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*Intellectual property rights and 'open  
innovation' in services*

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## Intellectual Property Rights and ‘Open Innovation’ in Services<sup>1</sup>

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### Abstract

In this paper it is argued that the evolution towards using the IPR system in support of ‘open innovation’ processes in services, based upon sharing information, knowledge, ideas and (cultural) expressions, has been led by firms and industry in their strategic interactive or collaborative IP management, rather than led by government policy designing the law and enforcement. IPR legislation in its current form is providing very exclusive broad rights for a long period. Using an example of computer implemented inventions and innovations, the paper demonstrates how ‘open innovation’ processes in services can successfully be underpinned by the IPR system using both *proprietary* strategies and *non-proprietary* IPR methodologies regarding appropriate and less exclusive IPR protection and associated innovation management. Other elements related to the efficiency of the IPR system, such the functioning nature of the IP market place, for stimulating ‘Open Innovation’ in services are also highlighted.

**Keywords:** ‘Open Innovation’; services; intellectual property rights; proprietary and non-proprietary; strategy and policy.

**JEL classification:** D23, O3, O34, P14, P48

### 1. Introduction

The nature of innovation is changing. It is becoming increasingly open with a multitude of agents participating in the same knowledge, creative, development and commercialization spheres which tend to be collaborative, multi-disciplinary and global. The term ‘Open Innovation’ has been coined to encapsulate this evolution. (‘Closed Innovation’ is when companies are only seeking in internal innovation route, as opposed to external, using only internal resources.)

Especially knowledge intensive business services have experienced an emergence of ‘Open Innovation’ into their innovative spheres. This is because these service sectors are already heavy adopters of information and communication technology (ICT) and micro electronics in their efforts to increase the quality and productivity of their

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services. These are the very same technologies which makes possible the worldwide availability and distribution of scientific data, information and ideas etc. However, to reap the benefits of this ‘Open Innovation’ evolution, innovation policy and innovation practices in firms and industries must adapt.

The aim of this paper is to address the issue of Intellectual Property Right (IPR) in a future perspective by asking if the IPR environment in its current form is able to support the movement towards ‘Open Innovation’ in services. By IPR environment, in this paper, is meant the areas of (i) the IPR regime (e.g. IPR law, patent offices etc.), (ii) IPR strategies of firms, and (iii) the IPR market place). By ‘Open Innovation’, in this paper, is meant innovation processes of firms and individuals which take place in the industrial sector, or the technological domain, in interaction with other firms and individuals and/or other private or public organizations. IP users have also become IP contributors in an ‘Open Innovation’ dialogue. Firms and individuals engage in IPR-underpinned ‘Open Innovation’ for a variety of reasons, such as interdependency in knowledge bases, or a belief that this will produce better quality new innovations, but there are also many other incentives (see section 4).

Focus in this paper is especially on the key ICT based service sectors, such as software and communications, but other services (such as media, publishing, creative industries, health care, science and education) are also mentioned to underpin the arguments of this paper.

This paper argues that Intellectual Property Rights (IPRs) (conventionally associated with monopolistic market structures) and ‘Open Innovation’ are not innovation strategies which are necessarily contradictory in terms. Rather, the movement towards ‘Open Innovation’ in services can be (and has been in many cases) supported and even underpinned by the IPR system in many different ways, using both *proprietary* and *non-proprietary* strategies regarding IPR protection and associated innovation management. However, this does not imply that IPRs cannot be (or are not sometimes) used as a weapon to destroy an ‘Open Innovation’ process, so appropriate policy and management is essential.

The paper also flag out in the open two paradoxes. Firstly, it seems paradoxical that while micro-electronics and the new information and communication technology support the dynamics of sharing information, knowledge, ideas and (cultural) expressions in new ‘Open Innovation’ spheres, this is made more difficult, and sometimes impossible, by the IPR legislation in its current form of providing very *exclusive and strong* protection (e.g. via broader patents, increased period of protection of patents and copyrights, lower requirement of ‘inventive step’, new areas of protection, increased enforcement worldwide, etc.).

Secondly, it is also a paradox that, while government has made IPRs more *exclusive and stronger* the way in which IPRs have been managed by firms and industry in ‘Open Innovation’ systems has made them less exclusive and less strong. That is, this paper argues and outlines some tendencies showing how the movement towards using the IPR system in support of ‘Open Innovation’ in services has been led by the very nature of the ‘play of the game’ (reflected in strategic interaction) by firms and industries, rather than the ‘rules of the games’ (reflected in IPR legislation) set up by government policy. The crucial factor is the way firms and industries govern IPRs, in

both proprietary and non-proprietary appropriation models, in their efforts to foster innovation and to increase value creation from their innovations.

A related concern addressed the paper is that the very exclusive and strong IP rights stimulate anti-competitive behaviour and abuse of IP rights. Basically, the ‘rules of the game’ can encourage efforts to secure as large a share of the innovation value-pie as possible rather than behaviour that contribute to increasing the size of the value-pie creative by the collective. In other words, it can encourage (or outbalance) rent-seeking rather than welfare enhancing behaviour.

The challenges and implications ‘Open Innovation’ methodologies have for both IPR policy and IPR management are addressed in detail. Policy and management should be concerned with the actual interaction between the design and implementation of the ‘rules of the game’ and the ‘play of the game’ and the IP market place.

Finally, mainstream theory arguing all the perceived benefits of IPR rights should be treated with caution due to its underpinning in the form of unrealistic assumptions such as the non-existence of various factors as: technological interdependence, a social origin of invention and innovation, strategic interaction inside or outside the IP market place, or power asymmetries (e.g. in IPR related bargaining situations). These are indeed the phenomena which today underpin the ‘Open Innovation’ dynamics and performance of IPR systems. Also, theory does not deal with the specifications of any system or practical applications which can have a huge impact on the performance of the system.

### Paper outline

The paper is structured as following: Section 2 raises some concerns regarding the implications and implementations of the IPR rationales (or societal objectives), as defined by theory and reinforced by many governments, in relation to supporting and creating the basic incentives for ‘Open Innovation’ processes in services. Section 3 reviews various types of IPRs which are regarded of being of ‘high importance’ for a range of service sectors who are producers and/or owners and/or users of the IPRs.

Section 4 analyses the design and performance of the established IPRs system in relation to ‘Open Innovation’ processes in services. This section critically discusses how the IPR system can be best geared towards supporting ‘Open Innovation’ processes, and how the evolution towards using the IPR system in support of ‘Open Innovation’ processes in services has been led by firms and industry in their strategic interactive or collaborative IP management, rather than led by government policy designing appropriate IPR law or appropriate IPR enforcement. Focus is on the management of IPRs in both *proprietary* and *non-proprietary* based ‘Open Innovation’ systems within services. To provide an illustrative case study, section 4 refers to computer implemented innovations, but other service innovations are also mentioned to underpin the arguments. The paper concludes in section 5 on the interfaces between IPRs and ‘Open Innovation’ processes and policy implications.

