such as the development of resource-optimised forms of production and lifestyles.

The **Dutch** innovation policy highlights a particular trajectory. Until 2012, there has been a national taskforce on workplace innovation, but this has come to an end without the introduction of new national policies in the field of organizational or workplace innovation. Since then the government took a step back to the narrow approach of innovation policy, consequently organisational and social innovation gained a residual role. The **French** innovation policy hesitates between the adoption of the American model of Silicon Valley and German-type Mittelstand model. The former is successful mainly in radical innovation carried out by small start-up firms, while the latter is particularly efficient in incremental innovation introduced by large enterprises. Beside the policy is very much focused on technology and applies a narrow approach to innovation. However, recently a clear shift can be identified towards a broader concept of innovation. There are two strands of this policy reorientation: the first is to help

SMEs' innovation activities in the service, while the second is the 'New Deal for Innovation' which applies an approach more open towards non-technological innovation and instead of prioritising either SMEs or large enterprises (cf. American vs German model) puts more focuses on medium-sized firms.

The innovation policies currently being implemented in **Spain** and in **Hungary** are reflecting the old-school innovation policy paradigm characterised by a strong technology focus, an emphasis on science-based radical innovation representing the linear mode of innovation. In Spain for example the acts and strategies are targeting 'Science and Technical Research *and* Innovation'.

4.2 Growing role of business community as the locus of innovation

As concerning the business orientation, all national policies acknowledge the importance of enterprises as the main locus of innovation, where "the transformation of knowledge into new innovative products and services takes place" (Ramstad, 2014:2). In **Spain**, the government transferred the competences of Research and Development from the Ministry of Science and Innovation to the Ministry of Economy and Competitiveness, sending a clear message of the major economic role played by R&D&I in their growth strategy. In the past, R&D was largely managed by the Ministry of Science and Innovation and before its creation by Ministry of Education, although other economic departments had also an important role in innovation policy. The **Hungarian** innovation policy identifies key actors of the innovation system as follows: (1) 'leading edge' research institutes, (2) R&D centres operating in Hungary within the innovation systems of the large global companies, (3) R&D-intensive Hungarian middle sized firms expanding in the international market, (4) fast growing R&D&I based small firms ('gazelles"), (5) innovative SME's suppliers, (6) innovative start-up firms, (7) early phase and risk capital investors integrated into the international markets, (8) R&D&I activity in the public sector or using the innovation in the public sector. As we can see 5 out of 8 actors are firms of various types.

The **Dutch** policy also focuses on the transformation of knowledge into new products and processes through a better cooperation between enterprises, knowledge institutes and government. In the Dutch triple helix model the role and functioning of government is seen as 'governing networks' among many stakeholders in business, research and education institutes and public bodies. In **France**, innovation policy has been highly centralised until the end of the 1990s, the state playing the main role, while business organisations have a residual role and lobbies of big (often once state-owned) companies in key technological sectors were powerful. In the past 15 years this landscape has changed significantly paving the road for other stakeholders such universities (gaining autonomy in 2007), business organisations of SMEs and various local and regional actors.

There is a shift in the division of tasks and roles between public and private sector also in the **UK**. In contrast to previous innovation strategies, the current policy assigns a central role to the private sector, whereby the government plays a role in creating the right environment for entrepreneurs, financiers and innovations to operate. Other elements of this shift are encouraged multi-partner collaborations between research and businesses and a special focus on SMEs. These latter two are key elements of the **German** innovation policy that address cross-cutting activities to ensure a climate for innovation and innovation-friendly framework conditions. Other key elements include provision of venture capital; education and training policies; and regulatory policies with regard to standardization, property rights, and innovation-oriented public procurement. A greater emphasis than before is placed on transparency and participation in order to increase societal acceptance for new technologies, to identify problems in the implementation process and to account for risks of new technologies in the design of innovation policies. In **Sweden** the primary objective of the innovation strategy is to increase the quality of research. This is well reflected by different funding schemes targeting mainly higher education and research institutions.

