



**Quality of jobs and
innovation generated
employment outcomes**

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**LINKING INNOVATION AND JOB QUALITY:
CHALLENGES AND OPPORTUNITIES FOR
POLICY AND RESEARCH**

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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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Executive summary

The European Commission recognises the current weaknesses in EU innovation performance and signals that new approaches to improving it are needed. One possibility is to explore its link to job quality, with an assumption that their relationship might be mutually beneficial. However research is needed to better understand the link between them and its outcomes.

QulnnE addresses the challenge of developing better scientific understanding of this potential link. It is an interdisciplinary research project that investigates the relationship between innovation and job quality, and the effects this relationship might have on employment outcomes. The new scientific understanding that it generates helps support the *Europe 2020* strategy and its aim to stimulate the growth of high-innovation, high-job-quality firms to create more and better jobs. Based on a review of the relevant literatures, this Working Paper focuses on the relationship between innovation and job quality and if that relationship might be mutually beneficial. The purpose is to improve understanding of how that relationship and its outcomes might be better researched.

The Working Paper has four main parts across a number of sections. The first part examines how innovation and job quality are treated in current EU policy. The second part reviews key literature and debates about how innovation and job quality are conceived, measured and classified. The third part analyses existing understanding of the relationship between innovation and job quality. The fourth part develops a new framework of analysis that includes a preliminary model of the relationship between innovation and job quality, and which also specifies QulnnE's conceptual position.

The first part outlines the European Commission's recognition of the importance of both innovation and job quality but also the tendency of the Commission to position them separately within policy. Given that the Commission wants economic growth to be delivered by firms that are both high-innovation and high-job quality, there is, however a potential policy convergence emerging around innovation and job quality but which needs to be underpinned by research of their link.

The second part recognises the need to first understand how innovation and job quality are currently conceived and measured, as well as classified in the case innovation. A first section outlines debates about the classification of innovation through its different types, impact and novelty. Whilst acknowledging the definitional and measurement problems in the main survey tool used to measure innovation – the Community Innovation Survey – QulnnE adopts the four types of innovations listed in the OECD's Oslo Manual and used by the European Commission: product, process, marketing and organisational. QulnnE also recognises that classification alone is insufficient and that what is also necessary is understanding of the process that delivers innovation. The second section in this part outlines debates about the nature of job quality, from which it is argued that a bespoke employee-centred, multi-dimensional and cross-disciplinary six-dimensional framework of job quality best captures the approaches used across the existing scientific literature. These dimensions are: wages, employment quality, education and training, working conditions, work life balance and employee participation. This approach to job quality strips out the extraneous factors that appear in some measures of job quality and focuses instead on only the work and employment of employees. These reviews result in understandings of both innovation and job quality as multi-dimensional, and also, at the very least, moving towards being centred on work and employment practices within firms.

The third part outlines current understanding of the relationship between innovation and job quality. With examples, it shows that analyses of the relationship highlight not just its complexity but that its outcomes can be varied. Both innovation and job quality are multi-dimensional and not easily captured in single indicators. In addition, the relationship between the different types of innovation and the various components of job quality may differ. Moreover, causality can run both ways: innovation can affect job quality and job quality can affect innovation. In addition, in both cases that effect may be positive or negative: innovation might enhance or diminish job quality; job quality might enhance or diminish innovation; innovation and job quality might also be mutually reinforcing. What shapes the relationship and its different outcomes is currently under-researched. What is required is not just further research but a framework of analysis that seeks to capture the complexity.

The fourth part develops a framework of analysis that features a preliminary model that seeks to unpack the complex relationship between innovation and job quality. It is argued that their interaction requires the development and deployment of employee-derived innovative capacity. This innovative capacity within firms is both a function of the innovation potential of firms and the job quality of its employees, and an outcome of firms' ability to access and mobilise this potential – and hence the adoption of a mode of innovation that is employee driven. This set of interactions potentially forms a virtuous circle. Within this circle, it is suggested that innovation might improve job quality, job quality then might then enhance innovative capacity, and innovative capacity might deliver more innovation. The converse can also occur, creating a vicious circle whereby innovation undermines job quality, which in turn diminishes innovative capacity, resulting in less innovation.

Within the framework, a number of hypotheses are offered about intra- and extra-firm mediating and contextual factors respectively that might explain the functioning of the triangular dynamic between innovation, job quality and innovative capacity. Within the firm, managerial choices about the pursuit of competitiveness, including technology introduction and implementation, plus human resource management and innovation management were suggested as mediating factors. Outwith the firm, it is also acknowledged that firms' embedding within particular national institutional configurations can also shape the functioning of the virtuous circle. Four particular aspects of firms' institutional environment are hypothesised as salient: the industrial relations system, the education and training systems, and employment protection and welfare regimes. How these factors might influence the virtuous circle then becomes open to empirical examination, including international comparative research.

Exploring the relationship between innovation and job quality through this framework and model would advance scientific understanding of that relationship and its potentially mutually beneficial outcomes through the conducting of better research. In doing so, that research would also provide evidential support for the necessary shift to integrated policy thinking around innovation and job quality. As a consequence, the European Commission might be able to better pursue its desire to have positive impact on innovation and job quality at the firm level within the EU. It would also enable research also signalled as important by the European Commission that examines whether the innovation-job quality dynamic can help reduce inequalities and improve inclusion through jobs.

Introduction

Scientific and policy interest in innovation and job quality rises and falls over time (see respectively Fagerberg 2013 and Warhurst and Knox 2015). Current renewed interest in both recognises the benefits of linking them (e.g. Jensen et al. 2007; OECD 2015). A central aim of the European Commission's economic strategy *Europe 2020* (EC 2012) is to stimulate the growth of high-innovation, high-job quality firms that create more and better jobs.

The problem is that innovation and job quality still tend to exist in different policy silos despite recognition by the European Commission of this potential link. An attempt to redress this weakness is found in the Horizon 2020 EURO-2-2014 programme call (EC 2014). This call recognises the current weaknesses in EU innovation performance and signals that new approaches to improving it are needed, stating that 'a broad range of factors that stimulate innovation need to be explored' (p.10). The link to job quality might be one possibility, it is posited. However research is needed to better understand the link and its outcomes the call recognises.

QuInnE addresses the challenge of developing better scientific understanding of that potential link. It is an interdisciplinary research project that investigates the relationship between innovation and job quality, and the effects this relationship might have on employment outcomes. The new scientific understanding that it generates helps support the *Europe 2020* strategy and its aim to stimulate the growth of high-innovation, high-job-quality firms to create more and better jobs.

Based on a review of the relevant literatures, this Working Paper focuses on the relationship between innovation and job quality. It has three purposes: first, to specify the classifications and concepts of both innovation and job quality generally and as used by QuInnE; second to offer a preliminary model of the relationship between innovation and job quality; and third, to develop hypotheses about the factors – within and outwith the workplace – that might shape the interaction between innovation and job quality. The Working Paper does not seek to solve the scientific challenges of defining either innovation or job quality. Instead it builds upon existing understandings of innovation and job quality, seeking to build better understanding of how they might relate to each other and provide a framework of analysis for how their relationship and its outcomes might be better researched.

The Working Paper has four main parts. The first part, and next section, examines how innovation and job quality are treated in current EU policy. The second part has two sections that review key literature and debates about innovation and job quality, from which QuInnE's approaches to both are partially specified. The third part analyses existing understanding of the relationship between innovation and job quality before the fourth part develops a new framework of analysis that includes a preliminary model of the relationship between innovation and job quality that also finalises QuInnE's conceptual position. In addition, this part discusses a number of factors that are likely to shape the interactions within that relationship. The conclusion signals how the framework and preliminary model developed in the Working Paper might be applied to further policy and research development.

Exploring the relationship between innovation and job quality through this framework and model would advance scientific understanding of that relationship and its potentially mutually beneficial outcomes through the conducting of better research. In doing so, that research would also provide evidential support for the necessary shift to integrated policy thinking around innovation and job

quality. As a consequence, the European Commission might be able to better pursue its desire to have positive impact on innovation and job quality at the firm level within the EU.

Innovation and job quality in EU policy

Whilst the EU recognises the importance of both innovation and job quality, there is still a tendency to position them separately within policy. Maintaining this separation is unhelpful if the European Commission wants economic growth to be delivered by firms that are both high-innovation and high-job quality.

The EU's growth strategy *Europe 2020* aims to tackle the challenges of boosting sustainable growth across the continent. It notes the lack of innovation dynamism in the EU and long-standing innovation weaknesses compared to competitor nations. Innovation is regarded as important because it generates growth, competitiveness and employment, all of which the EU needs following the global financial crisis (GFC). 'Innovation', the European Commission states, 'is 'the main economic driver of growth' (EC 2013a: 3). Innovation creates the capabilities that underpin sustained growth in an environment that is both international and competitive (Cantwell 2013). The debate as to whether innovation creates or destroys jobs has been superseded by empirics which show that in the long run jobs lost are replaced elsewhere in the economy. The key debate now is the type of jobs being created and the changes to residual jobs. These outcomes are not pre-determined within regional or national economies but mediated by innovation systems in which labour markets and other institutions matter (Pianta 2013).

The *Innovation Union* is one of the seven flagship initiatives within *Europe 2020*. It argues that investments in science (particularly in universities) and R&D are needed. In its aim to boost innovation, the Innovation Union (EC 2013a) wants the EU to be 'a world-class performer in science' and the *Innovation Union Scoreboard 2013* (EC 2013b) sets a key target for the EU to raise spending on R&D to three percent of GDP.

Whilst EU innovation policy has evolved over time, this faith in R&D remains constant. Three points are worth noting about R&D spend as the focus of innovation delivery (Cantwell 2013; O'Donoghue 2015; Makó et al. 2016). First, the evidence base for understanding the interaction of universities with industry to deliver innovation is under-developed. Second, while spending on R&D across the EU increased to 2.03 per cent of GDP in 2015, it was still lower proportionally than the R&D spend of its major competitors e.g. the US (2.81%) and Japan (3.47%). Third, even as the R&D expenditure of 23 of the EU's 28 Member States increased over the decade to 2015, the EU's relative innovation performance remains relatively unchanged. In other words, this science-centric model of innovation being pursued by the European Commission may be an important lever of innovation but it is not sufficient. Progress in boosting innovation has been less advanced than hoped, the European Commission has acknowledged and new ideas are needed (EC 2015).