## 2. IPR rationales in support of ‘Open Innovation’ processes in services.

In order to understand why government is concerned with IPR protection in services as they have become increasingly knowledge based, we need to address the fundamental rationales for IPR protection. Section 2.1 outlines the rationales for IPR and section 2.2 critically addresses some concerns regarding why the IPR system does not always perform in accordance with the dynamics of ‘Open Innovation’ processes.

### 2.1 The rationales for IPRs

The rationales for IPR protection was first proposed by a range of classical economists are now adopted into mainstream economics. The following summary will be based upon the thorough explanation of them in Andersen (2004, 2006), Mazzoleni and Nelson (1998), Kaufer (1989), Machlup (1958), Machlup and Penrose (1950) and Towse and Holzhauser (2002).

(i) *Market creation rationale*: patents and copyrights enable the creation of markets by correcting market failure in relation to knowledge based ideas, creative expressions and intangibles.

- Dynamics mechanism: as knowledge embedded in product and process innovations as well as in creative expressions are intangible, and many services are in themselves intangible, such assets face the problem of non-excludability when exchanged in the market place. IPRs can facilitate markets by correcting for such market failures.

(ii) *Incentive rationale*: patents and copyrights facilitate spill-over and expansion of knowledge based ideas and creative expressions of ideas through the creation of incentives to trade.

- Dynamics mechanism: the fact that knowledge and creative expressions, and many services (e.g. computer implemented inventions or cultural products such as music) can be consumed jointly, involves significant fixed costs in development, and does not lose value by use, opens up for the possibility of wider commercial exploitation in trade, when protected by IPRs. The bigger the market the larger profit, so establishing property rights for knowledge based ideas and creative expressions implies an incessant drive to expand the market for knowledge and creative expressions so as to generate greater rents (Rivera-Batiz and Romer 1991). Market expansion is also believed to facilitate spill-over such as transfer of knowledge embedded in ideas and (cultural) creative expressions.

(iii) *Sustainable development of firms and industry rationale*: patents and copyrights protect entrepreneurial talent which facilitate sustainable development of firms and industries.

- Dynamics mechanism: IPRs offer market privileges to entrepreneurial talent through temporary protection from imitation and market entry of products or services embodying their novel ideas and original creative expressions. This protective space is meant to allow entrepreneurs as well as the industry or the market to develop, which is, in turn, believed to facilitate sustainable development of firms and industries. Without protection the inventor is not believed to do the investment in the first place in the fear that (s)he will not be able to cover R&D or

reap the profits as imitators can, in principle, steal the idea without having to pay the basic research costs.

(iv) *Reward rationale*: patents and copyrights reward inventiveness and creativity throughout the economic system. (This is related to the natural rights and moral rationales that can be attached to IPRs)

- Dynamics mechanism: in principle, patents and copyrights guard the natural right to claim an intellectual property, and the moral right to compensation and reward if someone exploits another's idea or expression of an idea. Thus, individuals and firms inventing ideas and creative expressions should find their rights protected and rewarded by the IPR system.

In total, those rationales describes how patents and copyrights are believed to be beneficial for many economic reasons related to market creation, trade, knowledge spill-over, cultural expansion, creation of incentives for investment, invention and innovation, sustainable development of firms and industries, as well as an assurance of an ethical reward to inventiveness and creativity. Furthermore, as elaborated in Andersen (2004), in those mainstream contributions, it is believed that all those rationales for IPR protection have welfare effects throughout society.

Therefore, the mainstream frameworks of the effect of IPRs have been further reinforced by a commonly held view in industry and government as well as organizations for regional economic cooperation (e.g. the European Union) and some international agencies (e.g. World's Intellectual Property Organization, WIPO), that the privatisation of intellectual capital and knowledge-based assets in the knowledge based service economy provides mainly advantages. If IPRs did not perform in accordance with the perceived expectations it was viewed this was viewed as being mainly due to mis-management of those enforcing the regime (e.g. the legal system) or the players (ie firms and individuals). Thus, any problem could be solved by increasing awareness and increasing IP management competencies.

Therefore, due to the perceived 'mainly advantages' of the privatization of knowledge based ideas and expressions, the emergence of a global knowledge based service economy has resulted in the setting of an international norm stressing the need for strengthening the IPR system through the harmonization of national and international IPR rules and the establishment of universal or international minimum standard for IPR protection. This has also resulted in an increased enforcement of IPRs, including new areas of protection (e.g. business methods patents and gene related patents in many regions of the world), increased length of IPR protection (patent protection extended to 20 years and copyright protection extended to 70 years after the author's death), and an increased commoditisation of traditional cultural expressions and traditional knowledge, etc.

Following the growing importance of knowledge-based assets and creative expressions in recent years, and due to the increasing enforcement of the IPR system, it is increasingly being recognized that patents and copyrights often represent strategic assets for those who own and control them. Therefore, it is hardly surprising that the pace at which individuals, firms and the public sector are using IPRs to privatise knowledge-based assets and creative expressions has been accelerating.

## 2.2 Some concerns over IPR rationales in relation to the creation of an ‘Open Innovation’ process

However, recent meetings organized by national governments, international organizations (UNCTAD), organizations for regional economic cooperation such as the EU, activist organizations (such as Foundation for Free Information Infrastructure FFII), and especially within developing countries, indicate the emergence of a deep and widespread concern with the impact of the increasing privatization of knowledge based assets, associated with the stronger IPR regimes. For many, it has become evident that the global harmonisation processes and the increased enforcement of IPR rules have led to highly asymmetrical results across the board (across countries, regions, sectors, and firms within sectors) in terms of meeting the originally intended objectives regarding stimulating innovation-based competition, facilitating market creation and spill-over and expansion of knowledge based ideas and creative expressions of ideas, rewarding inventiveness and creativity throughout the economic system, and facilitating sustainable development of firms and industries. Thus, while proponents of the strengthening of IPR regimes stress the consequent convergence and closing of income and technology gaps, there is a growing concern that strong IPR regimes are having the very opposite effect.

Also, within the IPR research community, the social and economic effects of tightening the IPR system are not considered obviously beneficial and the IPR policy encouraging increased enforcement is largely perceived as based upon the ‘vision’ of policy makers rather than the findings of solid empirical research.

A key problem is that the IPR system is designed to stimulate the exercise of very exclusive rights, and sometimes very basic rights, over a very long period (it is almost as, the more private the knowledge is, the better), and it is not designed to stimulate or work around the increasing need for ‘Open Innovation’ processes.

