The Role of IP in Servitized Technology

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Introduction

Services account for an ever growing stake in the economy, and the information technology sector does not make an exception. Traditional products are continuously being replaced by solutions, where the service component is becoming the principal differentiator and revenue generating engine. While the transformation of IBM in the late 1990s may be seen as the starting point of this phenomenon, the advent of cloud computing has given a dramatic boost to the servitization of software, and big data analytics are now paving the way for personalized intelligence services accompanying the sale and application of previously commoditized goods and services.

In contrast, the current framework of intellectual property is still bound to protect innovation in the development of products rather than services. The most prominent example is the diffidence of both patent and copyright laws to award protection to business methods and their implementation.

This paper is looking at the challenges for information technology businesses in their process of being transformed from product suppliers to service providers:

- To what extent are service methodologies in “new” fields of cloud services and big data analytics susceptible to IP protection?
- To what extent may recipients’ use of services be controlled by IP, contractual means or otherwise?

- Does the trade-off derived from the principle “disclosure against protection” still work in servitized economies, or does it foster “dark pools” of innovation?

1. The Advent of Servitized Technology and its Effects

The term “servitization” was first recognized in the late 1980ies as the process of creating value by adding services to physical products. This approach regarded services as additional offerings to the existing physical product – it was product-centric.[1] Today, the notion of servitization carries broader nuances and also embraces the phenomenon of standalone services that are replacing a precursory product (like software operating in the cloud and made available to customers as a service functionality), or the appearance of new services without any reference to a physical product. An example of this second category is the personalization of commodities by means of intelligence derived from data analytics, such as personalized pricing of consumer goods and services.

In the information technology industry, a shift of innovation from the development of new physical products or software to the creation of services can be observed. This seems to be a natural consequence of the increasing stake of the service sector in the econo-

[1] NEIL J. BARNETT ET AL., Servitization: Is a Paradigm Shift in the Business Model and Service Enterprise Required? In Strategic Change 2013, p. 145; NABIL SULTAN: Cloud and MOOCS: The Servitization of IT and Education, in: Review of Enterprise and Management Studies, Vol. 1, No. 2, 2014, p. 1.

mies of developed countries.[2] It is also noted that production nowadays depends less on physical equipment and structures and more on intangible assets such as intellectual property, user-generated content, organizational capital and human capital.[3] This trend is largely imputed to the digitization of the economy and the associated data processing and data transport capabilities that permit real-time interaction of complex operations with remote virtual computing environments.

Does servitization have an impact on the way we are looking at innovation? In our opinion, servitization of information technology is characterized by the following major differences compared to traditional product-oriented innovation patterns:

- Servitization is output driven. A consumer investing in a physical product wants to pursue a certain objective and obtain a certain result when employing such product. Servitization looks at this objective alone, but detaches it from the physical engine that is producing the desired effect. The result of the innovation that is made available to the community does no longer consist in the technology as materialized in a tangible product or software code, but rather in the output (information) generated by remote background operation of an innovative technology. Hence, it is fair to speak of a dematerialization of the economy. The most illustrative example of this differentiator is SaaS (software as a service).

2 SULTAN (footnote 1), p. 2.

3 ERIK BRYNOJOLFSSON / ANDREW MCAFEE: The Second Machine Age, 2014, p. 119.

- Servitization is process oriented. Innovation in physical products is usually inspired by market demand for certain functionality. If the development is successful, the product will be placed on the market and the corresponding demand will be satisfied. However, the product remains blind to the task of integrating it in the existing process landscape of the enterprise that is using the technology. Therefore, innovative products frequently call for the implementation of new business processes, the cost of which outlasts the investment in the product itself.[4] Servitization entails a change in mindset, in the sense the service aims at catering for both the desired functionality and the process supporting it, and in the realm of information technology it also aims at automating the process to the extent feasible and desirable. Therefore, methods, process definitions and algorithms all become very relevant innovation drivers. An example for this differentiator is an inventory management system that automatically orders and dispatches stock based on actual and forecasted demand, or – transposed to a private home – an intelligent fridge that replenishes itself.
- Servitization leverages on existing resources. A product has a dedicated purpose. If another need is evolving that the product cannot satisfy, it becomes redundant and must be replaced. Servitization in the digitized economy is responsible that new functionalities can be put on the market simply by recombining existing capabilities and resources funneled into a new

