Exploring a theoretical framework to structure the public policy implications of open innovation

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Open innovation is increasingly popular among practitioners and scholars, but its implications for public policy making have not yet been analysed in detail. This paper explores a theoretical framework to structure the debate about public policy making that facilitates open innovation. We first define open innovation in terms of firms’ open innovation practices and external conditions that encourage enterprises to practice open innovation. We show that policies for open innovation are legitimate as traditional arguments like market and system failures continue to apply. Next, we identify several guidelines for policymaking. Rather than just offering R&D and interaction-oriented policies, we conclude that open innovation warrants attention in a broader range of policy areas, including entrepreneurship, education, science, labour markets and competition. Developing truly horizontal policies is a major challenge to facilitate open innovation in developed economies.

**Keywords:** open innovation; policymaking; national innovation systems; market failure; system failure

1. Introduction

Open innovation has become increasingly popular among scholars and industry practitioners since the term was coined by Henry Chesbrough in 2003. It can be defined as ‘the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively’ (Chesbrough, Vanhaverbeke and West 2006, 1). The basic insight of open innovation is that useful knowledge is widely diffused. Knowledge is ubiquitous and the knowledge landscape is heterogeneous including players such as companies of all sizes, universities, non-profit organisations, user communities, etc. When knowledge is abundant the role of firms’ research and development (R&D) has to change. Internal search and discovery in an R&D department becomes less important in favour of the detection and assimilation of externally developed knowledge. Consequently, companies have to adapt their innovation strategy

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Open innovation is a new way of managing innovation and it has been applied not only by large, multinational enterprises (Chesbrough 2003, 2006; Chesbrough and Appleyard 2007; Kirschbaum 2005) but also by small and medium sized companies (Lichtenthaler 2008; Van de Vrande et al. 2009).

Open innovation practices rely upon the availability of external knowledge and other innovation resources such as venture capital and human capital. Yet the availability of these resources cannot be taken for granted. They are the result of numerous, often unconnected, public policies towards science, technology, intellectual property (IP), competition, entrepreneurship and education. Policy measures may in practice support open innovation, while others may impede the adoption of open innovation practices. Therefore, public policy makers can play a crucial role in the effectiveness of open innovation. Yet, although policy measures can facilitate open innovation, it has not yet captured the attention of most policy makers and policy researchers. Open innovation has been mainly studied at the level of companies (Chesbrough 2006; Chesbrough, Vanhaverbeke and West 2006). Some seminal contributions have focused on the policy implications of specific elements of open innovation, e.g. IP policies (Encaoua, Guellec and Martinez 2006), innovation networking (Nootenboom 1999) and science funding (Fabrizio 2006). Some recent contributions cover a wider range of changes in innovation strategies and challenges to public policies (e.g. OECD 2008). Moreover, the European Commission, especially DG Enterprise and Industry Research, as well as Information Society, have issued papers on the subject (see, e.g. DG INFSO’s Open Innovation Policy Group). Finally, a growing number of national governments and international organisations are also considering implications of open innovation. We aim to add to this debate with the current paper by structuring a number of policy issues into a broader theoretical framework.

This study contributes to the literature in several ways. First, we show that public policy makers can shape the legal and institutional setting in a way that facilitates open innovation. However, inappropriate policies can also severely limit open innovation as a practice in an economy. Next, we argue that public policy measures have to be taken in a broad range of policy domains besides the classical domains that are directly linked to science and R&D policy. To spur open innovation policy makers have to adapt education policy, labour market policy, measures stimulating entrepreneurship, fiscal policy, etc. As open innovation can be affected by different types of policy measures, we claim that a horizontal policy making approach is required to align the policy measures taken in different domains.

The paper is structured as follows. Section 2 defines open innovation in terms of its key dimensions in order to identify relevant guidelines for policy making. We argue that public policies should be aligned with the requirements underlying open innovation practices. Section 3 discusses why it is legitimate to develop policies focusing on open innovation. We argue that previous theories to justify innovation policy interventions, including market and system failures, also apply for open innovation. In Section 4 we discuss the implications for policymaking. We propose that open innovation requires a broader perspective than those used in traditional policies such as stimulating R&D and inter-organisational networking. We identified 21 policy guidelines and we briefly explain how they are related with the key dimensions of open innovation. In Section 5 we analyse to what extent these guidelines are incorporated in the current policies of three European countries: the Netherlands, Flanders (Belgium) and Estonia. In the final section, we draw some conclusions and provide suggestions for future research.

2. Open innovation

To identify the policy implications of open innovation we first need to define open innovation and identify dimensions in open innovation that may offer us relevant angles to shed light on
policy issues. First, the innovation management literature (e.g. Tidd and Bessant 2009; Dodgson, Gann and Salter 2008) provides useful information to identify some of these dimensions as it currently focuses on external sources for innovation, innovation networks, corporate venturing and management of R&D as central research topics. Second, the role of the external environment is emphasised in the national innovation systems approach; Chaminade and Edquist (2006), for example, emphasises that the provision of R&D and competence building, networking and financing of innovation processes are crucial activities in national innovation systems. In line with these literature streams we identified two major dimensions that can structure public policy issues related to open innovation. First, policies for open innovation must be aligned with the new innovation practices of companies when they switch from closed to open innovation. Networking, collaboration, intra- and entrepreneurship, IP-management and R&D management are five topics that change considerably when companies seize open innovation. Second, public policy measures should also shape the external conditions in a way that motivate companies to adopt open innovation when this leads to additional welfare creation. In this respect, three topics deserve more attention, i.e. the provision of a strong public knowledge base, increasing the mobility of knowledge workers and improving access to financial sources.