For example, it is a problem that the received analytical frameworks constructed and propagated by mainstream academics inspired by neoclassical economics, or written by companies wanting to demonstrate their success, do not usually spell out the limitations of the tools for analyzing the dynamics of the IPR system. Rather, prevailing mainstream IPR theory *assumes* that the interaction of all micro-participants (e.g. firms and individuals) within IPR systems maximises social and economic welfare at the sector, national and global levels. Also, IPR regimes designed at the national and international levels are *assumed* to deliver maximum welfare for each participant within the IPR system. (See Andersen 2004 for a critical discussion of the mainstream assumptions underpinning the IPR rationales).

All the characteristics of the healthy dynamics of ‘Open Innovation’ processes is hugely ignored. For example, the mainstream analytical framework assumes that all inventors, whether individuals or firms, are *autonomous*, rational, profit-maximizing agents and that the aggregate of their behaviour maximizes both their own and social welfare. Largely ignored are the crucial effects of *technological interdependence*, the *social origin of innovations*, *strategic interaction* and *collaboration* in innovation processes and in competitive IPR markets, the specific (cumulative and incremental) rigidities of productive knowledge applied in technological ideas and the nature of norms, values and beliefs embedded in cultural expressions (can e.g. affect the

efficiency of patent systems and copyright systems, respectively), *power relationships and asymmetries* in IPR related licensing and other bargaining situations, and the opportunity costs of using the IPR system as a corporate tool or political instrument. Also, IP markets are assumed to work perfect.

Such ‘real life’ elements must be taken into account when designing policies in support of the changing innovation processes which are becoming more open with a multitude of agents participating in the same knowledge, creative, development and commercialization spheres which tend to be collaborative, multi-disciplinary and global, and where IPR rights presents a huge knowledge governance tool.

### **3. Intellectual Property protection tools in services which are of ‘high importance’**

Clearly the intangible nature and the specialized knowledge involved in many services poses considerable problems for the identification and measurement of innovation and quality. Many of the service objects are not based upon science and technological (S&T) knowledge, or developed through research and development (R&D) (Andersen et al 2000). This raises the question of appreciating other forms of knowledge types as an alternative to the traditional measurement. Innovation in services is often driven by applying other knowledge types than those associated with S&T or formal R&D. This includes knowledge types such as aesthetic knowledge, cultural knowledge, social, organisational, and managerial knowledge, and information based knowledge (see Andersen and Corley 2006). Thus, whereas patent protection is the key for many manufacturing innovations, which are mainly of technical character, service firms are expected to use a wider spectrum of innovation protection which should also be reflected in their IP protection.

Therefore, service firms also seek very different IPR protection. The importance of IPRs for innovation protection in innovative service companies was studied in the EU funded research project ‘Patents and Services’ (ERBHPV2-CT-1999-06) (EU Research Project 1999, Miles, Andersen, Boden and Howells 2000). This study in which firms were asked about the *relative importance of various IP protection tools* is still among the state of the art analyses regarding our knowledge of the strategic behaviour of many service companies in Europe. An overview of the results is presented in Table 1.

Table 1: IP protection tools in services which are of 'high importance'

IPR	Examples of service sectors who find this protection method of 'high importance'
Patents	R&D and Consultancy Telecommunication and ICT system services, Mobile phone services, Radio and television broadcast services, Internet services
Design patents	Architecture
Copyrights	Media and news services Advertising services Cultural services (music, film, publishing, art)
Trademarks	Retail, Wholesale Recreation (fun) parks Logistics, Mail, Railways, Air transport services, Transportation of persons and goods
Secrecy (not only trade secrets)	Engineering and technology related services. R&D and consultancy. Database services Public administration and research Retail, Wholesale Cleaning services

Source: Summary of results from EU Research Project "Patents and Services" (ERBHPV2-CT-1999-06).

Table 1 is based on answers from 63 firms across a range of sectors. The firms are grouped in sectors of similar character with regard to the nature of their service. If at least 50% of the firms in a group regard an IPR tool to be of 'high importance' for their innovation protection (as opposed to 'medium' or 'low importance') the group is listed next to the IPR tool in question. It should be noted that an IPR tool can be of high importance, irrespectively of where the invention took place, so firms were not only questioned about their ownership of IP but also if they were users of IP. Basically, many service firms are heavy users of IP even if they are not (or have never been) owners of it. This also reinforces the view the IPR system should not only be geared up to protect owners of IP but also users, and often the two groups are also inter-dependent in open dynamic innovation processes.

It is interesting to observe how, already in 1999, both patents, trademarks, copyrights, trademarks and secrecy play an important role for many services, and how the results differ across the various firms or sectors. This high importance of IP is undoubtedly even stronger today. However, due to the nature of heterogeneity of the services, the different size of the firms analyzed, as well as the analytical problems with a small sample, no strong conclusions should be drawn from Table 1.

#### 4. 'Open Innovation' in services and the application of IPRs

Section 4.1 discusses the emergence of 'Open Innovation' processes within services and the implications for IP management. Section 4.2 will consider the proprietary models and section 4.3 will consider the non-proprietary models. Both will use the development of computer implemented inventions such as software as an example. Furthermore, the challenge of proprietary based 'Open Innovation' in the IP market place is discussed in Section 4.2, and alternative non-proprietary Open Innovation models applied in other service sectors than software is addressed in section 4.3

#### **4.1. The emergence of Open Innovation processes in services**

‘Open Innovation’ is a term which is often used to describe the innovation processes in today’s knowledge based service economy. The term has been interpreted in many different ways. Chesbrough (2003) who coined the notion, meant something specific, mainly that firms look at an ‘external path’ (rather than ‘internal’) to the market when they advance and commercialize their new technology. An external includes utilization of external knowledge, mobility of workers, venture capital, etc. Other authors apply the concept more loosely and link it directly with industrial dynamics and applied evolutionary economics. In this context, successful inventions, and the commercialization of such inventions during innovation processes, unfold due to a range of key processes which include some kind of interaction with the external environment. Christensen et al (2005, p. 1534) and Cohen and Levinthan (1990) emphasize the importance of absorptive capacity regarding the adoption of external ideas, and the utilization of science and other knowledge inputs to innovation. Rosenberg (1982), Lundvall (1992), Pavitt (1998), von Hippel (1988) and others, address the interactive, cross-disciplinary and inter-organization nature of innovation and learning processes. These approaches can be contrasted with what has been termed the ‘Old Innovation’ process (which was dominant in the post World War II innovation paradigm) according to which companies generate their own ideas, do their own research and development to transform their ideas into innovative products, production processes, distribution, etc., using only internal resources if at all possible (Chesbrough 2003, Christensen et al 2005)

The ‘Open Innovation’ approach in this paper rests on the industrial dynamics approach by Carlsson and Stankiewicz (1991) and Carlsson (1997) who emphasize how firms advance their knowledge base (or competence bloc) by engaging in complementary knowledge spheres which means that they become technological inter-dependent, independent of whether they compete in same markets or belong to different industries.

