

Department of Information and Service Economy

Openness of Innovation in Services and Software

Essays on Service Innovations, Open Source, and Hybrid Licensing Models

Mikko Riepula



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Open Innovation—and Open Source as its particular manifestation in the software industry—have recently been touted as cornerstones of competitiveness for firms in the new service economy and of value added by public institutions involved in the gathering, processing and publishing of information. Although the basic concepts are by no means new, a considerable surge in research literature has occurred over the past decade around the keywords of open source, open innovation, value co-creation and both innovation in general and service innovation in particular.

Putting breakthrough inventions aside, I consider what exactly open innovation means: What qualifies as an innovation and how is it different from the plain old product or service development? Is open inherently better than closed, and what exactly is the difference between the two? What middle ground is there, if any? Services growing in importance, is open innovation in (software) services different from (open) innovation in software products? Besides, is there any real difference between software services and software products? Particularly, what is the role of customers in that extended open community around the firm? What is the value that they see vs. the value that the firm sees?

In the four research publications in Part II of this dissertation, I am addressing these questions in more detail in various contexts: both from a purely software development and software business perspective and from a more general service development and innovation perspective. The four publications have more specific research questions and detailed implications, in addition to contributing to the general themes outlined above. They elaborate on the following topics:

Different perspectives to value co-creation in services and the customer/supplier value construct; Roles of customers in service innovation activities in standardised services with transactional intent; The effect of adoption of open-source tools within a commercial for-profit organisation on the organisational structure itself; and Hybrid open-closed software licensing model as a platform for reverting from commoditised product business to higher-value customer relationships.

Beyond the theoretical and practical contributions of the publications in Part II, Part I of this dissertation offers a robust definition of innovation in general as well as a more defensible view of the nature of services vs. goods. In addition it clarifies what the term product means in relation to both services and goods as well as in the software industry—a topic that often causes confusion among academics and practitioners.

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List of Publications

This doctoral dissertation consists of Part I as an overview and of the following publications, which are referred to in the text by their numerals, comprising Part II.

Paper 1: Riepula, M., Kuusisto A. (2011). “Different Approaches to Increasing Customer Value by Service Innovation—Linking Customer-Orientation to Innovation Typologies in a Broader Value Concept” in van der Rhee, B. and Victorino, L. (eds), *Advances in Service Quality, Innovation and Excellence, Proceedings of the 12th Int’l Research Symposium on Service Excellence in Management*, Ithaca, NY, June 2–5, 2011, ISBN 978-0578084572, pp. 845–854.

Paper 2: Kuusisto, A. and Riepula, M. (2011). “Customer interaction in service innovation: seldom intensive but often decisive. Case studies in three business service sectors,” *International Journal of Technology Management*, Vol. 55, Issue 1/2, pp. 171–186.

Paper 3: Lindman, J., Riepula, M., Rossi, M. and Marttiin, P. (2013). “Open source technology in intraorganizational software development—Private markets or local libraries?” in Eriksson Lundström, J.S.Z., Wiberg, M., Hrastinski, S., Edenius, M., and Ågerfalk, P.J. (Eds.), *Managing Open Innovation Technologies*. ISBN 978-3-642-31649-4 (2013), pp. 107–121.

Paper 4: Riepula, M. (2011). “Sharing Source Code with Clients: A Hybrid Business and Development Model,” *IEEE Software*, Jul/Aug 2011, pp. 36–41.

1. Introduction

When reading the service research, innovation, or information systems science (ISS) literature or the business press, it seems that no business, industry sector or economy can be competitive or appealing today without having constant innovation activity, fostered by innovation ecosystems, clusters and policies, helped by physical spaces where ideas are let flow freely and result in those great innovations, with all actors co-creating value (Chesbrough et al., 2006; Clark and Guy, 1998; Payne et al., 2008; Porter, 1998; Prahalad and Ramaswamy, 2004; Smits and Kuhlmann, 2004; West et al., 2014). Yet when one tries to identify those resulting innovations, not necessarily all that much has changed from traditional business after all (Mowery, 2009)—obviously times are changing, business evolving, knowledge increasing and companies improving their operations, working smarter and coming up with new products and services, but what distinguishes all such business as usual from those sought-after innovations that policy makers and private investors long for and consider key competitive elements in economic growth (Salmelin and Curley, 2013)? If the term innovation has undergone inflation, then so too have the terms open innovation and co-creation in the research literature (Grönroos, 2008; Grönroos, 2011; Mowery, 2009; West et al., 2014).

In what follows I will try to clarify the term innovation with a few definitions, i.e. to turn a loose term into a construct with some discriminatory power, but what should be of more interest is how awareness of the various dimensions in innovation activities can help businesses come up with simply better products and services, whether we decide to call the outcomes inventions, innovations or improvements. And “better” means such products and services that are more value-adding to different actors involved. So, behind this dissertation that may seem rather conceptual and philosophical in places, there is a clear utilitarian motivation aiming at more and better business.

In the last decades services have become increasingly important as an economic driver (Vargo and Lusch, 2008). In OECD countries, more than 50% of economic activity occurs in or by services (Neely, 2008; OECD, 2000, p. 3, p. 19; OECD, 2008). Servitisation (or servicisation) has been coined as a term referring to the on-going transformation in different industries and economies, as services continue to grow in importance both overall and in cross-border trade. This phenomenon is not new in the ISS field and below I will recapitulate some of that recent discussion, adding my own comments on the ontological nature of goods and services. Servitisation also implies more focus on service innovations.

In this introduction I will further clarify the meaning of the term product, explain what is usually understood by open innovation, and argue that in the end the constructs of offerings and relationships are more useful than the age-old and somewhat misguided discussion on

products vs. services (or goods vs. services), and return to the importance of the value construct, both from the customer and supplier perspective.

Last in the present Section 1, the structure of the rest of this dissertation is explained.

1.1. Background and Motivation; Certain Definitions

The three most defining keywords in my dissertation, in different combinations, are: innovations, services and software. In so saying, I do not want to rule out software products—they are software as well, and could increasingly be seen as services; neither do I want to turn a blind eye to commoditisation of software as a counter-effect (or lack) of innovations in software. Software is at the core of information and communications technology (ICT), which I also consider in scope more broadly, albeit the focus is decisively more on software than on hardware or other ICT artefacts. And there are obviously many very interesting and relevant service innovations having nothing to do with ICT or software. In its naïve way, Table 1 depicts what this dissertation is about. As explained later, the middle column (nature of offering) is perhaps the least defining of the three, as I will argue that the division into services vs. goods or products is a somewhat artificial one.

	<i>Ingeniousness</i>	<i>Nature of offering</i>	<i>Domain of offering</i>
In focus	Innovations	Services	Software (ICT)
Less in focus	Commodities	Goods	Non-ICT offerings

Table 1. Focus areas of this dissertation.

1.1.1. Innovations and Services

1.1.1.1. *About the Term Innovation in General*

Those familiar with innovation literature have learnt to live with the inflation of what constitutes an innovation, especially in the context of pure services (Toivonen and Tuominen, 2009). Certainly an innovation need not be an invention, which we can reserve as a term for those special cases of innovation that result in breakthrough products, technologies or processes, such as the transistor, the application of radiation to treat cancer, etc. Curley et al. (2013, pp. 28-29) alone list no less than 35 different definitions of the term innovation ranging from the vague but intuitive (e.g. “successful exploitation of new ideas”) to the abstract, elusive and descriptive (e.g. innovation as “a product of the interaction between necessity and chance, order or disorder, continuity and discontinuity”) rather than rigorous and defining with discriminatory power.

The early Schumpeterian notion of innovation entailed new combinations of a firm's existing resources, or setting up a new production function, and remained rather broad and vague (Hagedoorn, 1996, p. 886), yet often cited—and criticised.

Building on Saviotti and Metcalfe (1984), Gallouj and Weinstein (1997, p. 547) first declare that any product, good or service, can be represented by three vectors (final, technical and competence characteristics) and define innovation as any change in any of these vectors.

Van de Ven (1986, p. 591) defines the process of innovation as “the development and implementation of new ideas by people who over time engage in transactions with others within an institutional context,” showing a departure from the firm- or product-oriented thinking.

Damanpour (1991, p. 556), paraphrasing Zaltman et al. (1973), focuses again on the firm when defining innovation as “adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization...” Adoption and diffusion of innovations can be seen through the classic 1962 theory of Everett Rogers on how innovations spread over time (Rogers, 2010), without necessarily taking a firm stance as to what an innovation is or needs to be. Diffusion of innovations forms an influential strand of innovation literature in its own right, usually assuming innovation to be the thing spreading, not the action of adopting it.

Hardly any of the above definitions of innovation is such that it wouldn't leave room for argument. Despite the challenge of coming up with a definition or even characterisation of what should be regarded as an innovation, I will try to provide mine later below.

First, is innovation a process or an outcome? In everyday use amongst innovation management professionals the word innovation tends to refer as much to the activity of innovating, for example emphasising systematic processes one could use to increase the likelihood of coming up with innovations, as the outcome itself. Like most scholarly authors, I adopt the view that the term innovation should nevertheless refer to a specific outcome (whether a method, an offering, or an outright invention) than to innovating activity in general. Thus, while the term can be used as an uncountable noun in the English language to refer to the activity or process, I mostly use the term as a countable (“*an* innovation”, many “innovations”).

How radical does an innovation need to be? It is difficult to draw the line between incremental improvements in product or service development and ground-breaking innovations, which has resulted in many using the term radical innovation to refer to innovations that are more easily recognisable as true innovations. Then the less radical ones are qualified as incremental innovations, but innovations nevertheless. E.g. Dewar and Dutton (1986) draw the line as follows:

Radical innovations are fundamental changes that represent revolutionary changes in technology. They represent clear departures from

existing practice (...). In contrast, incremental innovations are minor improvements or simple adjustments in current technology (...). (Dewar and Dutton, 1986, pp. 1422-1423, original references omitted)

This obviously does very little to solve the theoretical dilemma with the definition, but only rephrases it; the dilemma is not solved even if a mathematical notation is introduced for product characteristics and a requirement set for the entire system of characteristics to be different, as was done by Gallouj and Weinstein (1997, pp. 547-549). However qualifying certain minor improvements as innovations does have a positive practical effect of implicitly valuing those more mundane and less glorious improvements (incremental innovations), which are often necessary for the wider adoption of earlier goods or services—and hence potentially of even greater economic importance.

At the same time we should also try to remember that to preserve some meaningfulness in using the term innovation, it cannot be used to refer to just about any and all development or improvement either. We will return to this distinction shortly.

Who is talking and why? The radical vs. incremental nature of innovation is more relevant when considering the audience: the innovator (the supplier) would probably like to come up with radical innovations to increase its/his/her value appropriation possibilities, be it via patents or otherwise. A radical innovation by definition gives more distance ahead of competitors than a small incremental one. Given the choice, who would not want to come up with a radical innovation rather than just an incremental one? However for the adopter (the client) the small improvements may well be equally important or outright necessary—or the only affordable ones. The economy needs both, and in defining innovation policies it is obviously easier to show success when also relatively small, incremental innovations are counted. Also, in determining whether something qualifies as an innovation, is the implicit purpose to praise, evaluate or mimic the innovator or to examine the adoption of the instance of innovation? The bar could be raised or lowered accordingly, and a good definition of innovation should allow for this. And what about the cost of those innovations? Multibillion development and innovation programmes can often be seen to yield only a handful of rather modest innovations, but who is to judge and quantify their benefits? Should the outcomes of innovation activities be called innovations even if their economic benefits never outweigh the cost of their inception? I doubt we will ever get a clear answer or a definition of innovation that works for all in this respect.

What about services? Service scientists have traditionally emphasised how services are different from goods, or service sectors in the economy different from manufacturing industries. For a long time, authors have proposed such defining characteristics as intangibility, heterogeneity [in production process], inseparability [of production and consumption] (Lovelock, 1983; Shostak, 1977), and then also the

perishability of services—or the IHIP qualities for short (Vargo and Lusch, 2004b; Zeithaml et al., 1985). Today the research focus is on other aspects when trying to capture the essence of what services actually are—such as on co-creation of value (Prahalad and Ramaswamy, 2004; Payne et al., 2008) or on what service science is (Maglio and Spohrer, 2008). The point here is that many schools of thought exist that want to see services as different from all the rest (e.g. from manufacturing industries), i.e. they seek a dichotomy between services and non-services, and subsequently focus on innovations only in services (Gallouj and Weinstein, 1997; Hipp and Grupp, 2005; Toivonen and Tuominen, 2009). I will return to the differences and similarities between goods and services later on.

First, in an endogenous view one would study innovations and services in industries and domains which have for long exhibited the service characteristics referred to above, since the innovation studies made within e.g. manufacturing industries may not apply there. That is, the transferability of earlier results is questionable.

Second, in light of the servitisation trend or in an exogenous view, i.e. the pressure on traditional non-service industries to reinvent themselves and to transform more and more into service industries, the rise in service innovation research could also be seen to reflect the need to innovate services instead of products. (Penttinen, 2007; Vargo and Lusch, 2008; Kastalli and Looy, 2013) That is, how can companies that have been perceived to operate in non-service industries increase their business by offering more and better services—usually at first around their old core non-service offerings?

It is now well established in the service innovation stream of literature that the definition of innovation needs to be expanded from purely technical innovations (Hipp and Grupp, 2005, p. 519), which still used to be the norm more than a decade ago.

1.1.1.2. *Earlier Definitions of Service Innovation*

For many scholars, service innovations are in fact not very glamorous: de Jong and Vermeulen (2003) sum it up in their literature survey, referring to many earlier works and juxtaposing services and physical products, as follows.

... services tend to be intangible, heterogeneous, simultaneously produced and consumed, and perishable ... As a consequence, *innovation in services* mostly involves small and incremental changes in processes and procedures, and innovations in services are easier to imitate... (de Jong and Vermeulen, 2003, p. 845, their original references omitted)

While it is hard to disagree with the above statement, it gives a rather bleak picture of service innovations among innovations in general and almost reduces service innovations to any new service development (NSD). In their literature review de Jong and Vermeulen (2003) have rather sought for the specific details in NSD that make for successful

services. In this dissertation I am still trying to make a distinction between innovations and business as usual, and hence I would not automatically regard all successful new services as innovations, admitting that, to comply with the earlier research tradition and some of the macroeconomic policy goals, the bar needs to be lowered somewhat in order to include those new service concepts that most of us would intuitively call innovative without them being too radical. There are obviously numerous definitions for service innovation, too, in earlier literature, but let me go directly into the more recent and relevant ones.

Den Hertog (2010) defines service innovation as

...a new service experience or service solution in one or several of the following dimensions: new service concept, new customer interaction, new value system/business partners, new revenue model, new organizational or technological service delivery system. (den Hertog, 2010, p. 19)

In a particular instance of service innovation, one of the said dimensions may dominate. This is likely to instigate changes in other dimensions, too, in order to make up a coherent service offering and a successful innovation (den Hertog, 2010, p. 46). According to den Hertog (2010), service innovations most often appear new in two or more of the said dimensions.

Each of these six dimensions is summarised below (den Hertog et al., 2010, pp. 492-496). De Jong et al. (2003) mainly regarded dimensions 1, 2, 5 and 6 of those below.

1. A new service concept: “a new idea or concept of how to organise a solution to a problem.” For example, a telecom provider may bundle their services into a packaged offer or an outsourced call centre provide a holistic end-user support service on behalf of the brand owner. Similarly, many other new kinds of outsourced service offerings, stemming essentially from what I called horizontalisation above in Section 1.1.2.1, are in essence innovations in this dimension.

2. New customer interaction: customers may have new roles in co-creating value. Service innovations are often about new ways of interacting with clients, be it by self-service on the Internet or otherwise. Thus, a new division of labour between the service provider and the customer often qualifies as a service innovation.