[4] *Id.*, p. 119 *et seq.*

service delivery stream.[5] An example of this is the popular smartphone application Waze® , which is a navigation system combining GPS technology, sensor technology, transmission of user data and data analytics in a service providing route directions based on real-time traffic information.[6] Other examples are mobile applications that are combining readily available sensor and computing technology to create new health related services. These services are all a conglomerate of different pre-existing components; the innovation consists in leveraging the combination of these pre-existing functionalities for the creation of a new service. It is fair to state that imitation and inspiration from existing achievements has always been at the core of innovation. In that sense, this last identified differentiator of servitization (compared to product-centric innovation) is not new. What is new: the degree of reliance on capital intensive pre-existing infrastructure and achievements in servitized technology is disproportionately high compared to product innovation. This reduces the cost of development and time to market and dramatically lowers entry barriers for new players in economic fields that had previously been cultivated by well-established industry champions.

5 *Id.*, p. 78 *et seq.*
6 *Id.*, p. 80.

2. Implications of Servitization on Intellectual Property

a) Traditional Purpose of IP Protection

The idea of protecting intellectual property is devoted to an ideal and an economic consideration. The ideal side of the coin recognizes the ownership of the author or inventor as a reward for its effort and intellectual investment. This concept is still rooted in the recognition of original authorship and moral rights vested in the authors of copyrighted works in continental European legal systems and in the right to inventorship that is known to all major patent systems. Second, intellectual property aims at protecting the investment made in the innovation by virtue of a limited monopoly. This economic purpose is historically older than the ideal one and closely linked to the evolution of capabilities and techniques of reproduction. When the sovereign realized that control of innovation by restricting reproduction was of economic value, it started to create privileges that were granted in consideration for the introduction of a new industry. The proprietor of the privilege was not necessarily the innovator. For this to come, the concept of intellectual property (the ideal aspect) first had to be developed.

Today, it is widely recognized that intellectual property serves a general economic purpose. It is best enshrined in the United States constitution, in what some refer to as the copyright and patent clause, according to which Congress is empowered

"To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[7]

In the patent context, this provides inventors with an incentive to create new products and processes. Congress has limited the duration of the monopolistic protection.[8] In return for the protection, the inventor must disclose his invention to the Patent Office which, in turn, discloses the information to the general public.

The Patent Act was drafted to accomplish two goals:[9] First, it encourages innovation and discovery through its incentive of limited monopoly.[10] Second, the patent system promotes the disclosure of useful technology to the general public by putting it in the public domain.[11]

The purpose of IP protection is therefore to promote innovation, discovery and creativity by way of a quid pro quo trade-off: the fostering of making available to the general public technology, art and science in exchange for a limited monopoly. IP is supposed to create an incentive to contribute to progress by disclosing innovation, which then serves as inspiration for further developments without jeopardizing the interests of the innovator. An economic analysis of IP protection therefore always requires a subtle balance between individual incentives to reward innovation, without exces-

7 Article I, Section 8, Clause 8 of the United States Constitution.
8 35 USC § 154 (1994).
9 Earl Kintner & Jack Lahr, *An Intellectual Property Primer* ,10, (2d ed., 1982).
10 *Id.* @ 10-11.
11 *Id.* @ 10-11.

sively impeding the exploitation of the state of the art by others as a necessity for achieving further progress. These fundamentals should always be borne in mind when discussing the need and nature of IP protection in the domain of servitized technology.

In a free market economic system, competition is deemed to be a main driver to increasing efficiencies and driving down costs. Competition also leads to innovation. However, without strong IP protection, research and development investment by one company may be easily copied by another who did not need invest capital to develop the technology.

b) Exceptions to IP protection

While there have been industries which have been born and flourished under a strong IP protection scheme, there are notable exceptions of technologies and subject matter which, for public policy reasons, in some jurisdictions, do not enjoy protection. One of these notable exceptions are medical and surgical procedures.