4.3 National Innovation System: Re-focusing the role of intra-organisational relationships

Intra-organisational developments are the less accentuated dimension in the national innovation policies. This is partly because of the narrow approach applied in these strategies, neglecting the importance of organisational innovation. On the other hand as it was shown in the previous

section, the business orientation of these policies is poor, consequently their intra-organisational developments gain less attention. This is true for all countries analysed. The only exception is **Germany** where one of the six priority areas is 'innovative world of work' targeting to develop suitable measures and precisely adapted frameworks for 'good digital work' that both support technical progress and comprehensively take account of social factors such as employee rights, competency development, work and process innovations and health protection and safety in the workplace. It is worth highlighting again the special case of the **Netherlands** where workplace innovation was a priority area for a long time but this came to end in 2012. Considering the fact, that soft forms of innovation (particularly organisational, workplace and social innovations) has recently been gaining more attention in the EU, it can be expected that this withdrawal will be cancelled sooner or later.

4.4 Need for a better equilibrium between players and locus (macro-, meso and micro levels) of innovation policies

The fourth distinctive element of the innovation generating model developed by Ramstad emphasizes the importance of the relationships between players and processes at macro-, meso- and micro-levels. This view of the innovation policy is going beyond the well-known "top-down" and "bottom-up" dichotomy of the stakeholders. It insists on the necessity of interactions between different players and various levels of fields of actions too. In this section we were also looking for elements of policy learning processes in the national reports, to what extent these policies are capable of learning and what kind of feedback mechanisms exist. Monitoring and evaluation tools were also assessed.

As we have seen previously, there is a shift in UK innovation policy from a knowledge-transfer and institution-focused approach towards an open and collaborative system, involving active participation of not only the government but its partner organisations and individual citizens as well. It was also indicated that the list of stakeholders involved in policy shaping is one of the most impressive, including a wide range of actors (see p. 25.). What is more, in the UK separate innovation strategies were developed at regional levels. Beside the UK-level policy, Scotland, Wales and Northern Ireland have their own innovation policies reflecting much more their local needs and capabilities. These strategies apply often a more broad-based concept of innovation

also. For example, the Scottish Government acknowledges and appreciates non-science-based forms of innovation. The Scottish innovation policy uses a systems-based approach to innovation, in some initiatives as 'hubs', that involve knowledge transfer opportunities, cohesive learning systems, support for R&D, and which together stimulates and supports greater demand for innovation amongst domestic organisations, public, private and voluntary. There are similar trends in Wales and Northern Ireland also, whilst in England regional development agencies were abolished and were replaced by 39 Local Enterprise Partnerships. This can be assessed as a shift from a top-down to a bottom-up approach. In the UK, monitoring and evaluation is done to a large extent by Nesta (National Endowment for Science, Technology and the Arts) which works as an independent 'innovation charity'. For example, they developed their own index to measure (not exclusively technological) innovation in the UK. They also carry out policy and programme evaluation in the field of innovation.

Germany is another country where the state is organised on a federal basis. The main activity of the 16 federal states include funding universities, co-funding jointly with the state government four large research organisations: Max Planck Society, Fraunhofer Society, Helmholtz Association, Leibniz Association and fundraising from the European Regional Development Fund (ERDF) in order to finance programmes launched in the framework of the regional smart specialization strategies. Besides, the federal states administer direct thematic R&D programs together with the Federal Ministry of Education and Research and the Federal Ministry of Economics and Technology. These programs represent the main channel to provide financial means to companies. As concerning monitoring processes, the German R&D and innovation system is evaluated on a yearly basis by the Expert Commission on Research and Innovation composed by internationally well-known experts of innovation, research and technology. The current government has also established a central advisory body (High Tech Forum) consisting of 20 experts from the areas of science, industry and civil society. This body is charged with developing proposals for the strategy's further development and implementation. Unlike its predecessor, the Industry-Science Research Alliance that was initiated by the government in 2006 as an advisory group to accompany the High-Tech Strategy, the new advisory body also includes representatives from civil society (e.g. one trade unionist). Another feature of the German system is that professional and business organisations play a decisive role in shaping the innovation policy and its projects. A good example for that is the

Industrie 4.0 project, one of the largest "forward looking projects"[8] in Germany. It was initiated by the federal state in 2012, but from 2015 it was handed over to non-governmental actors, including the representatives of science, professional and business organisations and trade unions.