**Firms’ open innovation practices**

By coining the open innovation model, Chesbrough (2003) explained why former leading multinationals like Xerox, IBM and P&G did not manage to monetise their knowledge assets, and why a multitude of start-ups managed to grow rapidly since the 1990s. Chesbrough claims that there has been a paradigm shift from closed to open innovation. In the ‘old’ closed innovation model successful innovation required control, counselling firms to be strongly self-reliant and to execute all innovation tasks internally. The open innovation paradigm, on the contrary, prescribes that enterprises should also use external ideas to accelerate their own innovation and develop external paths to the market to commercialise their internal knowledge (Rohrbeck, Hölzle and Gemünden 2009). We distinguish five topics that capture in general what enterprises do when they practice open innovation: (1) networking, (2) collaboration, (3) corporate entrepreneurship, (4) IP management, and (5) R&D management. These open innovation practices constitute a first important input to structure a public policy framework that is aligned to the needs of open innovation.

**Networking** includes all activities to acquire and maintain connections with external sources of social capital, including individuals and organisations. Networking allows enterprises to rapidly fill in specific knowledge needs without having to spend enormous resources to develop that knowledge internally or acquire it through vertical integration. Similarly, networks are a source of new business partners to commercialise new product ideas or prototypes which would otherwise remain ‘on the shelf’ (Chesbrough 2003). Useful network partners may be customers, competitors, suppliers, consultants, engineers, industrial associations, universities and other public research organisations, governments and intermediary organisations (Keupp and Gassmann 2009).

**Collaboration** relates to all cooperative efforts between firms and other innovation actors to explore or exploit technologies or business opportunities. Collaboration is different from networking because cooperation is formalised, including R&D alliances, joint ventures and other forms of temporary organisation. In small firms innovation collaboration has a long tradition as such enterprises lack the resources required to fund innovations and they cannot maintain large innovation portfolios to spread their risks (Acs and Audretsch 1990). External collaboration has substantially increased in larger enterprises during the last decade (Poot, Faems and Vanhaverbeke 2009). R&D alliances have become a popular means to acquire and leverage technological capabilities (Contractor and Lorange 2002; Lavie 2007; Heinz and Kuhlmann 2008).
Corporate entrepreneurship is another way to benefit from internal ideas, or to acquire external ideas that were initially overlooked. Relevant activities include corporate venturing, intrapreneurship and spin-offs (Chesbrough 2003; Kirschbaum 2005). Corporate venturing implies investments in new or existing businesses, enabling innovations that were initially abandoned or that did not seem promising to be recovered. Enterprises may create corporate venturing programmes to invest in start-ups and other businesses to keep an eye on potential opportunities (Chesbrough 2006). Another option to become more innovative is to encourage employees by means of suggestion schemes and related facilities (e.g. Van Dijk and Van den Ende 2002). Finally, enterprises may commercialise their internal knowledge outside the borders of their own organisations by creating spin-off companies (Chesbrough 2003).

As for the management of IP, open innovation implies that enterprises are proactive – rather than using IP for defensive reasons they try to monetise it (Chesbrough 2006; Lord, Mandel and Wager 2002). The benefits of IP are not limited to internal development, but IP can also be sold, licensed, or even given away for free (Von Hippel 2005; Christensen, Olesen and Kjær 2005). Conversely, enterprises may speed up and nurture their own research engine by acquiring or licensing IP from others.

Although the open paradigm stresses alternative pathways to benefit from innovation, this does not imply that internal R&D has become redundant (Chesbrough 2003; Cassiman and Veugelers 2006). Internal R&D is still important as it may generate revenues by developing and commercialising internal knowledge – just as in the old days. Moreover, R&D is necessary to obtain and maintain the absorptive capacity that is needed to tap from external sources. Absorptive capacity is defined as an organisation’s ability to value, assimilate and apply new knowledge for commercial ends (Cohen and Levinthal 1989, 1990). Absorptive capacity depends on the knowledge source and prior knowledge, it is conditioned on the appropriability regimes and it influences the innovative performance of the firm. The concept has been extended recently by Zahra and George (2002) and Todorova and Durisin (2007) who also reconceptualise absorptive capacity as a dynamic capability (Teece, Pisano and Shuen 1997).

External conditions

Chesbrough (2003) identified various external trends or ‘erosion factors’ to explain why enterprises increasingly adopt the open paradigm. There is, for example, a growing availability of knowledge from multiple innovation actors, including universities, specialised suppliers, inventors and knowledge brokers. In addition, the mobility of highly experienced and skilled people has grown rapidly since the 1990s and venture capital has a prominent role in financing risk-laden innovations. We argue that policies for open innovation should not target only firms’ behaviours, but also need to secure the key external conditions of open innovation. As most important conditions for open innovation we included: (1) strong public knowledge base, (2) mobile and educated labour force, and (3) good access to finance.

The availability of a strong public knowledge base is important for firms to engage in open innovation. Access to a strong knowledge base facilitates a more effective and efficient search for new innovations by researchers working in corporate R&D labs (Cockburn and Henderson 2000). However, private enterprises increasingly refrain from investments in fundamental research because of the growing pressure by shareholders for short term profitability and the erosion factors identified by Chesbrough (2003). These factors help to enable a new division of labour in the funding, conduct and focus of R&D in the innovation system of a society. This new division has caused businesses to shift the focus from internal R&D towards more external sources of
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knowledge, and it has encouraged managers to seek new business opportunities for their existing knowledge base more aggressively than in the past. Accordingly, this growing division of labour between industries, governments and academia, results in less basic research being conducted inside corporate research laboratories. This implies that the government’s role of funding basic research is more important than ever before.

A mobile, educated working population is another condition that enables open innovation. As knowledge can flow through people moving between organisations, labour mobility enables or even forces firms to open up their innovation processes. Whenever knowledge workers leave a company they take their knowledge with them and this applies particularly to their tacit knowledge which is considered most important for innovation. Labour market mobility is an important source of network ties between organisations (Cohen and Fields 2000).

A third condition is that ample external finance for innovation should be available. External financing can take a variety of forms, including equity investment, debt financing, asset-based financing, or public grants. Sources of external financing can range from friends and relatives, business angels, venture capitalists, banks, governments and even stock markets (Shane 2003). Although Chesbrough (2003) concluded that venture capital is abundantly available nowadays, the current credit crunch probably demands governments to restore confidence and bolster this condition.

