Quality of jobs and innovation generated employment outcomes

Quinne.eu

The Evolution of EU Innovation Policy Relevant to Job Quality and Employment

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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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Introduction

A central aim of the current EU growth strategy *Europe 2020* (EC 2012) is to stimulate the growth of high innovation, high job quality firms that create more and better jobs, which in turn tackle social inclusion and inequalities. Whilst innovation can destroy jobs, in the long-run, innovation and employment creation are complementary. Cross-country analysis finds that innovation links to productivity and more productive firms create additional jobs (OECD 2010). Moreover innovative firms in more innovative countries have higher employment growth and their employment tends to be higher quality (de Kok et al. 2011). Innovative firms can also be inclusive, enveloping workers marginalised in the labour market (Dutz et al. 2011; OECD 2010). It is not surprising therefore that the European Commission (EC) regards innovation as an over-arching driver of EU growth (EC 2013a): the *Innovation Union* is one of the seven flagship initiatives within *Europe 2020*.

Unfortunately, the innovation performance of the EU lags behind key international competitors such as the US and Japan and its lead over new competitors such as China is decreasing (EC 2013a). There are also innovation performance differences between the EU member states which, after a period of convergence, have widened with the global financial crisis (Mako et al. 2014). Boosting innovation within the EU is therefore not a new but long-standing policy concern. The aim of this QuInnE Working Paper is to evaluate key past and current EU innovation policies relevant to job quality and employment. The Working Paper first summarises the two approaches that dominate thinking about innovation. It then outlines the evolution of EU policy on innovation over the past twenty years, followed by a short critique of this policy. The final section offers comments and recommendations about how EU innovation policy might be developed in the future in order to better meet the innovation challenge facing Europe.

1 Evaluation of the European innovation policy relevant to job quality and employment

There are two stylized approaches within innovation policies. In the first, more traditional and narrow approach, innovation is regarded as a linear process, where the source of all innovation activity is scientific research. The results of scientific basic research are transformed into engineering and manufacturing products, which are then sold through marketing and sales activities. Within this approach innovation is mainly about creating radically new products or processes; any incremental innovations are regarded as of secondary importance. The emphasis of this narrow science-focused approach to innovation is thus the generation of new explicit knowledge and ideas. Innovation is technological and primarily occurs in 'high-tech' industrial sectors. With an emphasis on science and the generation of explicit knowledge, policies aim to improve both the quantitative and the qualitative aspects of higher education e.g. by raising the number of PhD students produced and improving the research base of EU countries.

Within this narrow approach the main rationale for state intervention in innovation is an assumption of market failure (Fagerberg 2014). It is embedded in the neo-classical stream of the economics in which self-regulated markets create optimal resource allocation. According to this argument, innovation has 'public good' properties inhibiting firms from investing as much in innovation as the 'optimum level' would require. Innovation requires investments from firms but the benefits of these efforts are risky, hard to monopolize and will diffuse across the whole economy, thus limiting returns to firms that might choose to invest in innovation. Therefore 'rational firms' avoid innovation activities, resulting in under-investment in it. If self-regulating markets are unable to provide the 'optimum level' of innovation investment, justification then exists for state intervention.

Schienstock and Hamalainen (2001) critique this traditional narrow approach to innovation by underlining its implicit assumptions: innovation is understood 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 it neglects collaborative elements of innovation. As they note, there is an increasing volume of evidence that suggests that the linear model of innovation represents the exception rather than the rule, and it is difficult to find a direct causal link between new scientific knowledge and innovation.

Schienstock and Hamalainen (2001) contrast the science-based understanding of innovation with an activity-based understanding of innovation which can take place anytime and anywhere. Instead of being a single event, innovation, they argue, should be regarded as a continuous process related to the everyday practice of organisations. As such incremental innovations are important with tacit, rather than explicit, knowledge being important. Another basic feature of innovation, they point out, is its uncertainty. In order to cope with this inherent uncertainty, Schienstock and Hamalainen propose a 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' (p.51.). In this approach, the triggers of innovation may vary depending on the case, there are multiple actors involved in the process of innovation and there are 'complicated feedback mechanisms and interactive relationships' among them (p.51).

This broader, recursive model of innovation implies a different policy approach. Trust relations, strong cooperation and intense social interactions between actors ensure the necessary flow of information and knowledge, with continuous learning having a central role in this broader model, and the social embeddedness of innovation has to be recognised. This different approach required of policy is best reflected in accounts of national innovation systems. In this view, each country represents a specific case with specific actors and institutions, with unique relationships among them. National systems of innovation evolve historically and show path-dependent characteristics. It is also implied that there are no universal policy solutions or instruments that can be effectively implemented independent of the circumstances of any given country.

Working within this approach, Ramstad (2014) proposes an innovation ecosystem model. This 'expanded triple helix' innovation-generating model, with interrelated actors and processes at different levels, has a number of aspects:

1. it uses a much broader scope of innovation including organisational, service and policy innovations;

2. it does not limit the key actors in policy shaping to those in public sector institutions but includes representatives of employers' association and trade union, and recognises that that enterprises are the main driver of innovation;

3. there are thus players and process at both micro, meso and macro levels, moreover changes at one level imply changes at the other levels;

4. intra-organisational relationships are just as important as inter-organisational dynamics;

5. within enterprises, emphasis is placed on high-involvement practices that lever innovation e.g. autonomous working teams, management-employee relationships and employee-driven innovation, and which can enhance both firm productivity and quality of working life.

These two approaches to innovation – narrow and broad – imply two different knowledge management models because they rely on two different types of knowledge. According to Jensen et al. (2004), the narrow approach can be characterized by the STI-mode (Science, Technology, Innovation) of knowledge management system that focuses on codifying explicit, abstract knowledge, while the broad approach involves tacit and 'often highly localized' knowledge where Doing, Using and Interacting, the DUI-mode of knowledge management, is important. The two approaches are characterised in Table 1 below.

Table 1: Narrow and broad approaches to 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	Not sector specific
Policy implications	Market failure approach	System approach

2 The evolution of the concept of innovation in European innovation policies

This section describes and evaluates how the concept of innovation has changed across different European Commission policy documents over the past 15-20 years. The examination of the content of these documents draws on the theoretical framework summarised in the previous section. It should be noted he EC has produced a large number of innovation policy documents over this time and a meta-analysis of these documents is beyond the scope of this working paper. Instead, prefaced by the 1995 Green Paper on Innovation, this review examines the most important innovation policy documents related to the two key ten-year strategies of the EC, namely the Lisbon Strategy and Horizon 2020.

Green Paper on Innovation (1995)

One of the very first documents intended to determine innovation policy at the European level was the *Green Paper on Innovation* adopted in 1995 (EC 1995). The first edition of the Oslo Manual which defined types of innovation and its ways of measurement had been recently approved (OECD, 1992) and on the basis of the Manual the first wave of the Community Innovation Survey (CIS) was launched in 1993. Organised by Eurostat and carried out by national statistical offices, the CIS was the first coordinated survey of innovation activities and initially covered 12 European countries using a standardized methodology and questionnaire (Godin 2002). Since then, there have been nine waves of the survey and it became the largest survey on innovation in the world. However, it is organised on a voluntary basis, with the result that it does not cover all Member States of the EU.[1]

The objective of the Green Paper was to identify key factors and policy measures through which innovation activity could be enhanced in the EU. Although the opening definition of innovation adopted in this strategic document was quite vague – 'the successful production, assimilation and exploitation of novelty in the economic and social spheres' (EC 1995: 1) – the document does later include definitions for product, process and organisational innovation. The document also emphasized the role of the public sector and the importance of innovation culture generally as well as an appreciation of firm-level practice and capabilities, as the document puts it 'innovation is … the introduction of changes in management, work organisation, and the working conditions and skills of the workforce' (p.1).