Levering potential mutuality with job quality is one such idea (EC 2014). The link between innovation and job quality, however, has not always been obvious to the European Commission. Policy was largely founded on a belief that there is a trade-off between the quality and quantity of jobs (Guillén and Dahl 2009). This belief was enshrined in EU policy discourse, for example in the *Kok Jobs, Jobs, Jobs* report (European Employment Taskforce 2003). Any references to job quality tended to be implicit rather than explicit, as the 1980s Social Chapter of the Single Market illustrates. Whilst the early version of

the European Employment Strategy (EES) did make explicit reference to job quality it concentrated on increasing employment and reducing unemployment (EC 2008; Davoine et al. 2008; Sieborn-Thomas 2005). Some indicators of job quality were included in the evaluation of the 2000 Lisbon Strategy but the issue of job quality per se was overlooked in the Strategy itself, which instead again emphasised quantitative job growth. The evaluation recommended that this omission be rectified in the future (Rodriguez et al. 2010). More recently and in parallel to the development of the *Innovation Union*, improving the quality of jobs has been added to the European Employment Strategy (EES). As a consequence, concern about the quantity of employment is augmented by concern about the quality of employment (Pianta 2013). It is now believed that better, not just more jobs are needed if the EU economy is to recover and grow (EC 2008, 2012; Fernández-Macías and Hurley 2008) because synergies are believed to exist between job quality and the other objectives of the EES – namely full employment, labour productivity and social cohesion and inclusion (EC 2008). This dual approach of wanting more and better jobs is based on the complementarity, not trade-off, between more and better jobs. Indeed, claims of a policy trade-off between job creation and job quality have been exposed empirically as a myth in the US (Osterman 2012) and the EU (Erhel and Guergoat-Larivière, 2010). At the very least employment and unemployment levels cannot be simply read off levels of job quality (see, for example, Erhel and Guergoat-Larivière 2016). Indeed, the correlation between job quality and the employment rate is positive and significant; that is, job quality does not hinder the creation of employment but in sum aids it (Erhel and Guergoat-Larivière 2010; Anton et al. 2012). Pursuing more and better jobs simultaneously is now embedded in *Europe 2020*, most obviously in its flagship initiative *An agenda for new skills and jobs* (EC 2010a).

Unfortunately, whilst EU policy affirms the importance of innovation and recognizes the importance of job quality, it positions each separately. The European Commission acknowledges that innovative firms in more innovative countries have higher employment growth, and their employment tends to be higher quality (if skill level is the marker) (de Kok et al. 2011). However the European Commission recognises that the linkages between innovation, growth and employment are complex and that more research is needed to understand this complexity. The Horizon 2020 programme responds to this need, stating explicitly that ‘it is essential to understand better the conditions under which innovation fosters growth that benefits the whole society through high quality jobs’ (EC 2014: 10).

Whilst, we would agree with Totterdill et al. (2012: 3) that, in terms of policy, there is therefore a ‘potential for convergence’ to be explored between innovation and job quality, we would argue that providing the underpinning research means overcoming a number of challenges: first, current measurement of innovation and job quality has conceptual limitations; second, the relationship and interaction between innovation and job quality is not sufficiently modelled; and, third, the evidence base of the relationship between innovation and job quality is under-developed. It is important therefore that new research focuses on exploring the relationship between innovation and job quality. To do so first requires an understanding of both innovation and job quality.

Classifications and types of innovation

Interest in innovation has risen significantly since mid-twentieth century, emerging as a distinct field of enquiry and not untypically related to science and/or science policy (see Fagerberg 2013). This section outlines the classifications and types of innovation.

Classifying innovation

There is a consensus in the literature that innovation has powerful impacts on firm, regional and national economic performance. However it is important to define what is being classified. A common but sufficiently differentiating definition of innovation is that it is a novel phenomenon that is implemented or practiced. This definition stipulates that for something to be called an innovation it must have real effects in the form of a physical or immaterial entity, or impact behaviour, and have a sufficient degree of novelty.

There are three main ways in which innovation is classified: by *type*, *impact* and *novelty*. There are a number of types of innovation (see Armbruster et al. 2008). The main instrument for measuring innovation in the European Union is based on the OECD's (2005) Oslo Manual. This Manual has two major types: technological and non-technological. These two types are broken down into two further types – under technological there is product and process innovations, and under non-technological there is organisational and marketing innovations. The EC's *Innovation Union* (EC 2013a) refers to each of these types in articulating its 'broad, balanced approach to innovation' (p.4) and it is the Oslo Manual classification of innovation that underpins the EU's Community Innovation Survey (CIS). These types of innovation, with their definitions, are outlined in Table 1 below.

Table 1: Defining the four types of innovation

Type of innovation	Definition	What is not included
Product	<p>The introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses.</p> <p>This definition includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.</p>	<ul style="list-style-type: none"> • Minor changes or improvements. • Routine upgrades. • Regular seasonal changes (such as for clothing lines). • Customisation for a single client that does not include significantly different attributes compared to products made for other clients. • Design changes that do not alter the function, intended use or technical characteristics of a good or service. • The simple resale of new goods and services purchased from other enterprises.
Process	<p>The implementation of a new or significantly improved production or delivery method.</p> <p>This definition includes significant changes in techniques, equipment and/or software.</p>	<ul style="list-style-type: none"> • Minor changes or improvements. • An increase in production or service capabilities through the addition of manufacturing or logistical systems which are very similar to those already in use.
Marketing	<p>The implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.</p>	<ul style="list-style-type: none"> • Changes in product design or packaging, product placement, product promotion or pricing based on marketing methods that have previously been used by the firm. • Seasonal, regular and other routine changes in marketing instruments. • The use of already applied marketing methods to target a new geographical market or a new market segment (e.g. socio-demographic group of clients).
Organisational	<p>The implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.</p>	<ul style="list-style-type: none"> • Changes in business practices, workplace organisation or external relations that are based on organisational methods already in use in the firm.

		<ul style="list-style-type: none"> • Changes in management strategy, unless accompanied by the introduction of a new organisational method. • Mergers with, and the acquisition of, other firms.
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Source: OECD (2005).

The *impact* of innovation refers to its scale and effect. Scale can be seen as having two dimensions, one focusing on the weight or profundity of the impact, ranging from large to small, and the other focusing on the breadth of diffusion or uptake of the innovation, ranging from widespread to limited. Effect classifications look at substantive impact, usually on particular groups or societal spheres or processes. Descriptors of these impacts include: ‘disruptive’, ‘progressive’, ‘growth-inducing’ and ‘break-through’.

The final main way of classifying innovation assesses its *novelty* and can be said to deal with how far the innovation extends from its presumptive point of origin. Here the scale ranges from incremental to radical, with a tail on the other end of incremental dealing with changes that are not considered novel enough to be classified as innovations, with phrases such as ‘routine improvements’ or ‘minor changes’ used in lieu of innovation. In other words, this extended scale demarcates the changes that are sufficiently novel to be classified as innovation, with the innovation section of the scale extending from incremental, by which the origins are not very distant to the innovation, to radical, with a profound departure from a point of origin. Incremental and radical innovations are thus positions on a continuum that builds upon or diversify existing products and process (Dodgson et al. 2014). Orlikowski (1991: 5) presents the issue in the following manner:

The former [incremental] implies a linear, cumulative change in a process or product ... while the latter [radical] are nonlinear, paradigmatic changes, representing significant departures from existing practice or knowledge. The categories of radical and incremental are intended as ends of a continuum representing the level of new knowledge embedded in an innovation, and not as exclusive categories.

Technological and non-technology innovations can each be radical or incremental. It noteworthy that firms increasingly create value through a wide range of complementary technological and non-technological innovations (OECD 2010), in other words, combining types. These combinations create synergistic advances. For example, research in Denmark found that companies combining technological and non-technological innovations were five times more likely to have product innovation (Jensen et al. 2007). Thus, technological and non-technological innovations can complement rather than substitute for each other (see also Battisti and Stoneman 2010).

However it should be noted that there are difficulties demarcating boundaries within classification systems. Even with what might appear as a clean classification system of types of innovation found in the Oslo Manual, the boundaries between types can be blurred, for example between process and organizational innovations, and they can be treated as synonymous by survey respondents. Likewise, when scales are used it can be difficult to delineate incremental compared to radical innovation where differentiations are a matter of degree rather than type or where there are effects of cumulative processes.

Classification systems that distinguish different types of innovation are useful therefore but not sufficient. It is also necessary to understand the process that delivers innovation. As Fagerberg (2013: 20) notes, classification schemes identify various dimensions of innovation without commensurate understanding of how innovation happens: ‘we know much less about how and why innovation occurs than what it leads to.’ (p.20). This gap in understanding needs to be filled.

Shifts in thinking about innovation

Resonating with this call to better understand how and why innovation occurs, there have been two related attempts to shift the emphasis in thinking about innovation. The first seeks to reduce the emphasis on technological innovation or at least rebalance it. The second wants to go further and privilege non-technological innovation, though grapples with the nature of that innovation.

Based on the increasingly popular work of Jensen et al. (2007), the first shift distinguishes two *modes* of innovation: first the Science, Technology and Innovation (STI) approach and, second, the Doing, Using and Interacting (DUI) approach. The STI mode has a narrow science and technology focus on innovation, with new products and processes driven by the generation of new explicit knowledge and ideas based on R&D: the ‘production and use of codified scientific and technical knowledge’ (p.680). It assumes that innovation is linear, passing through various stages of scientific discovery, development, production and marketing (Fagerberg 2013). It is also a narrowly focused approach, typically centred on the manufacturing sector and involving scientists and engineers etc. who create new products (e.g. Isaacson 2014). The second, the Doing, Using and Interacting (DUI) approach is based on a broader, more incremental and activity-based understanding of innovation which can take place anytime and anywhere by anyone. DUI innovation is conceived as a continuous process related to the everyday practice of organizations in which innovation emerges from the involvement of multiple actors embedded in interactive relationships: ‘The STI-mode gives high priority to the production of ‘know-why’ while the DUI-mode typically will produce “know-how” and “know-who”’, state Jensen et al. (2007: 682). Recursivity, tacit and collective knowledge and ideas emerging from within the organization play an important role here, as well as the context in which organizations and individuals operate. It is this everyday practice that helps establish and characterise innovative capability within firms.

Linking back to classifications of innovation, these two modes can be characterised as featuring in narrow and broad approaches to understanding innovation, see Table 2 below.

Table 2: Narrow and Broad Approaches to Innovation

Dimension	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

From: Mako et al. (2016).

Evidence suggests that incremental, non-technological innovation rather than radical technological innovation is more prevalent within organisations (Toner 2011). Even in innovation leader countries such as Denmark, radical innovations account for less than six per cent of all innovations (Nielsen et

al. 2012: 11). Importantly, evidence also suggests that the DUI mode, specifically organisational innovation, can have at least as profound an economic impact as that of the STI mode (Sanidas 2005).