3. Linking open innovation to market and system failures

A key supposition of any innovation policy intervention is that the social benefits of innovation ought to exceed the benefits of individual enterprises that would benefit from the intervention (Smits, Kuhlmann and Shapira 2009). As markets are usually anticipated to result in optimal outcomes, it is quite generally accepted that policy makers should not intervene in the economy unless there is market failure and system failure. We examine whether these two arguments still apply to open innovation.

Market failure implies that markets result in suboptimal outcomes. This argument was proposed some decades ago (Nelson 1959; Arrow 1962) and is frequently used today. Whenever some firms are innovating, competing companies will benefit because of knowledge spillovers (Jaffe 1996; Griliches 1992; Cassiman and Veugelers 2002). Knowledge is by its very nature a public good (Jaffe 1986) that generates spillover effects that allow competitors to free-ride on an innovator’s R&D efforts. This translates on the macro-level into a market failure. Four sources of market failure have been identified: weak appropriability regimes, uncertainty, indivisibility and asymmetric information (Chaminade and Edquist 2006). These failures imply respectively that actors may not be able to appropriate the benefits of their innovations, that they cannot adequately predict when innovation will pay off, that innovation can be too demanding in terms of up-front investments and that external finance may not be available because potential investors evaluate opportunities incorrectly. As a consequence, innovation by private enterprises will be suboptimal from a social point of view.

More recently system failure arguments have been used to justify public policy actions. The systems literature proposes that innovation is the result of complex and intensive interactions between enterprises, users, knowledge suppliers and intermediaries, and influenced by various infrastructural arrangements and other external conditions (Lundvall 1992). A key supposition is that under-investment in innovation may also be caused by system failures, including capability, network, institutional and framework failures (O’Doherty and Arnold 2003). These imply that actors in the innovation system may themselves lack innovation capabilities; that they do not
interact sufficiently with others; that established practices, rules or laws are inappropriate and that the general external conditions for innovation do not function correctly.

Market and system failure arguments have been developed assuming implicitly that companies organise their R&D activities under the premises of the closed innovation paradigm. In the open innovation era companies organise their R&D activities in a different way which, in turn, may affect the incidence of market and system failures. We argue that both market and system failures are still present but open innovation is likely to change their relative impact. For market failure, we anticipate that problems with indivisibility and uncertainty have been diminished. As open innovation stresses external collaboration and using alternative pathways to the market, this creates better opportunities to spread the risks of innovation. However, problems with appropriation may be anticipated to be more severe. Labour mobility means that enterprises can no longer rely on trade secrets to appropriate their knowledge. The problems related with information asymmetry may be somewhat alleviated through open innovation. Open innovation starts from the observation that information is nowadays more diffused providing more and more accurate information to all parties involved in trading technology.

Open innovation is clearly related with the systems of innovation literature. Although both literatures have been developed by different disciplines (managerial vs economic), they actually have much in common. Table 1 shows some similar lines of thinking in the two literature streams.

Table 1. Similarities between the open innovation and systems of innovation models

<table>
<thead>
<tr>
<th>Open innovation (e.g. Chesbrough 2003; Chesbrough et al. 2006)</th>
<th>Systems of innovation (e.g. Lundvall, 1992; O’Doherty and Arnold 2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprises obtain better results if they open up their innovation processes, i.e. involve the world outside.</td>
<td>↔ Innovation is the result of complex and intensive interactions between various actors.</td>
</tr>
<tr>
<td>Innovation is no longer the domain of the internal R&amp;D department; traditional stage-gate models provide an incomplete picture of how innovation should be organised.</td>
<td>↔ The linear model in which knowledge-related activities are divided in supply and demand does not hold any longer.</td>
</tr>
<tr>
<td>Enterprises can benefit from purposive inflows and outflows of knowledge. Knowledge spillovers offer opportunities and are not just a threat.</td>
<td>↔ Knowledge spillovers are essential for the functioning of the innovation system, and are very much desirable.</td>
</tr>
<tr>
<td>Enterprises need both internal innovation competences (other than R&amp;D) and competences to connect with external parties in order to be successful.</td>
<td>↔ The functioning of innovation systems can be hampered by capability and network failures.</td>
</tr>
<tr>
<td>As enterprises increasingly depend on external sources, infrastructural arrangements (e.g. IPR) and other framework conditions become more important.</td>
<td>↔ The functioning of innovation systems can be hampered by institutional and framework failures.</td>
</tr>
<tr>
<td>A mobile, educated labour force is among the trends that eroded the closed innovation model.</td>
<td>↔ Human and social capital provide the oil necessary for lubricating the innovation system.</td>
</tr>
<tr>
<td>If the innovating enterprise cannot internally benefit from its innovations, maybe others can.</td>
<td>↔ The social benefits of innovation exceed those of the individual innovating actors.</td>
</tr>
</tbody>
</table>
Since open innovation starts from a firm level perspective it is highly complementary to the systems of innovation literature which describe the relationships of innovation actors at higher levels of aggregation. More detailed research should indicate how several key insights of the system of innovation literature can further explain how open innovation takes place in a local or regional innovation system. Similarly, the key lessons of open innovation have the potential to fine-tune our understanding of systems of innovation.

Hereafter, we elaborate on why it is legitimate to develop policies for each of the previously mentioned dimensions of open innovation.

**Firms’ open innovation practices**

The various open innovation practices of companies can be supported by public policies. Networking requires that enterprises have the internal capabilities to identify, assimilate and use external knowledge and ideas. Whenever these competences are inadequately developed, policy measures can stimulate and support the networking skills of enterprises. Such policies can be justified with the system failures of deficient capabilities (justifying policies to teach enterprises how to engage in networking) and network problems (justifying policies to enable enterprises to interact with other actors in the innovation system) (Cooke 2005; O’Doherty and Arnold 2003).