In relation to the theoretical framework briefly sketched in the previous section, the Green Paper vacillates between the broad and narrow approaches to innovation. The document recognizes that innovation is not a linear process but involves dense interactions of different actors. Reflecting the broad approach it states that innovation:

[1] For a detailed description of the countries participating in different waves of CIS, see: http://ec.europa.eu/eurostat/web/microdata/community-innovation-survey

> … is not a linear process, with clearly-delimited sequences and automatic follow-on, but rather a system of interactions, of comings and goings between different functions and different players whose experience, knowledge and know-how are mutually reinforcing and cumulative. This is why more and more importance is attached in practice to mechanisms for interaction within the firm (collaboration between the different units and participation of employees in organisational innovation), as well as to the networks linking the firm to its environment (other firms, support services, centres of expertise, research laboratories, etc.). Relations with the users, taking account of demand expressed, and anticipating the needs of the market and society are just as important – if not more so – than a mastery of the technology. (EC 1995: 1)

The Green Paper also distinguishes between radical and incremental innovation, giving equal importance to both kinds of innovation. The document also argues that organisational innovation plays a crucial role in being a necessary precondition for the success of other forms of innovation and that Europe lags behind its competitors in this field. As to which sectors are innovation-centred, the document remains neutral, recognizing the importance of innovation not only in high-tech sectors but also in agriculture, services and even the public sector. The latter is particularly noteworthy given that the CIS omits to survey the public sector.[2]

Despite this rhetoric, there is a noticeable gap between the theoretical orientation of the Green Paper and the measures proposed; whilst the former reflects the broad approach to innovation, the latter are grounded in the narrow approach of innovation. In this respect, the document refers to one of the most important weaknesses faced by the EU being the so-called 'European paradox'. This term refers to the fact that while Europe performs well in terms of basic scientific research it struggles to transform its scientific excellence into commercial success compared to its main competitors: at that time the US and Japan.[3] This analysis had a long-lasting impact on the orientation of European innovation policies, focusing mainly on patent regulation, tax incentives and stronger collaboration between R&D sectors and industry, strengthening the technology absorption capacity of SMEs etc. Although from an innovation theoretical point of view, this document can be evaluated as one which fully applies the broad approach, in terms of policy measures it remains technology-oriented. In the second part of the Green Paper, the Commission proposes a full set of actions that has to be taken in order to improve innovation capacity of both firms and individuals in the European Union. None of the 13 measures[4] listed

[2] The EC only piloted a survey of public sector innovation in the early 2010s following the Innovation Union initiative, see http://www.technopolis-group.com/wp-content/uploads/2014/06/1540_EIS-2011-12_EPSIS-2013.pdf

[3] The question to what extent this statement was true at that time is not investigated in this Working Paper. However, note that according to the Green Paper by 1993 there already existed a significant gap between the US, Japan and the EU in R&D expenditure as a share of GDP (2.7%, 2.8% and 2.0% respectively) and the gap was widening.

[4] The Green Paper defines 13 Route of actions as follows: Develop technology monitoring and foresight, Better direct research efforts towards innovation, Develop initial and further training, Further the mobility of students and researchers, Promote recognition of the benefits of innovation, Improve the financing of innovation, Set-up fiscal régime beneficial to innovation, Promoting intellectual and industrial property, Simplify administrative procedures, A favourable legal and regulatory framework, Develop 'economic intelligence' actions, Encourage innovation in

link to non-technological innovation but instead reflect a narrow approach especially emphasizing the importance of technological innovation, scientific, explicit and individual knowledge-base, the STI mode of innovation and the manufacturing sector. This dissonance between theoretical grounding and the focus on particular measures is a pattern that can be identified in subsequent EU innovation policy.

In terms of the relationship between innovation and the quantitative and qualitative aspects of employment, the Green Paper emphasizes mainly the former. It is argued that product innovation boosts employment by increasing demand and thus investment. Process innovations, for their part, also increase employment because it increases firm productivity or lowers production costs. As such, in the long term, a positive effect on employment growth may occur. However, the relationship between innovation and job quality is poorly developed in the document. There is appreciation that 'by its nature innovation is a collective process which needs the gradual commitment of an increasing number of partners. In this respect, the motivation and participation of employees is critical for its success' (p.11). However the document also warns of a trade-off between the quantity and quality of jobs: whilst 'innovation generally improves living and working conditions, care has to be taken that new methods of organising work (such as just-in-time working) do not jeopardise jobs' (p.11).

First phase of Lisbon Strategy and the changes in the innovation concept (2000-2004)

The aim of the Lisbon Strategy (2000) was to create a knowledge-based economy and society as the basis for the EU becoming the most competitive and dynamic economy in the world.[5] The Strategy defined three strategic goals: sustainable economic growth; more and better jobs; and greater social cohesion. In the context of wanting to create a knowledge-based economy, it is not surprising that innovation quickly became a core issue. There were two main initiatives intended to foster innovation. The first was the establishment of the European Area of Research and Innovation; the second was to create friendly environments for start-ups and SMEs.

With respect to the first initiative, the European Research Area (ERA) is a tool to coordinate research activities at the national and European level in order to support Europe's best researchers and scientists. This aim could be achieved, argued the Strategy by – among other things – developing joint research programmes, creating an environment that stimulates increased private investments in R&D, benchmarking national R&D policies, establishing the European Innovation Scoreboard, fostering the mobility of European researchers and creating a common European patent protection.

The second initiative aimed to increase the competitiveness and dynamism of the business sector by creating a friendlier environment especially for start-ups and SMEs. To do so involved lowering the costs and the administrative burdens of doing business. Encouraging interfaces

enterprises, especially SMEs, and strengthen the regional dimension of innovation, Update public action for innovation.

[5] The Lisbon Strategy is available:
http://www.consilium.europa.eu/en/uedocs/cms_data/docs/pressdata/en/ec/00100-r1.en0.htm

between the partners of the Triple Helix models and advisory services and other types of business angels also became a priority. In support of this initiative the European Investment Bank launched its *Innovation 2000 Initiative*[6] covering five main areas: human capital formation; research and development; information and communications technology networks; diffusion of innovation; development of SMEs and entrepreneurship.

Despite the reference to partners and the triple helix model, these two initiatives reveal scant attention in these key policy documents to the broad approach to innovation. In fact, the only quantifiable innovation related objective of the Strategy was to increase the share of R&D expenditures in the GDP from 1.9% to 3% by 2010 and to raise the proportion of private sector generated GDP from 55% to 67% of the total. According to the document's estimations, such growth would lever an additional 0.5% GDP growth and 400,000 additional jobs per year after 2010.[7] However, to do so would have required an annual growth rate of 6% for the public sector and 9% for the private sector – figures that were never realised. It should also be said that although innovation is recognised as playing a crucial role in achieving another strategic objective – increasing the European employment rate from 61% to 70% – its impact on job quality was not explored in any detail despite the policy desire to create better, not just more, jobs.

The implementation of the Lisbon Strategy was achieved in three main phases. This first period, known as Lisbon I, occurred between 2000 and 2004. This phase was followed by a mid-term review and a second phase of the Strategy over 2005 to 2008, known as Lisbon II. This mid-term review resulted in a slightly modified innovation strategy *European Partnership for Growth and Jobs* and in an Action Plan *More Research and Innovation – a Common Approach*. The third phase was the continuation of Lisbon II in the context of global financial crisis and economic downturn.

Before the mid-term review, the European Commission also issued a communication updating the concept of innovation[8] and also had an action plan.[9] Both documents were approved in 2003. The strategy (EC 2003:a) represents a theoretical shift from linear to a systemic model of innovation:

> Important though research is as the source of invention, innovation encompasses more than the successful application of research results. The evolution of the innovation concept – from the linear model having R&D as the starting point to the systemic model in which innovation arises from complex interactions between individuals, organisations and their operating environment – demonstrates that innovation policies must extend their focus beyond the link with research. (EC 2003a: 4)

[6] See in detail: http://cordis.europa.eu/finance/src/inno2000.htm
[7] European Commission, 2003(b).
[8] EC (2003a).
[9] EC (2003b).