There are three main concerns that some people have regarding the patentability of medical procedures when the U.S. considered and eventually adopted limitations of damages for medical and surgical procedure patents in 1996.

- A first concern is that the proliferation of these patents will lead to higher medical cost[12], e.g. royalties to the patent owner.[13]
- A second concern is that the quality of health care will suffer and the quality of health care would be jeopardized as a result of medical procedure patents.[14] This could occur in one of two ways. First, there will be less peer review of the medical procedures.[15] Second, a physician may opt not to perform the patented procedure and use a different, less advanced, one rather than paying royalties to the patent owner.[16]
- Finally, a third concern is that there will be a "chilling effect" on the free-flow of research information by physicians fearing

[12] *See e.g. Prepared Statement of Jack A. Signer, MD.. Before the House Committee on Judiciary Subcommittee on Courts and Intellectual Property Re: H.R. 1127 the "Medical Procedures Innovation and Affordably Act.."* 103rd Congress, 2d Sess., Thursday, October 19, 1995; *Testimony of Charles D. Kelman, MD.. Before the House Subcommittee on Courts and Intellectual Property of the Committee of the Judiciary, Hearing on H.R. 1127 and H.R. 2419,* 103rd Congress, 2d Sess., October 19, 1995; *Prepared Statement of H. Dunbar Hoskins, MD.. Before the House Committee on Judiciary Subcommittee on Courts and Intellectual Property Re: H.R. 1127 the "Medical Procedures Innovation and Affordably Act.."* 103rd Congress, 2d Sess., Thursday, October 19, 1995.

[13] *Prepared Statement of Jack A. Signer, MD.. Before the House Committee on Judiciary Subcommittee on Courts and Intellectual Property Re: H.R. 1127 the "Medical Procedures Innovation and Affordability Act."* 103rd Congress, 2d Sess., Thursday, October 19, 1995.

[14] *Id.*

[15] *Testimony of Charles D. Kelman, MD.. Before the House Subcommittee on Courts and Intellectual Property of the Committee of the Judiciary, Hearing on H.R. 1127 and H.R. 2419,* 103rd Congress, 2d Sess., October 19, 1995

[16] *Id.*

litigation for infringement of another's patent.[17] This concept is best illustrated through an example. For instance, a physician who, without authorization, has been performing the surgical procedure patent claim. The physician then makes a discovery relating to the patented procedure. Normally, the physician would publish his or her results. In this case, the physician may be wary to do so. Since he or she did not have authorization to practice the procedure, he or she has infringed the patent. Publishing the results may result in a lawsuit by the patent holder against the practicing physician. Rather than taking this risk, the physician may suppress his or her discovery, and never disclose it to the public. Consequently, the world would be permanently deprived of ever knowing the physician's discovery.

Having explored both the arguments advocating for IP protection and the rationale for implementing exceptions thereto, it is now our task to examine how these considerations should be applied in the realm of servitized technology. Before commencing this exercise, we shall briefly discuss the current approach of IP policy to the protection for services in general.

c) IP Protection for Services in General

The available intellectual property rights are subject to a *numerus clausus*, which includes the following principal rights:

[17] *Supra* n. 16

- Copyright;
- Patents;
- Designs; and
- Trademarks.

Copyright protects works, i.e., intellectual creations of literature and art which have a unique character. Computer programs are also protected under copyright. However, protection is limited to the form in which an idea is expressed, such as a written text (or software code). Copyright is therefore not suitable for protecting services which are an amalgamation of ideas, principles, algorithms, methods or concepts. Article 9 para. 2 TRIPS makes clear that

"Copyright protection shall extend to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such."[18]

Copyright can assume an ancillary role in protecting services, e.g. when it comes to of user interfaces or manuals, which are eligible to copyright protection. Further, databases which by reason of the selection or arrangement of their contents constitute intellectual creations are also copyrighted, but the protection does not extend to the data itself.[19]

Patents are available for any inventions, whether products or processes, provided that they are:

[18] See also article 2 WCT.
[19] Article 10 para. 2 TRIPS; article 5 WCT.