3. A new value system: a new constellation of business partners can result in jointly produced innovations. In a value network each service provider delivers its specialised service component, and the value of the total service to the client is more than the sum of the specialised components.

4. New revenue models are often needed for new services to succeed. They are closely linked to the value systems above, implying for example new cost and revenue sharing models between partners, or how and what customers pay for.

5. A new human delivery system is in question when personnel is organised and motivated in new ways, including the wider corporate culture. Ways of scaling the organisation up and down with sales volume can be such a novelty. Innovation in this dimension easily occurs in combination with the third dimension when organising reaches outside the provider organisation's boundaries.

6. New technological service delivery system refers to how the technological element, ICT in particular but not only it, has enabled numerous service innovations. Recent examples range from Google and Skype to do-it-yourself DNA testing, car insurance whose premiums depend on actual mileage tracked by GPS, or mobile payments of parking fees.

Another appealing definition of service innovation was that of Toivonen and Tuominen (2009):

A service innovation is a new service or such a renewal of an existing service which is put into practice and which provides benefit to the organization that has developed it; ... In addition, to be an innovation the renewal must be new not only to its developer, but in a broader context, and it must involve some element that can be repeated in new situations... (Toivonen and Tuominen, 2009, p. 893):

Both den Hertog's (2010) and Toivonen and Tuominen's (2009) definitions may work well in their own contexts and for the purposes their authors used them. They can also be seen to reflect the desire of service innovation researchers to point out how services (new service development, service innovation) are different from the goods or products context (new product development, product innovation) and merit attention to their special features. I will later argue in Section 1.1.2.2 that they are more and more the same—not that services are like goods, but that goods are services.

1.1.1.3. *Towards a Unified Definition of Innovation*

In further analysing the value creation process and the very nature of customer value, I started working on a more general definition for Paper 1 in Part II. The one presented in Paper 1 for a service research community can be seen as a precursor to this later, more developed definition. The definition below works for both service innovations and product innovations, cf. Section 1.1.2.2.

Definition: An **innovation** is a *non-trivial design* change resulting in a *sustainable* increase in *net* customer (user) or supplier value *over time*.

Keywords in italics above are further highlighted below. As a combination of the elements outlined below, this definition is different from the many others used in earlier literature and appears more robust in terms of

validity and discriminatory power, even if it, too, could be regarded by some as a characterisation including elusive elements.

Non-triviality. For anything to qualify as an innovation, it needs to be less obvious at its time—perhaps not a patentable invention, but non-trivial in any case. Non-triviality means that the proposed innovation must not be obvious to professionals in the trade. Certainly we have the right to expect a certain degree of novelty from an innovation. Unlike den Hertog et al. (2010) and many earlier authors, I would however expect more novelty than just newness to the firm: an innovation is not truly an innovation in today’s connected economy even if a firm independently comes up with a new-to-itself or new-to-its-client concept, if it is already known to the industry or in a neighbouring country. I thus propose rephrasing the novelty or non-triviality requirement from “new to the firm” to “new to many in the industry”.

Design change. For the innovation to be a service (or product) innovation, that non-trivial improvement needs to be incorporated in the *design* of the service or product—an improvement in a one-off service delivery instance or in an individual specimen of a product not affecting the rest of the series should rather be considered a good improvisation or insight (service), a good patch (a product) or a good “hack” (software product). Incorporating a change in the design means that the effect will be repeatable and also that the change is implementable and economically feasible—something that one-off prototypes or single-instance service concepts hardly ever are as such. This may imply organisational changes and most likely will imply changes in many areas of service delivery (or production process), not just a change in a single minor detail, specification or document. Here, the key idea behind the term design is how it acts as a template for future production items or service delivery instances. Changing a design (or creating one from scratch) requires not only jotting down an idea on paper, but also a reconfiguration of the delivery mechanism, be it a production line or a high-skill human organisation, and possibly also affects the sales process.

Increase in value. The overall formulation of innovation so as to require an increase in customer or supplier value reflects the commercial or business nature that I would call for in particular with service innovations, without being too stringent as to how well the revenue logic of the business selling it works, or whether the innovation leads to a market success. A certain level of success is what should distinguish an innovation from a trial—however it may also come with some delay, or even be translated completely into consumer surplus without any value appropriation to the original innovator. The customer value concept may or may not be operationalised in terms of monetary value—usually in service science it is not.

Net value, defined as the total, or gross, value the customer experiences minus the price he/she/it pays for the service or product, is key—not the gross value, which can easily be increased by embellishments

and incremental improvements that one would hardly consider innovations. (Such incremental improvements would then also bring the cost, and thus price, up and leave the net customer value largely unaffected.) Even if the customer value is an elusive construct to measure, just as is net value, changes in price are rather directly and proportionally reflected in customer's net value. Economists would refer to this net value concept as *consumer surplus*, using the term consumer without prejudice to business customers.

Sustainability. It is important that the increase in the net customer (or supplier) value is *sustainable over time*, so as to exclude the effects of pricing tricks or marketing campaigns, which obviously well may affect the pricing and hence the instantaneous net customer (and supplier) value.

Customer (user) or supplier. Sustainable net customer value usually is the result of a service provider making money in the long term—a common criterion in other definitions is that an innovation should benefit the innovating firm. However, in today's more open innovation landscape there is not necessarily always one innovating firm, or even any firm at all (cf. open source). Nevertheless user innovation, such as that manifested by open source, is a generally accepted class of innovation. A proper definition of innovation should not rule it out. But neither is all innovation necessarily benefiting the customer in the end: a great increase in customer value could be fully appropriated by the innovating firm in a monopolistic market, hence pushing the increase in net customer value over time to zero. The very early Schumpeterian, and still prevalent, notion of innovation benefiting the firm is thus also covered. Even if commoditisation of any innovation drives down its net value to the supplier firm over time, and thus the net value may not be sustainable over extended periods of time (while this time may heavily depend on e.g. available IPR protection schemes), it only means that the net value shifts more to the customer side as consumer surplus as prices fall but the utility remains largely the same¹.

Below I will note how den Hertog's (2010) and Toivonen and Tuominen's (2009) definitions of a service innovation fit my more general view of an innovation as a value-increasing factor in the long run, with some important differences.

Novelty is a given in all three definitions. In theirs, Toivonen and Tuominen (2009, p. 893) do state that somehow the innovation needs to be new "in a broader context". By explicitly listing the dimensions in his definition, den Hertog (2010) lowers the expectations of what should be considered non-trivial in the case of services: a new customer interface or a new way of billing for the service suffices. In requiring novelty not only

¹ We could try to further enhance the definition by stating that it is the *sum* (net value increases of customers + the net supplier value increase) that needs to be sustainable; however, a more quantitative formulation is out of scope here.

to the adopter but to many (or most) in the industry/in the world, I place a stricter requirement on the innovating firm. This is in order to avoid excessive watering down of the novelty aspect, while still recognising that novelty and non-triviality are subjective and bound in time: the wheel surely was an innovation at its time, even if today no-one wants to reinvent it. Novelty is a function of marketing success: not all innovations catch like wildfire; some need to be diffused by extensive marketing efforts. Novelty can also be a victim of an innovation's own success: people may start taking the innovation for granted but ignore or forget the innovator. Nailing down the novelty or non-triviality aspect may be the hardest aspect in any definition of innovation. Novelty to the adopter is also implied by the added value over time—a client would not see the added value in the same way, if the offering had old or concurrent competition.

All six dimensions by den Hertog fundamentally affect the service design. Toivonen and Tuominen (2009) are more explicit about the design aspect by demanding repeatability.

Direct reference to customer or supplier value created, whether momentary or sustainable, or how it relates to the price of the service, is missing in den Hertog's definition. He obviously assumes some level of success and hence implicitly the increase in net value. Toivonen and Tuominen (2009) require the developer, i.e. the supplier, to be benefiting.

Specifically, the price paid for the service is missing from den Hertog's (2010) and Toivonen and Tuominen's (2009) pictures, just as it is missing in the majority of service innovation literature. Yet, for the provider, being able to provide the service profitably while maintaining a competitive customer proposition is key to any success—while den Hertog (2010) specifically mentions new revenue models, they alone would not in my opinion constitute a sufficient criterion for an innovation unless the price point can be set so as to increase the provider's or the customer's net value. In fact, it is not rare to encounter such "innovations" with little sustainable revenue potential that are sold with a revenue-sharing model, just to find that there was no added value to be shared, at least not sustainably. I'd then rather call these trials than innovations. Den Hertog (2010), too, does assume success but not as explicitly in his definition.

The definition of Toivonen and Tuominen (2009, p. 893, quoted above) excludes user innovations as a class—they assume an organisation developing a service and it is the organisation that must benefit from it, customer value being only a way to achieve it. I have specifically wanted to allow for the inclusion of user innovations in my general definition of innovations, which is not limited to services either.

An idea behind an innovation, no matter how central to the innovation, is not an innovation without an instance of it. Proof of the pudding is in the eating: whether sustainable increase in net customer or supplier value was created is of course only possible to determine after an instance of the innovation has proven itself. A certain level of commercial

or other economic success is something that most authors would, at least implicitly, agree to use as a criterion.

Although the novelty criterion is an obvious (or assumed) criterion for practically all authors, many authors have earlier settled with “new in a certain reference group”, “new to the (adopting/innovating) firm”, or “perceived to be new by the relevant unit of adoption” (Dewar and Dutton, 1986; Zaltman et al., 1973) as their criterion. This is a very marketing-oriented view. In today’s networked global economy, I believe we have the right and need to require more in terms of novelty: “new” can only mean “new to the addressable market” or “new in the field globally”, if not “new to the world”. Again, the purpose justifies the means: if the purpose is to study the adoption or diffusion of innovations, then this whole question is less relevant as newness has little intrinsic value; if the purpose is to predict or enhance the likelihood of economic success, then it is crucial to be the first one in the world, by being well aware and connected to other actors, as opposed to independently coming up with something previously unknown to a small isolated group.

1.1.2. Services and Software

Debate about the differences of products and services has recently been a popular one (Nambisan, 2001; Vargo and Lusch, 2008) and something I have tried to avoid dwelling on in the individual papers—much has been said in prior literature about the special nature of services as opposed to goods or products on the one hand, and, on the other, about how the line between software products and software services is becoming very fine indeed, if it can be distinguished at all any more. Without claiming much originality, let me elaborate a little in the present Part I of what I mean by this. No doubt such discussion merits conceptual research papers of its own, but in the original research papers in Part II my intention has rather been to steer clear of such debate for the benefit of focus on those other interests.

Here I am elaborating briefly on three shifts, or trends, in the modern service economy: First, servitisation in general, i.e. the fact that services have gradually become a major part of western economies compared to the sale of goods, even without regard to software and how it is classified in statistics; second, software is being delivered and used more and more as a service, while those service offerings are being productised to an increasing extent; and third and more generally, the dichotomy of services vs. goods is becoming less relevant. Or if anything, we should see goods as services. This will be explained in more detail below.

1.1.2.1. Servitisation of Modern Economies

Whereas earlier the predominant view of world trade was goods-centric, in the last decades services have become increasingly important as an economic driver (OECD, 2008; Vargo and Lusch, 2008). The OECD has calculated that in OECD countries 64% of jobs were in activities relating to

services in 1997 (up from 55% in 1980), more than 70% of economic activity in some OECD countries was comprised of services, and that the overall trend is a growing one at the expense of manufacturing slipping to under 20% (Neely, 2008; OECD, 2000, p. 3, p.19). Trade in services is growing more rapidly than trade in goods but still accounted for less than 20% of overall trade at the turn of the millenium (OECD, 2000, p. 24).

Globalisation is one view to explain the growth in trade, but the importance of services over goods more generally in economies can also be reasoned along the two following factors: liquification and unbundling (Normann, 2001; Vargo and Lusch, 2008b).

Liquification: the value-adding activities of practically all economies evolve to a direction where physical goods play a diminishing role compared to what people and business can do to better serve each others' needs. This again relates to the increasing importance of knowledge and its application in ways only humans can do (say, knowledge-intensive business services or KIBS, health services, tourism, recreational services, car repair, etc.) compared to just producing more and more of commodity goods; this also stems from more automated procurement of intangible goods or industrial production of by-now commodity services (say, cleaning, basic telecom services, retail banking, etc. that benefit from economies of scale and scope); i.e. the increasing ability to separate, transport, and exchange information, apart from embodiment in goods and people; and

Unbundling, or what I'd like to call the *horizontalisation* of industries or economy, i.e. the splicing of value-adding columns into thinner layers of specialised, independent and competing actors, which in itself is a recurring theme from the times of Adam Smith. In statistics, one gets what one measures: if a company as a single economic entity, reporting its financial figures not least for the purposes of taxation and its other statutory obligations, splits into two interacting entities, then *ceteris paribus* this exposed interface gets reflected in the statistics as an increase in economic activity, and often such specialisation, manifested by outsourcing, relates to services rather than only goods being passed back and forth in the value network. The reconfiguration (horizontalisation) of economic actors into more specialised entities happens mostly by function, not by type of end product.

Another viewpoint on servitisation, or a reasoning behind it, would be a near parallel to Maslow's (1943) needs hierarchy: as wealth increases, we as humans tend to put less focus on basic physical goods: there's only so much food a person needs, and increasing amounts of clothing, housing, and all other *things* around us tend to yield diminishing satisfaction in our personal lives. Interest and focus in consumption behaviour shifts to the intangibles. Of course this is only the demand side, and not all are so lucky as to preoccupy themselves with the higher-order needs in Maslow's pyramid. But even on the supply side of all these basic "necessities" ranging from food to the latest consumer electronics, by specialised

services and knowledge-intensive ones in particular—not least education and better structured societies—economies can deliver more of those necessities, i.e. make better use of scarce natural resources and increase the productiveness of labour (the “technological development” that macroeconomists use to explain everything beyond labour and capital).

1.1.2.2. *Software as a Service and Other Illusions of a Product; the Increasingly Artificial Dichotomy of Services vs. Goods*

While software is increasingly being sold as a service, so are service providers increasingly striving to productise their service offerings so as to package them with a clear interface, be it a service-level agreement (SLA), application programming interface (API), or other black-box abstractions of a technical or legal nature. A product is an illusion at best: a service disguised in the shape of a CD or DVD, a downloadable file, or a system of software and documentation called a turn-key solution. Besides, most buyers would not settle with the illusion only but would demand installation, training and other such components that anyone would call services anyway.

The discussion around products vs. services often assumes a tangible character behind products, so that in some way products would belong exclusively to the realm of tangible goods, or at most to that of generalised goods comprising also intangible, or digital, goods. This is where the discussion goes astray.

Rather than trying to view services as special kinds of (intangible) products, I rather view these kinds of products (i.e. intangibles and tangible goods alike) as special kinds of services. In fact, to make the distinction clearer, I prefer to use the term *generalised goods* for intangibles and tangible goods collectively, and free the term product later to refer to a high degree of standardisation in the offering in the sense of Tether et al. (2001).

The aforementioned illusion of an intangible product, or products overall, is not exclusive to software and the ICT industry. While earlier, services were not so much in researchers’ focus and the minority of researchers specialising in the special nature of services almost had to justify such a then-marginal focus, today few economists doubt the relevance and importance of services. So we hardly need to stick to the old assumption that business offerings would always be either services or products (often synonymous with goods in common parlance). Goods are tangible; however, immaterial artefacts such as software suites can and usually are called products with an implicit reference to the tangibility of the object². I will call these jointly generalised goods to make the difference to services clearer. Next I will argue that even that difference is increasingly artificial.