In addition to the R&D-based linear approach, the document also recognises the importance of incremental innovations, value-innovation[10], organisational and business model innovation, and design and marketing innovation. Interestingly, the document criticized previous innovation policies: 'Although it is the systemic model that now dominates in policy discussions, many measures put into practice with the intention to promote innovation still appear to owe more to the linear view' it admitted (EC, 2003a:7) – whilst maintaining the strategic aim of raising R&D expenditure to 3% of GDP.

This broadening of the approach to innovation involved not just a shift in the focus of innovation policy but also recognition that enterprises are at the heart of innovation. As such the most important target of innovation policy should be enterprises, their behaviour, capacities and environment. In parallel with this shift, statistical data analysis was also to be reviewed: 'These models also colour measurements of the innovation process and innovation performance, which are usually biased towards indicators of technological innovation' (EC 2003a: 7).

While the policy upgrading document explored the new broad-based approach of innovation, the action plan that came later in the same year reflected less of elements from the renewed concept of innovation elaborated a few months earlier. The only focus of the action plan was to design policy initiatives to help to reach the Barcelona objective – that is, to increase the average research investment level from 1.9% of GDP to 3% of GDP by 2010 and of which two-thirds should come from the private sector.[11] Although the plan notes in footnote 8 that: 'Technological innovation must often be combined with other forms of innovation, such as in design, marketing and business organisation, in order to draw the full commercial benefit.' (EC, 2003b:7), initiatives aimed to boost organisational or other non-technological innovation are absent from the action plan. Instead it determines four main sets of action aiming at:

1. Harmonisation of policy mixes adopted by the Member States and the creation of a European Technology Platform
2. Considerably improving public support to research and technological innovation
3. Reach the necessary increase in the levels of public funding for research
4. Improving the environment of research and technological innovation in Europe: intellectual property protection, regulation of product markets and related standards, competition rules, financial markets, the fiscal environment, and the treatment of research in companies' management and reporting practices. (EC 2013b: 4)

Whilst both the policy document (EC 2003a) and the action plan (EC 2003b) emphasize the important role that innovation plays in boosting employment, the quality of this employment was not taken into consideration in either text. This absence is not surprising given that among the structural indicators intended to continuously monitor the success of the implementation process of the Lisbon Strategy and approved by the European Council in March 2000 none are aimed at measuring non-technological innovation or issues related to job quality (beside life-

[10] This notion was popular at the end of the 1990s and refers to innovation as the main driving force in the search for new markets, and can occur via radical as well as incremental innovation.
[11] This objective was officially by the European Council in meeting held in Barcelona on March 2002.

long learning[12] and accidents at work). Instead the indicators focus on employment rates (including that of older workers), unemployment rates, the gender pay gap and the tax rate on low-wage earners; the innovation and research section included indicators such as public expenditure on education, total R&D expenditure, the level of Internet access, the number of science and technology graduates, patenting activities, venture capital investments and ICT expenditure. In other words, reflecting the narrow approach to innovation. Although it was planned from 2000 to develop indicators measuring job quality, that intention was never realised. They are still missing from the headline indicators accompanying the Europe 2020 strategy which retained two rough indicators: the employment rate of those aged between 20-64 years of age (the target being 3% by 2020) and the gross domestic expenditure on R&D (the target is 3% by 2020).

Mid-term review and the second phase of the Lisbon Strategy (2005-2008)

The first phase of the Lisbon process ended in 2004 and was followed by a mid-term review. The strategic objectives of the Lisbon Strategy had not been achieved: the gap in competitiveness had widened compared to North America and Asia; the employment rate of the EU-15 countries did not rise to 65% and the share of R&D expenditure was 1.83% of the EU-15 GDP according to Eurostat. Nevertheless, the mid-term review led by a High-Level Expert Group headed by Wim Kok (EC, 2004) did not rewrite the Strategy's objectives; instead it proposed a narrowing of their focus and urged more effective implementation through better governance and mobilisation. As one of the key documents evaluating the Lisbon Strategy noted:

> … the conclusions of the mid-term review were very critical, especially as regards the design of the Strategy: an overly ambitious agenda; excessively numerous and often contradictory priorities; poor coordination of policies in different areas; and a limited sense of urgency and commitment at national political level. It also subscribed to the idea of limiting the number of objectives and targets, focusing on 'growth and jobs' and placing concrete measures ahead of the strictly quantified targets for 2010. (European Parliament 2010:38)

Innovation remained a core issue in the renewed agenda as an engine for both growth and employment. The mid-term review did not result in any significant changes in innovation policy. After reviewing the Lisbon Strategy, the Commission issued several important communications. The first (EC 2005a: *Working together for growth and jobs – A new start for the Lisbon Strategy*) is a general reorientation of the Strategy based on the Wim Kok Report. The second (EC 2005b: *More research and innovation – investing for growth and employment: a common approach*) is a more specific policy guideline about the next steps needed in the field of research and innovation. Both of these documents are derived from Integrated Guidelines. Based on the Wim Kok Report (EC 2004) the Commission summarized the main objectives of the renewed Lisbon Strategy into the Integrated Guidelines for Growth and Jobs, 2005-2008 (EC 2005c). These Integrated Guidelines were divided into two parts, the first dealt with broad

[12] Life-long learning refers to the adult participation in education and training.

economic policy; the second with employment. The first includes a special section on how to boost innovation. Among the 23 guidelines, four are dedicated to measures related to innovation:

> **Guideline No. 12. To increase and improve investment in R&D:** 'Member States should further develop the mix of measures to foster business R&D through: improved framework conditions and ensuring that companies operate in a sufficiently competitive environment; increased and more effective public expenditure on R&D; strengthening centres of excellence; making better use of support mechanisms, such as fiscal measures to leverage private R&D; ensuring a sufficient supply of qualified researchers by attracting more students into scientific, technical and engineering disciplines and enhancing the career development and the transnational and intersectoral mobility of researchers.' (p.21)
>
> **Guideline No. 13. To facilitate innovation and the take up of ICT:** 'Member States should focus on improvements in innovation support services, in particular for technology transfer, the creation of innovation poles and networks bringing together universities and enterprises, the encouragement of knowledge transfer through FDI, better access to finance and affordable and clearly defined intellectual property rights. They should facilitate the uptake of ICT and related changes in the organisation of work in the economy.' (p.22)
>
> **Guideline No. 14. To encourage the sustainable use of resources and strengthen the synergies between environmental protection and growth:** 'Member States should give priority to the internalisation of external environmental costs; to increasing energy efficiency and to the development and application of environment-friendly technologies. The implementation of these priorities should be in line with existing European commitments and with the actions and instruments proposed in the Environmental Technologies Action Plan (ETAP), through the use of market-based instruments, risk funds and R&D funding, greening of public procurement and the removal of environmentally harmful subsidies alongside other policy instruments.' (p.23)
>
> **Guideline No. 15. To contribute to a strong industrial base:** 'Member States should focus on the development of new technologies and markets. This implies in particular commitment to the setting up and implementation of joint European technology initiatives and public-private partnerships that help tackle genuine market failures, as well as the creation and development of regional or local clusters.' (p.23)

The second part of the Integrated Guidelines, the Employment Guidelines, included quantitative employment targets: an average overall employment rate of 70%, with employment rates of at least 60% for women and of 50% for older workers (55-64 years). In addition, the guidelines offered some general recommendations to promote the quality of jobs. However, no reference was made to the interrelationships between innovation, and qualitative and quantitative aspects of employment; the two issues appear almost completely separate. Although the Guidelines aim to exploit synergies between quality at work, productivity and employment and to improve job

quality, including pay and benefits, working conditions, job security, access to lifelong learning and career prospects, it remains rather broad, and innovation only features for its intervening in labour productivity.