In this context, the social origin of inventions argument in relation to concerns over IPR protection was first put forward by Plant (1934). He opposed even patent protection rewarding individuals for this reason. He argued that technological inventions and creative expressions are mostly a social creation of collective, cumulative and interrelated work to which we all contribute, and accordingly no person or firm should be able to claim the property.

In similar lines (although not with as radical views as Plant regarding the IPR system), David (2001) also argued that the creation of scarcity within information, knowledge and creative spaces is inefficient, as the dynamic nature of information, knowledge and creative spaces (facing increasing returns to scale) is very different from physical land spaces (facing decreasing returns to scale). Basically, information, science, knowledge and creative spaces are likely to be enriched the more researchers, inventors, artists etc are allowed to participate in the same spheres. David (who especially focused on research communities) argued that it is through wide and complete disclosure and the sceptical efforts to replicate novel findings and creative

expressions, that scientific and creative communities build bodies of reliable knowledge and creative expressions. Thus, IPR protection shall not be everywhere, not be too strong, and it must be a flexible system.

Other evidence illustrating the emergence of innovation processes which are necessarily open with multiple actors participating will now briefly be considered below.

Research on patent scope by Merges and Nelson (1990) also reveal how inventions happen along multi-product trajectories that are cumulative, path-dependent and complex, which implies that each innovation along the trajectory relies not only on own ideas but also on others' current or past ideas. Merges and Nelson (1990) argue that, whereas inventive rivalry is good for inventive progress, it should be noted that too strong patent protection will distort such progress due to patent blocking slowing down cumulateness. The basic argument is that, most innovations take place in a social context, in the sense that complex and multi-component products are the norm in many industries, and individual patents often cover only a single component or sub-component. There is no simple 'one to one' mapping of products and property rights, e.g. each product includes a variety of patents of different types and with different scopes and durations. The breadth of the patent scope is very important for understanding the monopoly effects of the patent system. Due to cumulateness in the innovative processes, a more narrow protection favours secondary inventions, but sacrifices the economic incentives that would otherwise be offered for breakthrough inventions, whereas broad protection has the opposite effect (as knowledge becomes scarce and costly for secondary inventions). Merges and Nelson (1990) illustrates by means of historical evidence how the strengthening of patent protection does not increase invention, due to the increased costs of the patent scope. However, they argue that patents do help to reach certain ends, and they discuss the idea of compulsory licensing to enhance more inventive rivalry, and to eliminate some of the problems with too broad patent scope enabling blocking power. In the same way as patent blocking is seen as destroying competition and hampering innovation, patenting of 'pure ideas' would also block innovation and competition due to too broad patent scope. This is the reason why 'pure ideas' - i.e. laws of nature (physics laws), theoretical principles (e.g. some mathematics), and natural species (an exemption being the controversial right to patent gene-codes in some regions of the world) - are not normally eligible for patent protection.

The same concerns related to the criteria for IPR protection have in recent history also raised by many firms arguing against broad or unlimited patents on business methods. Basically, the problem of the criteria of novelty and originality as well as IPR scope has been a central area for discussion as services innovations increasingly become protected via patents or copyrights. Basically, *due to the intangible and often non-technical dimension* of many services such *novelty and originality and IPR scope criteria* are hard to establish. For example, the criteria for what is original for software seem to become ever more ambiguous within digital and micro-electronics where new combinations are produced more easily or with very little effort (Andersen 2003).

Also, novelty criteria a not clear to define conceptually. For example, the novelty criteria defining how computer implemented inventions (such as software and business methods) should be IP protected has recently been discussed in a hearing

process by the European Union 2002-2005. This mainly concerned what is required in terms of ‘inventive step’ (or novelty) for a computer implemented invention to be eligible for a patent. This was especially relevant for innovation in services which are often related to the way the firm does business rather than its products and deliveries. Innovation of business methods is not related to the product, but to the ‘integrated nature of services production, delivery and use’. The Amazon.com one-click system is a good example of such an invention. One criteria (option 1) could be ‘technical’ where a business process can be patented if it reflects a technical advancement. In this sense, it is protected as computer programs. This is how inventions are protected in most European countries and Japan. Another criteria (option 2) could be ‘technological’. Here computer implemented inventions can be patented as long as they are ‘in the technological arts’. That is, the computer implemented invention may not necessarily be of technical character or a technical advancement, but it must be implemented via computers to get the protection. (This meets the UN’s definition of technology: ‘a combination of equipment and knowledge’.). This is how a business process is protected in the USA. A third criteria (option 3) could be that there should be no technical or technological restrictions on the patentability of business methods. ‘Any new concept’ of doing business or business method can be patented. This reflects US considerations. Option 1 imposes a strict novelty criteria, making it difficult to imitate the protected idea. Option 2 or 3 results in a fundamental change in the nature of patent law, making an informal exemption of the criteria of novelty, because it is impractical to judge what is novel when there is no requirement of technical progress. Option 3 even goes beyond the basic principles of current patent law, as this is not based upon any science-based principle of technical progress or technological change. It has often been argued (both during the EU Software Hearing and in the Global Innovation Outlook 2 Report edited by IBM) that with vague novelty criteria, too many trivial inventions with very broad scope can be patented and the IPR system becomes inefficient. These are the concerns raised against the US system.

Andersen (2001) use patent statistics to illustrate how technological trajectories increasingly rely on broader knowledge bases, and have also become less concentrated in the sense that a range of different firms now participate in the same technological evolution, and this spurs incentives to Open Innovation processes.

In similar lines, Andersen, Kozul-Wright and Kozul-Wright (2007) illustrate, using the case of music copyrights, the generation of composite rent from *joint effort* throughout the music supply chain, in making the most of the musical resources and minimising of risk in volatile markets, as well as the raising of venture capital. There are economic incentives for transfer or sharing of ownership or control of music copyright, or transfer of revenue from musical works, in order to provide incentive for collaboration around such joint effort.

‘Open Innovation’ has proven to be especially relevant for knowledge intensive business services because of the increasing complexity of their knowledge bases of service solutions, with many different firms providing complementary knowledge to new technical and creative solutions. Thus, as firms engage in the same complementary knowledge spheres they need to cooperate through the exchange of ownership or the rights to control IPRs.

For this reason there has recently been an evolution among service firms to change their IPR management strategies in order to enable the flourishing of ‘Open Innovation’ and to make sure that the IPR system performs at its greatest potential for each of its participants. This will now be illustrated by using computer implemented inventions as an example. Initiatives towards ‘Open Innovation’ in other services will be briefly mentioned as well. There are three major trends.