² As already mentioned, later I will avoid using the term “product” in this sense and rather reserve it exclusively to refer to an offering with a high degree of standardisation.

My argument is that *any* commercial offering fundamentally *is* a service offering, whether at the heart of the offering there is a generalised good or not. In this view, as illustrated on the right side of Figure 1, goods are a genuine subset of generalised goods (some may call these products), which again are a genuine subset of services; not so that services would be an ancillary offering around goods or products. The notation in Figure 1 is that of set algebra. Even in the trade of goods there is an increasingly important inherent and inseparable pure-service aspect involved—one that is never non-existent, and one that is getting more and more attention as a competitive factor between suppliers. Any offering is a service, and even goods *are* services!

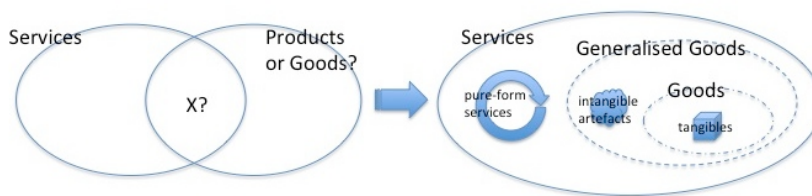


Figure 1. From the artificial dichotomy of products (goods?) vs. services in a business offering to goods *being* services (and not the other way around).

In Figure 1, the X is what Software as a Service (SaaS) is largely about and what has also preoccupied ISS researchers. In the software industry, products are immaterial in any case, but to build a meaningful picture that also works with the tangible products, or goods, I prefer to talk about (generalised) goods as a special case of services. At first, this may sound like a purely terminological trick but it reflects a whole different philosophy in viewing the world around us.

Note how this is still somewhat different from the service-dominant (S-D) logic of Vargo and Lusch (2004a). S-D logic sees a service as a process—doing something for another party. In S-D logic, goods are still important and distinct from services; however, service is superordinate (Vargo and Lusch, 2008, p. 256). Furthermore, Vargo and Lusch’s (2004a, 2008) goods-dominant logic (G-D) sees services as a special type of good (Vargo and Lusch, 2008), not the other way around. Nevertheless, my view of goods as services and the S-D logic share more similarities than they are in disagreement: both emphasise service as the fundamental basis of exchange, are customer-oriented and relational, underline that all economies are service economies, etc. (Vargo and Lusch, 2008b).

Figure 2 illustrates the difference in the “from G-D to S-D” mind-set and the “goods are services” mind-set. Again, the notation in Figure 2 is that of set algebra. The borders between the intangible and tangible artefacts as well as those between intangibles and pure-form services are blurring, if not disappearing, not least due to digitalisation. Later, under Section 1.3 we can again avoid the problems with the term service,

overloaded with different meanings in the past, and refer to these services in general as offerings.

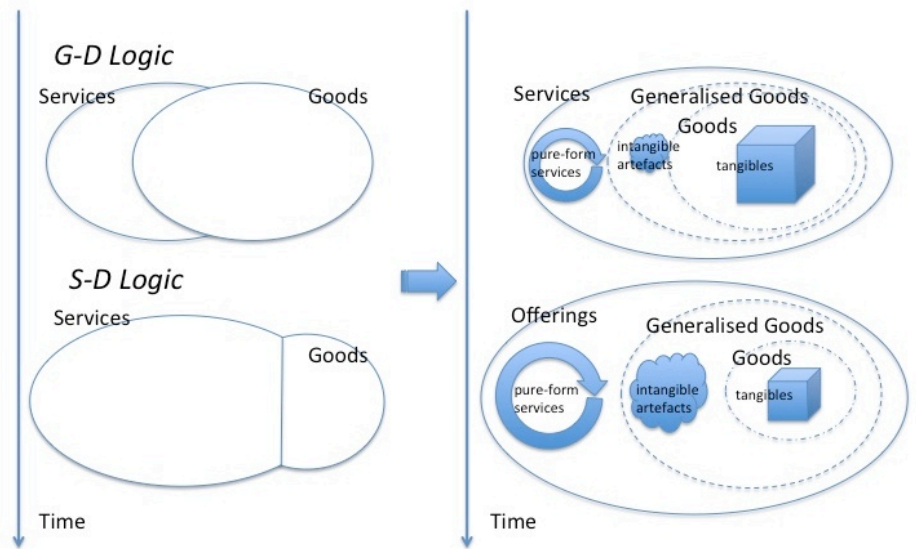


Figure 2. Instead of services dominating over goods, goods should be seen as services.

Our “goods are services” mind-set is well in line with, but not the same that Christensen and Raynor (2003) and Christensen et al. (2005) mean with their “jobs to be done”. For them, as for Vargo and Lusch (2008b), goods are a distribution mechanism for service provision. Christensen et al. (2005) are more concerned with the ownership of the good and what the good can do for its owner after the owner has bought it, rather than with the transaction of buying it. I am talking more about the business offering, i.e. the exchange or acquisition of the good here, and that even without any kind of a maintenance plan or after-sales service, the mere act of offering a good for sale and selling it to the customer is fundamentally a service. Furthermore the pure service aspect is a mandatory wrapper rather than an optional side dish: one cannot buy groceries at a shop without them being first made available on a shelf, then presented somehow, perhaps weighed by the customer or the shop personnel, the customer queuing up for the cashier and executing the payment, and in the end putting them in bags. Christensen et al. (2005) emphasise how the car will render services to its owner by moving him or her around; what I am emphasising here is that going to a car dealership, talking to a car salesman and having to sign certain papers, perhaps including financing, is an inseparable part of that service called a car. Grönroos (2000) again refers to these as hidden services. In business-to-business trade of goods the importance and existence of these hidden services, including contracting, invoicing and dispute handling processes, is pronounced. Even for retailers of consumer goods, the decision of how to sell—what kind of customer experience is offered—has become a relevant strategic

question for their competitive advantage (Rintamäki et al., 2007). *If you are selling anything, you cannot **not** provide a service.*

The extent and quality of the mandatory wrapper, or hidden service, is naturally reflected in the price: the same banana in two adjacent grocery stores costs double in the one that is clean, safe, has more staff to serve its clientele, and a cashier with a smile, than in the one that just sells them from its shabby storage room with minimal investment in the service experience. After eating one of each, one could not necessarily tell which banana was from which store. Likewise, if living in a city, one is likely to associate a higher value with a banana available in the nearby corner shop than one far away outside the city; etc. In commerce the whole process which we call a banana and mistakenly have only seen as a physical object, is a service—a banana *is* a service, since one never gets a banana without the service wrapper around it. Unless one has a plantation of course, in which case it would be a *self*-service!

Think of more and more complex products (goods or generalised goods): buying a TV set, a car, or a company buying a packaged enterprise resource planning (ERP) system or a cruise vessel—the more complex it gets and the less commodity it is, the more significant the service component *of* the good (or, in the case of the ERP system, the generalised good) is.

Quite obviously, the physical nature of goods necessitates many supplier processes that intangibles do not: transport of raw materials, their processing into the final goods, and storage and distribution of sometimes significant scale. But this is mainly of concern on the supplier side and not really something that would come as a surprise to any business professional. Material handling and logistics are after all very well developed disciplines and skills in industrial societies. What deserves current attention is the demand side and how the offering can be made grow in value rather than optimising, i.e. lowering the production and distribution costs. Therefore I consider it more justified to view goods as special kinds of services.

ICT and management consultants have by now learnt to anticipate almost any “XaaS” acronym (or *aaS, as some refer to “anything as a Service”): first Software as a Service (SaaS), then Infrastructure (IaaS), Platform (PaaS), Network (NaaS), and now even Business Process as a Service (BaaS) and Knowledge as a Service (KaaS)! (Abdullah et al., 2011; Xu and Zhang, 2005). To some extent this proliferation of the term service may also indicate that the term is superfluous and the “as a service” part is losing its significance—would “Service as a Service” make any sense? Against all that evolution in marketing terminology it is perhaps easier to accept the ontological standpoint that *any* offering *is* a service.

In the ICT industry these XaaS terms are of course used to convey certain specific meanings beyond what the terms without the “as a Service” part used to imply, mainly with reference to the delivery mechanism. The point is that the vendor does the client a favour (lends a

service), without the client needing to invest so much in server hardware, application management etc. The proliferation of XaaS offerings also goes to say that soon we can drop that “aaS” part altogether and come to grips with the fundamental nature of all commercial offerings *being* services, no matter how they were delivered³. A banana, which in itself already was a service, is now home-delivered! Thus there is no need to coin “GaaS” for “Good as a Service”, since goods are services.

In software business, the term service has taken on yet another meaning, too, and that is the extent of particularisation (Tether et al., 2001) in the offering. Cusumano (2004) and Nambisan (2001) are good examples in this respect, as by a service company they mean one that offers tailored, or bespoke (particularised) solutions. However, that is not in line with the mainstream service science, where services are seen as (standardised or particularised) processes with the IHIP qualities; as something even more elusive than software in the tangibility dimension. Neither is that compatible with the way services are understood in most of the services industry: a barber’s shop and a bank are definitely providing services to their clients, even if their offerings were very standard (the same, i.e. productised) to all their clients. Alajoutsijärvi et al. (2000) refer to businesses with a high orientation to particularisation as project businesses, which is a less confusing term.

We may sometimes, and usually do in fact, think abstractly about an idealised good—the idea of that good just existing *per se* as a physical object—but we are never able to touch or feel it, let alone buy it. (The same argument goes for the generalised good without the touching part.) We can only buy the real good, or product, which is a service, and by touching we would feel its tangible core, if anything.

We can draw an analogy to the early value philosophers (Aristotle, Adam Smith etc.), who tried to dissect the value concept into *value in use* and *value in exchange* without quite succeeding in isolating the two—then either (Grönroos, 2011; Ramírez, 1999). If the earlier service science scholars have emphasised that the goods in use are rendering services, I am further pointing out that the goods in exchange, too, fundamentally are services. A physical object or reality may or may not exist depending on one’s ontological choices, but the moment one tries to attach a value to an object, it becomes a service—hence particularly in trade we use the active and positive term good as opposed to a mere passive “object” or the like. Therefore, I am sceptical about whether the efforts made to define pure services as opposed to goods (e.g. Gadrey, 2000) will yield any more useful grounding than efforts made to define goods. Having redefined the term service myself above, but recognising how overloaded the term already is, later I prefer to talk about offerings.

³ These “XaaS” concepts of course started off as concepts referring to the offering vendor’s differing method of delivery compared to the old ways. What the vendors are now offering is the banana without even the need for one to go to the shop.

1.1.2.3. *The Whole or Total Product Concept*

Levitt (1980), McKenna (1991) and their followers have rather focused on the meanings of “a product” when using the terms total product or whole product. Admittedly, even an idealised product without any pure-service component is more than the generic (core) product in the customer’s view: the customer has certain expectations for the product (the expected product), the supplier can augment it in ways that differentiate the product in the customer’s eyes from competitors’ products (the augmented product), all the way to the potential product, the idea of which marketers are painting when attracting customers. Figure 3 depicts the idea of the latter always enclosing the former.

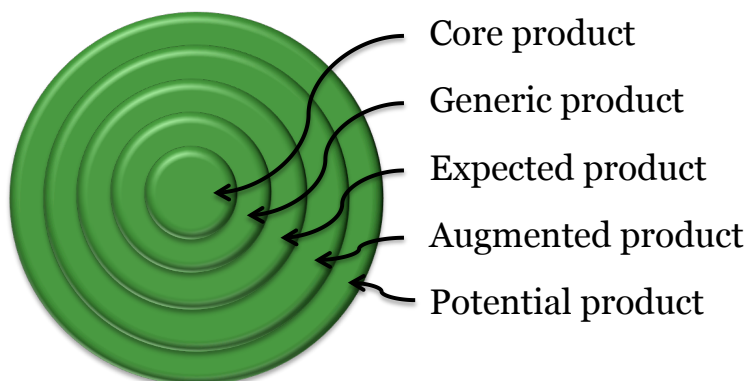


Figure 3. The whole (or total) product concept (Kotler, 1994).

Levitt (1980) included such service aspects in his expected product that they can be considered to parallel the above good-is-a-service thinking. Sometimes the core benefit or product is further extracted as the inmost nucleus from the generic product, thus resulting in a five-layer onion model (Kotler, 1994), whereas some prefer only to distinguish three levels, leaving out both the core benefit and the potential product.

The underlying motivation in analysing the total, or whole, product is to do better marketing (including of course feedback to product development) and as such, this marketing-oriented view is not a conflicting but a complementary view of the question of what an offering is and how to make it better. As Levitt (1980) points out,

the customer never just buys the ‘generic’ product like steel, or wheat, or subassemblies, or investment banking, or aspirin, or engineering consultancy, or He buys something that transcends these designations...
Levitt (1980, p. 85)

My good-is-a-service discussion is ontological in nature. (How are, or are, services different from goods? What is a product?) The total, or whole, product thinking is more directly concerned with increased sales. (Why

does a customer buy something from a particular vendor? How can a vendor entice a customer to buy its product instead of buying from competition?)

In line with our above reasoning and terminological definitions, we would rather then talk about the total (or whole) service or total offering, whereas Levitt (1980), McKenna (1991) and others have assumed the term product to include a certain set of services, or be composed purely of services. When talking about good-centric products, they still ontologically assume the existence of a core product without the service components, whereas I deny the existence of goods or products without their inherent service components.

It is true that in the case of goods, the expected product and augmented product can often be enhanced by pure-service components added on top of the core product. But the same also applies to pure services as the core product.

Rather than only focusing on the ontological nature of goods and services, it is also important to consider a company's (whether it is called a vendor or a service provider) resources, core competencies and innovation capability when determining whether it should call its offerings services or products and how the company should see itself. Being good at economies of scale in production and distribution is not necessarily the same as being good at selling and profitably delivering customised software services (Nambisan, 2001); it takes a different set of skills but ultimately, if the product does not address a real (current) customer need, those skills will be wasted and the product short-lived—product businesses and service businesses in the software sector can both learn something from each other. Similarly, Cusumano (2004) almost categorically sees software product companies distinct from customised software companies (or what he calls software service companies in line with established business terminology), and posits that the most fundamental question in software business strategy is to choose one's side and stick to it. In the end, four out of the five key issues on which software service and product companies differ, according to Nambisan (2001), (i.e. on IPR, product complementarity, abstracting knowledge and integrating technology, and connections with users) have more to do with execution than with the nature of the offering. Whether one wants to talk about a product or a service in marketing boils down to the size of the market the offering addresses (returns from scale, the 5th key issue), which again is largely a function of the vision behind the offering.

1.1.2.4. Closing the Loop: Productising Services

If earlier it has been concluded that a stronger focus on services is welcome, and that we should see even tradeable goods fundamentally as services, then why do some try to (seemingly) swim against the current and emphasise the importance of productising services (Feller et al., 2008)?

From a customer's viewpoint, a customised or personal service is great, provided it comes with a decent price and not too much inconvenience, leaving enough value to the customer. However, the provider would obviously be able to offer the same at a lower price and/or better margin, if the provider benefitted from economies of scale and scope. We can call the attempts to package, bundle and price an offering into a neater, more easily comprehensible product as productising. Productising is all about *standardising* the (service) offering to something that is easier to sell and deliver to multiple customers; indeed Tether et al. (2001) preferred to talk about standardisation on the one hand, and on the other, about *particularisation* as its opposite. The idea is only natural and applies to pure-form services, intangible goods and physical goods alike: any of these can be productised; ontologically none of them are products by necessity. This standardisation-particularisation dimension is intricately linked with what Grönroos (1997) refers to as transactional vs. relational intent, respectively, as well as to Cusumano (2004) writing on strategic choice for a software company to become a products or services company, respectively.