The second communication *More research and innovation – A common approach* contained concrete policy measures through which the Commission intended to 'put research and innovation at the heart of EU policies' (EC, 2005b:5). The majority of these measures were related, however, to research, science and technology rather than innovative enterprises. For example, it aimed to create: a better regulatory framework for new technology, a more effective and efficient protection of IPR, an attractive single market for researchers, a better designed and more widely used system of tax incentives, and to use public procurement to foster research and innovation and make European Structural Funds as well as the Community Framework for State Aid for R&D more research and innovation oriented.

There are, however, some new elements in this innovation policy document. First, it makes explicit reference to market failure approach as a rationale for state or EC-level intervention. Suggested interventions include R&D projects, technical feasibility studies, industrial property rights for SMEs, innovation advisory services and innovation support services, aid for young innovative enterprise and or aid for innovative clusters. This inclusion contrasts sharply with the argument of previous policy documents in which the system approach was adopted. Another new element is the inclusion of a stronger sectoral focus. The document admits that different sectors have different sectoral needs and specificities which have to be taken into consideration if innovation policy is to improve competitiveness. In relation to this sector-focused reorientation, a separate strategy exists aimed to promote innovative services in the EU and intervention to boost for process and organisational innovation in services is encouraged. The reason for targeting services is a belief that 'Innovation in services … is typically less systematic' and that services tend to 'adopt [] business and organisational models and practices from more innovative sectors' (EC 2006: 16-17).

A slight shift can be detected towards non-technological innovation: in its introduction the Communication 'addresses the full research and innovation spectrum, including non-technological innovation' (EC 2005b: 7). Although no further references are made on this point, in the abovementioned new framework of the State Aid programme, there is a separate section dealing with organisational innovation.)

Qualification for this aid had the following criteria:

> '(a) organisational innovation must always be related to the use and exploitation of Information and Communication Technologies (ICT) to change the organisation;
>
> (b) the innovation must be formulated as a project with an identified and qualified project manager, as well as identified project costs;
>
> (c) the result of the aided project must be the development of a standard, of a business model, methodology or concept, which can be systematically reproduced, possibly certified, and possibly patented;

(d) the process or organisational innovation must be new or substantially improved compared to the state of the art in its industry in the Community. The novelty could be demonstrated by the Member States for instance on the basis of a precise description of the innovation, comparing it with state of the art process or organisational techniques used by other undertakings in the same industry;

(e) the process or organisational innovation project must entail a clear degree of risk. This risk could be demonstrated by the Member State for instance in terms of: project costs in relation to company turnover, time required to develop the new process, expected gains from the process innovation by comparison with the project costs, probability of failure.' (EC 2006: 17)

The document still echoes the important objective of having more and better jobs but no explicit reference is made on the relationship between innovation and job quality.

Crisis and the third phase (2008-2010)

The last phase of the Lisbon Strategy was dominated by the global financial crisis and economic downturn. The European Commission responded by launching the *European Economic Recovery Plan* (EC 2008). The aim of the Plan was twofold: first to safeguard the purchasing power of the people in order to maintain demand; and, second, to direct short-term actions in selected areas with the aim of maintaining Europe's future competitiveness. The Commission determined four priority areas: people, business, infrastructure and energy, and research and innovation. This latter area included three main fields of actions:

1. Increase investment in R&D, innovation and education.
2. Develop clean technologies for cars and construction.
3. High-speed internet for all.

The second type of actions included 'smart' investments, combining innovation and the green economy, and maintaining the competitiveness of some key European industries (i.e. car manufacturing and construction). As such, the plan was consistent with the existing priorities of the Lisbon Strategy.

It has been suggested that the Lisbon Agenda was over-ambitious and that 'reporting fatigue' became an issue with more progress indicators being added on which Member States had to report. Moreover, prior to having to respond to the economic crisis that emerged from the global financial crisis , the EU was expanding to incorporate Central and Eastern European countries, most of which were poor and had less resource capacity than larger and richer existing member states (Casey 2009).

Horizon 2020 and its first evaluation

In the new European strategy, Horizon 2020, innovation remains an important issue and is one of seven flagship initiatives. The aim is to adopt a more strategic approach to innovation so that

is becomes an 'overarching policy objective' (EC 2010a: 2). The flagship *Innovation Union* initiative identifies three main weaknesses within 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.' (EC 2010a: 2)

The *Innovation Union* 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.

Overall, the strategy aims to link better research and innovation to each other in order to get out more value from investments in research into innovation. Of the 34 commitments, some are more pertinent to this Working Paper. Again, and despite the financial and economic crisis, one of the primary aims of the strategy remains increasing R&D&I investments to 3% as a share of GDP in all Member States. The strategy argues that investments in education, R&D&I, innovation and ICTs should be protected from budget cuts. The strategy not only aims to increase the amount of investment in R&D&I but also wants to use this money in a more effective way by tackling fragmentation in research and innovation systems at EU and national levels. Modernisation of the education system includes the creation of more world-class universities and the attracting of top talent from abroad. The European Research Area also needs to be strengthened to promote the cross-border cooperation of European researchers and innovators, and to ensure a free movement of knowledge. The EU also wants to simplify its own R&D&I programmes, ensure that access to them is open to everyone in an equal way. The leverage effect of public spending on private sector investments also has to be enhanced, the document argues. Public procurements also have to be used in a more strategic way promoting innovation activities of the enterprises. Obstacles to bringing ideas to market have to be removed. Fast-growing SMEs in particular are targets for the easing of access to finance and making intellectual property rights more affordable to enterprises.

In addition, the documents signals that the European Regional Development Fund should support projects that are based on smart regional specialisation strategies reflecting the special needs, strengths and weaknesses of regions.

In order to tackle societal challenges more effectively, the strategy launched a special programme called the *European Innovation Partnership* (EIP). 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 and interfacing.' (EC 2010a: 22)

The partnership initiatives are expected to focus on one or two of these challenges and be accompanied by strong political and stakeholder commitment, creating clear added value for the EU so that there is a strong focus on results, outcomes and impacts underpinned by adequate financial support. The strategy emphasizes the importance of design and creative activities, innovation in the public sector and social innovations.

In terms of assessing the progress of innovation activities by Member States, a set of indicators have been developed by the High Level Panel on the Measurement of Innovation established by Máire Geoghegan-Quinn, the former European Commissioner for Research and Innovation. The panel proposed five key indicators (EC 2010b: 4-6):

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

The Panel also proposed a single composite indicator to capture innovation performance consisting of five variables: the 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 percentage of total employment, the contribution of medium and high-tech products exports to the trade balance, knowledge-intensive services exports as percentage of total service exports, and employment in fast-growing firms of innovative business industries, excluding financial services (EC 2013c: 12).

In terms of monitoring the implementation of the strategy, a first internal evaluation was conducted in 2014 and another is currently under preparation by Ernst & Young, Open Evidence, Matrix and Wuppertal Institute. According to the first evaluation, the EU succeeded in reducing the innovation gap between EU-27 and its main competitors of the US and Japan by almost 50 per cent (EC 2014a: 11). Great efforts have been made in reducing fragmentation and overlaps in the European research system and researchers' mobility has increased considerably. There have been successful gains in unitary patent regulation and public procurement. The availability of finance has become more accessible 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: active and healthy ageing; water; agriculture; raw materials; and smart cities. As such the evaluation of the overall performance of the EIPs 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' (p.10).