The OECD (2010) notes that policy interest has been shifting from the STI to a DUI-related mode. For example, Finland, one of the leading innovators in Europe, has adopted a 'broad-based innovation policy', which incorporates this approach to innovation, 'expanding the target of innovation policy to give more significance to non-technological innovations and increasing the positive joint impacts of technological and non-technological innovations' (Alasoini 2013: 1).

The OECD (2010) quickly aligns the DUI mode with one specific type of non-technological innovation – organisational innovation – and argues that organisational innovation should become more central in analyses of innovation. The 'bottleneck' in improving innovation performance, it states, is not low levels of R&D but 'the widespread presence of working environments that are unable to provide fertile grounds for innovation' (p.11). In leveraging these environments, human resource management practices are 'essential tools' of innovation, it continues (p.13). Similarly, Arundel et al. (2007) argue that instead of targeting a higher level of R&D expenditure at national level – which, in any case, seems hard for governments to achieve – more attention should be paid to organisational innovation for two reasons: it is easier to affect and it provides greater effect. Moreover organisational innovation has positive effects on growth at both country and firm-levels, the Dortmund Position Paper states: at the country level, 'investments into organisational change are now visible in the New Growth Accounts ... From the analysis of these accounts, it is clear that such "intangible" investments influence up to some ten percent of economic growth' ((2011: 9). At the firm level, a review of some sixty American articles on workplace innovation shows that 'the magnitude of the effects on efficiency outcomes is substantial, with performance premiums ranging between 15 per cent and 30 per cent for those investing in Workplace Innovation' (p.p.9, drawing on the work of Appelbaum et al. 2011). Little wonder that the European Commission (2004: 15) has long suggested that 'Non-technical innovation may well be the "missing link"' in explaining the EU's comparatively poor innovative performance internationally.

Unfortunately, in practice, the EU still leans heavily on the narrow STI mode: the initial CIS focused on this mode and, despite some revision, the CIS is still dominated by questions focused on this mode (Armbruster et al. 2008; Makó et al. 2016; Ramstad 2009). However renewed efforts are being made to give non-technological innovations more prominence (e.g. EC 2015), including organisational innovation.

One of the problems is the quick slippage between different concepts. As the above discussion shows, the OECD quickly conflates the DUI mode with organisational innovation and the Dortmund Position Paper likewise, whilst discussing organisational innovation, quickly shift terminology to refer to 'workplace innovation'. As we note below, these three concepts are not synonymous and it is difficult to measure or better still, in this case, improve measurement of something that lacks conceptual definition.

Prominent in this regard is organisational innovation. Despite featuring in the Oslo Manual, and now promoted by the European Commission (EC 2013a, 2015), organisational innovation is vaguely defined (see also Coriat 2000). It is also bluntly, if not poorly, measured in the CIS, with a simple 'yes/no' answer to a single question about the introduction of items signalled in the Oslo Manual definition (see also Kesselring et al. 2014). To refer back to our discussion above, no information is gleanable

from the CIS about the impact and novelty of organisational for example. As a consequence, evidence examining the particular effects of organisational innovation is difficult, Pianta (2013) notes.

The second shift in thinking tries to provide the necessary conceptual clarity. In attempting to do so, it seeks to privilege non-technological innovation. The starting point in this shift are attempts to unpack and provide a more detailed elaboration of organisational innovation. Prominent in these efforts are Eurofound (2012) and Armbruster et al. (2008). For Eurofound, organisational innovation centres on 'people management' (2012: 9), itself broadly referring to the practices that 'renew' work and employment, and includes:

- Business practices – including knowledge sharing and staff development
- Workplace organisation – including devolution of decision-making to employees
- External relations – between employees in one part of an organisation and those of other departments or externally
- Other innovations – including use of variable pay as a change to reward systems or atypical employment contracts

For Armbruster et al., organisational innovation is 'the use of new managerial and working concepts and practices' (2008: 646) and differentiates between innovations that are:

- intra-organisational (changes within an organisation e.g. teamworking) and inter-organisational (changes beyond an organisation's boundaries e.g. with supply chain management)
- structural (e.g. changes to functions such as command chains) and procedural (e.g. changes to routines such as just-in-time operations)

Both conceptualisations of organisational innovation recognise working practices, though, unlike Eurofound, Armbruster et al. ignore employment practices. This latter also extends beyond working practices to organisational and management practices but which can be hard to disentangle from process innovation as elaborated in the Oslo Manual.

An attempt to deal with these blurred boundaries occurs in the European Commission's recent promotion of the concept of workplace innovation (Kesselring et al. 2014). This concept explicitly covers both organisational and process innovations and rests, the authors state, with *human resource management* and *organisational development* functions respectively within workplaces (see also Pot et al. 2016). Moreover, workplace innovation offers an alternative *model* of innovation. The up-to-now still dominant STI mode of innovation rests on a simple inputs-outputs approach, with the CIS, counting, for example, the number PhDs (inputs) and patents (outputs) in each Member State. This approach is discontinuous and ends-focused – with a new good or service most obviously. Workplace innovation offers a broader input-process-output-outcome-impact schema that is more concerned with the process, which, it argues, is dynamic and reflexive with continual refection, learning and transformation (see also Dortmund Position Paper 2012). Inputs or 'enablers' are the individual, organisational and societal resources that underpin innovation-directed activities. Process refers to the actual practices that make innovation happen and involve diverse stakeholders within and sometimes outwith any particular organisation. With this emphasis on multiple actor involvement, workplace innovation is not unlike the DUI mode of innovation outlined by Jensen et al. (2007). Outputs are the immediate results – innovations. Outcomes refer to the impact on organisational

functional performance. Impacts refer to the longer-term and longer-scale impacts on organisational financial performance. Unlike the STI mode with its focus and concern with the seemingly linear leap from inputs to outputs, workplace innovation is focused on and concerned with the in-between process and so how innovation occurs for organisations.

For the very practical reason that the CIS exists, statistical analyses of innovation at country level within the EU still draw on it. As a consequence, it is still the four types of innovation as laid out in the Oslo Manual that dominate such analyses – and QulnnE is no different in this respect: its research too covers these types. However QulnnE also accepts that research of the innovation process should not only be concerned with analysis of types of innovation but should also seek to understand how innovation and why innovation occurs, as Fagerberg (2013) argues, and doing so across all types of innovation. As we outline above, there are a number of concepts forwarded that attempts to explain this process. Each of the suggested concepts privileges non-technological innovation over technological innovation, making it salient in the innovation process. However it is not clear if this salience means that non-technological innovation drives all innovation or if it merely delivers more impact on innovation than other types. In other words, the residual, unresolved problem is that attempts to provide conceptual clarification around organisational innovation as the key type of non-technological innovation only add further confusion by conflating type and mode of innovation. Understanding of how and why innovation occurs thereby remains ambiguous at best, still under-developed at worst. What is useful, however, is that, to varying degrees, each concept includes work and employment as important issues in the innovation process – which neatly dovetails with QulnnE's approach to job quality

Job quality: importance and approaches

In recent years, there has been resurgent interest job quality (Gallie 2007a; Knox and Warhurst 2015), as the next section outlines. Within this resurgent interest, there remains a need to define and operationalise job quality, and QulnnE develops its own bespoke framework for doing so and which is also elaborated below.

The resurgence of interest in job quality

The renewed interest in job quality is fuelled by a number of developments. First is the proliferation of low quality jobs and the increasingly precarious nature of employment in contemporary capitalism, although the extent of these developments varies significantly between countries, sectors and occupations. This development can take the form of the growth of non-standard, insecure and low paid jobs (Kalleberg 2009, 2011; Koch and Fritz 2013; Eichhorst and Marx 2015) or of a declining quality of certain features of standard jobs (Dekker and van der Veen 2017). Second is the emergent awareness of the intimate relationship between job quality and a number of other key socio-economic indicators, including inequality and labour market dualisation (OECD 2015; Wilkinson and Pickett 2009) as well as health and well-being (Julia et al. 2017; Benach et al. 2016). Third, the renewed interest in job quality has also raised interest in the respective role of collective actors. Increasing attention has been given to the ways in which industrial relations actors, and in particular trade unions, influence job quality (Keune 2015; Burgess et al. 2013; Simms 2015). It has also raised questions concerning public policy, which in the EU for many years has emphasized activation, prioritizing the raising of employment rates over the quality of jobs (Keune and Serrano Pascual 2014; Barbier and Ludwig-

Mayerhofer 2004). The role of institutions and public policy is further emphasized by persistent differences between countries in terms of levels of job quality and the respective within-country inequalities (Anton et al. 2012; Green et al. 2013). Finally, more recently, it has been fuelled by concerns that, since the GFC, there has been further growth in Europe of some types of ‘non-standard employment’ (temporary, part-time, zero-hours and bogus self-employment) (Eurofound 2016), compounded by the rise of the putative digital economy, in which platform companies and gig work provide work with weakened terms and conditions of work and even question ‘employment’ as a status, potentially creating permanent precarity (Taylor 2017; Warhurst et al. 2017b).

Job quality therefore needs to be boosted in the EU. Prior to the crisis, job quality had various trajectories in the EU: upgrading in Nordic countries for instance, some polarisation in Continental countries and expansion in the number of mid-quality jobs in Southern countries. Using pre-crisis data, Anton et al. (2012: 42) calculated that 13 per cent of jobs in the EU were ‘bad jobs’ of low quality as measured by pay, intrinsic job characteristics, terms of employment, health and safety, and work-life balance. They also found that bad jobs are heavily concentrated in Eastern European countries (e.g. Romania and Bulgaria). The country with the lowest share of bad jobs was Denmark. These authors note, however, that these findings are largely driven by the effect of wages. With the crisis, job quality in the EU has come under further pressure, with a tightening polarization of job quality across the EU (as measured only by wages) (Eurofound 2013). Other research confirms this trend. Using another marker, work intensification, Gallie (2013) found that work intensification, has increased across all jobs following the crisis regardless of country – though it is most marked in the Liberal countries. Using another marker – job control – Nordic countries’ workplaces now offer the best job quality, those in Southern and Transition countries the worst. Indeed the incidence of high and low-quality jobs overall varies by country in the EU. The Transition and Southern countries have the worst job quality, the Continental countries now have middling job quality and the Nordic countries the highest. Significantly, high quality jobs still populate the most productive industries within the EU’s primary, secondary and tertiary sectors, e.g. energy, transport and financial services respectively, Gallie found. Moreover, better quality jobs, as characterized by pay, have proved to have greater resilience during the crisis, particularly in the public sector in education and health (Eurofound 2013), and those countries with higher job quality fared better economically during the crisis, for example the Continental and Nordic countries.