- of technical nature,
- new,
- non-obvious, and
- capable of industrial application.

The requirement of technicality is the biggest obstacle on the way of obtaining patent protection for services. Business methods and software may be perceived as abstract ideas or mathematical algorithms, not eligible for patent protection if they are not implemented in a way that triggers a tangible technical effect or deemed to be applied in a way that is significantly more than the abstract idea or mathematical algorithm.[20] Although, historically, the U.S. Patent Office ("USPTO") had been more liberal in granting protection for business methods, process and software than its European counterpart(s), recent judicial decisions by the United States Supreme Court have reaffirmed its prior judicially created exclusions of patent ineligible subject matter and identified laws of nature, natural phenomena and abstract ideas as non-patentable categories of subject matter.[21] As a result, many pending patent applications with claims to business methods and computer-implemented processes are being rejected as attempting to claim patent ineligible subject matter. Although the USPTO has issued a couple of interim guidelines including the most recent ones in December 2014[22] for evaluating subject matter eligibility for processes, final guidelines have yet to be published as of the time of this paper.

20 *Alice Corp. v. CLS Bank Int'l*, 573 U.S. ___; 134 S.Ct. 2347 (2014).
21 *Id. citing Diamond v. Diehr,* 450 U.S. 175 (1981), 185.
22 2014 Interim Guidance on Patent Subject Matter Eligibility, Fed. Reg., Vol. 79, No. 241.

Notwithstanding these new limitations on subject matter eligibility, U.S. Patent No. 8,706,530 ('530) was issued with a claim protecting

"A unique health score computation system […] and method for collecting health related information, processing the information into a composite numerical value, and publishing the value […]. Information concerning a plurality of intrinsic and extrinsic parameters of a user is collected. Weighting factors are applied to the parameter in order to control the relative affect each parameter has on the user's calculated numerical. The health score is computed using the processor by combining the weighted parameters in accordance with an algorithm. The numerical value is published to a designated group via a portal, while the underlying parameters remain private. In one implementation, the portal is an internet based information sharing forum."[23]

Most would conclude that this claim is nothing but the expression of a method of analyzing health related data (an abstract idea) by application of an algorithm and as such a typical example of patented servitized technology.

It is important to note that the '530 patent was issued before the U.S. Supreme Court handed down its most recent opinion regarding subject matter eligibility of business methods in *Alice Corp. v. CLS Bank Int'l*,.[24] It is very likely that the validity of the '530 patent could be challenged on the grounds that its claims are to

[23] United States Patent US 8,706,530.
[24] *Supra* (footnote 20).

subject matter not recognized as being eligible for patent protection under U.S. patent law as being directed to an abstract idea[25].

U.S. Patent No. 9,009,082 was granted on April 14, 2015, thus post-*Alice* and includes claim 4, which recites:

"4. A computer-implemented method for assessing reliability of evaluations supplied by users, the method comprising:

receiving multiple evaluations from an evaluator user, each of the received evaluations being for one of multiple content pieces that are supplied by an author user distinct from the evaluator user and including a quantitative rating of that content piece with respect to an indicated content rating dimension;

automatically assessing the received evaluations to identify one or more of the evaluations that are unreliable, the identifying being based at least in part on a determination that a bias relationship between the evaluator user and the author user exists at one or more times during which the identified one or more evaluations are received; and

providing an indication of the identified unreliable one or more evaluations, so that use of the identified unreliable one or more evaluations is inhibited."

[25] *Id.* and note the European Patent Office issued a negative statement – interestingly not because the patent aims at protecting "software as such", but because the subject matter does not involve an inventive step within the meaning of article 56 EPC (EPO Decision T 0641/00 (Two identities/COMVIK) (ECLI:EP:BA:2002:T064100.20020926) (September 26, 2002).

Although this patent is issued, it is hard to reconcile its validity as reciting eligible patent subject matter in view of the current USPTO examination guidelines.

For the purposes of this paper, these examples serve show that the market players strive to carve out their territories and secure competitive advantages in the servitized economy.