In **Sweden** innovation policy is shaped in an interactive way. Although it is formulated by the Ministry of Education, it is based on academic research and parliamentary reports which also usually canvass lower level actors, and then the so-called *remiss* process allows organisations and agencies to comment on draft legislation and ideas, which allows meso-level actors the opportunity to participate in the policy formulation process. Beside there is an advisory board (Innovation Council) helping the Prime Minister consisting of top level national experts on innovation. The funding schemes also combine top-down and bottom-up approaches. On the one hand, similarly to the UK, direct funds are allocated to prioritized areas and – similarly to Germany – specific projects. On the other hand, money is also allocated to the four primary research funding agencies: the Swedish Research Council, The Swedish Research Council for Environment and Nature, Agricultural Sciences, Animals and Food, and Spatial Planning, Sweden's Innovation Agency, and the Swedish RESEARCH Council for Health, Working Life and Welfare, to develop models for evaluating and rewarding or promoting excellence in their respective research areas. There are also increased allocations to business sector research institutions - Research Institutes of Sweden Holding A/B to help with commercialization of research findings. There are blocks of funding dedicated to universities in order to facilitate stable research environment.

In the **Netherlands**, there does not exist innovation policy as such, innovation is part of a new enterprise policy, the so-called Top-Sector policy adopted by the Ministry of Economic Affairs. It identifies nine clusters of economic activities that are of key importance for Dutch industrial development. The implementation of the policy is monitored mainly by the Ministry. Three main targets were set up[9] and these targets are monitored on a yearly basis. However, external

[8] These projects serve to concentrate the public R&D expenditures and orient research and innovation towards the most important global challenges.

[9] (1) The Netherlands has to be listed in the 'top 5' of knowledge economies in the world in 2020; (2) increasing the total R&D investments in the Netherlands to 2.5% of GDP in 2020; and (3) investing

evaluations are rare and seem to lack real impact. For example, academic policy advisers highlighted the importance of social innovation and workplace innovation for innovation successes but the government ceased to support innovation activities in these fields. In 2014, a more independent, and more qualitative evaluation have been published, focused on the experiences of several stakeholders in the implementation of the Top sector policy.

In **France**, as a consequence of the legacy of the post-World War II "industrial policies" led by the 'dirigiste State'– which has a very strong tradition in France, since the XVIIth century – innovation policy is shaped very much in a top-down way. However, a slight shift from this top-down, 'dirigiste', traditional 'industrial policy' (aiming at promoting key technological sectors via sustaining 'national champions', such as Airbus in the aeronautic, Areva in nuclear fields) to a new industrial policy, more focused on innovation and competition, took place at the end of the 1990s - beginning of the 2000s. Beside this, we found little evidence of how the policy learning is ensured, or how implementation is monitored in France.

In Spain the most important feature of the innovation system is the central role of the 17 regional governments. These regional governments dispose significant proportion of budgetary resources. Spain is among the OECD countries with higher decentralization of public expenditure. In 2009, 36% of total public expenditure was controlled by the regional governments (compared with 8.5% OECD average). R&D is one of the areas where central and regional governments share competences. We didn't have enough efforts to analyse these regional innovation policies in the framework in this work package. However, the share of R&D expenditure in regional government budgets show significant differences. Regions such as Rioja or the Basque Country (País Vasco) spending more than three times the national average, while other, such as Castilla-La Mancha or the Balearic Islands spend less than a third of the national average. It is also worth noting that one basic principle of the national level innovation strategy is the coordination between the administrations at different levels: EU, Regional Government, and sectors of economic activity in order to gain synergies.

in 'Topconsortia voor Kennis en Innovatie' for at least 500 Million Euro's and 40% participation from business.