These country differences are significant for they signal that, as with innovation, research now discerns an institutional impact on job quality at country level. This country effect runs counter to dominate arguments that technology is a major, if not the, driver of driver of job quality. It is digital technology, for example, that underpins the platform economy and its effect on working conditions noted above. The main theory aligned with this technologically-deterministic position is the Skill-Biased Technical Change thesis. This theory posits an upgrading of job quality as routine manual and routine cognitive tasks are replaced by computerised automation, while the same computerisation boosts demand for non-routine cognitive tasks (Autor et al. 2003). However, some research challenges this theory. Using pay as the measure of job quality, data over 1995-2007 reveals trend variation amongst EU countries. In some countries job quality has polarised, in others it has upgraded – that is, improved. With no pattern common across EU Member States, these outcomes show that technology does not deterministically drive the quality of jobs but is instead mediated by institutional factors (Fernandez-Macias 2012). For example, during the period under study, some countries deregulated their labour markets, with increased non-standard employment, whereas others had strong trade

unions able to counter this development. Fernandez-Macias concludes that there is nothing inevitable about technology's effect on job quality. Instead, he says, 'institutions have an important impact on what happens' (p.177).

There have been a number of theories centred on explaining the relationship between national institutions and work and employment. The most popular currently is the 'varieties of capitalism' (VoC) theory (Hall and Soskice 2001). As with other institutional theories, VoC posits that country-specific institutional arrangements – such as financial markets, employer organisations, trade unions, welfare provision, and education and training systems – create distinct forms of capitalism. Two main forms of capitalism are then offered: liberal market economies (LME) and coordinated market economies (CME). Organisations within these different types, exemplified by the UK and Germany respectively, use their workforces differently. The UK has a low-skill equilibrium, incentivising employers to compete on cost with simplified work processes, dis-incentivising them to train workers and allowing them to easily hire and fire these workers. In contrast, German organisations compete on quality, with highly-skilled, co-operative (with management) workers on more secure employment contracts (Finegold and Soskice, 1988). Within this dualist opposition of types is an implicit, sometimes explicit, assumption that the CME provides better jobs than the LME (Crouch, 2009).

A similar theory that has been explicitly applied to job quality is employment regime theory (Gallie 2007a). It also focuses on institutional structures but narrows that focus to the employment and industrial relations policies that underpin them and the role of organised labour in employment policy and regulation. The theory distinguishes three models of employment regime: 'inclusive', 'dualist' and 'market'. The inclusive regime favours integration of organised labour into policy making, strong workplace dialogue and good quality jobs. The dualist regime has a core-periphery structure with voice and good job quality restricted to core employees. The market regime has minimal employment regulation, job quality contingent on market power leading to strong variations by skill and class.

There have been a number of revisions and additions to these institutionalist theories (e.g. Smith and Meiksins 1995; Warhurst 1997). Given its popularity, VoC has attracted most scrutiny. Critics have pointed out that the dualism of VoC fails to capture important differences between the Nordic and Continental countries and leaves the Southern and Transition countries unclassified (Gallie, 2007a; Iversen and Stephens, 2008). Research also reveals differences within countries, not just between countries – particularly by sector (e.g. Crouch, 2009; Eichhorst and Marx, 2009). While the job quality predictions of Employment Regime Theory fare better, as in the case of VoC it does not account for the relatively favourable position of the liberal countries with respect to many job quality indicators and there remain significant unexplained differences between countries within the same regime type.

Nevertheless, as research of the EU shows, at the aggregate level, countries do vary in terms of job quality (e.g. Gallie 2013). Moreover, Fernandez-Macias' (2012) data highlights country clusters within the EU in terms of the direction of job quality trends over 1995-2007. Continental European countries experienced job polarisation, Scandinavian countries job upgrading and Southern European countries an expansion of middling quality jobs. The UK and Ireland generally had mild polarisation. Using a range of indicators, Erhel and Guergoat-Larivière (2016) identified four country clusters within the EU: the Nordic countries (Denmark, Finland and Sweden) have high wages, training, work-life balance and social dialogue, though non-standard employment is above average. Working conditions are close to the average. The Continental countries (Germany, Austria, Belgium, Luxembourg and the Netherlands), as well as the UK and Ireland, have high high-wage and low-wage incidence and the

highest non-standard employment but they also have good training, work-life balance and social dialogue. The third cluster of Eastern and Central European countries (excepting Poland) has low incidence of non-standard employment but also low wages and poorer working conditions. The fourth cluster of Southern countries (Portugal, Italy, Greece and Spain – complemented by France and Poland) has high non-standard employment, lower training and learning opportunities, and below average social dialogue and wages, but also lower incidence of low-wage working.

Such research not only highlights differences in job quality by country or country cluster but that change also occurs in job quality over time. These changes can be twofold: first in terms of the stock of jobs that are good or poor quality; second in terms of the content of jobs. In terms of trends therefore, within any country or across the EU, more good or more poor jobs can be created, or existing jobs can get better or worse (Carré et al. 2012). What becomes important is understanding how these changes occur and how job quality can be improved.

The empirics bear out that having different levels of job quality impacts growth. EU Member States with a larger share of high quality jobs have significantly higher rates of employment and employment activity (EC 2012) and countries such as Germany which suffered less in the current economic downturn also have higher aggregate job quality (Lundvall 2014). Analysing EU data, Siebern-Thomas (2005) finds that job quality improvements increase the national employment rates from 60 per cent to 64 per cent and decrease the unemployment rate from 10 per cent to 6 per cent over a 10-year period. The correlation between country-level employment rates and components of job quality is positive and significant when longitudinal European data is analysed (Erhel and Guergoat-Larivière 2010). Industries with high job quality have higher employee job satisfaction and lower employee absenteeism and turnover but also higher productivity and, significantly, higher innovation (respectively Clark 2005; Clegg 1983; Freeman 1978, Toner 2011, Patterson et al. 1997). There are therefore bottom-line benefits to EU firms in having good job quality. Better jobs not only have positive outcomes for countries but also firms and individual workers. It therefore makes sense for the EC to aim to stimulate higher job quality within organisations as a policy aim, and an explicit emphasis on job quality exists in the *Europe 2020* strategy (EC 2012).

Defining job quality

Despite the renewed academic and policy interest in job quality, there is, as yet, no commonly agreed scientific definition of job quality and disciplinary and measurement approaches to it are heterogeneous (Knox et al. 2015; Wright 2015). This lack of common definition and the variety of approaches to measuring it hamper effective policy responses to job quality (Warhurst 2017).

At present, there are three main approaches to assessing job quality (Muñoz de Bustillo et al. 2011; Muñoz de Bustillo and Fernández Macías 2005).

1. The first is to use job satisfaction as an overall indicator of job quality, instead of identifying and measuring the attributes that define the quality of a given job. This approach is not based on a model of job quality but makes implicit links to job quality. Its main advantage is its simplicity. However, it has a number of disadvantages, including limited between-country variation, low correlations with objective job quality dimensions, and the sensitivity of job satisfaction to other factors that are not related to job quality. Job satisfaction is therefore a problematic indicator of job quality, regardless of its merit for other purposes.

2. The second approach is an intermediate variant where workers are presented with a list of job attributes to be chosen and/or ranked by importance, to then use their answers to identify and weight the attributes of a good job, which are measured separately. This approach has the advantage of respecting workers' own preferences without relying on an overall satisfaction measure. It can also flexibly adapt to national specificities and change over time in the thinking of what makes a good job. However, the pre-selection of items to be scored by the workers may be just as complicated as choosing the dimensions of job quality itself, while they also necessarily constrain workers' choices. Also, workers' valuation of job characteristics depends on personal, cultural, temporal and geographical characteristics. The results can be difficult to interpret, generalize and compare between countries or over time.
3. The third approach shifts the focus from workers' opinion to the implication for workers of a variety of objective quality dimensions of jobs, drawing both on theory literature and empirical evidence. Most current scientific research on job quality uses such objective, multi-dimensional definitions of job quality. Moreover, there is a long tradition across disciplines of studying the impact of different elements of work and employment relationship on workers. These disciplines' research also provides a guide to determining what constitutes job quality based on their overlaps. It is this third approach that can be adapted to international comparative research on job quality. It is objective, employee-centred, multi-dimensional and applicable to a large variety of sectors/branches and countries.

Drawing upon and synthesizing the existing scientific studies of job quality, the overlaps across the disciplines are identifiable and suggest six key dimensions that commonly constitute job quality. These six dimensions emerge from the studies as the core components of job quality and together provide a comprehensive picture of job quality (for details of the mapping of these studies, see Warhurst et al. 2017a). From this analysis, QuInnE adopted a bespoke multi-dimensional framework of job quality with the six dimensions and a number of indicators in each dimension (Table 3).

Table 3: QuInnE's bespoke framework of job quality

Dimension	Indicator
Wages	Pay level relative to national minimum pay and average for required qualifications
	Pay variability
Employment Quality	Permanent/Temporary Status
	Job Security
	Internal Progression Opportunities
	Predictability of Weekly Hours (Overtime – Zero Hours)
	Presence/Absence Involuntary Long Hour Work (40 +)
Presence/Absence Involuntary Part-Time Work (<30)	
Education & Training	Learning Opportunities on the Job
	Training Incidence
	Training Quality
	Opportunities for General vs Specific Skill Acquisition (Transferability)
Working Conditions	Individual Task Discretion/ Autonomy
	Semi-Autonomous Teamwork
	Job Variety
	Work Intensity
	Health and Safety (Physical and Psychosocial)
	Supervisory Social Support
Work Life Balance	Peer Group Social Support
	Work Time Scheduling (Unsocial Hours)
	Hours of Work (Duration)
Employee participation	Working Time Flexibility – Provisions for Time Off for Personal Needs
	Direct Participation re Organisational Decisions

	Consultative Committees Works Councils
	Union Presence
	Union Decision Making involvements

QulnnE does not employ a synthetic indicator to be calculated based upon these dimensions. It acknowledges the existence of multiple interrelations between these dimensions but refrains from imposing an ex-ante accumulative or trade-off interpretation of the directions of these relations, which we see as an empirical question. This framework is applied in the QulnnE research to compare job quality between countries and sectors, to study job quality at the organizational level and, most importantly, to identify correlations and explore causal effects in the relationship between innovation and job quality.

At an aggregate, national level data to populate these indicators exists in the latest European Working Conditions Survey. However the sample size for each Member State is only 1000 respondents, though a small number of Member States boost this size for their own country. Nevertheless, disaggregation of the data by industry, and respondents' demographic details for example is constrained, which greatly limits analysis even at country level, though not at the EU level (Anton et al. 2012). To analyse it at the organisational level, national administrative data is required, though there are other issues about data comparability across Member States. As a framework of job quality, however, the six dimensions framework is gaining traction amongst policymakers and practitioners within EU Member States (see, respectively, Taylor 2017 and CIPD 2018).