Collaboration requires enterprises to possess similar competences. Accordingly, the absence of alliance and network capabilities in companies legitimises policies to enhance collaboration (Heinze and Kuhlmann 2008). Collaboration may also help to overcome market failures resulting from the indivisibility of innovations. In fact, for small firms collaboration is a widely recognised strategy to obtain a minimum scale required for innovation (Acs and Audretsch 1990). As for external corporate entrepreneurship, capability failure also justifies policy interventions. Top management is often reluctant to initiate external corporate entrepreneurship, making them insensitive to business opportunities embedded in the rapidly increasing number of sources of external knowledge. According to Chesbrough (2006) it is a common problem for companies to outsource their knowledge if they feel that they cannot sufficiently profit from it. If they initiate entrepreneurial activities, there will be a problem in finding suitable partners and transferring their knowledge effectively. Furthermore, there might be a market failure problem caused by asymmetric information, as potential users may perceive that only trivial or worthless technologies are offered for commercialisation.

Proactive IP management requires that there are markets for technology and that enterprises are commercialising their IP as part of their overall innovation strategy. In virtually all large companies the majority of patents and other forms of IP are not used to develop new products or businesses and remain unused on the shelves. From a social point of view, IP must be revealed and applied as much as possible (O’Doherty and Arnold 2003). It is therefore legitimate for governments to interfere in the process of diffusion of IP. Companies’ willingness and ability to trade their IP seem to be hampered by various market and system failures, including the inability to appropriate the benefits of innovation, asymmetric information, and capability and network failures (e.g. Fabrizio 2006). Finally, for R&D expenditure the traditional argument of market failures (e.g. Arrow 1962) still applies.

Capability failures may also be relevant, because R&D enhances the absorptive capacity of enterprises (Cohen and Levinthal 1990). Companies must conduct R&D to develop innovative products and to be able to learn from their external environment (Fabrizio 2006). This implies that R&D policies are also valid from a system’s perspective.
External conditions

A strong public knowledge base is among the main conditions of open innovation, but institutional and framework failures may prevent such a sufficient public asset from being present. For example, universities and public research organisations may lack the incentives to valorise their knowledge. Moreover, enterprises should be able to interact with publicly funded universities in order to assess and adopt new, fundamental knowledge, but this may be hindered by network and capability failures (Fabrizio 2006).

A mobile, educated labour force is another necessary condition for open innovation. The systems literature considers the mobility of knowledge workers as the cement that connects various innovating actors, holds the innovation system together and ensures that knowledge spills over between different organisations (O’Doherty and Arnold 2003). System failures related to institutions and other framework conditions may, however, act as serious impediments (Cooke 2005). Successful innovation systems provide wide access to good quality education and training, rather than focusing on the education of small elites. Conditions dictated by labour market policies may also unnecessarily reduce the mobility of labour forces.

As for access to funding, policy interventions can be justified with a traditional market failure argument. Two relevant bottlenecks are asymmetric information and uncertainty (Shane 2003). Innovation is a process in which enterprises identify innovative opportunities, but to discover such opportunities, they possess idiosyncratic information. External financiers, however, do not have the same information and tend to perceive the same business opportunity differently. Besides, innovation is marked by uncertainty because resources must be obtained and recombined in advance. As a consequence, innovating firms face considerable problems in acquiring external funding – and the current credit crunch certainly worsen the situation.

4. Implications for policymaking

Keeping the open innovation practices of companies and the previously mentioned external conditions in mind, we can now identify a set of policy areas which are relevant to facilitate open innovation in an economy. We identified seven policy areas which are most significant in establishing a public policy that can facilitate open innovation. These policy areas focus on R&D spending, collaborative innovation, entrepreneurship, science, education, labour market and competition policies (De Jong et al. 2008). We find that traditional R&D and interaction-oriented policies are still important (interaction policies facilitate the linkages in the innovation system, for example by offering matchmaking services). Such policies now apply in all OECD countries (see www.proinno-europe.eu).

Entrepreneurship, science and competition policies are usually included in the traditional innovation policy mix, but they are usually not explicitly related to firms’ (open) innovation activities or the external conditions of open innovation. Entrepreneurship policies stimulate and support the creation, survival, growth and transfer of private organisations. Science policies determine how universities and public research organisations are funded and managed, helping to create a strong public knowledge base. Competition policies deal with the functioning of markets in order to secure better quality and/or prices for customers. Education and labour market policies have other objectives than stimulating innovation, but they can be nevertheless influential as they determine the mobility and education level of the working population.

Juxtaposing the key dimensions (firms’ open innovation activities and external conditions) with the seven policy areas, we identified 21 policy guidelines for open innovation (Table 2). We derived
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Table 2. Guidelines for open innovation policymaking

<table>
<thead>
<tr>
<th>Policy area</th>
<th>Guideline</th>
<th>Firms’ open innovation activities</th>
<th>External conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Networking</td>
<td>Collaboration</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>1. Financial R&amp;D incentives</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>2. High-quality IP systems</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>3. Support standards</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>4. Support user innovation</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Interaction</td>
<td>5. Develop skills</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>6. Stimulate interaction</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>7. Enhance technology markets</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>8. Use go-betweens</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>9. Back up clusters</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Entrepreneurship</td>
<td>10. Support corporate entrepreneurship</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>11. Access to finance</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>12. Back up challengers</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Science</td>
<td>13. Appropriate funding</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>14. Balanced incentives</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>15. Focus on excellence</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>16. Organised diffusion</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Education</td>
<td>17. General stimulation</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>18. Entrepreneurship education</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Labour markets</td>
<td>19. Aim for flexibility</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td></td>
<td>20. Enable knowledge migration</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Competition</td>
<td>21. Stimulate competition</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

these guidelines analysing how different measures in several policy areas could facilitate firms’ open innovation activities directly or indirectly by changing external conditions. We triangulated our search for guidelines through in-depth interviews with different experts and policymakers on innovation management in Europe (De Jong et al. 2008).
While acknowledging that the table includes only the most palpable connections, we now discuss how the different open innovation activities and external conditions may be influenced by public policies.¹

How policy measures influence firms’ open innovation activities?

Managing open innovation is demanding and capricious. Consequently, policy makers have to be careful in setting up and implementing initiatives that may have an impact on managers’ innovation decisions. We formulate a number of policy measures, but we should keep in mind that poorly designed measures or a sloppy implementation of these measures can harm open innovation practices rather than fostering them.