Note that while the service provider's primary intent may be to cut production cost for the service by standardisation, this to some extent goes hand in hand with the customer's added value in terms of better documentation, interfaces, contracts, smoother billing and in general with everything the customer would associate with a market-ready product, thus adding value to the customer. In fact, the seller would like the customer to be better able to stick to the illusion of an easily acquired product, instead of the customer seeing the mesh of interdependent tasks and components that make up the service. Too much particularisation (or more bluntly, lack of standardisation) can be a bad thing even for those so-called service companies and their clients, if the relationship doesn't yield any benefits of scope, either, to the supplier or means too much involvement by (or inconvenience for) the customer. On the other hand standardisation requires time and effort, in addition to a clear idea of what to standardise, of course.

Returning to the XaaS terminology, had we jumped over the PC revolution and computing power on users' own computers, the same concept that we now know as SaaS could quite well have been called "Software as a Product" or "Service as a Product" (as in a well-standardised offering instead of custom-tweaked code fit to individual clients' needs).

So, at the same time goods- and product-based businesses are seeking more revenue by servitisation—and indeed whole economies can be seen as being servitised—and services are being productised in order to sell and deliver them more easily and cost-effectively. What first may have appeared as a paradox makes in fact a lot of common sense.

Figure 4 illustrates how the "products or services" discussion has been revolving around the wrong question—products and services lie on

different axes, on different dyads or dimensions. If one wants to distinguish different degrees of tangibility in the offerings being traded, then one can try to put goods, intangible goods and pure services on such a tangibility axis⁴. But the question remains, is tangibility important in the end? Bebko (2000) claims it is, as she has found it to be, perhaps somewhat surprisingly, a key factor affecting consumer service quality expectations, for

... consumers may not be able to mentally 'unbundle' goods and services, and ... both process and outcome tangibles are an important source of 'tangibility' to the consumer and producer. (Bebko, 2000, p. 16).

While tangibility may thus be of inherent value in B2C offerings, what should be of more importance, especially for the B2B vendor, is the scalability, be it via the nature of digital goods, or scalability of the business offering tied in location or human labour, for example. This is better measured on the standardisation-particularisation dimension, which could also be called productised vs. customised dimension. Services can, and many should, be productised for better scalability, e.g. by automation, enabling self-service by customers with a technical platform, scripting of service staff, or franchising. However, sometimes what many may think of as a product may in fact best be viewed as a high-value adding offering with significant potential for pure-service development in a relationship and trust building exercise with few key customers (e.g. a paper mill, a cruise ship), and as an offering where most of the productised (standardised) components are relatively low-value adding commodities.

Returning the earlier IHIP definition of services (Zeithaml et al., 1985), intangibility is the first and most defining characteristic of services. In light of the above and standardisation (productisation) of certain, especially highly automated services, it is questionable whether heterogeneity ever was a very good defining characteristic at all. Compared to inseparability and perishability, the immaterial or intangible nature of services is by far the one that dominates when people implicitly categorise things into services or non-services. It is hence easy to understand that the somewhat misguided service-or-not discussion in the software domain has taken on a special twist, as all software is intangible in any case.

⁴ We could consider calling it the "cohesiveness", "containability" or "density" dimension too, to allow for the possibility of different degrees (as opposed to only tangible/intangible).

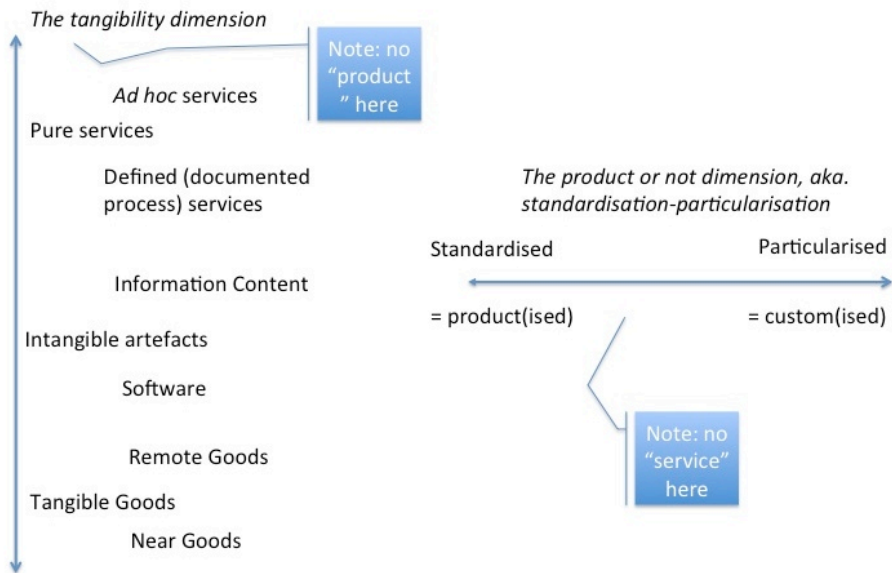


Figure 4. Products and services lie on different dimensions of an offering.

With the increasingly artificial and misguided dichotomy of products vs. services off my chest, let me now delve on the special role of software in modern (service and other) innovations, a discussion without which the holy trinity—software, services, and innovations—would not be complete.

1.1.3. Software and Innovations

ICT technologies in general are of course an undeniable and important domain of innovations in the modern economy, and they do not necessarily appear as separately visible technologies but become more and more embedded in business and societies. Software in particular, thanks to the scalability of potential markets and low distribution costs, is a focus area for innovation policies in Europe and elsewhere (Salmelin and Curley, 2013).

The aim of this dissertation is not to enlist or drill deeper into all the ways that pure software innovations are born and can be nurtured. What is of interest in this dissertation is to note how software and more generally ICT products, no matter how much hardware-centric, by themselves only form the core product in a larger whole, which we see as a service.

While often the most obvious and visible component, den Hertog et al. (2010) have chosen to list new technology (or, technological delivery system) only as the sixth and last aspect of service innovations. The point is that, perhaps certain consumer killer applications aside, it takes conscious efforts to build successful new services around a software core, without which the development efforts centred around a great new idea

and piece of software usually do not become successful innovations (cf. the first five aspects of den Hertog et al., 2010).

Licensing schemes (the revenue logic, or value appropriation) are an important part of software-centric innovations (Lerner and Tirole, 2002; Rajala 2009), and the licensing regimes (copyright and patent laws together with the free contracting rights of private parties) also greatly affect the incentives for such innovations. The prevailing copyright legislation leaves ample room for and actually forms the basis for privately defined licensing schemes, including open-source software (OSS), as without copyright law the various OSS licences would lose their effectiveness and open the door to such value appropriation that OSS proponents would hardly consider meaningful or desirable: e.g. the effectiveness of the obligation to further release the source code, as stipulated in pure OSS licences, is in fact based on copyright law and contract freedom (licensing) (Dixon, 2004). The various OSS licences are a reflection of den Hertog et al.'s (2010) fourth dimension of innovation, seldom sufficient alone to make a new idea into an innovation if there is not sufficient innovativeness in the sixth or other dimensions at the same time. In Part II, Paper 4 discusses the potential existence or emergence of other, more hybrid, licensing schemes.

1.1.4. Summary of the Background and Motivation

In short, above I hope to have both painted a backdrop for what follows and to have clarified a few issues emerging from the way certain terms have often been used in earlier research.

First, rather than settling with the G-D or S-D logic, I find the GaaS proposition most appealing, i.e. viewing even goods as services rather than being trapped in the goods-or-services dichotomy. Inclusion of intangible products as generalised goods is easy and appealing in GaaS thinking (cf. Figure 1 above).

It then follows that product innovation is a special case of service innovation, rather than the other way around. This seems very natural when thinking of designing products—including tangible goods—that are easier to sell, easier to package, distribute and unpack, easier to contract for, easier to bill and pay for, easier to appropriate value from by modularising or bundling, etc., and not just easier to use or more efficient *per se*.

It also follows that any software—not only SaaS but also any shrink-wrapped software product—ontologically *is* a service; at the same time, a vendor's ability to productise (i.e. standardise) such a service into an easily comprehensible, more easily sold and bought offering can be crucial for the scalability of sales. Productisation can occur both in a SaaS offering of pure service nature and in shrink-wrapped software as a generalised good (still a service). Software still is unique among services in that it does not require humans to run or roads to be transported on; it may require

humans to deliver and sell it, but the less it does the more scalability potential the offering has.

It is safe to say that today researchers all agree that pure-form services are ever-more important in the economy and that the G-D logic, as much as it ever existed as the only view, was not sustainable or sufficient, but nevertheless goods and especially software as generalised goods are an important part of the economy. I am saying that it is only easier to look at innovation in all these three classes through the GaaS lens instead of trying to justify why pure-form services deserve distinctly separate treatment (S-D logic) that focuses on the differences. S-D logic served its purpose at its time: opening researchers' eyes to the world as being dominated by services. But as they now are dominant, and mostly everyone agrees, it is no longer a useful focus to stare at pure-form services, or to try to define how they might differ from goods.

After a quick introduction to open innovation in the next Section, I will further continue the discussion on objects of economic exchange in terms of what an offering is and how relationships and trust are ever more important in business-to-business sales.

1.2. Open Innovation in Software

So what is *open innovation*? Literature on the subject is ample and an up-to-date review along with recent history of research is provided by West et al. (2014). Many trace open innovation back to Henri Chesbrough's seminal works, and he has defined it (among others) in the following terms:

Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, ... (Chesbrough et al., 2006, p. 1)

The funnel diagram in Figure 5 is often used to visualise how open innovation means that the organisational boundaries are, and should be, permeable to ideas, knowledge and technology both in- and outward, if the firm is to survive and thrive in the new, networked economy.

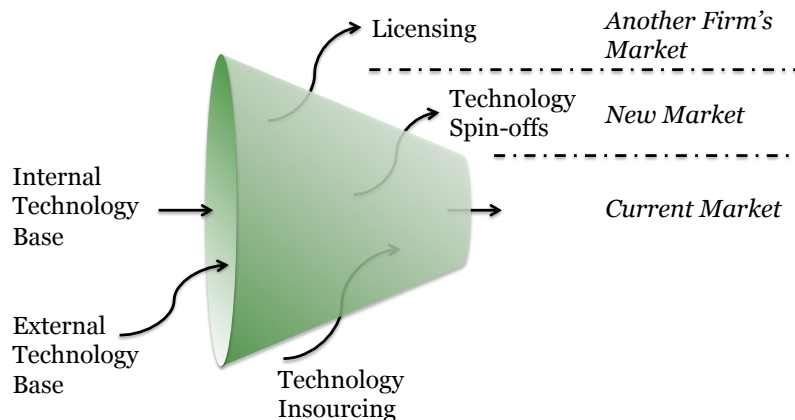


Figure 5. Open innovation features following Chesbrough et al. (2006).

The notion of open innovation is thus not anyhow specific to software, but software business is, by its knowledge-intensive and immaterial nature of course, conducive to such development. Another related, but not the same, concept was termed *user innovation* by von Hippel (2005). Especially in the domain of software, so-called lead users can, when empowered by appropriate tools and most importantly the source code to software, be the most capable ones to tweak the software to suit their own needs. These lead users can be clients or open source community members, and hardly make up more than a few percent of the overall user community for any product or software projects, but they are essential actors in the development of any open source project.

As a special case of open innovation, user innovation is also a widely researched topic. Open source software (Fink, 2003; Fitzgerald, 2006; Lerner and Tirole, 2002), in turn, can be seen as a case of user innovation taking off in the software domain. Much of von Hippel's research revolved around open source software (e.g. von Hippel and von Krogh, 2003), even if he was not by any means limiting the field of applicability of these ideas on user innovation to the software domain. An often-cited example from a non-software domain is how Lego succeeded in getting users to design toys that appealed to parents buying toys for their children (Antorini et al., 2012; Antorini and Muñiz, 2013), and von Hippel (2005) further lists user innovations from surgical equipment and pipe hanger hardware to mountain biking equipment. This should suffice for now, even if such a simple inclusive classification may not do justice to all authors: Chesbrough et al. (2006) and West et al. (2014) have pointed out though that their ideas on open innovation are specifically geared towards value capture (revenue and business models), which are lacking in pure-form OSS.

Is open then automatically better than closed? Of course it depends: it hardly makes sense for a company to give away its crown jewels in the form of differentiating intellectual property (cf. Figure 7, upper right-hand

corner in red), for example, or otherwise reveal all its business secrets any more than to insource fail-ready technology at a high price. And where is the limit anyway between open and closed innovation? Will a firm setting up a public blog count? The point that the recent interest in open innovation literature demonstrates is that it is beneficial, more often than it has been previously (say a couple of decades ago) thought, to open up innovation practices and policies at least to a certain degree. The benefits are relative to time and the then-current practices and general attitudes; open innovation is a boundary object (Star and Griesemer, 1989), like any new phenomenon worthy of a name, and elastic as such in its meanings. Open innovation clearly hit a need when the term was coined, and it may now or soon be on the brink of becoming the new business as usual.

Still, who would not want to be the sole proprietor of patents to a disruptive new innovation, or have a significant lead in time-to-market of a consumer device tapping into a recently identified, simple but profound market demand? Those who *can* thrive on their own would probably only lose by opening up their own practices. A case at point is Apple Inc., who are well known for innovative, very successful products, that rather exhibit the opposite tendency of targeting and locking down ideas and smaller innovations emerging partly in the open domain, such as many parts of the MacOS operating system, by legal means⁵. Perhaps the key for such success is a unique position of the innovator as the user and producer at the same time—the innovator, who in the case of Apple boils down to a very limited group of a few persons, is simultaneously the user in his/their everyday life. Perhaps the business of selling to other businesses is too different from this consumer-innovator pattern: a telecom software vendor may have employed people with an operator background, but these are still two distinctly different businesses and very few, if anyone, can simultaneously excel in both domains. Thus, as the vendor does not and cannot live the life of an operator, it needs to actively engage itself into such activities, and/or bring the operators closer into their development processes if it is to sell to real and not imaginary customer needs.

Again, we can draw a parallel between the standardisation-particularisation dimension and the closed-open dyad: perhaps those strong in differentiating intellectual property should remain closed and aim for scalability via standardisation, whereas those lacking in innovations and their own differentiating intellectual property should become more open to outside influences and seek to invest in relationships, rather than multiplying transactions. Intuitively, the idea appears appealing: if one is not the smartest kid on the block, then it's probably better to admit it and socialise rather than try to outsmart the others. The key insight is to realise that this works at many different levels

⁵ Not implying total absence of lawsuits and disputes, which are in any case a fact of life for a company of this size; at least it seems Apple has managed to give and take to/from the open community in a way that has not raised the masses of open source developers in a war against it.

in the business model of a company. Hardly any company is the best at all levels and thereby one can be very open with certain practices or areas of innovation and simultaneously find that a closed strategy is the appropriate one for stronger areas of innovation. Thereby many, if not most, companies can benefit from open innovation in some of their activities, even if it was not a suitable goal for most of their activities.

Co-creation is a much related term used in the context of open innovation and refers to the process of creating (something, anything) together—more specifically the provider together with the customer or its partners, as it goes without saying that people within an organisation are and should be working together. The term customer co-creation (of value) can be used to explicitly distinguish co-creation activities by and between the firm and its customers from co-creation by and between a firm and its business partners, and it is particularly in this former sense that Prahalad and Ramaswamy (2004) made the term value co-creation popular.

Different authors attach slightly different meanings to the terms open innovation and co-creation—and the term co-production may further be used with a slightly different connotation from co-creation. We can distinguish at least two uses of the term co-creation.