These Member States, as with the European Commission, are keen to improve innovation, not just job quality. It might be, as Totterdill et al. (2012) suggest, that there is potential for innovation and job quality policy to converge. Identifying and exploring any possible empirical relationship between innovation and job quality then becomes useful. Moreover if, as Toner (2011) notes, the extent to which a firm's workforce engages with innovation is strongly determined by the work and employment practices within those firms, then QulnnE's approach to job quality provides opportunity for analytically exploring that process, particularly if it is employee driven.

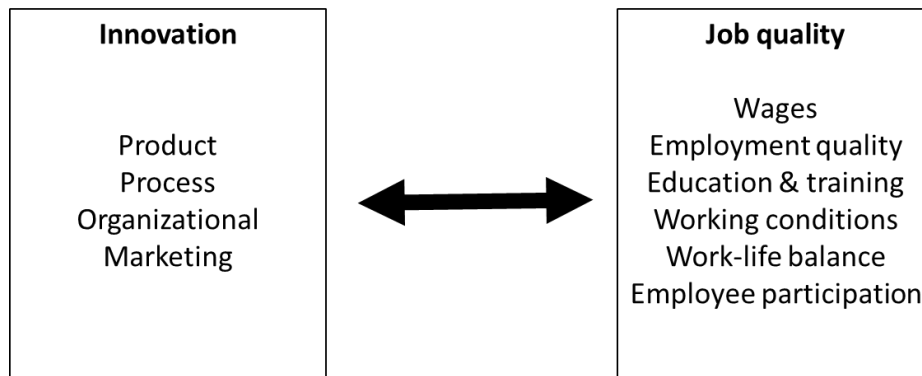
Analysing the relationship between innovation and job quality

A number of possible relationships between innovation and job quality exist: innovation might enhance or diminish job quality, job quality might enhance or diminish innovation. If the outcome is negative in either case it is possible that there could be a new trade-off between innovation and job quality just as the old trade-off assumption about job creation and jobs quality has been exposed as a myth. However it might also be the case that innovation and job quality are mutually reinforcing, such that boosting one might boost the other. What shapes these different outcomes is an open question empirically. Indeed, at present, the relationship between innovation and job quality is under-researched. Most existing research centres on the relationship between one or two types of innovation and one or a few dimensions of job quality. There is therefore a pressing need for research that better explores the innovation-job quality nexus within firms (Lundvall 2014; Pianta 2013).

Any attempt to explore the relationship runs into complexity. As we outline above, both innovation and job quality are multi-dimensional and not easily captured in single indicators (Figure 1). In addition, the relationship between the different types of innovation and the various components of job quality may differ. Moreover, causality can run both ways: innovation can affect job quality and

job quality can affect innovation. In addition, in both cases that effect may be positive or negative: innovation might enhance or diminish job quality; job quality might enhance or diminish innovation.

Figure 1: Innovation and job quality



Hence, the relationship between the two is multi-dimensional, multi-directional and multi-effect. These possibilities suggest that analysis needs to go beyond generic understandings of innovation and job quality to explore instead the interactions between the types of innovation and the different dimensions of job quality. However current data availability hampers this need. For example, the CIS offers limited analysis of organisational innovation and the EWCS has, until recently, not covered all the six dimensions of job quality common across the literature and adopted by QulnnE. As a result, there is little to no literature available that captures the complexity pictured in Figure 1. Current analysis of the relationship highlights not just its complexity but that its outcomes can be varied, as the next two sub-sections indicate.

Technological innovation and job quality

As current debate about the rise of the robots illustrates, huge expectations and fears are attached to technological (product and process) innovation and its effects on jobs (e.g. Frey and Osborne 2013). There are several transmission mechanisms that link technological innovation and job quality (Muñoz de Bustillo et al. 2016). The first is the impact technological innovation has on the structure of industries and occupations. Product innovation can result in new industries replacing old ones while process innovation may lead to the disappearance of certain types of jobs and occupations and the emergence of others. The second is how innovation directly affects the quality of jobs through *changes in production processes* that affect health and safety, the nature of work tasks and the skill composition of the workforce. The third is the way process innovation can have substantial productivity effects, which can translate into increased wages and reduced working time, for example.

As to the first two mechanisms, the theoretical debate focuses on the effects of technological change on occupations – for which read skill levels. It contrasts, on the one hand, the skills-biased technological change thesis that argues that technological change is leading to an increase of higher-skilled jobs and a decline of lower-skilled jobs (Autor et al. 2003) and, on the other hand, the more recent routine-biased technological change thesis which argues that technological changes have resulted in the growth of in particular high skilled but also low skilled jobs and in the decrease of medium-skilled jobs (Goos et al. 2014; Dolphin et al. 2014; Oesch and Rodríguez Menés 2010). The former argues that technological change leads to an upgrading of job quality with more better jobs,

while the latter argues that it leads to a polarisation of job quality, with more jobs with higher job quality and more jobs with lower job quality (for further discussion, see Hunt et al. 2018).

Whilst these two theories demonstrate important (potential) effects of technological innovation on job quality, they also have important weaknesses. One is the over-emphasis on technological innovation and their blindness to other types of (non-technological) innovations, even those already contained within the Oslo Manual, and which are more prevalent within organisations (Toner 2011). These other innovations might also affect job quality, as we discuss below. Another is their lack of attention to labour market (and other) institutions and power relations that mediate the relationship between technological change and job quality, as we suggest later. Thirdly, there is empirical evidence that the patterning of job quality outcomes is more diverse than these two theories predict (Muñoz de Bustillo et al. 2016; Fernández-Macias 2012). Finally, these approaches build exclusively on macro-level statistical analysis, which has serious limits in uncovering the mechanisms through which innovation affects job quality, as we have already noted with the CIS.

As for the third mechanism, the extent to which productivity increases are indeed the result of only technological innovation is again disputable. Whilst capital, in the form of investment in technology is important, there are other influences on productivity; why that technology is adopted and how it is used are important, as analyses of Total Factor Productivity highlight. As such, managerial and organisational structures and practices are important (Comin 2010); a point raised in analysis of the European productivity puzzle (Askenazy et al. 2016). Furthermore, productivity gains are not automatically translated into higher wages, indeed wage growth in Europe has been lagging behind productivity growth in recent decades (van Gyes and Schulten 2015). As a result, the labour share has been declining (Karabarbounis and Neiman 2013). This development again points to the importance of additional factors such as labour market (and other) institutions and power relations.

Finally, in terms of the employment effect of technological innovations, employment rates across the EU were increasing before the GFC and have continued to do so since the GFC. Technological change may have reduced employment in some industries but not in others. Indeed, as the OECD (2017) observes, the digital revolution (a technological innovation) has so far not reduced overall demand for labour. However, the OECD also argues that most job growth has taken place in technologically stagnant sectors, such as health care, public administration and personal services, and that these sectors might be subject to future technological innovations and therefore possible employment rate reductions.

Non-technological innovation and job quality

Analyses centred on technological innovation tend to assess job quality outcomes in terms of the resulting stock of good or bad jobs through industrial and occupational restructuring. Non-technological innovation draws attention to the resulting reconfiguring of the content of jobs.

Non-technological innovation refers to organisational and marketing innovation. Here, notwithstanding the debate we outline above about its definition and measurement, we focus on organisational innovation. The reason for this focus is twofold: first, because there are calls for organisational innovation to be made more central to analyses of innovation generally and, second, as we noted above, there are also calls for a better workplace balance to be achieved between organisational innovation, as a form of non-technological innovation, and the STI approaches based on technological innovation (OECD 2010). Following the Oslo Manual, organisational innovation

concerns the implementation of a new organisational method in an organisation's business practices, workplace organisation or external relations. Organisational innovation can have very direct effects on job quality since it is concerned with how work is organised, jobs are designed and organisational relations are shaped. In fact, there can be a blurring of the boundary between the organisational innovation and job quality as concepts, with both often featuring, for example, employee development, task discretion and autonomy, and employment status (Eurofound 2012). Certainly, in terms of how each is measured, existing research indicates an overlap of some of the workplace practices associated with organisational innovation and job quality (e.g. Valeyre et al. 2009).

It is instructive to highlight a number of organisational innovations that have been implemented and the resulting job quality effects, both negative and positive. The first and most obvious is Taylorism or scientific management first introduced in the early decades of the twentieth century. Although the language of organisational innovation was not used at the time, Taylorism, as the sub-title of Braverman's (1974) ground-breaking book states, led to a 'degradation of work in the twentieth century' as indicated by the deskilling of workers. The second, the Volvo Kalmar plant experiment in the 1970s, was an attempt to deal with one of the outcomes of Taylorism – high employee turnover. Through its organisational innovation – teamworking, it sought to make the plant a better place in which to work (Agurén et al. 1976). Lean production, another form of organisational innovation, is claimed by different researchers to both enhance and undermine aspects of job quality (for a short review, see Delbridge 2010). With an emphasis on labour flexibility, many lean organisations have increased external flexibility, through the use of flexible contracts or temporary agency work, and/or internal flexibility, through flexible working time arrangements adapted to production needs or functional flexibility. The effects on job quality differ. Flexible contracts and temporary agency work are generally seen as increasing insecurity and therefore lowering job quality. Functional flexibility can result in increased autonomy and task enrichment and therefore in higher job quality. However, it can also result in higher work pressure and increased stress if it mainly concerns an increase in the number of tasks undertaken by workers. Another relevant and popular concept amongst policymakers is high performance work systems (HPWS) (for a discussion, see Boxall and Macky 2009). HPWS aim to strengthen organisational performance through a bundle of innovations in the way work is organised. It includes self-directing teams, high involvement of workers in organising work, limited hierarchies, higher training efforts, etc. Although the language of job quality is not used in the HPWS literature (see Boxall and Purcell 2019f), such practices can have positive effects on job quality since they are likely to lead to higher autonomy, more opportunities for skill development and possibly wage increases resulting from improved productivity. At the same time, they may lead to higher levels of work stress and increasing work-life imbalance, Boxall and Macky note. What these brief examples illustrate is that organisational innovation, even the same organisational innovation, has the potential to enhance or diminish job quality. What they also underline is the variety of job quality dimensions and indicators used to characterise and measure the impact of organisational innovation.

Going beyond organisational innovation

Whilst useful, cross-multi-dimensional analysis might still be insufficient. Better understanding of the relationship between innovation and job quality might be generated by recognising that not only must analysis incorporate the multi-dimensional nature of innovation and job quality, it might also benefit from incorporating the employee-centred practices that underpin the relationship. This approach, whilst placing less emphasis on technological innovation, still refers to technological and non-

technological types of innovation, recognises these types' impact on job quality, as outline above, but seeks to provide better understanding of the process through which they interact with job quality to potentially improve innovation performance at the firm level.