Industrial designs and design patents (e.g. U.S.) have limited pertinence in services, since they intend to protect a specific visual appearance of a physical product, product component or ornamental design of an article of manufacture (i.e. a product). Same as copyright, designs may be used for subordinate purposes such as to protect the visual appearance of a graphical user interface.

Trademarks eventually may be used for protecting signs that distinguish services from those of other undertakings. Trademarks are the only intellectual property right that indifferently apply to products and services. However, they do not protect the service as such, but just its designation. Yet the importance of trademarks in servitization should not be underestimated. The distinction of a service from the competition becomes paramount in an economic environment where “the winner takes it all” (see below chapter 3). Accordingly, trademark protection is an important tool to attract and retain customers of innovative new services. Trademark has the power to convert the distinctive designation of a service asso-

ciated to a certain provider into a notion evocating the underlying service method as such, as has happened with Google® for online search.

A first overview of the classical protection instruments has shown that – to the exception of trademarks – intellectual property rights are product-centric. There is a strong reluctance of protecting services, rooted in the idea that such protection would impede the free flow of information and usurpation of general concepts and ideas.

Yet the owner of a service has an interest in retaining control over the use of the service and wants to prevent others from copying it. The following chapters therefore examine by which alternative means service owners can achieve that goal. Thereby, the three components of each service will be looked at separately: the service output (the result generated by the service), the service engine (the software running the service), and the service intelligence (the business ideas, processes, algorithms and combinations underlying the service).

d) Protection of the Service Output

When it comes to the protection of service output, two questions arise:

The first question asks if the owner of a service may assert control over the service output by virtue of IP. The answer is negative: On the one hand, raw information or data is simply not copyrighta-

ble.[26] On the other hand, even if the work result was more than just data and the result of some "choice" made by artificial intelligence, the programmer of that algorithm does not attain copyright in such expression. Copyright in a computer program has no extended arm to the output generated by that program. The only creative choice, if any, is made by the user of the program feeding it with input data.[27] The only exception that we can think of is the case where the service output is a reproduction or or other relevant use of a database protected by copyright or another exclusive right, the implications of which will be discussed further below in this sub-chapter.

The second question to be examined is whether the provider of a service may effectively grant licenses to the user under the intellectual property that is applicable to the product operating the service, i.e. the service engine. It is best investigated in the example of software as a service (SaaS). If the user of the service output was effectively bound by the terms of a license in the copyright applicable to the software installed on the remote environment, a breach of the license terms would not only constitute a breach of contract, but could also be prosecuted as a breach of copyright. This could be relevant if the end-user grants access to the service to more employees than permitted according to the agreement, or even to a third party alien to the contract. If there is not direct con-

[26] *Int'l News Serv. v. Associated Press*, 248 U.S. 215, 250 (1918).

[27] See also Raquel Acosta, Artificial Intelligence and Authorship Rights, JOLT Digest, February 17, 2012, <http://jolt.law.harvard.edu/digest/copyright/artificial-intelligence-and-authorship-rights>.

trol over the service output, at least some indirect control would be available.

In a pure virtual environment, where there is no permanent or temporary installation of software code in the user environment, the use of the service output does not entail an act within the scope of copyright protection. The user is solely granted access to the functionality of the software by rendering visible the graphical user interface on the user terminal and transmitting the user inputs through that interface. Hence, the user simply enjoys the benefits of the software, which does not entail the reproduction of software code and is therefore to be qualified as free consumption of the work.

The lack of control over the user by virtue of copyright protection seems to be a disadvantage at first sight. After further reflection, there may also be a benefit in exchange: in the absence of copyright or other IP protection, the owner may by contractual means assert control over the service output that would could otherwise not be exercised due to an exception / limitation of copyright (or other intellectual property).