First, as a development activity or mode of development, co-creation can be considered to occur in the early phases of the (open) innovation cycle, when people across organisational boundaries are yet looking for a potential solution to a mutual problem, or trying to formulate what the mutual problem or opportunity might be. Open innovation tends to refer more to the permeability of the organisational boundary to ideas and artefacts; co-creation is more centred on people from different organisations working together. In open innovation the objectives may be clearer and to some extent it is a management mind-set; the term co-creation may also imply more specific methodologies for engaging customers or partners in almost any process. In practice, authors employing the term co-creation often come in with an open innovation mind-set and, more often than not, assume a services context.

Second, when it comes to service delivery, value is co-created or the service co-produced by the supplier and the customer in the delivery, not only in the innovation phases (Grönroos, 2008). Different authors may use these terms differently in their details, but for us it suffices to view open innovation as a paradigm where ideas and artefacts purposefully cross organisational boundaries, and co-creation as a mode of working or as those interactions that create the value of a service. (Payne et al., 2008; Prahalad and Ramaswamy, 2004; Grönroos, 2011.)

Chesbrough (2011, 2011b) has used the momentum to write about *open service innovation*, which can be seen as an extension of open innovation from the traditional product development mind-set to the services arena; not necessarily fundamentally new to service scientists familiar with open innovation. One of the ideas is to leverage platforms (Gawer and Cusumano, 2013; Meyer and Seliger, 1998).

My purpose is not to give an up-to-date or historical account of developments in service science or innovation research, but to paint the backdrop for the research papers in Part II. To that end, suffice it to say that in recent years there has been a shift from the supplier-dominant view to a more customer-oriented (Heinonen et al., 2010) and then to a co-creational view of services. Along with co-creation and co-development, Kijima et al. (2012) emphasise co-elevation and co-experience as pinnacles of successful service design and delivery. Perhaps an adverse reaction can be seen in recent research spanning also value co-destruction (Smith, 2013)! *Co*-terms abound, and researchers have recognised the importance of the relationship between the supplier and the client instead of focusing on the supplier alone (as a long time ago) or the customer alone (as only recently).

1.3. Offerings or Relationships?

Any seller obviously needs to formulate its market offering in a way that can be sold and invoiced for. The offering is a central element in any business model (Morris et al., 2005; Rajala, 2009). The term “offering” or “value proposition” (Westerlund et al., 2008) is in fact a convenient way of avoiding getting tangled in the goods vs. services, or services vs. products debate and implicitly captures many of the meanings of services, as I defined them above, and of the total product concept. However, save for a few academic discussions, the term “offering” has not been used as much in research literature as it has been amongst sales practitioners. It has been used rather loosely and been a poorly understood mix of product and service augmentation aided by marketing (Storey and Easingwood, 1998). Rajala (2009, p. 22) used the term to refer to “anything offered to the market that might satisfy a want or a need of the target customers,” and hence ranging from products, services, solutions, and information all the way to content. I use the term in the sense of the general service concept comprising goods and other products, as defined in Section 1.1.2.2, and would furthermore equate a solution to the same and view information and content as intangible generalised goods, still making up part of that same overall service, a.k.a offering, a.k.a. solution, a.k.a value proposition to the customer.

More sales transactions normally mean more revenue. The efforts made in order to package products or services into sellable offerings—whether one calls them products or services or their combinations—are made for a good reason: to make the offering more communicable, easier and faster to sell, mostly by the means of standardisation (cf. Section 1.1.2.4).

Usually, however, in developed markets and low-volume sales the seller aims for repeatable business and, even if this was not the case (say, a seller trying to sell an inferior offering for a good price just once to one client, then moving on to the next client), at least the buyer is interested in

the seller being around even after the sale and delivery of a single offering, whether it is for the mundane after-sales support and maintenance or for developing new business spawning from the old. In fact, relationship marketing has recently emerged as a new paradigm in marketing research, contrasting the old, predominantly transaction-centric view (Alajoutsijärvi et al., 2000; Brodie et al., 1997; Grönroos, 1997; Gummesson, 2002; McKenna, 1991). Services marketing has contributed to relationship marketing by stressing interaction between customers and suppliers and between the customers in the service encounter (Gummesson, 2002). Relationships can be an essential source of competitiveness and their management an integral part of the business model (Penttinen and Palmer, 2007; Rajala, 2009). Ulaga and Eggert (2006) had observed that previous research of relationship value had been limited (focusing e.g. only on price reduction in a manufacturer-supplier relationship) and went on to formulate their framework of what relationship value consists of: they separated the core offering from the sourcing process and the customer firms' internal operations.

Whether it is more suitable and profitable for a company to adopt a strategy based on a relational intent or transactional intent is of course dependent on many factors, including the nature of the offering, the market situation, competitive situation etc., and the choice can be the most important strategic choice a company makes (Cusumano, 2004; Grönroos, 1997). Grönroos (1997) believes that some degree of relationship intent is required in more and more situations, because of the general development of the environment surrounding the marketers.

This leads us to think more whether a seller should view itself as selling those offerings as self-sufficient objects of trade or as selling relationships: Tuli et al. (2007) take the view that the seller implicitly is, and should view itself accordingly as, selling relational processes. After all, that is how most buyers look at it: when buying any reasonably complex offerings, the buyer will make their analysis on the solvability of the seller, their credibility as a supplier in the buyer's business context (reputation, size, market visibility and so on), and is more often than not interested in building lasting supplier-purchaser relationships. "No-one ever got fired for buying IBM," was an old truth in the ICT business. Laaksonen et al. (2007) corroborated earlier similar research with their observations and the conclusion that the significance of price and competitive bidding decreased as the relationship developed further from the market-based relationships, whereas trust and complementary resources were considered more important by both the buyers and the sellers.

An innovating firm, especially in the business-to-business (B2B) software sector, is not so much selling a single innovation as it is selling itself. In this context we are obviously assuming a situation where relatively new products or services, not targeted at mass markets, are being sold or are in the phase of being commercialised. Dominant vendors of shrink-wrapped software or downloadable apps may not be as

interested in relationship marketing as they are in transaction marketing, if it wasn't for their partners and close allies in the new networked economy, or for winning the trust of masses by openness and thus combining the transactional and relational intents

Furthermore, innovations themselves, especially service innovations, can be and often are germinated in close interaction between the seller and buyer. (Cf. the whole spectrum interaction and the relationship perspectives in Paper 1 in Part II.)

Paper 4 in Part II specifically calls for this kind of relationship perspective, as at the core of long-lasting and mutually benefiting business relationships is trust, and trust is increased by greater transparency, sharing of resources and relationship-specific investments.

1.4. Value-Based Pricing

I feel that the inclusion of price as a component of value is so important that it merits another look from a slightly different perspective still: *value-based pricing* is a term usually used to refer to price maximisation under minimal competition. (See e.g. Hinterhuber, 2004.) Innovation and servitisation were keywords in trying to get to that position of little or no competition. This is where, in microeconomic theory, the seller can drive the price up and come infinitesimally close to the customer's reservation price. Then the key question becomes whether price discrimination is possible to make that happen.

B2B. In trusted, large B2B sales, it often is, on a per-bid basis. But in B2B marketing, when doing so, the seller can hardly avoid the buyer gauging the seller's margin. What seemed like a done deal under the assumption of rational behaviour becomes a bargaining exercise between irrational people or departments. How much of that co-created value can the seller expect to appropriate? As the ultimatum bargaining experiment (Güth et al., 1982) showed, if the seller does not demonstrate a sense of fairness, the deal may well be off.

B2C. In business-to-consumer (B2C) sales, as well as in high-volume B2B sales, market segmentation by product variants (versioning), especially in software (Varian, 1997), is an obvious way to discriminate on price. But how does it affect the buyer's willingness to buy when he can see that the cheaper version is in fact the same as the more expensive, but with some functionality turned off, for example. A layman's guess suggests that the less voluminous the sales, and thus the more personal the pricing of the offering, the more the customer is sensitive to what he considers fair pricing by the vendor—"I'd agree it's worth it to me, but having now seen what's in it, am I paying for hot air?" (This would be a question for further research.)

The conclusion is that not only is the buyer's value subjective to the buyer and contextual, culture-bound etc. (in addition to being heavily dependent on the seller's proposition, of course), but it is also dependent

on the buyer's perception of price and of what value the seller extracts from the price. A professional buyer organisation can congratulate itself on a good deal better if, after long negotiations, it is confident it got a good price cut or left the seller with only a meagre margin. A rational investment decision is not at all as rewarding to the buyer who knows the seller is making much more margin. Sometimes the chase is better than the catch, and this counts.

The value subjectively experienced by a party can also under some circumstances be reinforced by the perception of high value on the counterpart's side. Instead of fairness, one situation could be characterised as blind faith or circular reasoning: "the value of the offering must be great since the supplier can command such a high price for it". Everyday examples of such logical fallacies that become facts of life by people (irrationally or not) believing in them include the value of art or brand design and, say, the share price in a highly speculated IPO⁶. In these examples, the customer's perception of high price and high value appropriation by the seller reinforces his/her perception of his/her own value. In some of such cases the value could be reinforced by public display of the price. ("I shop at an expensive store, therefore I am getting both quality and social recognition.") Another situation is that of the educated benevolent buyer: if, by paying a little bit more to the supplier, the buyer can expect the supplier to render additional services or in general to continue longer in business, then the buyer may have created more value for itself than it has lost by paying the supplier more. These aspects have perhaps been better raised up in the consumer marketing literature (cf. emotional customer value and symbolic customer value propositions in Rintamäki et al., 2007) than in B2B context in service or innovation research.

From value co-creation to mutual value perception. The above may sound rather far off from traditional service science, and indeed many service scientists would rather just not bother with such elements of purchasing behaviour or procurement negotiations, and would rather just focus on how the supplier can be value adding to the customer in delivering the very service the supplier specialises in, or in "co-creating the value with the customer". But that very service is an oxymoron—just as any good in trade was above shown to be a service in the customer's eyes, any pure-form service in the core of the service offering is in fact inseparably tied to a more comprehensive service offering⁷ with domain-independent aspects. Pure services in particular, as well as intangible goods and highly specialised complex technology products in the category of tangible goods (as a case of services, remember), represent an area where the seller can most benefit from a better understanding of the

⁶ In project management, a parallel maxim is known as "what is burnt is earned": a budget spent is an indication of things having been done, earning the same or more budget for the future (year).

⁷ Or "augmented service offering" in the words of Grönroos (2000, pp. 163-180), which I have chosen simply to define as *the service*.

customers' value perception—not only focusing on the seller's perception of the value co-creation. After all, all services need to be sold and bought to happen and the price is an essential element of that value.

1.5. Objectives and Research Questions

Below I have outlined the objectives of both this dissertation as a whole and the individual papers. The latter obviously contribute to the former, whereas the former are more general in nature; thereby also the answers to the former (cf. Section 5) are less specific than the answers to the latter (cf. Section 4).

1.5.1. Objectives and Research Questions of this Dissertation

The objectives of this dissertation, in rather broad terms, include clarifying the following questions.

What qualifies as an innovation and how is it different from the plain old product or service development? (The answer was given above under Section 1.1.1.3.)

Is open somehow inherently better than closed, and what is the difference between the two anyhow? What middle ground is there, if any? (The answer is given both above under Section 1.2 and below in Paper 4.)

Particularly, what is the role of customers in that extended open community around the firm? What is the value that they see vs. the value that the firm sees? (The former is answered particularly in Paper 2 and the latter in Papers 1 and 4.)

Also, along the way in this Part I a recapitulation of the current state of discussion was given as regards goods vs. products vs. services—and I added my view in an effort to consolidate the views in earlier research literature. The following questions arose and were already answered above:

Is there any real difference between software services and software products any more? Does it even matter if an offering is called a product or service? Is innovation in services that different in the end from innovation in products? Is open innovation in (software) services somehow different from (open) innovation in software products? And finally, can innovation processes for tangible products in fact be viewed as a special case of service innovation processes by regarding also goods increasingly as services?

Section 5 recapitulates my short answers to these questions.

1.5.2. Objectives and Research Questions of the Individual Papers

More specifically, each Paper in Part II has its own detailed objectives and research questions linked to this wider theme:

Paper 1 is rather conceptual and typological: What are the main approaches to customer value (co)creation in the prior service

management and innovation literature? Can the above approaches be mapped or linked to service innovation types and strategies? What is customer value exactly?

Paper 2 aims at developing our understanding of the intensity and significance of customer interaction in service innovation. While we already know that intensive customer interaction in service innovation is typical in knowledge-intensive business services (KIBS) (Howells, 2006), does the same hold for services that do not necessitate intensive person-to-person interaction in the service delivery? In other words, we look at relatively standardised service offerings, mostly with transactional intent. Specifically then: To what extent and in which roles are customers involved in such service innovation activities? Can new customer roles be identified? What types of innovation processes can be found? How does customer involvement in such innovation activities impact the development process?

Paper 3 examines the organisational and process changes instigated not only by a more open development paradigm, but also by the corresponding tools as such: How can the introduction of open innovation technologies, such as OSS technologies, be leveraged to improve development practices inside private development organisations, i.e. firms operating for profit? The answer to this question is more obvious than the answer to the next one. What are the institutional effects of these changes? After all, the OSS-style development tools, which themselves often are OSS, were born and evolved outside private firms. Are tools just tools or will their use shape the organisation using them?

Paper 4 is a forward-looking analytical publication: How could a vendor of a commoditised software product benefit from the open innovation paradigm in other ways than by the traditional open source model, or by other well-known and widely used open practices? What are the implications of opening source code access to clients, e.g. as to the governance or commercial model and development practices?

As it can be seen, each of the papers connects to and contributes to the general themes of this dissertation. It should be easier to see the relevance of the papers to the overall objectives introduced above than to find commonalities by detailed comparison between each two papers.

1.6. Structure of the Dissertation

1.6.1. Part I – Overview

This first part, Part I, of the dissertation has so far given the high-level view of what is meant in the literature and what I mean and understand by service innovation, open innovation, open source, and all the other concepts central to the theme, including such fundamental constructs as goods, services, and products. As a result, I proposed a unified definition for innovation as well as service-oriented nomenclature considering goods

as services and keeping products vs. customised services as a separate treatment. SaaS and other XaaS concepts were positioned against this backdrop. I then concluded that the term offering circumvents many problems the overloaded term service bears, and that productisation of offerings, whether or not there is a tangible core, should increasingly be of concern also in relationship marketing.

Above in Section 1.5, the objectives and research questions of the dissertation as a whole were defined first; then also the more detailed objectives and research questions in the individual papers in Part II.

In Section 2 of present Part I, I will further place the research I have done in context with the prior literature and prevailing theories both in the service innovation research tradition and in information systems science—Section 1 already did much of that, but Section 2 is reserved for more specialised theories and models used in the individual papers.

Section 3 outlines the scientific methods in the research papers.

I then discuss the findings and their relevance in Sections 4 and 5: first, Section 4 reviews the findings in the individual papers against their respective objectives and research questions (cf. Section 1.5.2), and Section 5 provides the answers to the overall objectives and research questions of this dissertation (cf. Section 1.5.1) and discusses not only the outcomes but also the limitations and potential further research.

Section 6 concludes Part I by listing the publications referenced in it.

1.6.2. Part II – Original Research Papers

Part II is comprised of the original research publications as a collection of four independent papers, each having been published in different publication outlets or fora, yet all reflecting the theme of this dissertation as follows. The order is not chronological, but thematic.

Paper 1 serves as an introduction to the general topics of service innovation and customer value, which are elements common to all of the papers. From the value philosophical point of view, it is also a good starting point for Part II. The rest of the papers can be seen to reflect the foundations explicitly laid out by this first paper.