In this respect, an approach to understanding how and why innovation occurs that is gaining increasing attention is Employee-Driven Innovation (EDI). Whilst it resonates with the conceptual attempts to clarify organisational innovation outlined earlier, it differs in that it is argued to underpin all four types of innovation outlined in the Oslo Manual rather than encapsulate some of them, for example, in the case of workplace innovation, organisational and process innovations. In this sense EDI is not synonymous with organisational innovation but an approach that goes beyond organisational innovation.

As with those other concepts, EDI starts from the position that what is important to innovation is not R&D. Unlike those other concepts, EDI is premised on the importance instead of what happens in the 'everyday lives' on the 'shop floor' of organisations (Høystrup et al. 2010: 131). In particular the focus, EDI proponents argue, should be the relations within organisations that support learning, with learning being a social not an individual act: it is 'the processes (and related products) by which individuals expand their capacity (knowledge, skills, competence etc.) through action, experience and social interaction', Høystrup et al. state (p.150). EDI is explicitly a 'bottom-up' process in which employees are the key source and component of innovation (Høystrup 2010; Anderson et al. 2014; Wallace et al. 2016). It is premised on not just a social but also a humanistic approach to innovation, with employees regarded as creative individuals who have expert knowledge of the organisation, its activities and its external relations, and who possess problem-solving skills as well as information that management does not have and that hence have an innovation potential (Tidd and Bessant 2009; Høystrup 2010). Employee learning, accumulated knowledge and their application are therefore the foundation of EDI.

EDI proponents recognise that the innovation potential of employees is not a given. Instead, it is likely to increase when job quality increases. A number of aspects of job quality are argued to be of importance to foster EDI. For example, based on a literature review, De Spiegelaere et al. (2014) argue that contractual and wage flexibility are negatively correlated with EDI (see also Michie and Sheehan 2003), while functional flexibility is positively correlated with EDI. Another precondition for EDI is workplace learning (Fenwick 2003; Evans and Waite 2010). Others argue that autonomy and worker involvement are key conditions for EDI (e.g. Kristiansen and Bloch-Poulsen 2010). Unfortunately, there is no consensus, or at least no consistency, across this literature as to which aspects of job quality matter.¹

There are similarities between EDI and attempts to clarify organisational innovation. All are practice-focused and make the case that employee resources and the organisational structures and practices that develop and deploy those resources are crucial to innovation. All are keen to pull understanding of the innovation process away from R&D departments. It is at this point, however, that the key difference also emerges. For the other concepts, outwith the R&D department, innovation is levered through the co-operation of a variety of stakeholders, including ordinary employees, across the whole

¹ The danger is that this gap in consistency is filled with the concept of the 'learning organisation' (cf. OECD 2010), which itself lacks a commonly agreed definition.

organisation. By contrast, Kesselring et al. (2014) point out critically, EDI's focus is confined to the immediate work environment of the ordinary employees.

QulnnE views this EDI position as a strength rather than a weakness because it seeks not to provide better understanding of one type of innovation – organisational innovation – but a way of understanding of how all four types of innovation outlined in the Oslo Manual might be better levered. Instead of being a type of innovation, EDI is unambiguously a mode of innovation; in other words, EDI represents a way of doing innovation. Crucially, whilst other concepts varyingly suggest incorporating work, employment, management and organisational practices into understanding the innovation process, EDI's bottom up approach focuses attempts to understand the innovation process solely onto ordinary employees' working practices. Its difference then is not the privileging of particular types of innovation, whether technological or non-technological, but rather the privileging of the working practices of employees. As such it directs analysis of how and why innovation occurs to these practices, the extent to which they exist within firms and the conditions by which they exist. In doing so, it squarely addresses the need identified by the OECD (2010) that we highlighted above for creating working environments that better lever innovation.

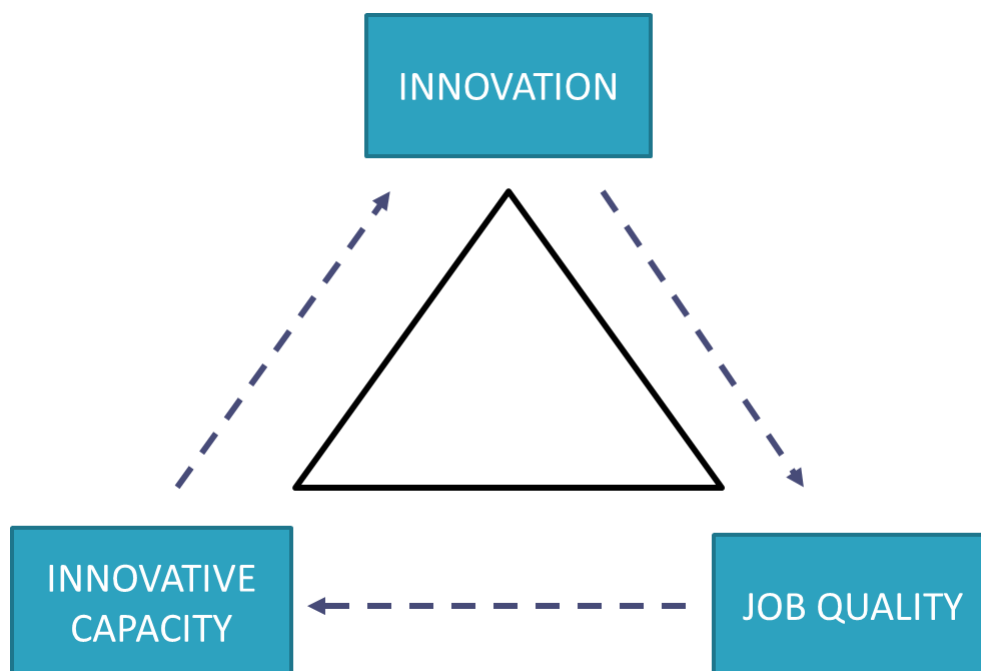
What EDI also does is reference innovative capacity of firms. The innovative capacity of an organisation, i.e. its capacity to successfully engage in the four types of innovation, is on the one hand a function of the innovative potential and hence the job quality of its employees. On the other hand, it depends on an organisation's ability to access and mobilise this potential. Here the relationships between employees as well as between employees and management come into play. Where work is organised in ways that facilitate cooperation instead of competition between employees and that strengthen trust between employees and management, the capacity to mobilise the innovative potential of employees, and therefore the innovative capacity of the organisation, are likely to be higher.

Innovative capacity increases the potential for innovation by encouraging the generation of new ideas and mobilising worker support for change but it does not in itself ensure the adoption of innovations. A number of factors may affect the translation of innovative capacity into innovation per se. Senior management may have limited awareness of the ideas developed by employees at lower organisational levels whether because of a technocratic conception of the innovation process, poorly developed communication systems or lack of capacity (for example in SMEs) to engage in the necessary consultation. There may also be real or perceived business constraints on the adoption of new proposals, resulting from financial constraints, lack of clear demand or risk aversion in a context of market uncertainty. It could be expected, however, that the stronger the participative mechanisms at workplace level, the greater the likelihood that innovative capacity would be converted into effective innovation, since it would encourage two-way dialogue in which managers would be more regularly exposed to ideas from below, while workers would have a greater awareness of the constraints that needed to be taken into account in the way proposed changes were formulated. The whole organisation needs to learn, not just employees, if organisations are to have innovative capacity.

The interaction between innovation and job quality requires this innovative capacity to be developed and deployed. If it does, a virtuous circle can exist, see Diagram 2 below. Within this model, innovation might improve job quality, job quality then might then enhance innovative capacity, and innovative

capacity might deliver more innovation. Conversely, a vicious circle can exist whereby innovation undermines job quality, which in turn diminishes innovative capacity, resulting in less innovation. Both beneficial and detrimental, as well as non-consequential, elements can travel between the boxes or, more literally, the changes within one box (can) have spillover effects on the other, with the directionality indicated. In short, innovation can be beneficial, non-beneficial or have no impact on job quality. Aspects of job quality can be beneficial, non-beneficial or have no impact on innovative capacity and innovative capacity can contribute to various forms of innovation in various ways or not at all, by going unused for example.

Diagram 2: A virtuous or vicious circle?



The virtuous circle rests on the innovation process being employee-centric and, if the EU is to improve its innovation performance, then encouraging the virtuous circle is important. The broken lines between innovation, job quality and innovative capacity in Diagram 2 signal that the relationship is non-deterministic and that other mediating factors also come into play. The mediating factors between innovation, job quality and innovative capacity thus become of interest, with the boxes for each, as they are presented in Diagram 2 really just realms of possibility affected by these mediating factors.

Mediating factors

The dominant STI-driven perspective regards innovation as an activity that is performed by specialised departments (R&D most obviously) within organisations. In these departments, highly-qualified employees engage in innovation processes, the outcomes of which are subsequently introduced in the organisation as new (or revised) products, processes, ways to organise work or forms of marketing. In this perspective, innovation is a linear, planned and top-down process, employees are receivers of innovation, and job quality in the organisation matters only to a limited extent, mainly in relation to the capacity and willingness to accept innovations in organisations (Klein and Sorra 1996).

Competitive strategies and managerial choices

As we have noted already, innovation can impact job quality in a number of ways; reducing the stock of good jobs, increasing the stock of bad jobs or reconfiguring aspects of the quality of existing or residual jobs (Muñoz de Bustillo et al. 2016). One mediating factor in these outcomes might be firms' competitive strategies. According to Porter (1980), these strategies are 'innovation', 'quality enhancement' and 'cost reduction'. Bundles of human resource practices then align with these strategies argue Schuler and Jackson (1987) Firms that pursue the cost reduction strategy require employees to work 'harder', typically with lower pay and skill. Firms pursuing the quality enhancement strategy require employees to work 'smarter' and typically receiving higher pay and more training. Firms pursuing the innovation strategy require employees to work 'differently' (p.210). The 'necessary ingredient[s]' of this difference may include employees being highly skilled, having more discretion, less managerial control and higher levels of co-operation as well as a longer-term focus, which, we would argue, is enabled by contract stability. Whilst a raft of research has sought to empirically test Schuler and Jackson's claims about the 'quality enhancement' and 'cost reduction' strategies, the 'innovation' strategy has received far less attention (Knox and Warhurst 2018). Whether these strategies are distinct is a moot point for example and in need for empirical investigation – as we noted above, innovation can lead to cost reductions within organisations.