To support and facilitate innovation networking, policy makers may first and foremost keep up their current interaction-based policies. Relevant guidelines (see Table 2) are to offer policies to develop networking skills (5), to directly stimulate interaction (6), to facilitate go-betweens (8) and to back up emerging clusters (9). First, policies may support enterprises in assessing and improving their networking skills by fostering knowledge development and competences in these areas, by providing information, or by popularising models and best practices. To be effective such services should be tailor-made and provided by experts with domain-relevant knowledge and skills. Consultancy services can be offered by either public or private organisations (Chaminade and Edquist 2006). Second, policies may directly target the interaction between innovating actors. In several situations governments need to help enterprises to cross a threshold – for example, by orchestrating meetings or, on request, by fostering partnerships. Policies should support self-organisation rather than directive actions. Interventions are preferably organised as competitions and would mainly be restricted to management, administrative and organisational support. Third, policy makers may facilitate go-betweens. These are matchmakers, trying to bring parties together to exchange knowledge, receive feedback or achieve transactions. Unlike agents, their allegiance is not exclusively to one single client; they are supposed to be independent and create a market for technology (Chesbrough 2006; Lichtenthaler and Ernst 2008). Go-betweens may be the same organisations as those providing consultancy services to develop enterprises’ networking skills (as discussed above). Fourth, policies can support emerging regional clusters. This is important as the effect of innovation networking is magnified by geographic proximity (Cooke 2005; Boschma 2005). The effectiveness of open innovation strategies used by organisations is believed to be strongly related to the presence of regional innovation systems (Vanhaverbeke 2006). Governments may therefore initiate development programmes to support geographically bounded innovation networking within the context of knowledge based clusters (Maskell 2001). Finally, financial incentives for R&D (1) may also be helpful, because R&D improves enterprises’ absorptive capacity and thus their opportunities to engage in networking effectively.

Policy makers need similar measures to stimulate formal collaboration, the second key element of open innovation. There are, however, some subtle differences with networking policies. Services to support the development of skills (5) for example also need to include strategic alliance and management skills, so that beneficiaries can deal more effectively with the formal aspects of collaborative innovation. Companies would need to know how to design contracts and how to organise other aspects of governance (Bamford, Gomes-Casseres and Robinson 2003; Edler and Kuhlmann 2008). As for stimulating interaction (6), a key design element is that successful collaboration requires trust between partners (Nooteboom 2004). Supportive policies should maintain a medium-term perspective (probably 3–5 years) with stable funds and institutional settings. Frequent changes in policy goals and unstable financing of programmes are even more detrimental to
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collaboration-oriented policies than they are to traditional R&D incentives (OECD 2002). Next, when policy makers facilitate go-betweens (8) these can also go beyond matchmaking by offering arbitration or intermediation services to help resolve conflicts. Moreover, cluster policies (9) may be designed to subsidise formal collaborations, providing a powerful instrument to initiate new collaborations and to strengthen existing ones (Heinze and Kuhlmann 2008). Finally, as financial incentives (1) for R&D enhance enterprises’ absorptive capacity, the cognitive distances between collaboration partners may be reduced, eventually resulting in more successful collaborations (Boschma 2005).

Various guidelines were found for corporate entrepreneurship, the third key element of open innovation. These included direct support (10), better access to finance (11), entrepreneurship education (18), support of technology markets (7) and entrepreneurial skills development (5). First, only few enterprises seem to realise that alternative strategies can be conducted to commercialise their internal knowledge (OECD 2008). Policy makers should raise their awareness of the potential of corporate entrepreneurial strategies such as venturing, intrapreneurship and spin-offs. This can be done through sharing information and using consultancy services on entrepreneurial strategy and management. It also helps if enterprises first develop an overall strategy on how to benefit from external knowledge, so that they can better decide if and when external corporate entrepreneurship is suitable (Chesbrough 2006). Second, it helps if incumbent enterprises obtain better access to external finance. Venturing used to be the domain of specialised funds, but large organisations have started to venture as well (Chesbrough 2006). Smaller organisations, however, still find venturing very risky and they face difficulties in acquiring external finance. Cheap money loans or guarantees for corporate entrepreneurial activities can be helpful here. Third, education policies will be influential provided that entrepreneurship is more explicitly taught (European Commission 2006). Basically all of today’s education prepares students to be employed. We find that fostering the entrepreneurial mindset of young people and developing their entrepreneurial competences can be take place from primary schools to universities. Such education should go beyond instructions on how to start businesses and also develop personal attributes and horizontal skills like creativity, initiative and self-confidence (Bird 2002). Fourth, policy makers should support and facilitate markets to trade technology. As we will discuss later, technology markets are still in their nascent phase, but they would obviously be helpful for enterprises willing to commercialise their knowledge by means of spin-offs. Finally, skills development (as discussed above) may also include skills for corporate entrepreneurship, e.g. on how to negotiate a participation, or how to motivate employees involved in spin-offs.

The fourth key dimension is the management of IP. If their IP is to be proactively managed enterprises first and foremost need high-quality IP systems (2). If enterprises find it too difficult to apply for patents or to defend their rights in case of infringement, they will rather keep their knowledge secret – so that no trade occurs at all (Chaminade and Edquist 2006). High-quality IP systems enable enterprises to safely offer their knowledge to external parties (OECD 2008). Second, policy makers should explicitly support trade by enhancing technology markets by intermediaries (7). Technology markets are markets on which technologies are traded after they have been created, but before they are converted into applications (Arora, Fosfuri and Gambardella 2001). Technology markets are not new but a new wave, fostered by a range of innomediaries (Chesbrough 2006; Sawhney, Prandelli and Verona 2003), is gradually changing the technology market dynamics. The absence of a well developed technology market represents currently a critical limitation in advancing open innovation. Much of the information needed for coordinated market trading is not yet available; for example, there is no reliable documentation about the number of licensing deals and the amount of money involved (Rivette and Klein 2000). There are also
no established instruments or rules to value IP adequately (Chesbrough 2006). In this vein, current IP systems dominantly focus on knowledge protection, but fail to inform on the value of technologies (Encaoua, Guellec and Martinez 2006). Third, governments should support standard setting processes (3). The more technologies are standardised, the better they can be traded. This may be done by facilitating standard setting organisations (such as the ISO). Although membership is voluntary, these organisations have a considerable impact on the rate and direction of technological change – primarily through their influence on the bandwagon process that leads to the adoption of particular technologies as industry standards (Simcoe 2006). Fourth, go-betweens (8) may be helpful to connect potential buyers and sellers of IP (already discussed above). Fifth, skills development (5) can also be targeted towards the skills that are needed to commercialise technologies – how to set up and manage a technology licensing programme, for example. Finally, because proactive IP management requires a market approach, aspects of competition policy cannot be ignored (21). Emerging technology markets need supervision to prevent some enterprises from abusing their power or trying to corner the market by creating patent thickets (Chesbrough 2006).