Further improvements are still needed to eliminate inconsistencies in rules and practices making innovation activity less burdensome and risky, especially by creating a real European single market. Another gap identified by the evaluation is the weak innovation culture within the EU. Although major achievements have been made in relation to public sector innovation, further progress is needed in this field. Whilst the strategy puts special emphasis on promoting the inclusive character of innovation in terms of equal access to both development capacities and the benefits of innovation, further steps need to be taken to strengthen this inclusion. In addition, the evaluation identifies considerable skills shortage and mismatches both in basic skills such as numeracy and literacy and skills more aligned to innovation –'the 21st century skills for creativity and entrepreneurial spirit' (p.11). Overall, in order to fully exploit the potential of the strategy, the evaluation stresses the need to continue its implementation drawing on the experiences gained during its first 4-5 years.

In terms of its theoretical positioning, the new European innovation strategy represents a significant shift from the narrow towards the broad approach to innovation. However that shift appears to leave policy somewhere halfway between the two. In this respect it is important to note the launch of other contemporaneous EU initiatives such as the Commission's *Employment and social development in Europe 2014* publication. Chapter 3 of this document deals with the future of work in Europe, and makes explicit the importance of 'job quality and work organisation for a smart and inclusive growth'[13]. In this respect, the DG GROW (the former DG ENTR) of the European Commission is supporting the diffusion of workplace innovation by creating the European Workplace Innovation Network (EUWIN) in 2013 with a remit to 'to facilitate the exchange of good practices and promote workplace innovation (Pot 2015).

It is also worth noting that since the launch of the *Innovation Union* (EC 2010), important policy priorities have been (re)defined. In addition to workplace innovation[14], the six priority areas include: social innovation[15], design-driven innovation[16], demand-side innovation policies[17], public sector innovation[18] and public procurement of innovation[19]. All six priorities have their own policy background paper, action plans and other initiatives. Their respective aims are outlined in Table 2 below.

Table 2: Innovation Policies in the European Union (2013)

Field	Aims
Social innovation	• stimulating social innovation as a source of growth and jobs

[13] See Chapter 3 of this document.
[14] http://ec.europa.eu/growth/industry/innovation/policy/workplace/index_en.htm
[15] http://ec.europa.eu/growth/industry/innovation/policy/social/index_en.htm
[16] http://ec.europa.eu/growth/industry/innovation/policy/design/index_en.htm
[17] http://ec.europa.eu/growth/industry/innovation/policy/demand-side-policies/index_en.htm
[18] http://ec.europa.eu/growth/industry/innovation/policy/public-sector/index_en.htm
[19] http://ec.europa.eu/growth/industry/innovation/policy/public-procurement/index_en.htm

	• promoting and sharing information about social innovation in Europe • supporting social innovation projects through the Social Innovation Competition.
Design for innovation	• to increase the use of design for innovation and growth across Europe; • to raise awareness of how design-driven innovation increases efficiency in public services and drives business growth; • to create capacity and competencies to deliver these policies.
Public sector innovation	• to strengthen innovation in the public sector a key player in the field as as a regulator, service provider, and employer • to build an efficient and productive public sector becoming a strong driver of private sector growth • to reach efficiency gains, better governance, faster delivery, and more citizens' involvement in public sector
Public procurement of innovation	• help foster market uptake of innovative products and services • increase the quality of public services in markets where the public sector is a significant purchaser • support access to markets for businesses, especially small and medium-sized enterprises (SMEs) • help address major societal challenges.
Workplace innovation	• to improve performance and working lives, and encourages creativity of employees through positive organisational changes; • to combine leadership with hands-on, practical knowledge of frontline employees; • to engage all stakeholders in the process of change; • to develop methods and indicators for measuring this type of innovation

Source: http://ec.europa.eu/growth/industry/innovation/policy/index_en.htm

With respect to workplace innovation, the Commission also compiled a report on a methodology for its measurement (EC 2014b). This methodology is important as it can be regarded as a first step to linking together job quality and innovation: 'Workplace innovation is considered contributing to European competitiveness: It encompasses practices that enhance employers' workability, resulting in higher productivity and improved employees' job-satisfaction and wellbeing. Workplace innovation, hence, is a cross-cutting policy issue, concerning all types of organisations, be they large firms, SMEs or even public administrations' (EC 2014b:6).

3 Calls to broaden the concept of innovation in EU policies

In this section we briefly outline the key critiques of European innovation policies that have emerged from within the recent scientific literature on innovation. These selected critiques focus on two main issues: the policy orientation per se and the relationship between innovation, employment and job quality.

The key critique comes from Lundvall (2014) in the Guest Essays series of the EUWIN network. Lundvall argues that one of the reasons why European economies underperform is the deteriorated quality of jobs in Europe as an outcome of the global economics and financial crisis. Lundvall acknowledges that an important feature of the Lisbon Strategy was that it aimed to improve simultaneously the qualitative and quantitative aspects of employment through 'more and better jobs'. This dual focus was even more remarkable as it ran counter to then dominant assumptions about a trade-off existing between job quality and rates of employment. However, Lundvall points out, the notion of job quality was never made operational and the mid-term review dropped job quality as an issue to focus only on raising the employment rate. This marginalisation is compounded according to Lundvall in the vagueness surrounding the formulation of priorities such as 'more and better lives' in the new EU growth strategy *Europe 2020* (EC 2012) strategy EU2020.

On the basis of empirical research with his European colleagues, Lundvall proposes to operationalise the notion of job quality. According to this proposal, the two most important aspects of job quality are learning opportunities offered by work organisations and the level of discretion (job autonomy) employees exercise over their work tasks. Jobs are better that offer these learning opportunities and autonomy; he posits that: 'those who operate in these jobs are significantly more satisfied with their work situation than the others' (Lorenz et al. 2004, cited in Lundvall, 2014: 2). Moreover there is a clear link to innovation: 'we have shown that these jobs contribute to an innovative economy (Lundvall, 2014: 2; also Arundel et al. 2007).

Expanding on this argument, and drawing on data from different waves of the European Working Conditions Survey, Lundvall identifies four types of work organisation: discretionary learning, lean production, Taylorism and traditional. Lundvall characterises good job quality as the share of employees working in the discretionary learning form of work organisation because it offers the best learning opportunities and highest degree of task discretion for employees. The data show that this share increased between 2000 and 2005 when the total level of employment also increased indicating a positive correlation between job quality and employment rates. However, from 2000 to 2010 a significant fall was observed in job quality in the majority of the EU-15 countries for non-management employees. This fall was particularly strong in leading-edge innovator countries such as Austria, Denmark and Finland. The cases of Sweden and the Netherlands are interesting because the share of non-managerial employees working in discretionary learning organisations decreased between 2000 and 2010 by about 5 percentage points, while overall the number of employees engaged in this type of work organisation increased by 8.5 and 3.9 percentage points respectively. By contrast, in Portugal and Spain the share of both non-managerial and all employees increased by a considerable extent. (These two

countries seem to be the exception to the rule and the reasons of this trend need further country-specific investigation.)

Table 3: Share of non-managerial and all workers engaged in discretionary learning jobs 2000 and 2010 in EU-15 countries

	2000		2010	
	Non-managerial	**All employees**	**Non-managerial**	**All employees**
Austria	39.5	51.8	32.3	44.5
Belgium	34.2	44.9	31.9	42.6
Denmark	55.5	64.7	43.3	61.1
Finland	39.6	44.1	29.7	43.8
France	26.0	38.0	20.2	30.6
Germany	34.8	47.6	29.5	41.6
Greece	16.6	23.3	13.7	23.4
Italy	32.2	41.7	27.6	40.4
Ireland	16.6	22.7	17.2	22.6
Luxembourg	29.2	41.6	26.5	34.7
Netherlands	49.3	59.6	44.1	63.5
Portugal	18.4	23.8	27.9	35.2
Spain	15.3	25.6	20.5	27.2
Sweden	41.1	57.0	36.4	66.5
United Kingdom	19.9	25.9	16.8	27.3

Source: Lundvall (2014:5); EC (2015:185-187).