Paper 2 then drills deeper into the specifics of service innovations in three different service sectors, of which ICT is but one. It has a clear empirical grounding but can also be seen to reflect much of the same value-philosophical underpinnings as Paper 1. A common trait for the service sectors and the cases studied was their nature, or goal, of producing fairly standardised services, i.e. service products. The special role of ICT in generating service innovations is already becoming apparent in Paper 2.

Paper 3 is a very ICT-specific one, with focus on software development methodologies and tools and, particularly, on how open or user innovation can be seen at work even inside the corporations, where the intra-organisational (departmental) boundaries are now being crossed in the same ways that open innovation originally pierced inter-organisational

boundaries, ie. those separating corporations. It is empirically grounded in deep case studies of two corporations heavily engaged in software development.

Paper 4 can be thematically seen as a continuation of Paper 3, exploring further the possible space of how user innovation might take on different forms in the future in software development and licensing across organisational boundaries. It emphasises the relationship aspect as well as the leveraging of a platform for nurturing such relationships. Several new research questions stem from Paper 4, as further elaborated under Section 5.3.

2. Positioning of the Research

My dissertation work is, if not guided, at least very much informed by the following widely accepted research models—some of them could even be called theories, even if in the field of ISS the tradition of theory building is still young and established theories are not too numerous (Gregor, 2006; Levy and Ellis, 2006).

Furthermore, at the risk of some repetition, in the present Chapter 2 I am positioning the papers and this dissertation in the various streams of research that can be identified in the respective fields.

2.1. Resource-Based vs. Opportunity-Based View

A company obviously should focus on what it is good at; this traditional view of a company ensuring its own success with its own resources, acquiring, configuring and applying them in an optimal way (Penrose, 1959; Peteraf, 1993), is often contrasted with the opportunity-based view, stemming from transaction cost economics (TCE) (Williamson, 1975), whereby the environmental conditions explain and drive the diversification and transformation of the company's opportunistic business (Conner and Prahalad, 1996). Both the resource-based view (RBV) and the opportunity-based view or TCE are definitely justified and valid viewpoints for strategy development. What the earlier discussion about a software company choosing its side may at first imply is that RBV would be dominant: a company should know its resources and choose whether it wants to become a products company or a customer-oriented services company (Cusumano, 2004; Nambisan, 2001); however it is by no means overriding the fact that unanticipated technology development and other changing market conditions create new opportunities that agile companies want to jump on—some are better than others in revising their resource base or simply have a better and more flexible resource base, as reflected by the more recent dynamic capabilities view (Teece and Pisano, 1994).

While either or both of RBV and TCE could have been taken as an explicit lens in this dissertation, they have both become so well embodied in the research knowledge by now that the added value of referring to them at every turn would be questionable. Suffice it to say that RBV is reflected in the above discussion of a company needing to define its offering on the standardisation-particularisation axis (Tether et al., 2001; see also Gallouj and Weinstein 1997) and in basic tenets of open innovation and sharing IPR: share and learn where your own resources are not sufficient or the best; whereas TCE can also be used to explain how the market opportunities form, and how the costs of delivering

standardised products vs. specialised, relationship-specific investments play out.

A further parallel to the standardisation-particularisation can be found in economies of scale vs. economies of scope (Pantzar and Willig, 1977). Teece (1980) bases his discussion on TCE (Williamson, 1975) and demonstrates how a single firm is likely to reap the benefits when the production of two or more products (offerings) depends on the same proprietary knowhow base or when a specialised indivisible asset is a common input to the production. We can regard the relational intent (Grönroos, 1997) as an intent where one varies (i.e. customises, or particularises) one's offering to a wide range of customer's needs, wanting to leverage essentially the same capabilities and knowledge.

2.2. The Two-Stage Model of New Service Development

De Jong et al. (2003, p. 33) outlined a two-stage model for new service development that we found helpful in analysing service innovations; not necessarily so that practical cases of NSD and service innovation would always or even often follow the idealised process, but more so for giving a certain vocabulary for referring to different phases and different kinds of activities involved.

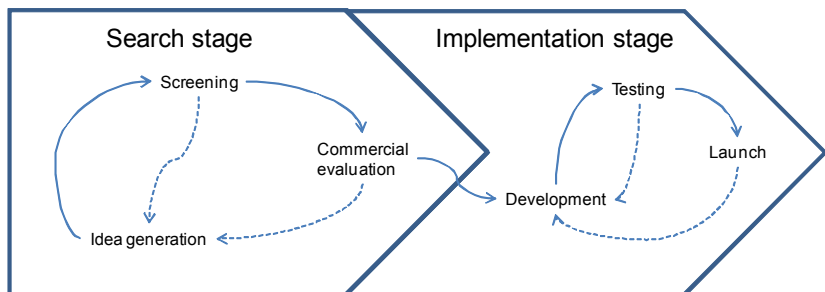


Figure 6. De Jong et al.'s (2003) model for NSD.

The model as such can be seen as a descendant of the traditional service research approach whereby a service provider is the one in charge and designs the whole service process, be it with a service blueprint (Shostack, 1984) or otherwise, and reflects what we have called the process perspective in Paper 1.

Again, neither Paper 1 nor Paper 2—any more than this dissertation as a whole—claims that de Jong et al.'s (2003) model is the only way that NSD, or let alone more radical service innovation, always happens in practice or should always happen. We have rather used it as a plausible reference model in order to, as far as possible, adhere to the same terminology for those activities present in the model.

2.3. Innovation Dimensions and the Dynamic Capabilities View

In an attempt to come up with a better definition for services and innovations, I have already above described the six dimensions that den Hertog et al. (2010) considered essential in qualifying service innovations. These dimensions have served as a good guideline in trying to reach some conceptual clarity for what is and what is not a service innovation.

However, in the end I started to prefer my own, more concise definition of innovation, which can be seen to be in good resonance with the dimensions that den Hertog et al. (2010) consider as telltale signs of service innovations.

Rather, den Hertog et al.'s (2010) model has other merits: it acts as a very useful and practical guideline for business developers who think they may have come up with a good new service: perhaps they have other ways of improving upon the offering, when considering all the six dimensions.

In the resource-based view, one can view the firm's resources as relatively static, or then consider them being in flux in accordance with the capabilities of the organisation. The new key resources are the human resources capable of transforming their operational environment. Den Hertog et al. (2010) draw on the resource-based view of the firm and contribute to the emerging *dynamic capabilities view, or DCV* (Teece and Pisano, 1994) of the firm by outlining those that could be called key *dynamic service innovation capabilities*.

Building on Teece (2009, pp. 87-88), den Hertog et al. (2010) define dynamic service innovation capabilities as

...those service innovation capabilities, hard to transfer and imitate, that organisations possess to develop, (re)shape, (dis)integrate and (re)configure existing and new resources and operational capabilities. These are needed to successfully offer clients a new service ... and ... adapt to a ... changing environment. (den Hertog et al., 2010, p. 498)

Den Hertog et al.'s (2010) six key dynamic service innovation capabilities are the signalling of user needs and technological options, conceptualising, the (un)bundling capability, co-producing and orchestrating, scaling and stretching, and learning and adapting.

The idea of a firm's resource base evolving and in fact consisting of dynamic capabilities is a fundamental one and the six key capabilities which den Hertog et al. (2010) propose are relevant and interesting. However at the time of this writing, they remain at the hypothesis stage and would need further empirical validation. Neither are they the only or the first dynamic capabilities suggested in research literature as independent variables for explaining the emergence of innovation: Other possible independent variables include e.g. those 10 measured by Ekvall (1996), used in many development programmes and then commercialised in the Dolphin Index: e.g. challenge, freedom, dynamism, debates, etc.

While these innovation climate dimensions sound appealing and Ekvall (1996) uses them to show correlation with three different leadership styles, evidence supporting their linkage to actual innovation outcomes is still scarce.

2.4. Open Innovation, User Innovations, and Open Source

Above in Section 1.2 we saw what is usually understood by open innovation (Chesbrough et al., 2006; West et al., 2014) and user innovation (von Hippel, 2005). The latter is usually understood to be a manifestation of the former, but not by all authors: e.g. Chesbrough himself calls for purposeful value appropriation in open innovation, to the financial benefit of the firm under scrutiny—an aspect that is usually lacking in open source software.

A considerable amount of research literature has been published on and around open source software (e.g. von Hippel and von Krogh, 2003), which as a non-profit community phenomenon certainly falls under the user innovation category, and which many authors would also regard as a case of open innovation. What was initially interesting in the open source phenomenon was its very existence: Why and how was it possible that something free, and of quite high quality sometimes, emerged almost out of nowhere, without money being paid for such development? These motivational factors were first extensively researched (e.g. Bonaccorsi and Rossi, 2003; Harhoff et al., 2003; Lakhani and von Hippel, 2003; Lerner and Tirole, 2002; von Hippel and von Krogh, 2003), not to say that interest in motivational factors would have totally waned in recent years (e.g. Spaeth et al., 2014). Then the research focus gradually moved onto corporate use of OSS, as in why and how for-profit companies use OSS (inbound) or release code as OSS (outbound) (e.g. Bonaccorsi et al. 2006; Fitzgerald, 2006; Gurbani et al., 2005; Mannaert and Ven, 2005). Some authors focused on the business models of still relatively few successful OSS companies, i.e. start-ups or other companies whose business was solely based on pure-form OSS, or maybe on dual licensing as revenue logic. While Paper 3 can be seen to follow this corporate OSS stream of research with its focus on the effects of OSS (tool) adoption on the corporation, Paper 4 is more clearly in the middle, mixing elements of pure-form OSS and the old traditional closed source business in a way that the resulting model is neither OSS, nor traditional closed source, but truly a hybrid.

Open source as a phenomenon is most often associated with software, but this need not always be the case. E.g. West (2014) discusses the possibility for open source in the biomedical industries, but concludes that large-scale successes, comparable to those in software, have not yet been seen.

2.5. Institutional Theory and Entrepreneurial Institutionalism

Specifically as to Paper 3, our conceptual framework draws on institutional theory (Scott, 2001) and social constructionism using the concept of an organising vision (Swanson and Ramiller, 1997).

Organisations can be viewed as institutions when they exhibit value for and adherence to procedures and methods beyond their ability to advance the organisation's goals (Jaffee, 2001, p. 227). Research on institutions has traditionally focused on continuity (Garud et al., 2007, p. 960), whereas that on entrepreneurship has concentrated on change. In institutional theory, this contrast of structure and agency has been identified as the paradox of embedded agency (DiMaggio and Powell, 1991). To avoid the contrast, Garud and Karnøe (2003) suggested regarding structures as platforms for change rather than as constraints.

Any new technology is a change and a disruption in the *status quo*. The term renegotiation can be used to refer to the frame elasticity in the meaning of central, seemingly shared constructs. For example, the organising visions (Swanson and Ramiller, 1997) are renegotiated within the boundaries of a certain language communities. This is also the case with OSS technology, whether in the form of inbound OSS tools taken into use or a company adopting OSS-like development practices. Such renegotiation implies the existence of boundary objects (Star and Griesemer, 1989).

In Paper 3, we thus use institutional theory and entrepreneurial institutionalism as lenses on the phenomenon of OSS tool adoption in our two cases that are more interesting from the information systems science perspective, i.e. we contribute to the ISS tradition by borrowing from organisation theory.

Above in the present Section 2, I have recapitulated the most important theoretical pillars or streams of research on which the four papers in Part II build. The following section focuses on how those were done, i.e. on the methods and their underlying assumptions.

3. Research Philosophy and Methodology

In this Section, I first describe the state of the art in contemporary ISS research in regard to overall research paradigms, or traditions, and the epistemological⁸ and ontological⁹ assumptions they are most often associated with. I will then position this dissertation against this backdrop.

Secondly, and in relation to the above, I will describe the ensuing methodological approaches first in general and then as used in the specific papers in Part II.

3.1. Philosophical Underpinnings

3.1.1. Overview of Contemporary Research Paradigms

Considerable controversy surrounds the issue of how the various research paradigms should be classified (Myers and Klein, 2011, referring to Bernstein, 1983). Burrell and Morgan (1979) identified four research paradigms: functionalist, interpretive, radical humanist, and radical structuralist. Hirschman (1986) was concerned mainly with humanistic inquiry as a welcome alternative for positivism, equating humanistic enquiry to what is usually known as interpretive paradigm today. Guba and Lincoln (1994) suggested four different ones: positivist, post-positivist, constructivist, and critical. In their most recent work, however, they acknowledge that there are major issues confronting their own classification scheme (Myers and Klein, 2011).

Orlikowski and Baroudi (1991), based on Chua (1986), suggest a classification into three research paradigms: positivist, interpretive, and critical. This three-fold distinction seems to have been widely embraced within the ISS research literature (Myers and Klein, 2011), however not exclusively (see e.g. Mingers, 2004).

Orlikowski and Baroudi (1991) further view constructivism as a variant of, or building on, the interpretive philosophy, and I will propose it as a fourth paradigm and discuss it in more detail shortly, as I believe it also best describes the assumptions of this dissertation. First, however, I will briefly describe the other paradigms. Such a description usually begins with positivism as the oldest and simplest view of science.

⁸ As in addressing the question of how we know what we know, or how we acquire knowledge.

⁹ As in addressing the question of what exists, what reality is, or even, if there is a reality.

3.1.1.1. *Positivism*

Positivism can be seen as stemming from the natural sciences, emphasising the empirical grounding of all human knowledge in observations of objective nature. Ontologically, positivists believe that reality exists objectively (Burrell and Morgan, 1979). Positivism is characterised by a nomothetic ideal of what science should be about: making generalisations and covering laws of deterministic, or at least statistically confirmable, nature (Orlikowski and Baroudi, 1991). Research which claims to be free of value-laden assumptions or claims complete objectivity of the researcher, is readily categorised as positivistic. While positivistic assumptions may be sufficient in many areas of natural sciences or mathematics, in social sciences positivism has for long been viewed as an overly naïve approach; yet at least when considering the methodological choices in published journal articles it seems to be alive and well in ISS still in the present millennium (Chen and Hirschheim, 2004; Mingers, 2001).

3.1.1.2. *The Critical Paradigm*

Orlikowski and Baroudi (1991) classify research as critical where a critical stance is taken toward taken-for-granted assumptions about organizations and information systems, and where the aim is to critique the status quo “through the exposure of what are believed to be deep-seated, structural contradictions within social systems” (Orlikowski and Baroudi, 1991, p. 6).

Critical research philosophy presumes an ability of people to change their material and social circumstances despite prevailing structures and norms. It emphasises social inequalities and conflicts, and how these conflicts lead to new social forms, as well as that knowledge is grounded in social and historical practices. Critical research aims to transform these alienating and restrictive social conditions, in short, for the betterment of society. Hence, critical research philosophy differs from the positivist and interpretive research philosophies, both of which “are content to predict or explain the status quo” (Orlikowski and Baroudi, 1991, p. 19). In the view of critical research philosophy, the goal of the researcher is to bring to light the imperfections of the status quo, thereby initiating change in social systems. Social research and social theory are thus vehicles of social critique. (Orlikowski and Baroudi, 1991, p. 21) Power structures, vested interests, and limited resources are brought to the forefront in and by critical research.

Myers and Klein (2011) further identified three major streams of critical research in the ISS discipline.

3.1.1.3. *Interpretive Research*

Ontologically, interpretive (information systems) research assumes that the social world (that is, social relations, organisations, division of labour) is not given but is produced and reinforced by humans through their

action and interaction (Orlikowski and Baroudi, 1991, p. 14). Reality does not exist *per se* but is socially constructed.

Interpretive philosophy is premised on the epistemological belief that

Social process is not captured in hypothetical deductions, covariances, and degrees of freedom. Instead, understanding social process involves getting inside the world of those generating it. (Orlikowski and Baroudi, 1991, p. 21, quoting Rosen, 1991.)