Finally, R&D investments by companies are still important, and to stimulate R&D investments governments can offer well-known policies like financial incentives for R&D (1), high-quality IP systems (2) and support for standard setting processes (3). Financial incentives include tax credits and subsidies to foster appropriate R&D investments by private enterprises (OECD 2002). Intellectual property rights make it more likely that innovating enterprises can benefit from their efforts (Arrow 1962). Standards enable enterprises to better assess if and when research efforts pay off (Simcoe 2006). Moreover, a related recommendation is to subsidise small, challenging enterprises more than large, incumbent ones (12). Small, challenging enterprises are more likely to introduce disruptive innovations (Schumpeter 1934). They are more likely to embody new combinations of knowledge, and new business models to commercialise that knowledge, and as a consequence, they will probably spur greater R&D-efforts from large incumbents too. In this vein, most financial incentives offered today are more generous for start-ups and small firms (Nil 2005). Finally, governments should not ignore that except for companies, individual users may also conduct R&D (4). Users may innovate by developing machines, equipment, software or any other applications to satisfy their own needs (von Hippel 2005). In this context, empirical evidence shows that users’ innovative activities are largely overlooked in R&D surveys (Laestadius 1998; NESTA 2007).

External conditions

There are multiple entries for policymaking to ensure a strong public knowledge base. Financial incentives (1) will encourage enterprises’ R&D activities and help to maintain the stock of basic knowledge (OECD 2002). Support for user innovation (4) would imply that more knowledge becomes available throughout society. In this respect, the welfare implications of a society in which users innovate are positive and substantial (Henkel and Von Hippel 2005). Backing up challengers (12) would result, as previously indicated, in more disruptive innovations which incumbent enterprises are likely to respond to. The most substantial contribution however may be anticipated from science policy, i.e. how universities and public research organisations are funded, assessed, managed and controlled. Relevant guidelines would be to ensure appropriate funding (13), to provide balanced incentives (14), to focus on excellence (15) and to organise the diffusion of scientific knowledge (16).

First, open innovation incentivises private organisations to finance less fundamental research in-house. As a result, there is a growing need for generous public funding of scientific discovery
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(Chesbrough 2003). Problems may arise when private financing starts crowding out public finance: as this often comes with restrictions or expectations of exclusivity – and thus, decreasing knowledge spillovers – more private financing for public research may eventually hinder open innovation. As long as private funding is additional there is no harm, but it should not be at the expense of public resources (Fabrizio 2006). Next, there is the issue of how scientists are rewarded and recognised. University staff currently lack the incentives to put their basic knowledge into practice, i.e. to spend time on valorisation. They rather dedicate themselves to scholarly work in academic journals in order to develop their careers. Academics tend to strongly value the production of knowledge but most of them are not interested in knowledge valorisation (OECD 2008). Moreover, as important as the amount of money provided by governments for research, is how this money is spent (Chesbrough 2003). Governments need to develop mechanisms to allocate their funding according to criteria of excellence, which can be realised by linking research performance to financial incentives. This would imply that grants are not offered as lump-sums, but made contingent on output criteria and visitations. Finally, policy makers can directly target the diffusion of knowledge, and by doing so, ensure that the current stock of basic knowledge becomes more widely available. Organised diffusion can be designed by means of valorisation grants, public–private partnerships or technology transfer offices at universities, to mention only a few examples.

Developing a mobile, well-educated labour force is primarily a matter of education and labour market policies. The role of education in innovation should receive much emphasis (O’Doherty and Arnold 2003). Developing and maintaining a skilled labour force entails that governments deliver and implement high-quality education, including lifelong learning and post-graduate training (17). Education policies could also enhance entrepreneurial capabilities. Entrepreneurial behaviour can be taught (18), but teaching entrepreneurship goes way beyond reading texts and analysing cases. Instead there should be opportunities to learn from experience, and to involve people with business experience as mentors or coaches (Bird 2002). Moreover, labour market policies directly influence labour force mobility (19). Pensions, health care and other aspects of compensation are typically tied to being employed in a particular company and this effectively constrains mobility. Making pensions and health care benefits more easily transferable between companies or between universities and companies would enable high-skilled workers to seek out the best opportunities to utilise their skills. Moreover, in many countries rules for hiring and firing employees seem unnecessarily complex and restrictive. Finally, there is an opportunity to benefit from working populations in other countries. Knowledge migration should not automatically be regarded as a socially undesirable phenomenon. From an open innovation point of view, it provides opportunities to directly enhance the quality of the current labour force (20). Migration of highly skilled and temporary workers may be promoted by simplified immigration rules and incentives such as preferential income taxes (OECD 2008).