The **Hungarian** innovation policy identifies the lack of strategic approach as the main weakness of the Hungarian innovation system. This is coupled with unstable, often modified policies, regulations and institutional structure in the last decades which constrained the systematic monitoring, consistent assessment of the various programs; lack of coordination between the EU cohesion policy and the Hungarian R&D&I polices; weak cost efficiency of the state R&D financing system; debate on the public service innovation and its social-economic impacts still in its infancy. In a European comparison, Hungarian innovation system is underperforming in the field of cooperation. Especially cooperation between research institutes and firms is below the EU average but weak cooperation characterises the relationships between the Hungarian SMEs sector and the knowledge base of both large Hungarian and foreign firms. Although the strategy acknowledges these weaknesses of the Hungarian innovation, it is not clear what steps are taken to address them. In the document a whole section is dedicated to the evaluation and monitoring mechanisms accompanying the implementation of the strategy. However, we have no information about the real functioning of these elements of evaluation mechanisms. The transparency is surely lacking.

In the next table we summarised the results of the above analysis. The number of crosses refers to relative position of each country in the four distinctive dimensions of the innovation generating model. For example, three crosses for Sweden in the dimension of broad-based innovation doesn't mean that the Swedish innovation policy applies a fully broad-based concept of innovation, but it denotes that Sweden is among those countries which took the most steps toward such an innovation policy.

Table 7: Traces of extended triple helix model in national innovation policies

	Broad-based innovation	**Business orientation**	**Intra-organisational developments**	**Interrelatedness of actors and processes at different levels**
Sweden	+++	+	+	++
UK	+++	++	+	++
Germany	+++	++	++	++
Netherlands	++	++	+	+
France	++	++	+	+
Spain	+	+	+	+
Hungary	+	++	+	+

REFERENCES

Alasoini, T. (2015) Two decades of programme-based promotion of workplace innovation in Finland: past experiences and future challenges, European Journal of Workplace Innovation, Vol.1, No. 1. February, pp. 37-54.

Arnold, E. and Bell, M. (2001) 'Some ideas about research for development', unpublished background paper provided to the Commission on Development Related Research in Denmark, Science and Technology Policy Research (SPRU), Technopolis.

Befektetés a jövőbe, Nemzeti Kutatás-fejlesztési és innovációs Stratégia (2013-2020) (Investment into the Future -IF) (National Research-Development and Innovation Strategy), Budapest Nemzetgazdasági Minisztérium (Ministry of National Economy), 2013, p. 90.

Devins, D. – Webber, D. S. (2013) Innovation and Growth in the City Region: Microeconomic Evidence of Asymmetries, Working Paper for the *ISBEA Conference*, 12-13 November, 2013.

Edquist, Ch. (2015) Innovation policy must be gathered in its own bill, (http://www.dn.se/debatt/innovationspolitiken-maste-samlas-i-egen-proposition/)

Edquist, Ch. (2014) Efficiency of Research and Innovation Systems for Economic Growth and Employment, CIRCLE (Centre for Innovation, Research and Competence in the Learning Economy), Lund: University of Lund, Paper no. 2014/08, May, p. 35

European Commission (2014a) State of the Innovation Union. Taking stock 2010-2014. Luxembourg: Publications Office of the European Union.

European Commission (2014b) Lessons from a Decade of Innovation Policy. What can be learnt from the INNO Policy TrendChart and The Innovation Union Scoreboard. downloadable: http://www.technopolis-group.com/wp-content/uploads/2014/05/1720_Lessons-from-ten-years-of-innovation-policies-.pdf

European Commission (2013a) Innovation Union – A pocket guide on a Europe 2020 initiative. Luxembourg: Publications Office of the European Union

European Commission (2013b) Innovation Union Scoreboard 2013. downloadable: http://ec.europa.eu/enterprise/policies/innovation/files/ius-2013_en.pdf

European Commission (2013c) Developing an indicator of innovation output Accompanying the document Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions. Measuring innovation output in Europe: towards a new indicator. Brussels: European Commission. http://ec.europa.eu/research/press/2013/pdf/staff_working_document_indicator_of_innovation_output.pdf

European Commission (2010a) Europe 2020 Flagship Initiative Innovation Union. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. SEC(2010) 1161

European Commission (2010b) Elements for the setting-up of headline indicators for innovation in support of the Europe 2020 strategy Report of the High Level Panel on the Measurement of Innovation established by Ms Máire Geoghegan-Quinn, European Commissioner for Research and Innovation. Brussels: European Commission, DG Research and Innovation, http://ec.europa.eu/research/era/docs/en/hlp-report-en.pdf

Fagerberg, J. (2014) *Innovation policy: in search of a useful theoretical framework*. Paper prepared for the 2014 EU-SPRI conference, Science and innovation policy: Dynamics, Challenges, Responsibility and Practice, 18-20 June, 2014, Manchester, UK

Gautié, J.(2015) France National lnnovation Policy, Paris, 14th May, p. 5.