The first trend concerns the increased use of interactive licensing agreements. Whereas strong opportunities to exclude via IPR protection persists among service firms, they increasingly use IPRs in interactive licensing agreements (e.g. cross-licensing and patent pooling), rather than holding on to them (see section 4.2)

The second trend is prompted by a recognition that IP markets do not work efficiently for Open Innovation processes; especially in relation to the IP proprietary based innovation processes discussed in the section 4.2. This has resulted in inter-firm pressure or sanctioning if competitors or collaborators try to distort the free market mechanisms, and this will be addressed by the end of section 4.2).

The third trend is the strong move by service firms towards using non-proprietary IPR protection, such as Open Source, Free Software, Freeware and Shareware (see section 4.3)

## **4.2 Proprietary software in an ‘Open Innovation’ context**

This section addresses the implications of IPR protection for ‘Open Innovation’ in services, with special emphasis on computer implemented inventions. Focus will be on proprietary software.

Proprietary software is software with restrictions on using, copying and modifying as enforced by the proprietor. Restrictions on use, modification and copying are achieved by either legal means (via patent and copyright law) and/or technical means (e.g. by releasing machine-readable binaries to users and withholding the human-readable source code).

The internal dynamics of such alternative forms of IPR governance are described in detail in Andersen and Konzelmann (2008). In summary, the financial or non-financial value generation through such ‘Open Innovation’ methods include (a) access to ownership of productive knowledge via various agreements, (b) setting territories (i.e. market power) via strategic (often exclusive) licensing, cross-licensing or patent-pooling agreements, (c) income from licensing or buying and selling IPRs, (d) cost cutting from royalty free cross-licensing or patent pooling agreements, (e) raising venture capital from listing IP assets on the stock market, (f) establishing favourable joint ventures, and (g) enabling the strategic evolution of common standards.

This value is realized via external interaction or relationship in which rights to own or control IPRs are exchanged. Such interaction or relationship range from simple arrangements:

- Buying and selling: Selling or buying is when the ownership of an IP is transferred between seller and buyer

- Licensing in and out: Licensing is a contract in which one or more firms gain access to intellectual property in the exchange of paying royalties. The use-right is transferred, but the ownership is not.
- Sharing the IPR: More than one firm can choose to share ownership and access to the IPR.

to more complex arrangements such as

- Cross licensing: Cross-licensing is the mutual sharing of IP between companies without an exchange of a license fee in cases where both patent portfolios are about equal in value.
- Pooling of IPRs: An IPR pool is similar to a cross-licensing agreement in the sense that the objective of the stakeholders is the gaining of access to IPR-protected knowledge on a royalty-free basis or being part of setting common standards or other. However, the IPR pool differs from a cross-licensing agreement in that it is non-exclusive and anyone able to make a contribution to the pool's development trajectory can join. Firms outside the pool, who cannot contribute, can obtain access to IPRs in an IPR pool by means of licensing arrangements. Patent pools have increased in popularity in markets for complex products and technologies that require input from many different specialized contributors. A leading example of a patent pool administrator within digital technology (e.g. digital video systems) is MPEC-LA (<http://www.mpeg-la.com>) whose mission statement is fair, reasonable, non-discretionary access to fundamental technologies.

These 'Open Innovation' methods contrast sharply to holding on to the IPRs right, excluding all others from access to the IPR., which was more common in the old Closed Innovation paradigm.

The forms of IPR interactions or relationships listed above are not exclusive; rather, most firms participate in several different forms depending on the IPRs they hold and need, and the type of financial and non-financial value they hope to generate from their IPRs. However, whereas all forms are equally common within patent systems, proprietary copyright systems tend to be biased towards licensing in or out or cross or simple buying or selling.

Firms which use proprietary IP protection methods in their management of software solutions include Micro-soft, IBM, Nokia, Siemens, etc.

The effectiveness of an 'Open Innovation' system is dependent of the ability and willingness of participants to perform a productive role. In this context, the performance of a productive role involves the participation in the creation of *the largest possible 'value-pie'* from IPRs. Alternatively, agents may be oriented towards securing *the largest possible share of the 'value-pie'*. In the context of the IPR system, the behaviour of the agents has an influence on the dynamics of the system and thereby shapes the welfare gains from IPRs as well as the direct and indirect costs associated with participating in the system. It should *in principle* be in the interest of both the individual and the collective to fully cooperate in value creation processes through IPR management of innovation and innovation appropriation. This is because of the mutual interdependence inherent in the alternative forms of IPR interaction or relationships, and the potential operational and dynamic efficiencies generated by

cooperation (e.g. through knowledge sharing, standard setting, and royalty free agreements, etc. - see point 'a' to 'g' above).

However, evidence shows that many software firms have experienced problems with their collaborators and competitors as a result of their redistributive rather than productive behaviour in 'Open Innovation' models. This tends to undermine the efficiency of the IP market place. Such behaviour partly results from the unproductive 'rules of the games', as will now be explained.

### The challenge to the IP market place

The 'Open Innovation' model also implies big challenges to the working of the IP market place. Thus, an efficient IP market place is especially essential for a proprietary 'Open Innovation' model as more rights are restricted in this model compared to the non-proprietary model (see Section 4.3). Accordingly, the market place plays a central or direct role in knowledge sharing than in the proprietary model. As showed just above, all forms of licensing, and buying and selling of IP rights, must take place in the market place for the 'Open Innovation' process to function. However, it has become obvious to many firms that the IP market place needs correction or restructuring. For this reason IBM launched an open source online international debate (IBM (2006)). It was conducted through the development of an online Wiki-document by more than 100 leaders from business, academia, government, and other organizations who joined with IBM's top researchers and consultants to examine the performance of the IP market place. It emerged into the report entitled 'Building a New IP Marketplace: A Global Innovation Outlook 2.0.

Main issues discussed and the some commonly expressed views in this open and frank online debate can be summarized within a few themes, as such:

*Flexibility:* As firms, today, need to jointly engage in the creative spheres in which they are interdependent in their knowledge bases, the IPR systems should not encourage (or perhaps even offer privilege to) the use of very exclusive rights but rather encourage more Open Innovation systems through open source codes, compulsory licensing, open standards, etc. There is a limit to the strength of IP protection which the law should be seeking. For the same reasons the US patent system supporting unlimited patents on software protection was heavily criticized by almost all firms participating in the debate (including IBM, Philips and Nokia). Contrary to the underlying rationale, IP markets do not perform better, the stronger and broader the protection is.

*Transparency:* There is a need for re-establishment of transparency in licensing markets for the following reasons: the ownership of IP is often difficult to trace; also, the terms and conditions under which firms will undergo licensing are difficult to trace; finally, the patent documents including text, explanations, graphics, drawings etc. are difficult to read. (It is not uncommon that even a person skilled in the art cannot make sense of the explanations on the patent document). Thus, there is not a sufficient public disclosure of the invention which (in principle) should be a minimum condition for the granting of a patent, and patent offices granting the patents should do something about this as they are partly responsible.