Finally, firms’ access to finance requires direct interventions (11) and efficiently functioning capital markets (21). Broadly speaking, policy makers have three options to secure that innovating companies have access to finance. Direct subsidies have already been discussed as part of the R&D policy. Finance can also be secured via seed capital, guarantees or matching funds (Chaminade and Edquist 2006). Moreover, well functioning capital markets that allow for corporate venturing and exits on secondary markets are probably most important to enable open innovation strategies (OECD 2008). It is recommended to create institutions to channel financial resources to promising new ideas and business models. Policymakers should stimulate private investors including banks, venture capitalists and business angels, as they are specialised in judging and financing business opportunities.
5. An application: the cases of the Netherlands, Flanders (Belgium) and Estonia

To identify how the framework can contribute to the policy-making, we used it to assess to what extent current policy mixes in the Netherlands, Flanders (Belgium) and Estonia reflect the open innovation policy recommendations we have developed in the previous sections. For each country an inventory of policies and policy instruments was made, starting with the most recent country reports of the INNO-Policy TrendChart.² We also studied a significant amount of policy notes, reports and action plans and interviewed policy makers both in the countries covered – 11 interviews on the Netherlands, five on Flanders and eight on Estonia to further complete the inventories. Table 3 reflects our assessment on the application of open innovation policy guidelines in the selected countries (see De Jong et al. 2008 for detailed country studies). The assessment for each guideline is based on a detailed evaluation of the different policy measure in a country under each guideline. The final score was determined in consultation with local innovation policy experts.

The current policy mixes in the three countries already contain many of the guidelines that can we derived from open innovation theory. This applies most to policies offering financial incentives for private R&D, to stimulate interaction between actors in the innovation system, to better secure innovating enterprises’ access to finance, and to generally stimulate competition and the functioning of markets (1, 6, 11 and 21 in Table 3). Financial incentives to stimulate firms’ R&D are offered in each of the countries and in multiple forms. Policies targeting to intensify

Table 3. Application of open innovation policy guidelines in three countries

<table>
<thead>
<tr>
<th>Policy area</th>
<th>Guideline</th>
<th>Netherlands</th>
<th>Flanders (Belgium)</th>
<th>Estonia</th>
<th>Overall assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D</td>
<td>1. Financial R&amp;D incentives</td>
<td>++</td>
<td>+</td>
<td>+/ +</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>2. High-quality IP systems</td>
<td>+</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td></td>
<td>3. Support standards</td>
<td>o</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>4. Support user innovation</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Interaction</td>
<td>5. Develop skills</td>
<td>o</td>
<td>+</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td></td>
<td>6. Stimulate interaction</td>
<td>++</td>
<td>++</td>
<td>+/ +</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>7. Enhance technology markets</td>
<td>−</td>
<td>o</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>8. Use go-betweens</td>
<td>+</td>
<td>+</td>
<td>o</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>9. Back up clusters</td>
<td>++</td>
<td>++</td>
<td>o/+</td>
<td>+/ +</td>
</tr>
<tr>
<td>Entrepreneurship</td>
<td>10. Support corporate entr.ship</td>
<td>−</td>
<td>−</td>
<td>o</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>11. Access to finance</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>12. Back up challengers</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Science</td>
<td>13. Appropriate funding</td>
<td>+</td>
<td>+</td>
<td>o</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>14. Balanced incentives</td>
<td>−</td>
<td>o/−</td>
<td>o</td>
<td>o/−</td>
</tr>
<tr>
<td></td>
<td>15. Focus on excellence</td>
<td>+</td>
<td>+</td>
<td>o</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>16. Organised diffusion</td>
<td>++</td>
<td>++</td>
<td>o/+</td>
<td>+/ +</td>
</tr>
<tr>
<td>Education</td>
<td>17. General stimulation</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>18. Entrepreneurship education</td>
<td>+</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Labour markets</td>
<td>19. Aim for flexibility</td>
<td>+</td>
<td>o</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>20. Enable knowledge migration</td>
<td>+</td>
<td>−</td>
<td>o/+</td>
<td>o</td>
</tr>
<tr>
<td>Competition</td>
<td>21. Stimulate competition</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

Note: Indicators show whether a guideline is not or barely (−), slightly (o), reasonably (+) or well represented (++) in the current policy mix of a country.
interaction and collaboration among innovation actors are also quite popular and this popularity may explain policy makers’ increased attention for network failures as a rationale for policymaking. Moreover, policy makers in the three countries seem to be well aware that challenging enterprises, especially high-tech SMEs, should be supported in order to bring disruption and increase knowledge spillovers.

Next, we also found multiple measures to secure enterprises’ access to finance in all three countries. Finally, competition is a topic that seems to be prioritised in the three countries, given the presence of rather strong competition authorities and support measures in all three cases. The Netherlands and Flanders (Belgium) have become much more active in this field ever since the European unification in 1992. For Estonia, after its independence it has fully embraced the market mechanism by developing generic institutions enabling level playing fields for all enterprises in order to obtain a competitive business environment. Other guidelines which are popular in the current policy mixes of the three countries include backing up clusters and supporting the diffusion of scientific/fundamental knowledge (9 and 16). Here, both the Netherlands and Flanders offer substantial help to private enterprises. In Estonia, policy attention has so far been limited, but in the 2007–2013 policy the efforts in these areas have been substantially increased.

Another finding is that the current policy mixes seem somewhat unbalanced compared with a policy that optimally facilitates open innovation: some of the guidelines are not or only barely present in the countries reviewed. For example, support for user innovation (6) is an aspect of RTD policies that is missing. We found no policies that stimulate, support or facilitate innovation in collaboration with users. Also, policies to enhance technology markets (7) are scant. As for the three cases, only Flanders has some policy measures in this area. Here we found some tax benefits and subsidies to stimulate the acquisition of external patents. Attention for corporate entrepreneurship (10) is limited as well. The Estonian case provides some examples of policy measures supporting enterprises to develop their innovation strategies, but policies which directly support and assist in spin-off creation, intrapreneurship or venturing activities are absent. Efforts to create and introduce balanced incentives (14) for scientific researchers, i.e. incentives that also reflect the importance of valorisation, are missing. We found that the three countries are quite active in creating new institutions and grant schemes to organise valorisation, but career incentives to directly influence researchers’ behaviour are left untouched. Support for standard setting processes (3) also seems an opportunity for policymaking. However, we have to emphasise that support for standards primarily needs to be dealt with on an international level, so it may be obvious that within the countries reviewed only few policy measures are found.