It has also emerged and gained a foothold in ISS (Walsham, 1995). Furthermore, within interpretive research, constructivist views can be distinguished:

In the *weak constructionist* view, the researcher attempts to understand the existing meaning systems shared by the actors, and thereby interprets their action and events..., [and] interpretive research is understood to complement positivist research, that is, by generating hypotheses for further investigation, and by filling in the knowledge gaps that positivist research cannot attend to. (Orlikowski and Baroudi, 1991, 15)

In a more extreme, *strong constructionist* view, interpretive research is considered to be based on entirely different philosophical assumptions from positivism. Interpretive research is then aiming to replace positivist investigations instead of complementing them. A researcher cannot select his or her research perspective at will according to the need without reliance on his or her predispositions (Orlikowski and Baroudi, 1991, p. 16).

Where the interpretive (including constructivist) paradigm differs from the critical paradigm is that the latter takes value positions and aims to change the social surroundings of the researcher. These differences aside, interpretive and critical paradigms are not that different in their ontological and epistemological foundations, even if in critical research at large, the philosophical underpinnings can also be considered less coherent or stable than those of interpretive research (Myers and Klein, 2011).

In short, the essence of critical research is in its aim, and it may use the same means as, say, weak constructivists.

It is not surprising that the classification of incommensurable paradigms has proven challenging and is in flux—hence the term “paradigm” in the first place. By now it is largely accepted that knowledge is not infallible but conditional; it is a societal convention and reflects a certain time period. Even research knowledge is a matter of acceptance by the research community, whereby knowledge claims are made and refuted, some surviving the test of time and critique better than others. The judges to one researcher’s work are other researchers—not reality, if indeed such an

objective reality can even be claimed to exist. Even all research knowledge is clearly socially constructed.

This obviously does not mean that one paradigm would be right and other paradigms wrong. E.g. formal logic is an exact science for which positivist assumptions are, for all practical purposes, sufficient and one that no other school of thought can really twist or distort. They each constitute a belief system that internally holds together relatively well, but none thoroughly explains the world. They, and their characteristic methods, can and even should often be combined in ISS (Mingers, 2001). So there is choice, and while understandably naïve positivism is hardly a career-progressing view of the world for a researcher in the social sciences in general and ISS in particular, it is mostly up to each researcher to subscribe to the paradigm(s) he or she finds most appealing. It is another issue to determine how much this personal choice is explicitly reflected in and by his or her published research, which for this dissertation and the papers in Part II is considered in the next section.

3.1.2. Positioning the Philosophical Assumptions of this Dissertation

Much research (in fact, all research in line with the reasoning above) is teamwork either during a particular research process or in the dialogue and critique after it, and researchers in teams hardly share exactly and entirely the same assumptions or are even always aware of the implicit assumptions they are making. Therefore it may be hard to label all individual research papers as clearly belonging to a certain and the same category.

The epistemological assumptions of this dissertation can best be described as reflecting weak constructivism as a variant of the interpretive paradigm—our knowledge of the world being built up by constructs as we inter-subjectively define them (cf. the above discussion on goods as services for example), but to be relevant and of utility, we would like our knowledge to be based on such empirical observations that we can inter-subjectively communicate about and agree upon. I do not subscribe to the strong constructivist view whereby empiricism should be thrown out the window, since I do wish this dissertation also to be rich in practical relevance. Empiricism and validity are thus of concern. For example, for Papers 2 and 3, a reasonable amount of empirical data was gathered. Nevertheless, Paper 1 can also be considered somewhat critical to the contemporary service science thinking that has been voided of the price construct and the bargaining perspective.

Paper 1 and Paper 4 are rather conceptual, again emphasising the constructivist viewpoint: Paper 1 by explicitly laying out a certain value construct; Paper 4 by outlining a new hybrid model of sharing software as a new construct. Paper 2 and Paper 3 have more explicit empirical grounding through case studies and data collection, highlighting the importance of not overlooking empirical research. Overall this

dissertation emphasises the possibility of and need for new constructs as in better definitions for innovation and service. Also it was very much discussed above what a product fundamentally is or how it should be interpreted as a construct.

Paper 3 specifically draws on social constructivism and is built on institutional theory and entrepreneurial institutionalism, which may not be mainstream in the ISS research tradition. It is at the same time very much an example of interpretive research:

Following on the ontological belief that reality is socially constructed, the interpretive researcher avoids imposing externally defined categories on a phenomenon. Instead of ..., the interpretive researcher attempts to derive his or her constructs from the field by in-depth examination of and exposure to the phenomenon of interest. (Orlikowski and Baroudi, 1991, p. 14.)

As new constructs, we proposed market and library metaphors. The constructs of reward, decision-making and communication structures were offered by prior research literature.

3.2. Research Process

For Papers 2 and 3, we took an empirical approach and analysed the respective questions by the case study methodology (Eisenhardt, 1989; Yin, 1994). In the weak constructivist view, while more quantitative approaches could also be imaginable in similar contexts had the research questions been set otherwise, for the questions of interest to us the more qualitative approach and choice of methodology was easily justified by the relative immaturity of the phenomena and related constructs. As a note from the critical viewpoint, these two papers are also the result of teamwork, and as such the inclination and research competences—in this case towards more qualitative research—is not without importance.

If Papers 2 and 3 can be seen as reflecting inductive reasoning, Papers 1 and 4 are more deductive but still obviously grounded in the earlier research as referenced and in the researchers' own experiences from such contexts.

The case study methodology. Both ISS and service innovation research have a sufficiently long tradition of qualitative research in general and of the case study methodology in particular.

A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, when the boundaries between the phenomenon and its context are not clearly evident, and in which multiple sources of evidence are used (Yin, 1994, p. 24).

Case study research is a good choice for investigating a specific phenomenon in greater depth and limited scope, particularly with nascent

and still amorphous topics. According to Yin (1994, p. 4) case studies can be exploratory, descriptive or explanatory. Our study in Paper 2 was decisively exploratory, whereas the study in Paper 3 was both descriptive and exploratory. The study in Paper 2 was broader and captured a certain point in time; the study in Paper 3 deeper and longitudinal.

Yin (1994) and Eisenhardt (1989) differ in their positions in regard to prior theory development. According to Yin (1994, p. 27), in case study research “theory development as part of the design phase is essential, whether the ensuing case study’s purpose is to develop or to test theory”. Eisenhardt’s (1989) position again is that

... most importantly, theory-building research is begun as close as possible to the ideal of no theory under consideration and no hypotheses to test. (Eisenhardt, 1989, p. 536)

She admits it is impossible to achieve this ideal of a clean theoretical slate:

... investigators should formulate a research problem and possibly specify some potentially important variables, with some reference to extant literature. (Eisenhardt, 1989, p. 536).

The processes employed for both Paper 2 and 3 are closer to Eisenhardt’s (1989) practical approach, as in both cases the models and theories from extant literature were studied and consciously chosen in the early phases of the research process, but still by no means fixed and more variables were allowed to emerge during the process.

In multiple-case studies such as ours, the generally accepted norm is to follow replication logic not to be construed as statistical sampling. Cases are selected so that they either predict similar results (literal replication) or produce contrary results but for predictable reasons (theoretical replication) (Yin, 1994).

In Paper 3, the choice of two cases serves as an example of theoretical replication. In Paper 2 literal replication occurred within an industry sector (similar cases) and theoretical replication across these (different industries), but in such a way that with the theoretical replication we had no fixed theoretical basis or many expectations as to what the differences would be. Also it was clear from the beginning that even within an industry, the cases could vastly differ from each other. As the study was exploratory, we had no presumptions about the similarity or difference of the cases either within or across industries. Our very aim was to let the differences between cases emerge from the data, even if we presumed that the cases selected from the ICT industry would probably have a more significant technology component involved. (Later, the data also revealed a higher value network component.)

3.3. Validity and Reliability

Yin (1994) states that the usual four criteria apply (also) to evaluating a specific case study: construct validity, internal validity, external validity, and reliability. These terms and concepts originally stem from quantitative methods where analysis of causal relationships between variables is of key concern (Denzin and Lincoln, 2000).

Construct validity refers to the extent to which operationalisation measures the concept it is supposed to measure. This is often further divided into convergent and discriminant validity: multiple attempts to measure the same concept should be in agreement (high covariance), while measures of different concepts should be distinct (low covariance) (Campbell and Fiske, 1959). In the case study context, construct validity means establishing the correct operational measures for the concepts being studied. Testing for it may be a challenge, but there are techniques to enhance it (Yin, 1994).

Internal validity refers to the extent to which a causal conclusion of a study is warranted based on the sample at hand and would be deteriorated by e.g. measurement errors, among many other sources of distortion in the application of a method to a sample. In the qualitative context, the concept of internal validity can be extended to the general soundness of the inferences made (Yin, 1994), or solidity of argumentation (i.e., “does it make sense?”).

External validity refers to the extent to which the results of a study can be generalised to a population and is thereby largely affected by e.g. sampling strategies in quantitative methods. It is by no means exclusive to quantitative studies however. One could claim that generalisability is a defining feature of the very notion of science, even if it was explicitly played down and thus made implicit in some of its forms. It certainly is of great concern in ISS (Lee and Baskerville, 2003) and service science, also when applying the case study methodology (Yin, 1994).

Reliability refers to the repeatability of a particular research process and its results, i.e. that the operations and procedures of the research method as well as the instruments can be repeated by other researchers, who then achieve similar findings.

Focus on quantitative research in the positivist paradigm assumes that the world is made up of observable, measurable facts (Glesne and Peshkin, 1992, p. 6), though the assumption that “social facts have an objective reality” and “variables can...be identified and relationships measured” (p. 7) is problematic, as was already explained above.

For the purposes of qualitative research in non-positivist paradigms, these four criteria have been refined to confirmability, credibility, transferability and dependability (Hirschman, 1986; Lincoln and Guba, 1985; Morse et al., 2002), yet these terms have not always been used coherently and consistently by all researchers, specifically regarding the exact difference between these notions and the (qualitatively extended) validity and reliability concepts (Morse et al., 2002). Morse et al. (2002)

argue that reliability and validity remain appropriate concepts for attaining rigour in qualitative research. As can be seen from below and in Table 2 specifically, the differences are subtle and to some extent terminological—so much so that in Table 2 the evaluation of the case study research in this dissertation can readily be done by more or less equating the traditional and constructivist terminology.

Validity and reliability (respectively confirmability, credibility, transferability and dependability) can be improved upon by triangulation, or crosschecking. Triangulation in social sciences refers to a process by which a researcher attempts to verify a finding by showing that independent measures of it agree with or, at least, do not contradict it (Miles and Huberman, 1994).

According to Meijer et al. (2002), Smaling (1987) described three approaches, which can be applied to triangulation in qualitative research. First, an individual researcher can intuitively interrelate data from different sources, but then it is not easy or often even possible to replicate the study. A second approach is documenting each step in order to make it transparent and procedural, and hence replicable. Thirdly, researchers can jointly, prior to executing them, aim to agree on the steps to be taken in the second approach.

A researcher can try to enhance validity and reliability by triangulation, and in the weak (not the strong) constructivist view, we have also tried to do so. In a strong constructionist view, no triangulation would even be possible, since the interpretive perspective cannot accommodate such positivistic beliefs (Orlikowski and Baroudi, 1991, p. 16).

The following actions can be taken to improve validity and reliability in case study research (Riege, 2003), and below, Table 2 indicates in its rightmost column which was used in which paper involving case studies in Part II.

Table 2. Techniques employed during the research process to enhance validity and reliability, or confirmability, credibility, transferability, and dependability (Riege, 2003).

<i>In traditional terms of validity and reliability in general</i>	<i>In (weak) constructivist terms in general</i>	<i>Specifically in this research</i>
<p>Construct Validity</p> <ul style="list-style-type: none"> - Multiple sources in data collection, e.g. the triangulation of interview tapes, documents, and artefacts, to protect against researcher bias (Yin, 1994). - Chain of evidence in the data collection phase, i.e. verbatim interview transcripts and notes made during field trips which allow sufficient citations and cross checks (Yin, 1994; Hirschman, 1986). - Letting key informants and research assistants review transcripts, parts of the data analysis and final report (Yin, 1994). 	<p>Confirmability</p> <ul style="list-style-type: none"> - Confirmability audit during the data collection and data analysis phase of the research (Lincoln and Guba, 1985): the examination of raw data, findings, interpretations and recommendations; retaining the raw data, such as field notes, tapes, and documents. - Auditor can judge whether inferences based on the data are logical during the data analysis phase. 	<p>Evaluation of construct validity or confirmability</p> <ul style="list-style-type: none"> - Voice recordings of interviews have been retained for Papers 2 and 3. For Paper 2, all, and for Paper 3, most were transcribed in full ; - Interview questionnaires have been retained for Papers 2 and 3. - For Paper 2, all findings and interpretations were independently analysed by the other researcher. - For Paper 2, the respondents were often given a sanitised version of the initial analysis to check. - In the analysis for Paper 2, many original citations were carried along until late stages of the analysis.

Table 2 (continued).

<i>In traditional terms of validity and reliability in general</i>	<i>In (weak) constructivist terms in general</i>	<i>Specifically in this research</i>
<p>Internal Validity</p> <ul style="list-style-type: none"> - Within-case analysis, cross-case and cross-nation pattern matching in data analysis (Miles and Huberman, 1994). - Illustrations and diagrams in data analysis to assist explaining (Miles and Huberman, 1994). - Internal coherence of findings in data analysis by cross-checking the results (Yin, 1994). 	<p>Credibility</p> <ul style="list-style-type: none"> - Triangulation, e.g. multiple sources, investigators and methods in data collection and analysis (Lincoln and Guba, 1985). - Peer debriefings, e.g. regularly presenting the data analysis and conclusions to colleagues (Hirschman, 1986). - Presenting the findings and conclusions to the respondents and considering their reactions (Lincoln and Guba, 1985). - Trying to consider the researcher's assumptions and view of the world 	<p>Evaluation of internal validity or credibility</p> <ul style="list-style-type: none"> - For Paper 2, as a rule multiple respondents from the same organisation were interviewed, even if occasionally we had to rely on a single respondent. In total, 22 interviews were done for the 12 cases. - For Paper 3, multiple respondents from different departments in each of the two case organisations were interviewed - For Papers 2 and 3, analysis was jointly done by two researchers in iterations. - For Paper 2, the respondents were given a sanitised version of the initial analysis to comment upon. - Researchers were sufficiently senior for the task. - Part I makes certain assumptions explicit.

Table 2 (continued).

<i>In traditional terms of validity and reliability in general</i>	<i>In (weak) constructivist terms in general</i>	<i>Specifically in this research</i>
<p>External Validity</p> <ul style="list-style-type: none"> - Literal and/or theoretical replication logic in multiple-case studies in the research design phase (Eisenhardt, 1989). - Comparison of evidence with the extant literature in the data analysis phase, to clearly outline contributions and generalise those within the scope and boundaries of the research, not to a larger population (Yin, 1994). 	<p>Transferability</p> <ul style="list-style-type: none"> - Develop a case study database during the data collection phase of the research, which includes a “thick description” for readers to assess the potential transferability (Lincoln and Guba, 1985). - Use of cross-case and, where appropriate, cross-nation analysis (Miles and Huberman, 1994). - Use of specific procedures for coding and analysis such as symbols, signs and others during the data analysis phase helps to ensure transferability (Yin, 1994). 	<p>Evaluation of external validity or transferability</p> <ul style="list-style-type: none"> - For Paper 2, 12 cases (out of 15 preliminarily) and for Paper 3, two deeper cases were compared against each other. Three cases (one industry sector) for Paper 2 were discarded due to concerns with external validity. - For Paper 2, all cases were in Finland, whereas for Paper 3, both case organisations were international with a focus in Europe. - All researchers involved were Finnish; for Paper 2 so were the interviewees, whereas for Paper 3 the interviewees represented different nationalities.