More significantly perhaps, Knox and Warhurst's (2018) review of the evidence suggests that competitive strategy might be less deterministic of aspects of job quality than argued by Schuler and Jackson. This evidence reveals that firms pursuing the same strategy can offer different job quality, for example with regard to employment security by using temporary or permanent employment contracts (Metcalf and Dhudwar 2010). Such differences rest on managerial choices, Sung and Ashton (2015) suggest on the basis of a number of UK case studies, with some managers being much more people focused than others, and so more likely to invest in developing the skills of their employees for example. In other words, Sung and Aston argue, managerial choices influence the strategies pursued. Other Australian case study evidence (Skills Australia 2012b) suggests that it can be more mundane managerial concerns such as recruitment and retention problems but which are still addressed strategically by employers through the introduction of human resource policies that encourage, for example, skill development and skill use in the hope of making those firms more attractive places to work. Both sets of evidence resonate with the much earlier research by Child (1972) which points out that the introduction and implementation of technological innovations within firms is not determined by that technology but the outcome of choices exercised. These choices are exercised by powerful actors within companies, for example management and trade unions, and are often contested and negotiated. Current debates about the new digital technologies are blind to these organisational choices, who makes them and how they are made (Warhurst et al. 2019f). Nevertheless, these choices about technological innovation affect both the quantity and quality of jobs within workplaces. What these debates about strategy and choice highlight is the need for research focused on the right-hand slope of the triangle on how innovations translate into job quality that does not regard innovation, technological or otherwise, as deterministic but instead influenced by choices exercised within firms.

Human resource management

The link between job quality and innovative capacity is contingent upon organisations having appropriate and effective forms of human resource management (HRM). Given that innovation within organisations is predominantly incremental, Toner (2011) argues that organisations' workforces have a central role to play in generating and diffusing technological and non-technological types of

innovation. There is suggestion in the literature that particular forms of HRM not only enhance job quality (see Skills Australia 2012a) but are also the same aspects of job quality that help develop and deploy innovative capacity. For example, the HRM literature on HPWS has posited an indirect relationship between HRM and innovation, with particular forms of HRM implying better job quality (e.g. Huselid 1995). The innovation described again tends to be incremental and process, and job quality characterised by pay, training, skill and workers having task discretion (see Laursen and Foss 2015). Without the link to job quality being made explicit, but in practice enveloping some of the dimensions of job quality used by QuInnE, the HRM literature argues that particular human resource practices facilitate innovation. Laursen and Foss (2003) for example find that delegated problem-solving facilitated through workers, individually and in teams, and workers having task discretion allows for the use of knowledge and skills leading to product innovation. Certainly, from a Schumpeterian perspective, more innovative firms should have more socialised forms of production, with less hierarchical control and more horizontal coordination amongst their workforces. Classic studies of innovation seem to support this argument, highlighting that innovation occurs best with particular forms of what is now called HRM. For example, in Burns and Stalker's (1961) case studies, organic forms of internal firm organisation aligning with unpredictable environments and more bureaucratic organisation aligning with predictable environments.

Research on human resource architecture within organisations suggests that innovative capacity is best created when employee knowledge is shared amongst employees (see Lepak and Snell 2010). To this end, work and employment needs to be organised to enable that knowledge acquisition and diffusion. In this respect, skills, education and training have a vital role in preparing the capability of these workforces for innovation but that these workforces' capacity to engage innovation is shaped by work organisation, Toner (2011) acknowledges. In 'high road' organisations, work is organised to enable trial and error experimentation amongst the workforce, which is also able to work collaboratively within and across functions and departments (Ahanotu 1998; Warhurst 2002). Similarly, the enablers of workplace innovation, as outlined by Kesselring et al. (2014), ensure that employees and managers have the capacity and willingness to engage with each other in innovation, which, they state means co-creation and co-design through work tasks that are organised to allow that engagement. Taken together this bundle of human resource practices has clear echoes of HPWS premised on employees having the ability, motivation and opportunity (AMO) to apply discretionary effort to achieve higher levels of performance (Appelbaum et al. 2000). Ability refers to employees being appropriately skilled, most obviously through training. Motivation can be extrinsic/financial, meaning 'gainsharing' reward systems, or intrinsic, meaning workers being challenged in work, thereby inducing greater satisfaction and commitment, or is induced through a culture of trust between employees and managers. All three components have to be present for workplaces to become high performing – or specifically in relation to the innovation process, are the organisational enablers of the relevant employee practices.

Overall, what this literature highlights is that innovative firms have better job quality, underpinned by particular forms of HRM. Unfortunately, if the relationship between HRM and innovation is recognised in the literature (for an overview, see Laursen and Foss 2015), the relationship between HRM and job quality tends to be overlooked, implicit at best (Boxall and Purcell 2019f). Our reading of the HRM literature would suggest that this myopia needs to be addressed; HRM mediates between job quality and innovative capacity, acting as the facilitator for the bottom side of the triangle in Diagram 2.

Innovation management

The other mediating factor is innovation management (IM). IM 'encompasses the choices managers make regarding what innovations to pursue and how they develop, introduce and gain value from their endeavours' (Dodgson et al. 2014: 3). As such IM is a broad domain, encompassing the apex of the triangle in Diagram 2, and impacting both the left and right slopes of the triangle. While this perspective on IM is broad, it focuses on the choices and activities of managers as arbiters or gatekeepers of innovation, both in terms of what types of innovations are selected, in light of organisational internal and external factors, and how these innovations are implemented with different effects on employees (the right-hand slope). An even broader perspective on IM would also include the ways in which employees also actively or passively participate in managing the innovation process through formal collective or informal processes.

Remaining within the mainstream perspective that privileges the choices and actions of managers, the right-hand slope of the triangle is the 'implementation' aspect of innovation management, in keeping with the definition of innovation as the implementation or application of new ideas and processes. Often this implementation entails selection among multiple options, in terms of basic options and more fine-grained choices. Of equal concern for our purposes is the role of innovation management in facilitating employee participation in the innovation process – the left-hand slope. From an IM perspective, this activity is the most complex as it entails coupling employees' ideas, abilities and motivation to participate in innovation processes with other resources more exclusively at the disposal of managers, such as finance, time, physical infrastructure, wider knowledge resources, technology, collaboration networks etc. It often requires coordinating across the span of organisations (Philips 2014). In the triangle, employee-sensitive innovative capacity becomes one necessary and central resource for the innovation process but it needs to be facilitated and augmented by other types of resources. As resources are pulled from outwith as well as within the organisations, IM plays a mediating role in terms of both resources and opportunities and demands from the institutional and economic context beyond the organization, while simultaneously forming and utilizing the capacities within the organization. As with all management, actions can be successful or fail, productive or counter-productive, with beneficial and disadvantageous outcomes resulting from managerial action for a variety of reasons despite the intentions of managers, as Webb (1992) highlighted over 25 years ago.

In terms of creating a virtuous circle, it is thus hypothesised that the link between job quality and innovative capacity that is effective in engaging employees in the innovation process is contingent upon a number of mediating factors. The first is the bundle of managerial choices about the pursuit of competitiveness, including technology introduction and implementation. The second is the ability and willingness of management to construct appropriate forms of HRM. Relevant HRM practices include, for example, forms of work organisation, training and reward that strengthen cooperation, build trust and mobilise skills. The link between employee-centred innovative capacity and innovation is contingent, thirdly, upon the capacity and willingness of management to provide adequate systems of IM, with these systems including, most obviously, channels for taking account of employee contributions (e.g. consultative and/or representative participation) and for integrating technical advice, from R & D for example, with employee knowledge and ideas. It needs to be appreciated that how these factors play out can be firm-specific, and organisations can be leading-edge and exemplars within their sectors for other firms to follow (Smith and Meiksins 1995). However the aspiration for the European Commission has to be for these managerial choices and forms of HRM and IM to be

standard, not leading, management and organisational practice if EU levels of innovation and job quality are to be raised. At present there are predominantly country-level contextual factors that might also be hypothesised as also coming into play.

Contextual factors

It is not just levels of innovation and job quality that can vary substantially between countries as a result of institutional variations, the relationship between job quality, innovative capacity and innovation may well also vary for the same reason. As Polanyi et al. (1957) noted over half a century ago, any economy is an 'instituted process', in which 'institutional' refers to both agency and structure with social rules that, routinised, provide for 'an organised pattern of action' for economic actors (Zucker, 1987: 444). Each country, and sometimes regions within countries depending upon the extent of devolved responsibilities, has a 'distinctive configuration of institutional arrangements' (Stark and Nee, 1989: 9) for example financial and banking regulations, training and education policies, industrial relations systems and familial arrangements. As we noted earlier, a very popular expression of this institutionalism is the 'Varieties of Capitalism' approach (Hall and Soskice 2001), though there are increasingly influential variants, such as employment regime theory (Gallie 2007b).

Economic organisations, for example firms, are not just 'embedded' within these institutional configurations but for normative, coercive or mimetic reasons (DiMaggio and Powell 1983) also adopt the configuration of institutional arrangements within which they are located. Firms' structures and practices are thus encouraged and/or constrained by their institutional context. Stated more crudely, firms come to resemble the countries in which they are embedded.

These wider institutional and cultural environments are likely to effect key aspects of the innovation process. The relationship between job quality, innovative capacity and innovation may well vary substantially between countries as a result of institutional variations in the regulation of both employment relationships and the labour market, helping to account for marked differences in country innovation performance. The literature has pointed to four particular aspects of the institutional environment that can affect worker experiences, attitudes and behaviour in a way that may be important for innovation – the industrial relations systems, the educational and training system, employment protection regulations and the welfare system (e.g. Allmendinger and Liebfried, 2003; Anderson and Pontusson, 2007; Gallie, 2007b; Soskice, 1999).

Industrial Relations Systems

The regulation of employment relations too is institutionalised. A key dimension of differentiation of institutional systems with respect to employment relations is the extent to which they encourage participative decision-making, whether with respect to the social partners or more directly with the workforce at the organizational level. As has been noted, there are substantial variations between countries in the prevalence of participative decision-making at work, with the Nordic countries having relatively high and the Southern and Transitional countries having relatively low levels of participation (Gallie and Zhou, 2013).

Stronger institutionalization of social dialogue could be expected to strengthen a virtuous cycle of higher job quality, greater impact of job quality on innovative capacity, stronger conversion of innovative capacity into innovation and more positive effects of innovation on job quality. Participative decision-making with respect to work organization should raise job quality by producing a better adaptation of jobs to the preferences and needs of workers, thereby leading to stronger

motivation to improve work processes. At the same time, it should encourage greater trust and cooperation between employees. Higher motivation and increased worker cooperation are essential conditions of high innovative capacity. Further, stronger institutionalization of social dialogue at workplace level should facilitate the communication of workforce ideas for improvements to higher levels of management. Forms of innovation informed by consultative processes are more likely to be associated with further improvements in job quality and less likely to lead to a deterioration in work conditions (at least for workers with a given employer). The key point is that the propensity for these practices to occur is likely to be mediated by the particular institutionalisation of employment relations within each country.