*Integrity:* Behaviour in the IP markets place has become anti-competitive, manipulative, poor in terms of companies bullying each other, and there are too many unjust court cases. This distorts the whole idea of an Open Innovation process. The importance of trust and social capital for IP markets to work well should be recognized.

*Patents of good quality and high value:* There are too many patent application filed with small or no inventive step or of very similar type. For example, it is well known that for each invention a large firm usually files 10 applications in similar lines, in hope for some success. This creates a burden to examination offices. There are also too many patents granted with small or no inventive step, so we have a problem of too many patents of bad quality. Thus, the recent critique of the patent offices (including the critique of the EPO during the EU software hearing 2002-2005) is about the need for patent offices to shape up their practices. However, firms should also stop filing such poor patent applications (as mentioned in this paragraph and in the paragraph on *Transparency* above).

Relevant quotes underpinning the above arguments, taken from the end of project report: Building a New IP Marketplace: A Global Innovation Outlook 2.0 (IBM 2006):

- Flexibility: “Maybe it’s not [only] the patent system that we have to make flexible, but our licensing process – turning it into a more flexible one that enables us to be protected while encouraging collaboration...” León Felipe Sanchez Ambia (Fulton & Fulton); and “..open technology standards have created the foundation for new forms of collaborate and/or cumulative innovation” (text citation)
- Transparency: “I think globally coordinated efforts need to focus on what level of transparency we really need to facilitate exploitation / transaction / licensing of patents in the market place and whether or not such level of transparency may reach our goal” Xiaoguang Yang (ZhongZhi Law Office)
- Integrity: “Integrity: Actions: Design a series of checks and balances to engender trust in the system, prevent manipulative behaviour and provide a frictionless channel for patent owners and licensees to transact business” (text citation).
- Patents of good quality and high value: “Patent quality is a key to the future of the European patent system” Alain Pompidou (President, European Patent Office 2005 Annual Report)

In short, the ‘rules of the game’ set by the IPR legislation of strong patents over a long period of time, combined with poor management of the system underpinning the IP market place, encourage rent-seeking rather than welfare enhancing behaviour. IPR governance of proprietary software today is *not based upon the ‘Open Innovation’ spirit of optimising* the value (i.e. optimizing the size of the value-pie) realized from IPRs. Rather, it is based upon a particular constellation of interests and power which is concerned with *securing their share* of the value-pie.

### **4.3 Non-proprietary software in an ‘Open Innovation’ context**

The paper now turns to address the non-proprietary models regarding value generation from IPR protected software in ‘Open Innovation’ systems. The models

addressed are not exhaustive, but they include the most common forms: Free software, Open Source Software, Freeware, Share ware.

### Free Software and Open Source Software

Free Software and Open Source software is concerned with users' freedom to run, copy, distribute, study, change and improve the software. (For a full detailed definition, see the web-site of the free Software Community: <http://www.gnu.org/philosophy/free-sw.html#exportcontrol>).

However, a central difference between the Free Software and the Open Source software communities is that they are separate movements (or two political camps) in the 'Open Innovation' context. The Free Software movement stresses freedom or liberty (in terms of right to use, express, modify and distribute) as intrinsic values. In this sense, the concept 'Free Software' may be associated with the concept 'freedom' or liberty. It does not mean getting something for free in terms of zero price (i.e. as in 'free beer') (<http://www.gnu.org/>). The Open Source software community, on the other hand, supports or values the 'right to use, express, modify and distribute software material', merely as a development strategy. They basically regard such knowledge sharing and interaction as the best development strategy (or business model) to create 'better software'. There are also other small differences between the two communities so they are not *exactly the same class* of software. For example, the Open Source community accepts some licenses that the Free Software community considers too restrictive, and equally, there are Free Software licenses that the Open Source community does not accept. However, the differences are small and nearly all Free Software is Open Source, and vice versa.

Thus, the two communities disagree on the basic principles, but agree more or less on the practical recommendations. Their combined force is often described as Free/Open Source Software (FOSS), or as Free/Libre/Open Source Software (FLOSS). However, their joint enemy (from the activists' point of view) is proprietary software.

Protection is via copyright, and copyrights are also the preferred licensing tool as opposed to direct contracts, as the latter tend to include further licensing restrictions. Their licensing strategy often takes the form of 'GNU General Public License (GPL)' or 'Copyleft'. (GNU is a computer operating system composed entirely of free software, and GNU is acronym for GNU's Not Unix which was chosen because its design is Unix-like, but differs from Unix by being free software and by not containing any Unix code). Whereas copyright law, in its current form, provides the right to exclude anyone to use, modify and redistribute copies of an author's work as well as a right to withhold the source-code; a GNP GPL or copyleft license use the copyright law to transfer these rights to the commons in order to ensure access, i.e. that every person who receives a copy of a work has the same rights to study, use, modify, and also redistribute both the work, and derived versions of the work. Thus, such licenses also require that the same license terms apply to all redistributed versions of the work. Thus, it is about changing the copyright terms from 'All Rights Reserved' to 'Some Rights Reserved.' In this sense, the rights which are not reserved move into the 'public domain' or commons. However, the type of license a developer chooses is a private decision. For example nobody advocates for the choice for

copyleft to be imposed on any author. Anybody should have the right to choose as restrictive a license as (s)he wants.

Participants in the Free Software and Open Source communities are also free to sell the Free Open Source software and even free not to disclose the modified versions and keep them privately. Thus, there is a huge commercial element to this software. Furthermore, due to the 'freedom to distribute etc.'-condition this development methodology may not have any huge price impact on consumers (compared to proprietary software), because with free or open source software users can copy the program from a friend who has a copy, or several users can join together, split the price of one CD-ROM, and then each in turn can install the software, etc.

Firms which use non-proprietary IP protection methods, such as open source, in their management of software solutions include a range of various small and medium sized enterprises including Linux New Media, Opera Software, Ilog, 11com7 Design and Media GmbH, Forest Start Networks, MySQL, Astaro, Ciber Europe, Data Lab, CISL Gruppen AB, Kelesing Software and many many more. Large firms which also use, develop and distribute open source software include IBM and Siemens. It should be noted that some of the firms (especially the larger ones) use both proprietary and non-proprietary IP protection methods of their many software solutions, so there is often no single strategy.

The Free Software and Open Source communities as well as FFII (Foundation for Free Information Infrastructure) do not advocate putting the software uncopyrighted into the public domain because they believe that this would allow uncooperative people to convert the program into proprietary software, based upon changes from the free software version, and then subsequently distribute the result as a proprietary product.