The recent ECJ judgment in the case *Ryanair v. PR Aviation BV*[28] handed down by the European Court of Justice (ECJ) on January 15, 2015 sheds an interesting light on this seemingly contradictory balance of interests. In essence, the EJC held that so-called screen scraping may be effectively prohibited by contractual means, provided however that the database is not protected by copyright or

[28] ECJ, C-30/14, January 15, 2015, *Ryanair v. PR Aviation BV*.

the *sui generis* database right afforded by virtue of the European database directive.[29]

Why should contractual means of protection be available if IP protection is non-existent, but be deemed void and unenforceable if IP protection may be asserted? The answer to that question is rooted in the "fair use" provisions enshrined in the database directive:

- With respect to databases susceptible to copyright protection, article 6 of the database directive provides:

  "The performance by the lawful user of a database or of a copy thereof […] which is necessary for the purposes of access to the contents of the databases and normal use of the contents by the lawful user shall not require the authorization of the author of the database."

- For databases that are protected by virtue of the *sui generis* database right, article 8 of the database directive reads:

  "The maker of a database which is made available to the public in whatever manner may not prevent a lawful user of the database from extracting and/or reutilizing insubstantial parts of its contents, evaluated qualitatively and/or quantitatively, for any purposes whatsoever."

Pursuant to article 15 of the database directive, contractual provisions to the contrary of these limitations shall be null and void.

[29] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases.

However, the terms and conditions applicable to Ryainair's flight booking portal provided that

"the use of automated systems or software to extract data from this website or www.bookryanair.com for commercial purposes ('screen scraping') is prohibited unless the third party has directly concluded a written license agreement with Ryanair in which permits it access to Ryanair's price, flight and timetable information for the sole purpose of price comparison."

Based on the limitations of copyright and *sui generis* database rights, a provider of an online booking portal that extracts flight information and prices from websites of airlines for embedding it into its own display of flights and rates could have possibly neglected the contractual prohibition. However, the court ruled that in the absence of any IP protection of the database, said limitations would not apply, and the terms of use would be fully enforceable in accordance with applicable national law.

Ryanair teaches us that IP protection of a service is not *per se* beneficial to the owner, and reliance on contractual means of protection may be more effective to avoid break-ins of compulsory fair use exceptions.

e) Protection of the Service Engine

The service engine is the product component of the service that is responsible for processing the data that is creating the desired output. Depending on the nature of the product, it is by no question

susceptible to IP protection. The main difference between product-centric and servitized technology is that in the latter, the service engine is not conveyed to the user, but installed on a remote environment that is not accessible to the user.

The concealment of the technological environment has certain advantages for the owner and corresponding disadvantages for the user or the community as a whole. As the technology remains undisclosed, it cannot neither be logically analyzed and understood nor reverse engineered. This is of particular relevance when a service engine includes open source software components. Pursuant to the majority of the license terms, the copyleft effect does only materialize if the software is distributed in a manner which enables other parties to make or receive copies. Mere interaction with a user through a computer network is not conveying within such meaning.[30] The only notable exception is the GNU Affero General Public License. It explicitly puts the interaction with the software remotely through a computer network on equal footing with traditional forms of propagation of a program code.

Consequently, massive replacement of traditional software delivery by SaaS solutions has the potential of undermining the essential elements of the open source spirit. Also with respect to proprietary software, the exceptions to restricted acts enshrined in

[30] Free Software Foundation: Frequently Asked Questions about the GNU Licenses, http://www.gnu.org/licenses/gpl-faq#GPLRequireSourcePostedPublic.

articles 5and 6 of the European software directive[31] that aim at safeguarding the user's rights to use the software in accordance with its intended purpose, the making of a back-up copy, the observation or testing of the functioning of the program in order to determine the underlying ideas and principles, and the decompilation in order to attain interoperability are all devoid of pertinence in an SaaS environment. Also, the user is not entitled to transfer the right to access the service by asserting exhaustion of the copyright in the copy of the software code installed, for the obvious reason that there is no copy that could be disposed of by the user.

f) Protection of the Service Intelligence

The service intelligence is at the heart of servitization. It provides the constituent in the service delivery machinery responsible for the major difference between product centric innovation and servitization. As already explained above, the methods, processes and algorithms forming the services are normally not protectable by traditional means of intellectual property. They are considered abstract ideas that should remain in the public domain. Hence, the core question on which we need to further elaborate is whether the service intelligence as the innovation driver in servitized technology should be susceptible to IP protection. This policy consideration deserves a chapter on its own.