Unfortunately there is no similar data available for the New Member States (NMS) on the evolution of the share of non-managerial employees; Table 4 below shows data for all employees only. The trends among the NMS countries are more ambiguous. In some countries the share of employees working in discretionary learning organisations decreased from 2000 to 2010 while in other countries it has increased. The former group of countries consists of Slovenia, Estonia, Hungary, the Czech Republic and Bulgaria Romania, Poland, Lithuania and Latvia. The decrease was particularly significant in the case of Hungary (41.4 vs. 32.8%), Czech Republic (39.3 vs. 28.6%) and Bulgaria (23.2 vs. 11.9%), whilst Latvia (29.8 vs. 44.0%) and Romania (17.3 vs. 25.2%) showed significant increase in the same period of time.

Table 4: Share of all employees engaged in discretionary learning jobs 2000 and 2010 in the NMS

Country	**2000**	**2010**
Latvia	29.8	44.0

Slovenia	45.0	42.2
Estonia	40.5	38.4
Poland	36.7	39.1
Lithuania	24.2	28.1
Hungary	41.4	32.8
Slovakia	24.2	28.7
Czech Rep.	39.3	28.6
Romania	17.3	25.2
Bulgaria	23.2	11.9

Source: EC (2015:185-187).

What is interesting in Lundvall and his colleagues' argument is that learning and autonomy are the two key elements that link together the issues of innovation, employment and job quality. They make an additional, equally interesting, point about equality and social divisions of labour within workplaces based on this data. In this respect, Lundvall tries to capture the inclusive character of the different workplaces by comparing changes in job quality according to occupational groups of managerial and non-managerial employees. In a similar way, investigating employee involvement and work organisations in Europe, in work for Eurofound, Gallie and Zhou found significant differences between different country groups of European member states: 'Occupational class differences were notably less great in the Continental and the Nordic country groups than in the other country groups. In the Continental and the Nordic groups, managers and professionals were almost 4 times more likely than non-skilled workers to be in high involvement organisations. But in the Southern group they were 7 times, in the East-Central group 8 times and in the East-North group 12 times more likely than the non-skilled to be in such organisations' (European Foundation for the Improvement of Living and Working Conditions, 2012: 32). Despite a concern within innovation policy about generating inclusive employment and recognition of the need to change management in order to boost innovation (e.g. EC 1995), this type of analysis has been absent from innovation policy documents over the past 20 years.

This absence has become a weakness in innovation policy and relates in part to the general problem of how innovation is measured. The Commission monitors the innovation performance of the Member States through the Innovation Union Scoreboard (IUS) and through the Summary Innovation Index (SII). The Scoreboard was first created in 2002 and has been revised several times since. The SII is a composite indicator of 25 sub-indicators. As the primary monitoring tool of the Commission, whilst also reflecting as well as including the Commission's innovation policy approach, its importance should not be under-played. In a recent research paper analysing the tool, Havas et al. (2015) revealed a strong bias towards R&D-based innovations in these indicators – that is, they clearly lean towards the narrow approach to innovation (see Table 5 below). As they point out, among the 25 indicators '10 indicators are *only* relevant for, and a further four *mainly* capture, R&D-based innovations;

seven could be relevant for both types of innovations; and a mere four focus on non-R&D-based innovations. Given that (i) the IUS is used by the European Commission to monitor progress, and (ii) its likely impact on national policy-makers, this bias towards R&D-based innovation is a source of major concern' (p.18).

Table 5: The 2014 Innovation Union Scoreboard indicators

	Relevance for R&D-based innovation	Relevance for non-R&D-based innovation
Human resources		
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	X	
Percentage population aged 30-34 having completed tertiary education	B	b
Percentage youth aged 20-24 having attained at least upper secondary level education	B	b
Open, excellent and attractive research systems		
International scientific co-publications per million population	X	
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	X	
Non-EU doctorate students1 as a % of all doctorate students	X	
Finance and support		
R&D expenditure in the public sector as % of GDP	X	
Venture capital investment as % of GDP	X	
Firm investments		
R&D expenditure in the business sector as % of GDP	X	
Non-R&D innovation expenditures as % of turnover		X
Linkages & entrepreneurship		
SMEs innovating in-house as % of SMEs	b	b
Innovative SMEs collaborating with others as % of SMEs	b	b
Public-private co-publications per million population	X	
Intellectual assets		
PCT patents applications per billion GDP (in PPS€)	X	
PCT patent applications in societal challenges per billion GDP (in PPS€) (environment-related technologies; health)	X	
Community trademarks per billion GDP (in PPS€)		X
Community designs per billion GDP (in PPS€)		X
Innovators		
SMEs introducing product or process innovations as % of SMEs	b	b
SMEs introducing marketing or organisational innovations as % of SMEs		X
Economic effects		
Employment in fast growing enterprises in innovative sectors (% of total employment)	b	b
Employment in knowledge-intensive activities (manufacturing and services) as % of total employment	x	
Contribution of medium and high-tech product exports to the trade balance	x	
Knowledge-intensive services exports as % total service exports	x	
Sales of new to market and new to firm innovations as % of turnover	b	b
License and patent revenues from abroad as % of GDP	X	

Source: Havas et al. (2015:18).
Legend: X: only relevant; x: mainly relevant; b: relevant for both types.

If analysis of the measures is narrowed further to cover non-technological and organisational innovation, the following indicators are directly or indirectly related to this type of innovation: Non-R&D innovation expenditures as percentage of turnover, Innovative SMEs collaborating with other firms as percentage of SMEs and the share of SMEs introducing marketing or

organisational innovations. This short list reveals that indicators measuring non-technological and organisational innovations are markedly under-represented in the SII. Moreover job quality is completely missing, even from the outcome indicators labelled as 'Economic effects'. Another imbalance in the range of indicators is evident in the exclusive focus on knowledge-intensive and medium and high-tech sectors. As Havas et al. rightly note, for a number of reasons, the low-tech sector is also important:

> First, the economic weight of low- and medium-low technology (LMT) sectors are significant in terms of output and employment: these sectors account for around 40% of the EU manufacturing jobs. Second, while the bulk of innovation activities in LMT sectors are not based on intramural R&D efforts, these sectors also improve their performance by innovations. Firms in the LMT sectors are usually engaged in the DUI mode of innovation (that is, relying on learning by doing, using and interacting), but they also draw on advanced S&T results available through the so-called distributed knowledge bases, as well as advanced materials, production equipment, software and various other inputs (e.g. electronics components and sub-systems) supplied by the so-called high-tech (HT) industries. (p.42)

This point leads to a more general question about whether innovation should target specific sectors. On the one hand, fast growing sectors create more jobs and are therefore a legitimate objective for support of innovation policy. On the other hand, traditional sectors have a greater number of employees, and established firms and industries spend more money on R&D&I than SMEs operating in fast-growing new sectors. In fact, the separation of 'old' and 'new' sectors is artificial; they often linked and build on each other. However, the dominant mode of innovation differs. In established industries, process innovation occurs more often based on knowledge accumulated within the firm through everyday practice, while in emerging sectors product innovation dominates creating more new jobs. It is also worth noting that European countries have different industrial structures. The examples of Denmark and Austria show that innovation can be maintained at a world-class level even with low-tech industries (Lundvall 2009; Peneder 1999).

Finally, another shortcoming of the index relates to the indicators measuring R&D&I expenditure. As Edquist (2014) rightly notes, not all resources spent on R&D will be transformed into innovations and it is hard to demonstrate how effectively expenditure on R&D translates into innovation (of any kind) (see also Edler et al. 2013). This measurement problem is particularly salient in the case of the number of new doctorate graduates or for the participation rate in secondary or tertiary education. These measures may have some influence on innovation activities in a given country but the linkage is mostly indirect. Nevertheless, 10 out of 25 indicators in the SII measure this kind of input activities:

- New doctorate graduates (ISCED 6) per 1000 population aged 25-34;
- Percentage population aged 30-34 having completed tertiary education;
- Percentage youth aged 20-24 having attained at least upper secondary level education;
- International scientific co-publications per million population;

- Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country;
- Non-EU doctorate students as a % of all doctorate students;
- R&D expenditure in the public sector as % of GDP;
- Venture capital investment as % of GDP;
- R&D expenditure in the business sector as % of GDP;
- Non-R&D innovation expenditures as % of turnover.