### Freeware and Shareware

Freeware refers to software which is copyrighted but freely available for distribution at zero price for unlimited time (so free means zero price). Shareware is also copyrighted but only freely available for distribution at no charge (i.e. zero prize) for a limited period. This is even the case when individuals install it on their own computers and engage in non-profit activity. After the trial period the Shareware software can still be distributed freely, but at a licensing fee.

Freeware and Shareware do usually not allow freedom to modify the software, and typically they do not open access to the source code (unless the programmer decides to stop developing a Freeware or Shareware product). Often, authors of Freeware who give away their software for free for an unlimited period (i.e. put their invention into the 'public domain') are motivated by providing public goods for the community, but at the same time they want recognition for their software and also to retain control of its future development.

## Other service sectors than software which use non-proprietary models in their 'Open Innovation'

It is not wrong to argue that IPRs are increasingly used to secure entry and non-proprietary dominance in knowledge spheres. Especially knowledge intensive business services have experienced such evolution, because are heavy adopters of information and communication technology which is the very same technology which makes possible the worldwide availability and distribution of knowledge, scientific data, information and creative expressions.

Thus, software technology is not the only service sector in which non-proprietary 'Open Innovation' models has taken force. The non-proprietary 'Open Innovation' movement is vibrant within services and it is growing in a range of other areas such as (to give a few examples):

'Creative Commons' in the creative industries (<http://creativecommons.org/>):

- Within the creative industries (such as music and art) copyrights are sometimes (and more often in recent years) licensed with a 'creative commons' licence which provides free access to legally share, reuse, and remix copyrightable material. In this sense Creative Commons provides free tools that let authors, scientists, artists, and educators easily mark their creative work with the freedoms they want it to carry. As with the GNU GPL or Copyleft, it is about changing the copyright terms from 'All Rights Reserved' to 'Some Rights Reserved' and the rights which are not reserved move into the 'public domain'.

'Wikipedia' and 'Wiki' in publishing:

- This is a 'web-based, free content encyclopedia project. Wikipedia is written collaboratively by volunteers; its articles can be edited by anyone with access to the Web site. The name is a portmanteau of the words wiki (a type of collaborative website) and encyclopedia.' (<http://www.wikipedia.org/>)
- A wiki is a website that allows visitors to add, remove, and otherwise edit and change content (sometimes without the need for registration). It also allows for providing links among any number of pages. This ease of interaction and operation makes a wiki an effective tool for mass collaborative authoring. The term wiki can also refer to the collaborative software itself (wiki engine) that facilitates the operation of such a site. With respect to a discussion of software patents, such an online Wiki-document was developed by more than 100 leaders from business, academia, government, and other organizations who joined with IBM's top researchers and consultants to examine the performance of the IP market place (see section 4.2). It emerged into a final published report (published under the editor name: IBM 2006).

Open source in media is also a trajectory currently taking off, using various forms, including

- 'Open Source Journalism' (use of Weblogs, Messageboards, and Open Document),
- 'Open Source Movie Production' (in which changing crew and cast collaborate in movie production)

- ‘Open Source Documentary’ and ‘Open source Filmmaking’ (which adopt a method of idea formation from open source software, but in this case the ‘source’ is raw unedited footage rather than a programming code.)

Open source in education and scientific research:

- Science Commons is a project of Creative Commons (<http://creativecommons.org/>) with the purpose to enable free access in education and scientific research.
- Open source health care and medicine: Open-source pharmaceutical development for the creation of new medicine to enhance healthcare led to the establishment of what has been termed the Tropical Disease Initiative, and also to a number of not-for-profit "virtual pharmas" such as the Institute for One World Health and the Drugs for Neglected Diseases Initiative.

But Open Innovation processes protected by non-proprietary IPRs is also reaching into manufacturing:

Open source innovation processes in markets for drinks:

- OpenCola is the first open source cola with its development phase inspired by the open source movement. OpenCola soda is distributed under the terms of the General Public License (GPL). Vores Øl (Danish for Our Beer) is the first open source beer. Today also known as ‘Free Beer’. It is also protected under a creative commons license (<http://www.freebeer.org/blog/>).

There are many other such non-proprietary based Open Innovation initiatives, and they are growing in numbers, and they are commercially sustainable. The limitations of the models are not about their commercial success, but about the forces which shall ensure reciprocal behaviour in terms of productive ‘Open Innovation’ collaboration for the sake of the commons, of which the individual firms also can benefit. In this sense the non-proprietary models are not different from the proprietary models (discussed in section 4.2 where the market functioning became an issue), although the non-proprietary models’ problems may be different. However, as the non-proprietary based ‘Open Innovation’ is a much newer tendency there is at this early stage no systematic research addressing what these problems are, but they will surely be addressing collaboration and appropriation issues.

## **5. Summary of findings and conclusion**

When service firms innovate, they increasingly engage or interact in the same complementary knowledge, creative, development and commercialization spheres. This is because they have become inter-dependent in their knowledge bases. (However, there are also other strategic incentives for this, as it is evident from the various types of proprietary and non-proprietary innovation models which illustrate a range of objectives for such collaboration, see section 4 and summary below).

This increasing tendency of many firms participating and interacting in the same knowledge and creative spheres which tend to be collaborative, multi-disciplinary and global, is also termed ‘Open Innovation’. It shall be seen in sharp contrast to ‘Closed

Innovation' where companies generate their own ideas when they then commercialize using only internal resources.

Innovation in services is driven by a range of knowledge types of which science and technology is only one. Other central knowledge types include aesthetic knowledge, cultural knowledge, social, organisational, and managerial knowledge, and information based knowledge. Therefore IP based service firms regard a wide spectrum of IP (including patents, design patents, copyrights, trademarks, and secrecy) to be of 'high importance' for their organization from either an IP-producer, -owner or -user perspective. However, evidence suggests that the specific type of such IP service sector specific.

### IPR protection and 'Open Innovation' are not contradictory strategies

IPR protection (which is conventionally associated with knowledge protection and monopolistic market structures) and 'Open Innovation' can seem like two innovation strategies which are contradictory in terms. Yet, in this paper it has been illustrated that it is not necessarily so, and that the evolution towards 'Open Innovation' in services can be supported and even underpinned by the IPR system in many different ways, applying both *proprietary* and *non-proprietary* models for innovation appropriation and protection.