The type of policy analysis in Table 3 has at least two limitations. First, a multitude of policy measures may give the impression that the existing policies are balanced and well aligned with the principles of open innovation. However, the number of policy measures does not imply that there is any coherence between them. It is recommended that policy makers adopt integrated approaches to innovation including less obvious areas such as labour market, competition and education policy. Second, the single focus on national policies prevented us from questioning whether the national level is the optimal level to take decisions for each of the guidelines. We come back to these limitations in the following section.

6. Conclusions and discussion

In this study, we explored the possibility of developing a public policy framework to facilitate open innovation. When more and more companies get involved in open innovation, the availability and accessibility of external knowledge becomes critical in determining its success. We have
argued that the availability of external knowledge is to a large extent the outcome of policy measures in relation to science, technology, IP, competition, labour, entrepreneurship and education. Consequently, policy makers have a considerable responsibility in taking policy measures and in shaping the institutional and legal context to stimulate open innovation practices in an economy. Furthermore, we have argued that it is also legitimate for policy makers to support and facilitate innovation as market and system failures persist in an era of open innovation.

We conclude that the current mainstream approach to innovation policy is too narrow in scope to deal with the challenges of open innovation; facilitating open innovation inevitably broadens the scope of policymaking. We identified that key open innovation activities in companies and external conditions can and should be influenced by a broader set of policy areas. Some of these policy areas are clearly beyond the traditional domains of R&D and interaction-oriented policies. The open innovation model emphasises a need to also develop remote policy areas such as labour markets and education. Therefore, policy makers should explore how to integrate various policy areas in a coherent manner. The guidelines we developed in this study have to be aligned with each other and integrated into a coherent and comprehensive set of policies. Hence, horizontal policies constitute a cornerstone in a public policy supporting open innovation.

Furthermore, we found a considerable overlap between open innovation studies and the systems of innovation literature. They focus on similar phenomena but they analyse them on different levels of analysis; open innovation takes the perspective of individual companies and accordingly it reveals what happens inside the ‘nodes’ of national innovation systems. Because of this overlap, and while acknowledging that the systems literature has greatly influenced innovation policy, we were not surprised to find that the policy mixes in developed countries contain several policy practices that already stimulate open innovation. Examples are financial incentives for R&D, interventions to stimulate interaction among innovation partners, measures to improve access to financial resources, and general policies to stimulate competition and the functioning of markets. Other guidelines that are frequently implemented are support for regional clusters and the diffusion of scientific knowledge. The fact that many policy measures are already in place implies that designing an innovation policy to facilitate open innovation does not entail a drastic change of the existing policy measures.

We also found that there are several blind spots in the policies of the three countries that we investigated. We recommend developing new policy measures in these areas. First, firms should collaborate and innovate more with users – because they have proven to be valuable sources of new business insights. Governments can in that respect focus on suitable external conditions, e.g. support for technology platforms, user communities and repositories for intellectual commons, which can be facilitated by investments in strong IT infrastructures (OECD 2008). Second, policies to enhance technology markets are still scant. Intellectual property policies are still focussed on preventing other companies from making use of a patented invention. Although strong IP protection may stimulate firms to innovate more, there is also a dark side to strong patents as they may be equivalent to creating monopolies with associated welfare losses (Hölzl 2007). To solve this potential problem, patent maintenance fees may be actively used as incentives to discourage the current habit of large firms putting unused technology on the shelf (Encaoua, Guellec and Martinez 2006). Another possible intervention relates to the provision of market information by developing information standards for IP licensing and associated trade, by making the supply and demand for technologies more visible and by developing know-how to value IP. Recent developments in IP-protection such as patent pools, clearing houses and open source models are promising too (Van Overwalle 2009): governments should carefully observe and stimulate these developments as they may increase the use of IP by multiple users increasing new business
developments and economic welfare from an existing stock of IP. Third, support for corporate entrepreneurship is also limited. This could be improved by interventions to raise the awareness of incumbent enterprises, by taking stock of best practices and by specific support packages including consultancy services to facilitate entrepreneurial strategies. Fourth, it seems important to create and introduce balanced incentives for scientific researchers. We found that the three countries investigated are quite active in creating new institutions and grant schemes to organise valorisation of IP, but career incentives with a direct influence on the behaviour of researchers are left untouched. This problem has an institutional dimension (performance and reward criteria) and a cultural one (scientific cultures tend not to appreciate valorisation). Incentive mechanisms should also motivate researchers to spend time on valorisation.

The current study is only exploring the implications of open innovation for policy makers. We acknowledge that the suggested guidelines need a more detailed analysis in future research. Some guidelines also require decision making processes at international level (e.g. high-quality IP, support for standards and enhancing technology markets), but we did not systematically analyse whether and when the international level is the optimal level for the decision making process. Future research should shed a light on the issue of globalisation and optimal levels of policymaking. Another suggestion is to study open innovation more explicitly in developing countries. Priorities may be different there, owing to the low absorptive capacity of indigenous companies and under-developed innovation institutions. Policy makers in developing countries may want to adopt our guidelines for open innovation policies in particular sequences, but how this should be done needs to be studied first. Finally, although horizontal policies are called for, we are aware that this is hard to realise in practice. Labour markets, science and education policies, in particular, tend to be influenced by considerations other than innovation and the creation of new business opportunities. For future work, it is essential to identify governance structures to effectively align and integrate policies for open innovation across different policy areas (Edler and Kuhlmann 2008).

The proposed framework is a first exploration of some guidelines for policy makers, rather than a blueprint for policymaking. We hope, however, that this study contributes to the growing awareness among policy makers that they have a substantial role to play in optimising the social benefits of open innovation and that they in this way can contribute to the prosperity of economies that rely more and more on knowledge as the major source of economic growth.

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Notes

1. We have identified these guidelines by confronting the different dimensions of open innovation (see section entitled ‘Open innovation’ the different policy areas that seem to be relevant. The guidelines themselves are the result of several discussions with innovation policy experts in the Netherlands, Flanders (Belgium) and Estonia. For more information, see De Jong et al. (2008).

2. www.proinno-europe.eu
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References

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