Many of these indicators measure research and education instead of innovation. However, as Edquist (2014: 10) stresses: 'It is also hard to know exactly what kinds of education have (what kinds of) effects on (what kinds of) innovation and what kinds do not.' The argument, according to which outcomes of research and education can be regarded as an input for innovation in such an automatic and mechanistic way is empirically untested and perhaps even untestable and instead simply reflect the assumptions and expectations underpinning the narrow approach to innovation.

4 Conclusions and Recommendations

Boosting innovation has been a core feature of a sequence of EU policies over the past twenty years at least. As the EU now seeks to grow its post-crisis economy, innovation has become a flagship initiative. There are two approaches to understanding and supporting innovation – a narrow approach and a broad approach. In the narrow approach, state intervention is justified by market failure and innovation is characterised as linear, focusing on radical and technological innovation of the manufacturing sector on the basis of scientific, explicit and individual knowledge. The broad approach acknowledges the importance of user-driven, interaction-based, recursive innovation not only in manufacturing but also in services, with public services having a key supportive role. Over the last twenty years, EU innovation policy has evolved theoretically, with a remarkable shift from the narrow to the broad approach. For a number of reasons, this shift is, however, partial and incomplete.

First, there is a considerable gap between the theoretical understanding now underpinning EU innovation policy and that policy's measures. In other words there is dissonance between policy intent on the one hand and policy implementation, measurement and evaluation on the other. As the Green Paper on Innovation (1995) highlights, on a theoretical level, EU innovation policy has embraced the broad, systemic or holistic approach to innovation as early as the mid-1990s. The Green Paper seemed to align with then latest scientific thinking about innovation, including recognising the importance of organisational innovation. Nevertheless, this theoretical understanding barely reflects in action plans and on the instruments for measuring policy attainment and evaluation. Instead the measures used are derived from the narrow approach to innovation. The different phases of the Lisbon Strategy from 2000-2010) represent a wider retreat to the narrow approach. One of the key policy documents (EC, 2005b), for example, makes explicit reference to market failure argument at a theoretical level, and the concrete policy measures proposed also reflected the narrow approach of innovation targeting research, science and technology rather than innovative enterprises by creating a better regulatory framework for new technology, a more effective and efficient protection of IPR, an attractive single market for researchers, a better designed and more widely used system of tax incentives, etc. The latest innovation policy emanating from the Europe 2020 growth strategy initiated in 2010 (EC, 2010a) shows some promising initiatives providing some counterbalance to the previous adoption of the narrow approach. Some policy priorities have been redefined, recognising the importance of policies aimed to foster workplace innovation, social innovation, design-driven innovation, demand-side innovation, public sector innovation and public procurement of innovation. All of these six priorities have their own policy background paper, action plans and other initiatives. This evolution of EU innovation policy is outlined in Table 6 below.

Table 6: The evolution of EU innovation policies 1995-2015

	Green Paper (1995)	Lisbon I (2000-2005)	Lisbon II (2005-2008)	Lisbon III (2008-2010)	Horizon 2020
Elements of broad-based innovation concept	Fully applied broad-based approach	A slight shift from linear towards systemic approach appears only in 2003[20]	Public procurement as a tool to boost innovation	No significant changes compared to Lisbon II	Top 6 priorities: social innovation; design-driven innovation; demand-side innovation policies; public sector innovation; public procurement of innovation; workplace innovation
Elements of narrow innovation concept	In terms of proposed policy measures, it remains technology-oriented: importance of technological innovation, scientific, explicit and individual knowledge-base, the STI mode of innovation	Strategic objective is to raise the share of R&D expenditures in the GDP from 1,9% to 3% by 2010	Focus is on R&D expenditures, green economy, strong industrial base and on innovation-friendly environment, explicit reference to market failure approach	Increase investment in R&D, innovation and education. Develop clean technologies for cars and construction. High-speed internet for all	Innovation statistics remained science and technology-focused
Measurement		Establishment of the European Innovation Scoreboard: no indicators on non-technological innovation and on Job Quality			5 key indicators[21] and the creation of Innovation Union Scoreboard and Summary Innovation Index
Sector prioritised	Innovation is important in low-tech sectors, in private and public segments of services	No sectoral focus	Promotes innovation in the services	Green economy, car manufacturing and constructions	Health and social service, green economy, public sector
Interrelation of Innovation and Job Quality	Recognised but poorly developed, more focus put on quantitative dimension of employment	Exclusive focus on quantitative dimension of employment, although improving working conditions	'Better jobs' dropped from the agenda		Job quality is of high priority again, though not in direct relation with innovation

[20] Though this shift does not appear in concrete policy measures and action plans and remained mainly rhetoric: 'enterprises are at the heart of the innovation process' (EC, 2003a:5)

21 Contribution of innovative-related trade in manufactured goods to the balance of trade of goods; Share of fast growing and innovative firms in the economy; Percentage of employment in knowledge intensive activities; Patent applications weighted by GDP; Hourly labour productivity.

		becomes a strategic objective		
Social inclusion	Does not appear			Special emphasis on promoting inclusive character of innovation.

Second, although the theoretical basis of the innovation policies widens to take account of the broad approach to innovation, it does so in an incomplete, inconsistent and theoretically ill-founded way. For example, after the mid-term review of the Lisbon Strategy explicit reference was made in the renewed innovation policy to market failure arguments. This is a theoretical choice with a number of implicit consequences such as reliance in the science push model in which the main source of innovation is R&D. This reliance sharply contradicts other elements of the same innovation policy arguing that the heart of innovation is firms. These inconsistencies, together with the abovementioned gap between theory, implementation, measurement and evaluation, reveal that the system-focus approach has never been successfully applied. What remains constant over the past two decades within innovation policy are the technological focus, the linear view of innovation based on scientific research, and the supply-side-dominated policy measures. The weaknesses of this approach are numerous and obvious. Education, for example, is a long-standing concern within innovation policy and features strongly as a supply-side measure, however there is no reference in any of the policies to the demand side of skill, and what skills firms actually need and deploy generally, let alone in relation to innovation. Both supply and demand have a role (Edler et al. 2013). Instead, education is targeted almost exclusively as a supply side issue. This failure to look inside firms and at what levers and enables innovation in these firms also explains the absence in policy documents of any appreciation of the interrelation of innovation and job quality. Where job quality is mentioned, for example with the reference to wanting 'better jobs' in the first phase of the Lisbon Strategy and now, again, in Europe 2020, it is hugely undeveloped theoretically and practically as a policy issue per se and in relation to innovation. Yet, as Lundvall (2014) notes, workplace learning and autonomy may be the two key elements that link together the issues of innovation, employment and job quality. Skill development (part of learning) and skill deployment (or utilisation in current policy parlance)[22] are integral components of job quality and plays a key role in the innovation performance of firms:

> Beyond the quantitative effect of new technologies on the number of employees, it is also important to investigate the qualitative effect of technological change on different categories of workers. The basic premise here is that innovations are skill-biased and, therefore, replace tasks traditionally carried out by unskilled workers with new jobs demanding skilled workers. (Vivarelli 2014: 138)

What is puzzling about the way that policy continues to be dominated by the narrow approach to innovation is that this approach has been seriously challenged scientifically. Evidence suggests that organisational (i.e. non-technology) innovation plays a major role informs innovativeness and that there are clear synergies to be gained from this form of innovation and technological forms (Battisti and Stoneman 2010). It is now also generally accepted that most innovation is not radical but incremental. However there is recent and growing evidence on the emergence of radical innovation generated by employee-driven innovation (EDI) reflecting the

[22] See Warhurst and Findlay (2012).

broad approach of innovation. In this respect Alasoini (2013: 20) calls attention to the work of Kesting and Ulhoi (2010), noting that:

> ... there is no reason to limit the scope of EDI to incremental improvements ... radical innovations are often employee-driven; they derive from doing something unique, valuable and difficult to imitate or plan in detail through standard management procedures.