That is, proprietary protected inventions (which include restrictions on using, copying and modifying any invention) by using all the legal restrictions which patent or copyright law provide or by using some technical means (e.g. by withholding the invention source) does not necessarily mean that value from innovation and innovation appropriation is generated internally in the firm. In the spirit of 'Open Innovation', the financial and non-financial value from such proprietary protected inventions is realised via external interaction in which rights to own or control IPRs are exchanged. Such proprietary relationships range from simple buying and selling, licensing out or in, and sharing the IPR, to more complex arrangements such as cross licensing and pooling of IPRs. These 'Open Innovation' proprietary methods contract sharply with the previous Closed Innovation paradigm in which firms hold on to their IPRs for market protection. The financial or non-financial value which can be established in such 'Open Innovation' methods using proprietary models are manifold. They include (a) access to ownership of productive knowledge via various licensing agreements, (b) setting territories (i.e. market power) via strategic (often exclusive) licensing, cross-licensing or patent-pooling agreements, (c) income from licensing or buying and selling IPRs, (d) cost cutting from royalty free cross-licensing or patent pooling agreements, (e) raising venture capital from listing IP assets on the stock market, (f) establishing favourable joint ventures, (g) or other measures such as enabling the strategic evolution of common standards. Thus, the strategic use of IPRs in proprietary protected inventions consider IPRs as a 'value driven intellectual capital'.

However, it is increasingly common for service firms to use IPRs in non-proprietary 'Open Innovation' models. Here IPRs are used as a tool to easily mark the scientific and creative work with the freedoms the inventors want it to carry. It is about changing the terms of IPR protection from all rights reserved to some rights reserved. That is, whereas IPR law is designed to automatically restricts the right to use,

imitate, modify and redistribute copies of an inventor's or author's work as well as provide permission to withhold the source of the invention; a modification of an IP license (e.g. General Public License (GPL) or copyleft license) uses the very same IPR law to ensure that every person who receives a copy of an invention or work has the same rights to study, use, modify, and also redistribute it, as well derived versions of it. Thus, such non-proprietary licenses require that the same license terms apply to all redistributed versions of the invention or work. Thus, it is about freedom of expression and access and/or contribution to the commons, and it is about believing that maximising such interaction in development spheres create better knowledge and inventions for businesses and society. The reason for not putting the invention or work into the public domain, unprotected from any use of IPRs, is essentially to secure that uncooperative agents do not convert the invention or the work into proprietary material, based upon changes from the non-proprietary material, and then subsequently distribute the result as a proprietary product.

Small and medium sized enterprises, as well as some large firms, increasingly are using the non-proprietary 'Open Innovation' models. Many firms use a mix of proprietary and non-proprietary 'Open Innovation' models.

It should be noted that especially knowledge intensive business services have experienced an emergence of 'Open Innovation' into their innovative spheres, such as media, publishing, creative industries, health care, science and education. This is because these service sectors are already heavy adopters of information and communication technology and micro electronics in their efforts to increase the quality and productivity of their services. These are the very same technologies which makes possible the worldwide availability and distribution of scientific data, information, ideas, knowledge, creative expressions, etc. However, to reap the benefits of this 'Open Innovation' evolution, innovation policy and innovation practices in firms and industries must adapt.

It therefore seems paradoxical that while micro-electronics and the new information and communication technology support the dynamics of sharing information, data, knowledge, ideas, etc., in new 'Open Innovation' spheres, this is made more difficult, and sometimes impossible, by the IPR legislation in its current form of providing very exclusive and strong rights (reflected in broad IPR scope, low requirement of inventive step or originality, always new areas of protection, high enforcement world wide etc.) for a very long period.

### Policy implications

This finding that IPRs and 'Open Innovation' processes can go hand and hand does not imply that IPRs cannot be used as a weapon to destroy an 'Open Innovation' process. Therefore appropriate policy and management is essential in order to ensure that the evolution towards 'Open Innovation' in services is appropriately supported institutionally.

IPR law is not currently geared towards encouraging 'Open Innovation' processes, as the current system is (more or less) based upon providing as exclusive IP rights as possible. It can even be questioned whether IPR law in its current form is able to support proprietary 'Open Innovation' model, as IPR law provides the opportunity to

exercise rights that are so exclusive, that it may be impossible avoiding any abuse of those. This in turn diminishes the potential productive dynamics of the proprietary ‘Open Innovation’ processes. It is a general problem in the nature of the ‘play of the game’ (i.e. the strategic interaction) in proprietary innovation models that many IPR stakeholders are more interested in the size of their individual share of the pie (or value created from IPRs) rather than the collaboration in creating a larger pie in which they may be given a smaller share. The ‘rules of the game’ (reflected in IPR legislation) encourages rent-seeking rather than welfare enhancing behaviour.

In order for IPR legislation to minimize such problems of abuse, the ‘rules of the game’ should be changed to become less exclusive, e.g. by introducing compulsory licensing, less broad patents, higher requirement of inventive step, required disclosure of the source codes, shorter terms (period) of protection. In addition, an efficient IP market place is especially essential or central for a proprietary ‘Open Innovation’ model as more rights are restricted in this model compared to the non-proprietary model. However, evidence of leading software companies has shown that there is a need for increased flexibility, transparency, integrity and good quality IPRs for the current IP market place to thrive and reap the benefits of ‘Open Innovation’ processes.

When considering why the IPR system does not perform in accordance with its (theoretical) rationale, it is important to emphasise that the theory does not take into account any practical considerations related to the specificities of the system. Thus, what are appropriate criteria for IPR protection with respect to novelty, originality, length for IPR protection; what is the appropriate breath of IPR protection, and what is best left in the public domain (e.g. the source code) is not defined, but guessed or assumed by policy makers, lawyers and economists.

Furthermore, the paper illustrates that the assumptions underpinning the IPR rationales, which are based on mainstream economic theory, are fundamentally flawed in their underpinning in the form of unrealistic assumptions such as the non-existence of various factors such as: technological interdependence, a social origin of invention and innovation, strategic interaction inside or outside the IP market place, or power asymmetries in IPR related bargaining situations. These are indeed the ‘Open Innovation’ characteristics which today underpin the dynamics and performance of IPR systems.

On the whole, it is interesting to observe that the evolution towards using the IPR system in support of ‘Open Innovation’ processes in services has been led by firms and industry in their ‘play of the game’ (reflected by their strategic interaction or collaborative IP management) rather than by government policy setting appropriate ‘rules of the game’ (such as appropriate IPR law or appropriate criteria of IPR protection or appropriate routines by patent offices etc.). Future innovation policy and management related to services should both consider the ‘rules of the game’ and the ‘play of the game’ as well as the efficiency of the IP market place. Of course the nature by which the ‘play of the game’ is carried out and the IP market place can also be regulated by the rules.

First when then the IPR regime and IP market place is updated to fit the modern ‘Open Innovation’ methodology, the system is able to perform efficiently in terms of reaching its originally intended objectives for the individuals and firms participating

in the system (see objectives ‘a’ to ‘g’ above) as well as reaching the economic or societal objectives in terms of creating markets for knowledge and creative expressions; facilitating, through trade, spill-over and expansion of knowledge based ideas and the creative expressions of ideas; stimulating incentives to invest in invention and innovation, which in turn stimulate innovation-based competition; protecting entrepreneurial talent which facilitate sustainable development of firms and industry; and rewarding inventiveness and creativity throughout the economic system.

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