Educational and Training Systems

Countries differ with respect to their skill formation systems in a way that may affect employers' openness to utilising the skills and knowledge of their employees. Even in countries with similar levels of economic development and the same technology use, there are differences in work-related education and training systems (Bosch 2017). Discussions of institutional differences in these systems have emphasized the significance of degrees of standardization and stratification of educational programmes (Allmendinger and Liebfried, 2003) for the status and recognition of skills. A parallel literature (Soskice, 1999) has underlined the distinctive dynamics of countries that promote specific skills in contrast to those that draw primarily on general skills (for an update, see Martin 2017). There can be contrasting expectations about the implications of differences in educational systems for innovation processes, in particular, with respect to their consequences for a more inclusive use of innovative capacity. On the one hand, they may encourage a technocratic conception of the innovative process, since they emphasize the importance of specific technical skills with distinct spheres of expertise and responsibility. This type of conception could encourage the creation of relatively closed organizational siloes, with those employees formally directing the innovation process reluctant to take account of the knowledge and views of those most directly involved in the work process. On the other hand, the certification of technical skills in the wider workforce that tends to characterize specific skill systems may raise the status of and respect given to workers on the front line and encourage higher levels of consultation. The relative importance of these two dynamics is an important issue for empirical investigation.

Employment Protection and Welfare Regimes

A third aspect of institutional differentiation that has been central to the literature has focused on mechanisms that enhance or reduce employee security, whether in specific jobs or in the wider labour market. As we noted earlier, the importance of job security for employees' willingness to engage with innovation has been a matter of debate. However, there is some evidence that lack of security encourages withdrawal and a defensive approach to innovation (Probst et al. 2007; Probst, 2009). It could be expected then that institutional structures that provide stronger job protection will favour more active involvement of employees in innovation and a greater willingness to accept the changes that it implies. The most direct institutional factors affecting job security are the nature of contracts and the strength of employment protection regulations. Innovative capacity is likely to be higher where the workforce is primarily recruited into regular, rather than temporary contracts, and where employment protection is stronger. It is possible, however, that the willingness of workers to engage with innovation will also be affected by their perception of their broader security in the labour market (sometimes termed employment security). If the labour market is seen as offering relatively good opportunities for finding new jobs, workers may still feel that there are benefits in being actively

involved in innovation in their workplaces, since the knowledge they acquire may enhance transferable skills that improve their future job prospects with other employers. While wider labour market security is predominantly related to macro-economic conditions, there is some evidence that stronger welfare systems and more developed labour market activation policies can contribute to a sense of employment security.

These four aspects of the institutional environment can thus not only enhance or diminish levels of innovation and job quality, it can be hypothesized that they will affect the relationship between innovation, job quality and innovative capacity, encouraging or constraining the virtuous circle. In the absence of EU-wide standardisation of institutions and institutional configurations, country differences will continue to matter within the EU with respect to the strength or weakness of the virtuous circle. However, to return to the point made above, institutions are not inert and actors within them have agency (Warhurst 1997). Vanselow (2008), for example, charts the new-entrant-employers-led changes to the long-standing institutionalised employment relations of the hotel industry in Germany over the turn of the twenty-first century that did much to undermine the job quality of room attendants. More positively, Metcalf and Dhudwar (2010) found that UK organisations operating in the same markets with the same pressures offered different levels of job quality, with those offering better job quality doing so because of their 'corporate ethos ... rather than operating requirements' (p.39). Consequently, even within countries, managers as employers in loco can make choices within the institutional constraints about whether to pursue human resource management and organisational development policies and practices that will enable their employees to take a more central role in innovation process.

Discussion and conclusion

The European Commission recognises the importance of innovation for EU competitiveness and also that the EU's innovation performance needs to be improved (EC 2012, 2013a). To this end it has begun to consider whether mutual gains can be made by linking innovation to another of its policy aims – the creation of high-quality jobs. It is posited that high-quality jobs within firms might be one of the factors that helps stimulate more innovation in those firms and so higher economic growth (EC 2014). As a consequence, there exists an emerging policy convergence around innovation and job quality but which, the Commission also acknowledges, requires further research.

QulnnE responds to this need, with this Working Paper outlining some of the challenges and opportunities that exist in analysing the relationship between innovation and job quality. Two particular issues are explored in the Working Paper: first the conceptual limitations in the measurement of innovation and job quality; and, second, the need to better model the relationship innovation and job quality, and how the two interact. The intention is to provide a framework of analysis for research that will help improve the evidence base of and policy development about the relationship between innovation and job quality and its outcomes.

The Working Paper first outlined current European Commission policy thinking about innovation and job quality, and how both are now regarded as important to the EU economic growth post GFC. However, to date, they have been treated separately within policy but that separation is now being addressed, with the Commission recognising possible linkages between innovation and job quality that might be mutually beneficial but which require researching. An important task in providing the necessary research that might explore this link is object clarification and the Working Paper reviewed

key literature about innovation and job quality. It outlined debates about the classification of innovation through different types, impact and novelty. Whilst acknowledging the definition and measurement problems in the current version of the CIS, QuInnE accepts the four types of innovations listed in the Oslo Manual (OECD 2005) but also recognises that classification alone is insufficient; it is also necessary to understand the agency and processes that deliver innovation. To this end QuInnE also adopts the EDI mode of innovation, with its emphasis on an employee-centred leveraging of innovation of all types. Likewise debates about the nature of job quality were outlined, from which it was argued that a bespoke employee-centred, multi-dimensional and cross disciplinary six-dimensional framework of job quality best captured the approaches used across the existing scientific literature. This approach to job quality strips out the extraneous factors that appear in some measures of job quality and focuses instead on only the work and employment of employees (see Muñoz de Bustillo et al. 2011). These reviews result in understandings of both innovation and job quality as multi-dimensional but centred on work and employment practices within firms. The literatures also suggest that innovation can enhance or diminish job quality and job quality can enhance or diminish job quality or mutual gains can accrue for both from their interaction. The relationship is also therefore potentially multi-directional. What is required is a model that helps explains these potential outcomes.

The Working Paper advanced a preliminary model that seeks to unpack the complex relationship between innovation and job quality, with their interaction requiring the development and deployment of employee-derived innovative capacity. This innovative capacity within firms is both a function of the innovation potential of firms and the job quality of its employees, and an outcome of firms' ability to access and mobilise this potential – and hence the adoption of the EDI approach. This set of interactions potentially forms a virtuous circle. Within this circle, innovation might improve job quality, job quality then might then enhance innovative capacity, and innovative capacity might deliver more innovation. The converse can also occur, creating a vicious circle whereby innovation undermines job quality, which in turn diminishes innovative capacity, resulting in less innovation.

A number of hypotheses were offered involving mediating and contextual factors that might explain the functioning of the triangular dynamic. Within the firm, managerial choices about the pursuit of competitiveness, including technology introduction and implementation, plus human resource management and innovation management were suggested as mediating factors. Drawing upon institutional approaches to economic organisation (e.g. Gallie 2007a), it was also acknowledged that firms' embedding within particular national institutional configurations can also shape the functioning of the virtuous circle. Four particular aspects of firms' institutional environment were hypothesised as salient: the industrial relations system, the education and training systems, and employment protection and welfare regimes. How these factors might influence the virtuous circle now becomes open to empirical examination, including international comparative research.

The preliminary model plus mediating and contextual factors together provide a useful analytical framework through which to research the link between innovation and job quality. The strength of this framework is that it draws on and develops key theoretical and empirical literatures across the innovation and job quality fields of study. In doing so, it clarifies the centrality of employees' working practices and supporting employment practices within the innovation process. It also highlights the important role of innovative capacity in the interaction of innovation and job quality. Furthermore, it recognises that this innovation process is likely to be shaped by wider management and organisational practices within firms, and the influence of the broader institutional environment into which firms are

embedded. In recognising the importance of contextual factors within the framework, the model opens up to research that is internationally comparative. This type of research would help identify for the European Commission if there are general or institutionally differentiated patterns and trends with respect to the relationship between innovation and job quality. In doing so, it would also be able to explore empirically whether some countries and, if so, which countries, are more likely to be characterised by firms with virtuous circles and those more likely to have vicious circles.

Whilst this Working Paper has focused on the relationship between innovation and job quality and the circumstances under which they may or may not be mutually beneficial, there may be other potential outcomes of this relationship that are of concern to the European Commission. One such concern is the reduction of inequalities and an increase in inclusiveness through more and better jobs (EC 2011, 2014). It is not clear that innovation alone can deliver these outcomes. As Marsden (1999) notes, work and employment are the primary generators of social equality/inequality in contemporary societies. This outcome occurs through several processes associated with the innovation-job quality-innovative capacity dynamic. At the most generic level, as discussed above, the creation, preservation and disappearance of particular jobs provide or deprive individuals with specific skills and socio-geographic characteristics of employment. Who is most affected by the resulting industrial and occupational restructuring, and in what ways, is unclear (Pianta 2013). As innovation impacts and runs through multiple dimensions of job quality, the triangular dynamic can increase or lessen equality in society by improving or leading to the deterioration of, for example, wage levels, occupational health, skills and training, ability to balance employment with domestic work for those in work. In other words, innovation and job quality are inimitably linked, with both beneficial and detrimental outcomes possible, and these outcomes promote or decrease equality in society as a consequence of both the quantity and the qualities of jobs as impacted by innovation. The beneficial and detrimental effects of innovation on jobs can have varied effects on skill groups, social classes and populations located in specific geographic areas, as well as upon age cohorts (younger and older workers) and men and women. This issue of in/equality as a potential outcome of the relationship between innovation and job quality is explored by Gallie (2018) and Hunt et al. (2018).

Within continuing academic and policy interest in innovation, and renewed interest in job quality, there is new interest in linking innovation and job quality because it is hypothesised that their relationship might deliver a range of EU policy aspirations (EC 2012, 2014). In particular new ways to improve the EU's innovation performance are needed. The conditions by which these aspirations might be delivered through this relationship need to be better understood through new research. Indeed it is essential to the beneficial (in policy terms) functioning of that relationship that research is conducted on its operation and outcomes. This research requires a framework of analyses that, on the one hand, provides a model of that relationship as a process and, on the other, can link that model to innovation as an output and the range of other potential outcomes and impacts of that relationship such as better jobs, economic growth and greater equality and inclusion (cf. Dortmund Position Paper 2012). This Working Paper provides that framework. No doubt it will be iterative, developed as new scientific evidence emerges from empirical research using the framework. In the meantime, the framework provides useful conceptual support for the European Commission as it shifts towards integrated policy thinking around innovation and job quality.

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