Havas, A. – Izsák, K. – Markianidou, P. – Radosevic, S. (2015) Comparative analysis of policy-mixes of research and innovation policies in Central and Eastern European countries. GRINCOH (Eu-funded FP7 project) WP3 Task7 Report, www.grincoh.eu

Havas, A. (2014) Mit mér(j)ünk? Az innováció értelmezései – szakpolitikai következmények (What we (are to) measure. Interpretations of innovation – policy consequences). *Közgazdasági Szemle*, Vol. 61., No. September, pp. 1022-1059.

Izsák, K. – Markianidou, P. – Radosevic, S. (2014) Convergence among national innovation policy mixes in Europe – an analysis of research and innovation policy measures in the period 2004-2012. GRINCOH (Eu-funded FP7 project) Working Paper Series, Paper No. 3.11, www.grincoh.eu

Jensen, M.B., Johnson, B., Lorenz, E. and Lundvall, B.-A. (2004), Absorptive Capacity, Forms of Knowledge and Economic Development, paper presented at the Second Globelics Conference in Beijing, October 16-20.

Lundvall, B.-A. (2009) The Danish Model and the Globalizing Learning Economy – Lessons for Developing Countries. United Nations University, World Institute for Development Economics Research (UNU-WIDER), Research Paper No. 2009/18.

Lundvall, B.- A.(2008) One knowledge base or many knowledge pools? DRUID Working Paper, No.06-08., p. 31.

Lundvall, B.-A.(2006) The University in the learning economy, DRUID Working Paper. No.02-06, p. 31.

Mandle, I. (2013) Restructuring SMEs in Europe, Eurofound, Luxemburg: Publications Office of the European Union, p. 110

Nielsen, P., Nielsen, R., Bamberger, S., Stamhus, J., Fonager, K., Larsen, A., Vinding, A., Ryom, P. and Omland, O. (2012) 'Capabilities for innovation: the Nordic model and employee participation', Nordic Journal of Working Live, 2 (4):pp?,October.

OECD and Eurostat (2005) Oslo Manual – Guidelines for Collecting and Interpreting Innovation Data, third edition, Paris: OECD.

Orlikowski, W. (1991) 'Radical and incremental innovations in systems development: an empirical investigation of case tools', Cambridge: Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology, CISR Working Paper No. 221.

Our Plan for Growth: Science and Innovation, Evidence Paper. Department for Business lnnovation & Skills,December, 2014. p. 34

Pot, F. (2015) Complementing technological innovation with workplace innovation, European Workplace Innovation Network, April Bulletin http://portal.ukwon.eu/Complementing_technological_innovation_with_WPI

Ramstad, E. (2014) A systemic framework for a broad-based innovation policy: The expanded triple helix as an innovation generating policy model, downloaded from: http://uk.ukwon.eu/pdfs/Elise-v4.pdf, date of download: 08. 07. 2015.

Renzl, B. (2008) Trust in management and knowledge sharing: The mediating effects of fear and knowledge documentation, Omega 36, 206–220.

Schienstock (2007) Creating a New Growth Path: Finland's Transformation from a Resource-based to a Knowledge-based Economy. In: Makó, Cs.–Moerel, H.–Illéssy, M.–Csizmadia, P. (eds.): Working It Out? The Labour Process and Employment Relations in the New Economy. Akadémiai Kiadó, Budapest, pp. 26-46.

Schienstock, G. – Hamalainen, T. (2001): Transformation of the Finnish Innovation System. SITRA Reports Series 7, Helsinki.

Szunyogh, Zs. (2010) Az innováció mérésének módszertani kérdései (Methodological questions of measuring innovation), Statisztikai Szemle (Statistical Review), Vo. 88., No.2.