There is clearly a task therefore for the policy and scientific communities to better articulate, and for the latter to better explain and make understood more effectively the advantages of the broad, system-driven approach to innovation, and for the former to better integrate research and policy making processes in the field of innovation. As Edquist (2014: 14) has noted:

> Innovation policy design is certainly lagging behind innovation research when it comes to being systemic, broad-based or holistic. This is clearly an example of a failure when it comes to the communication between innovation researchers and politicians in the field of innovation. This may be a strong reason to involve innovation researchers in policy design (formulation) and implementation to a much higher degree. There is a lot that policy-makers and, in particular, politicians can learn from innovation research, not only in principle or 'analytically', but also in policy practice.

Although in EU-level innovation policy documents, the shift from narrow to broad approach is incomplete and inconsistent, at country-level within the EU the shift is more comprehensive in some Members States, particularly those that have sought to link workplace development and workplace innovation. In this respect there is a clear division amongst EU countries, with those in the North actively making the link, with a complete absence in New Member States (Alasoini 2015). Finland is a good example of this 'Nordic exceptionalism' in the field of innovation and a willingness to look inside firms as part of a system-based approach. More than a decade ago, Finland launched a nationwide 'Workplace Development Programme – TYKES' with more than 1500 projects involving almost 350,000 workers. The objective of this programme was to simultaneously improve the Quality of Working Life (QWL) and productivity in Finnish workplaces. In addition to business-to-business networks, projects targeted work methods, work organisation, work community and supervision within firms. The 2012 launch of 'Liideri – Business Productivity and Joy at Work' programme represents the 'next-generation' workplace development programme and again reflecting the broad approach to innovation (Alasoini, 2015: 28-29). This focus of analysis is important because it enables thinking about innovation to recognise and appreciate the consequences of new production regimes with reconfigured management, work and employment practices. In addition, the Finnish approach enables innovation policy to capture not only firm-level but also system level practices that can help underpin innovation. As Alasoini points out:

> The object of workplace development has expanded during the last 40-50 years from traditional issues at the shop-floor, work-station and work-unit levels to issues involving entire organizations, production systems and companies, and even company networks, industrial clusters, regional innovation systems and ecosystems. (p.25)

The measurement involves not only more indicators of non-technological innovation but also more focus on 'workplace innovation', on the design of 'good work' and 'better jobs'.

The types of innovation that feature in the narrow approach have their merits. However it would be helpful to EU innovation policy if the Commission engaged more comprehensively with and in a more sustained way with the broad approach. A lever to this end would be for the Commission to rethink the measurement of innovation. Measurement plays an essential role in policy thinking. Current measures effectively prohibit the necessary policy development. The Innovation Union Scoreboard (IUS), formerly known as the European Innovation Scoreboard (EIS), is based on 25 indicators. It serves as a primary monitoring toolkit of the innovation performance of Member States. Analysis of the indicators highlights the dominance of narrow approach thinking as the majority of the indicators relate mainly to R&D-based technological innovation. However, as Havas et al. (2015: 42) rightly note:

> The current set of the IUS indicators can be seen either as a half-full or a half-empty glass. Compared to the EIS 2004 … it is an improvement. Yet, a much more significant improvement is still needed for a better reflection of the diversity of innovation processes, which is indispensable for devising effective and sound policies.

Although the problems in using these summary indexes are well known among the scientific community (e.g. Edler et al. 2013), they remain popular among policy-makers as they appear to provide simple answers to complicated questions, and provide easy to formulate policy responses – more graduates, more R&D spending, more patents etc. In this respect, the lack of consensus currently amongst the scientific community about the definition and operationalisation of job quality (Muñoz de Bustillo et al. 2011; Findlay et al. 2013) might explain its weak pursuance by the Commission in innovation policy. Assuming that this consensus can be achieved (Warhurst and Knox 2015), it could be incorporated into a revised set of measures of innovation. In this respect, the methodological bias of the IUS, with its excessive emphasis on R&D-based innovations and widely used to inform policy design, needs to be revised if traction is to be gained in better understanding innovation and redesigning innovation policy to make it more effective. This new and better innovation summary index might include:

- variables to capture non-technological as well as technology innovation – that is, most obviously, covering all four types of innovation outlined in the Oslo Manual.

- variables capturing national and EU-wide institutional arrangements that provide the context and conditions for innovation (e.g. employment regulation, industrial relations, management education, finance, accountancy and tax regimes etc.);
- variables that enable analysis of firm-level practices in terms of employment, work organisation, management etc., all of which reflect job quality;
- variables measuring innovation activities of low and medium-low technology sectors; manufacturing as well as services, including in the latter those of the public sector.

Some of these additions could be drawn from existing EU surveys, of which there are a number that currently offer innovation-related data but which are not used for this purpose, for example the European Working Conditions Survey. It might also usefully extend to incorporate qualitative research methods, for example with firm-level case studies that triangulate objective and subjective data. This latter type of data gathering would also help better understanding of the interplay between the context, content, process and outcomes of the various types of innovations at the level at which more and better innovation needs to occur within the EU – firms.

Importantly, this revised innovation index would be used not only for monitoring innovation performance but also for measuring the effects of different policy instruments. This evaluation would help the necessary refocusing of policy thinking. As Edquist (2014: 29) argues:

> Ideally, we should be able to estimate the importance of each innovation policy instrument by measuring its effects on (different kinds of) innovations. … Nonetheless, it may be achieved by means of considerable effort aimed at more widespread, profound and independent evaluations. In the longer term, this is the only reasonable way. Evaluations are badly needed.'

Better support for innovation is required from the Commission. However this support cannot be driven by the market failure argument as a justification of intervention. Market failure has many sources – economies of scale and scope, asymmetric information, externalities etc.[23] – but all of which are essentially reactive. EU innovation policy has to be proactive because, by its very nature, innovation support has to be nurturing and forward-thinking, based on the analysis of the characteristics, strengths and weaknesses of innovation eco-systems (Ramstad 2014).

To this end, this Working Paper offers general recommendations for EU innovation policy:

1. It should more comprehensively incorporate the range of types of innovation into policy thinking and policy design.

[23] For a literature review, see: BIS (2010).

2. It needs to better consolidate its approach to innovation in terms of drawing on the broad approach to innovation.
3. It needs to better consolidate the scope of innovation policy targeting to be more representative of EU economic and employment structures.
4. The changes signalled in #1, #2 and #3 have to be pursued in policy in a way that is sustained and coherent as a prelude to their evaluation.
5. Measurement tools must be revised appropriately to reflect the changes signalled in #1, #2 and #3, including the relationships of innovation to job quality and employment.
6. In support of these other recommendations, the Commission should better incorporate scientific evidence into innovation policy deliberation and design.

The aim of QuInnE is to support the *EU 2020* growth strategy. Both reflecting and in further pursuance of the recommendations above, QuInnE will assist EU policy-makers to formulate new and modify existing policies aimed at successful economic recovery and growth in line with the Commission's *Europe 2020* strategy by exploring the mutually reinforcing relationship between innovation and job quality and its employment outcomes, the latter in terms of inclusion and equality. QuInnE will explore statistically the relationships between innovation, job quality and employment outcomes, seeking to refine and update the correlations between them as well as identify and comment upon the strengths and weaknesses in current EU statistical data. It will also explore the causal relationships between innovation, job quality and employment outcomes through firm level qualitative research. The outcome will be the provision of high quality new and novel research for *Europe 2020* that will help the Commission with its aim to boost innovation, job quality and employment.

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