[31] Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs.

3. Should Service Intelligence Be Protected?

The crucial question on whether servitization, and in particular service intelligence, deserves enhanced IP protection must be discussed against the background of the overarching rationale that justifies the legal monopoly: the incentive to contribute to innovation, without jeopardizing further progress reliant on prior art. In other words it needs to be examined if the current framework of protection is detrimental to innovation in servitization, because it discourages investment to that effect, or whether there are other factors stimulating innovation so that a legal monopoly becomes superfluous or even counterproductive. In this context, the policy considerations justifying exceptions to IP protection must also be considered: Would essential services become too expensive? Would IP protection for services unjustly boost recourse to inferior, not patented, services?

The pivotal considerations therefore are:

- Are incentives needed to create, invent, innovate or commercialize new services? Without protection, would competitors be able to freeride on innovations of others?
- Are there any economic concerns in favor or against IP protection for services? What would be the economic effect of a monopoly in services?
- Who would benefit and who would lose from IP protection of services?

The abundant bounty of services that are being offered does not seem to advocate for additional protection. Often, the creation of factual monopolies can be observed in the services arena, because the globalized and digitized economy favors "the winner takes it all" scenarios, where one service offering emerges as the public's favorite and eliminates all competition due to non-rivaled scalability and ubiquitous availability of digitized services.[32] Since thresholds of market entry in servitized technology are relatively low, especially where the recombination approach is mastered, lead time of early movers has become practically irrelevant. Further, the churn rate is high, as changing a service provider is easier than changing a product, because no significant investment needs to be amortized in a "pay-as-you-go" environment. Every newcomer can speculate that the crowd will turn away from the incumbent provider and enthuse over the newly arrived substitute service. All these considerations taken together create sufficient incentive to invest in innovative services. It may be seen as unfair, but does not bother from an economic perspective, that the ultimate beneficiary is not always the first innovator.

On the other hand, it cannot be negated that servitization tends to foster "dark pools" of innovation. Since both the service engine and the service intelligence are not unveiled, but operate backstage, the idea that disclosure of new achievements catalyzes further development is likely to become irrelevant in servitized technology. There is no study of the long-term impact that such privat-

[32] BRYNOJOLFSSON / MCAFEE (footnote 3), p. 152 *et seq.*

ization of innovation may generate. We do also not know if the availability of patents for services would make a difference and the servitized environment more transparent.

When talking about overall economic impact, end users should not be forgotten. From their perspective, servitization helps cutting cost, increasing flexibility, and making sophisticated technology more affordable, but this comes at the price of being at the mercy of the service provider. The use of a product promises much more freedom and privacy than the use of a service.

Bearing all the previous aspects in mind, can the current IP environment be optimized? The major shortcoming that we identify when testing servitization against the existing legal framework is the creeping disappearance of innovative achievements behind the scenes, and in particular the remonopolization of open source in the information technology sector. However, if access to servitized technology was to be improved, it is hardly conceivable how this could be reasonably achieved without strengthening legal protection of the service intelligence. We believe that the problem in patenting services is not the patent right as such, but the shaping of the scope of exclusive rights and exceptions. The latter should leave sufficient leeway for building on ideas and concepts forming the protected service.

4. Protection Strategies

Leaving policy considerations aside, what are the immediate take aways when one has to define a protection strategy for a new service?

Lesson number 1 is that the contract becomes pivotal when it comes to the protection of the service output. The contract is the primary instrument for controlling the use of the service output. Reliance on exclusive rights does not suffice, it is even irrelevant. If the service is publicly available, adherence to contract terms by each user should be made a prerequisite for accessing the service.

Second, the legal situation regarding the service engine is very comfortable for the owner. As it forms the product element of the software, IP protection is generally available, and on top of it, the technology can be kept entirely confidential.

Third and last, the level of IP protection afforded to service intelligence is the Achilles heel. While algorithms can be kept as a trade secret, other elements of the service intelligence, such as the implementation of a business process, are necessarily disclosed when commercialized and thereby open to imitation.