Totterdill, P. – Exton, O. – Exton, R. – Sherrin, J. (2009) Workplace Innovation Policies in European Countries. UK Work Organisation Network.

ANNEX I: INNOVATION POLICIES: BILLS AND STRATEGY DOCUMENTS

Country	**Bills**	**Strategy documents**
France	Bill on Innovation and Research (1999)	**[1]** OECD (2014), *Reviews of Innovation Policy*, France, Paris **[2]** Beylat J-L., Tambourin P. (2013), *L'innovation, un enjeu majeur pour la France*, [Innovation, a major stake for France] Rapport pour le Ministère du Redressement Productif et pour le Ministère de l'Enseignement Supérieur et de la Recherche. **[3]** Lauvergeon A., *Un principe et sept ambitions pour l'innovation (Rapport de la commission Innovation 2030)*, (One principle and seven ambitions – report of the Innovation 2030 commission), La Documentation Française. **[4]** Une nouvelle donne pour l'innovation. Quatre axes stratégiques, quarante mesures (A new deal for innovation. Four strategic priorities, forty policy measures) **[5]** Plan d'action en faveur de l'innovation dans les services (Action plan for innovation in service activities)
Hungary	Bill 1414/2013 (VII.4.) National Research – Development and Innovation Strategy (2013-2020) www.kozlonyok.hu/nkonline/MKPDF/hiteles/MK13115.pdf	***Befektetés a jövőbe (Nemzeti kutatás-fejlesztési és Innovációs Stratégia) (2013-2020) (Investment into the Future – National Research – Development – Innovation Strategy – 2013-2020).*** **(**2013)Budapest: National Ministry of Economy - National Innovation Office
Netherlands	To the Top. Towards a new enterprise policyhttp://www.government.nl/government/documents-and-publications/parliamentary-documents/2011/02/04/to-the-top-towards-a-new-enterprise-policy.html	In the years 2014-2020, projects in the field of social innovation are related to activities at the local societal level, aiming to better re-integration and participation in the labour market: (NL) '*Kans voor gemeenten: sociale innovatie en transnationale samenwerking'*

Sweden	Bill on "Research and Innovation", October 2012. Ministry of Education [*Regeringens proposition 2012/13:30 Foskning och innovation*: http://www.regeringen.se/sb/d/15650/a/201368] Bill on National Innovation Strategy: Ministry of Education [*Regeringens proposition 2012/13:30 Foskning och innovation*: http://www.regeringen.se/sb/d/15650/a/201368]	
U.K.	"Our Plan for Growth: Science and Skills",(OK BIS), UK Parliament, 17th December 2014. https://www.gov.uk/government/publications/our-plan-for-growth-science-and-innovation.	
Spain	Act of Science, Technology and Innovation, STI, (*Ley 14/2011, de*	
Germany	Law on Venture Capital (2008)	BMAS[10] (2015a): Grünbuch Arbeiten 4.0. BMBF[11] (2015a): Berufsbildungsbericht 2015. BMBF (2015b): Bekanntmachung von Richtlinien zur Förderung von Maßnahmen für den Forschungsschwerpunkt "Arbeit in der digitalisierten Welt" BMBF (2014a): Bundesbericht Forschung und Innovation 2014 BMBF (2014b) New High-Tech Strategy (2014-)

[10] Bundesministerium für Arbeit und Soziales
[11] Bundesministerium für Bildung und Forschung

		BMBF (2014c) Deutschlands Spitzencluster BMBF (2014d): Industrie 4.0. Innovationen für die Produktion von morgen. BMBF (2012): Zukunftsprojekte der Hightech-Strategie (HTS-Aktionsplan) BMBF (2010) High-Tech Strategy 2020 (2010-2014) BMBF (2006) High-Tech Strategy (2006-2010) Forschungsunion / Acatech (2013): Recommendations for implementing the strategic initiative INDUSTRIE 4.0- Final report of the Industrie 4.0 Working Group MWIF NRW – Ministerium für Wissenschaft, Innovation und Forschung (2013): Forschungsstrategie Fortschritt NRW. Forschung und Innovation für nachhaltige Entwicklung 2013 – 2020