Table 2 (continued).

<i>In traditional terms of validity and reliability in general</i>	<i>In (weak) constructivist terms in general</i>	<i>Specifically in this research</i>
<p>Reliability</p> <ul style="list-style-type: none"> - Giving full account of theories and ideas for each research phase. Recording observations and actions as concretely as possible. Using multiple researchers who often discuss methodological decisions. Peer review or examination. (LeCompte and Goetz, 1982). - Ensuring alignment of research design with the research issues. Using structured or semi-structured case study protocols. (Yin, 1994) - Refining the way of questioning and its structure by conducting pilots (Eisenhardt, 1989; Yin, 1994). - Using an audio or video recorder. Developing a case study database at the end of data collection phase, to provide a characteristic way of organising and documenting the mass of collected data (Lincoln and Guba, 1985). - Meaningful parallelism of findings across multiple data sources (Yin, 1994). 	<p>Dependability</p> <ul style="list-style-type: none"> - Dependability audit during research design (Lincoln and Guba, 1985): Auditor examines if the processes of the inquiry are in order, understandable, well documented, and providing mechanisms against bias. - In research design, safeguarding against researcher's theoretical position and biases (Hirschman, 1986). 	<p>Evaluation of reliability or dependability</p> <ul style="list-style-type: none"> - For Paper 2, semi-structured interview protocols were used. - For Papers 1, 2 and 3, multiple researchers were involved. - All the data gathered for Papers 2 and 3 was recorded on tape (also transcribed literally for Paper 2) and cross-tabulated and re-examined by two researchers. - For Paper 2, an inventory of interviews and interviewees were kept as a table, or database.

3.4. Further Comments on Value-Philosophical Assumptions

There are a few further central value-philosophical themes or assumptions underpinning all of the papers:

The first assumption is the subjectivity of value as such—an age-old and widely adopted view—as well as the limitations of our own imperfect subjective assessment of someone else’s subjective perception of value (cf. the 2-by-2 matrix in Paper 1). Value may be subjective but the price is an essential element as the watershed between vendor’s value appropriation and added value experienced by the customer, yet it is often overlooked in the service innovation literature as something dirty, too mundane, too speculative or otherwise just not sufficiently research-like in the tradition of co-creation literature. Nevertheless the basic premises of traditional microeconomics prevail: a customer is willing to buy into a proposition if its consumer surplus¹⁰ is positive, i.e. if the price is less than the value he/she perceives getting from it. In fact, it is that surplus that is more of interest to the buyer than the total value. What further complicates the theory development is the irrational—but not erratic—behaviour of buyers and sellers also looking for a fair deal.

Secondly, I am not questioning the legitimate nature of organisational boundaries and the need for and justification of appropriating value by and to those who participate in its creation. While praising the benefits of open source and viewing it and its sustainability as an interesting phenomenon, I am not in favour of the extremist view that software should belong to all or even that software patents are immoral—rather I am sceptical from the economic point of view of the practicability and innovation-enhancing potential of software patents. The legal and licensing regimes rooted in the Western culture of ownership, value appropriation and justice, including current copyright and patent schemes (Simon, 1996), are not necessarily the only possible view of a fair and just world but neither are they being questioned in this dissertation. Surely those established regimes are far from perfect drivers of innovation in the digital age and they could use some fine-tuning, but rather than viewing open source as an ideology calling for abolishment of the copyright laws, I will take a more balanced view in line with Oksanen and Välimäki (2006): the reality is more complex, and copyright laws can also be seen to work in favour of open source developers.

The question is more about what we can do within the current regimes and schemes in new and smarter or better ways, creating more value and making more money, rather than trying to change those regimes. Any organisation or legal entity, however closed, permeable or open its boundaries may be, has and should have control rights to the software it develops, and by adding value to its clients, it legitimises its own value increase (e.g. in revenue, wealth or

¹⁰ In microeconomics, the buyer is most often assumed to be a consumer, but the basic concepts apply in the business-to-business context just as well.

stock valuation). All innovation depends on incentives – while open source is largely built on intrinsic incentives, it is the extrinsic incentives that make the vast majority of software vendors add value to their clients.

I would also be careful not to be naïve and believe that all the IPR rules are enforceable. Software piracy happens, designs and trade secrets get stolen and revenues are lost. A software company must just weigh the pros and cons of entering or operating on such markets or engaging with such clients they find difficult, having no practical ability to enforce the fine contracts once written. For example, it would be difficult to imagine the kind of model proposed in Paper 4 without being able to trust the legal (Simon, 1996) and contractual framework that is then used to implement the governance model.

Third, value is recreated and further amplified by subsequent exchanges. The free market and people and companies having the possibility to exchange services in a series of transactions amplifies the value of those individual (service) exchanges. To satisfy a certain need, a single vendor or partner is seldom sufficient; furthermore having satisfied that certain need once and for all opens up doors to new needs and opportunities to accumulate wealth and knowledge, or increase well-being and further self-actualisation. (A person cannot appreciate a car mechanic's services until he has bought a car and driven enough with it. And when he does buy the car mechanic's services, the value of the car rises, too.) Thereby also in research, the focus on *exchange* (implying monetary transactions downstream) is a fundamentally important and justified choice, which I am making consciously here. And as any seller would attest, the more and faster one can execute those exchanges, the better off we usually are—this of course reflects a more-is-better assumption of economy and human life in general, which appears to be true for most.

3.5. Summary of the Research Philosophy

Section 3 showed how the present dissertation is best described as representing a weak constructivist research paradigm (cf. e.g. new definition of innovation, service, the value construct, client-shared source, without neglecting the importance of empirical grounding as was done for two of the papers in Part II). The choice of the case study methodology was discussed, as it was used in the research: both as deep and as broad; both tied to a specific moment in time and as longitudinal; both as exploratory and descriptive. Validity and reliability were presented as concepts, and the research processes that resulted in the individual papers were evaluated from this perspective. Last, a few underpinning value-philosophical assumptions were revealed.

4. Review of the Findings

This Chapter summarises the central elements and the results of the four papers, focusing more on the theoretical contributions and conclusions. (I will return to the practical and managerial implications later in Section 5.2.)

4.1. Linking Customer-Orientation to Service Innovation Typologies in a Broader Value Concept

Paper 1: Riepula, M. and Kuusisto, A. (2011). “Different Approaches to Increasing Customer Value by Service Innovation—Linking Customer-Orientation to Innovation Typologies in a Broader Value Concept,” in van der Rhee, B. and Victorino, L. (Eds), *Advances in Service Quality, Innovation and Excellence, Proceedings of the 12th Int’l Research Symposium on Service Excellence in Management*, Ithaca, NY, June 2-5, 2011, pp. 845-854.

One of the first noteworthy observations made during the literature research was on that the value constructs used in earlier innovation research and service science were usually rather vague, and mostly void of a price construct. This is to some extent understandable since measuring total value is extremely challenging. However, in this paper my argument has been that price, as the essential watershed between seller’s value appropriation and buyer’s consumer surplus, cannot be decoupled from the concepts of supplier value and customer value. In fact, it is one of the easiest constructs to measure, so why neglect it, as central as it is in the equation.

Secondly, gauging both these two values can be and is—at least implicitly if not explicitly—done by both the supplier and the customer; the differences in these usually find a balance through price negotiations. This resulted in a simple 2-by-2 matrix, which acts as a reminder of the different views whenever we mention the term value.

Third, different perspectives on value creation in earlier literature were categorised into five main categories: the process, whole spectrum interaction, relationship, strategic intent and customer’s life (or ethnographic) perspective.

Fourth, these perspectives were considered alongside different types of service innovations in den Hertog’s (2010) nomenclature, and tentative links from those perspectives were also drawn to service innovation strategies and customers’ roles in innovation activities.

4.2. Customer Interaction in Service Innovations for Business Services of a Non-Interactive Nature

Paper 2: Kuusisto, A. and Riepula, M. (2011). “Customer interaction in service innovation: seldom intensive but often decisive. Case studies in three business service sectors.” *Int. J. Technology Management*, Vol. 55, Issue 1/2, pp. 171–186.

Three important roles for customers were identified in the process of ideating and developing a new service: Customers act as catalyst in the service development process: an idea may have been incubating within the innovating firm, but a concrete customer trigger is needed to initiate the innovation activities as a formal project. Customer feedback is often shallow and limited, but easily leads to key decisions. Customers have a key role in the internal marketing of the new service idea within the service provider's organisation.

We took the stages identified by de Jong et al. (2003) as a basis for our vocabulary but made the following further observations in our data: A pre-development stage often takes place early after the initiation of the project, so that the service innovator is able to sell the concept to potential customers; testing and evaluation often took place by actually selling the idea to a customer, before any further development took place; evaluation should not be regarded as a separate stage *a priori* as in many cases it was an overarching activity throughout the innovation process; and the development and implementation phases very much overlapped in many cases, i.e. as in Toivonen and Tuominen (2006), in our data too the new service development was often integrated in the normal line of service provisioning.

The 22 retained semi-structured interviews all took place physically face-to-face in the capital region in Finland with usually one researcher meeting with one informant at his or her workplace, although in rare cases both researchers were present or there were more than one informant being interviewed together simultaneously. All interviews were conducted in Finnish amongst native Finnish-speakers and transcribed verbatim from audio recordings. The list of interviews conducted is provided in Appendix I, and the interview questionnaire in Appendix II.

After re-reading the transcripts, the coding of constructs, preliminary analysis, all findings and interpretations were independently analysed by the other researcher, thus improving internal validity. Original citations were often carried along until late stages of the analysis. Chronologically, the analysis was interleaved with data collection, which allowed for certain very minor adjustments in the questionnaire early in the process and also resulted in the descopeing of a whole sector due to the difficulty of getting valid and interesting data. Additionally one case in the ICT sector was discarded due to lack of innovativeness.

In many cases the respondents were given a sanitised version of the initial analysis to check and comment on, although not always, as we did not get much feedback by doing so.

In the analysis stage, the data was indexed, coded and analysed in tabular as well as pictorial displays, for example by identifying the types of activities suggested by de Jong et al. (2003) and/or by Toivonen and Tuominen (2006), and by identifying how the responses reflected customer interaction. Both researchers jointly discussed the cases in order to gain a more complete picture, and particularities of each case were noted. Characteristic of the case

study method, we also qualified singular features as noteworthy if there were theoretical grounds for doing so.

Having multiple interviews per case, employing two researchers, and using more than one extant frame of reference, triangulation occurred at the level of informants, investigators, and theory. This helped alleviate any concerns with validity (cf. Section 3.3).

We found the following customer functions within the different stages.

Incubation stage: a new service idea may lie dormant a long while until a concrete customer need triggers its development into a sellable service proposition.

Pre-development stage: the customer acts as a sounding board for a draft service description. At this stage the customer hardly commits to buying anything yet: their commitment is non-financial in nature, the customer only devoting time to the relationship if it sounds promising.

Selling the idea to the customer: Some demonstrable customer commitment is needed for the innovating firm to commit the resources to further service development. (Still the commitment need not be a signed service contract; it could take the form of a letter of intent, or be demonstrated by senior enough customer management showing their support for the project.) We pointed out how it was often important that the customer thus helped the service provider's middle managers sell the idea to their senior management.

The 2nd development and testing round: often a pilot project was run, similar to beta testing in software. The service is already offered for real, but the financial terms and conditions are still more akin to testing and developing the concept.

Launch: we mostly found this to be a gradual process, where customers obviously act as references and informers to new potential customers. Instead of a clear-cut, well-prepared launch, the clientele gradually grew, and in parallel the offering was increasingly formalised and became better defined.

In short, our data supports the conclusion that while customer interaction in non-KIBS service innovation is often quite limited—perhaps less surprisingly, mirroring the limited interaction in the service delivery process as such—even weak signals from customers may still often be decisive in nature for the firm to steer such service development projects.

Paper 2 also offers reasonably extensive data for further analysis by other researchers.

4.3. How Inbound Open Source Changes Software Development Organisations

Paper 3: Lindman, J., Riepula, M., Rossi, M., and Marttiin, P. (2013). "Open source technology in intraorganizational software development—Private markets or local libraries?" in Eriksson Lundström, J.S.Z., Wiberg, M., Hrastinski, S., Edenius, M., Ågerfalk, P.J. (Eds.), *Managing Open Innovation Technologies*. ISBN 978-3-642-31649-4 (2013), pp. 107–121.

The findings in Paper 3 were based on deep case studies of two large commercial organisations, both developers of software and particularly of embedded software in their own industry sectors: Philips Healthcare in the industry of high-tech medical equipment for hospitals and Nokia (then Nokia-Siemens Networks) in the mobile telecommunications industry.

In Paper 3, we applied semi-structured thematic interviews. More structured interviews, let alone quantitative methods, were ruled out due to the emergent nature of the phenomenon. We interviewed two to three persons per case organisation in order to better capture the nuances of the organisational changes. We triangulated firstly by using two researchers as interviewers and secondly, by picking the interviewees from three different organisational groups in each case company.

The initial interviews in 2006 were done as face-to-face interviews on site by the lead author of Paper 3, assisted by two research assistants. They lasted from half an hour to slightly more than one hour and were fully transcribed. The language was most often English: the questionnaires were only in English and the verbal interview language was English except for certain interviews of Finns by Finns in which it was Finnish. I made a part of the latest interviews from late 2010 and early 2011 as audio-only teleconferences, i.e. not all were face-to-face with physical presence, without the help of the research assistants. The latest interviews were not fully transcribed but nevertheless recorded and notes from the interviews discussed with the other researchers.

The answer to our first research question on how OSS development tools can be leveraged to improve development practices in a private firm, turned out to be no big surprise. First, OSS technologies and products made for software developers, such as versioning tools, issue trackers, and discussion forums, had around those times gained their credibility as viable options outside their initial developer communities, and both case organisations had approached them in a rather systematic and analytical way: OSS tools were neither mandatory nor forbidden as such, but were subject to the same kind of overall evaluation and comparison as commercial alternatives. Second, and in particular in the Nokia iSource case, the need for OSS tools had arisen from OSS-style collaborative development practices that the company specifically wanted to foster. Little surprise, then, that the best tools to support the new OSS-style development were the same tools that were most often used in the OSS-style development being mimicked.

As to the second question of how the introduction of OSS development tools change the organisation, the answer is more interesting and multi-faceted. One answer can be seen in the way language is used and what developers, management and users understand by the term OSS. It should be noted that not all members of the organisation spend significant time with OSS development communities as in the meaning of the term that originally emerged, as a community phenomenon outside and irrespective of commercial firms. Thereby to many, the term OSS took the meaning they construed for it when listening and observing their colleagues; in other words, the boundaries of its meaning are stretched and the different groups assign

meanings to the term that are not necessarily shared, at least implicitly and automatically, by others who employ the same term in a different context¹¹.

Thus, at least two factors are confounded when members of the organisation say they are using OSS development practices and OSS development tools: the meaning of the term OSS has been stretched to suit the organisational context, leaving out connotations of an OSS licence or OSS freedoms that some community developers might attach to the term; and the tools and practices actually have changed the way the organisation develops its software and conducts its business, as further explained below.

Second, when delving deeper into the dynamics between the central development (platform) unit and the business units using the former unit's developments, we used the metaphors of a private market and a local library. By the hypothetical efficient private market, we illustrated the idea of dynamic resource allocation taking place based on changing needs of the business units (the users) and pricing mechanisms, considering also that simultaneously the business units can be the providers of development (of components and/or their maintenance) to other units, with respective flows of money. By the local library, we referred to the model of organising development by central governance in such a way that a share of the corporate development budget is spent on a common good that the business units then use, free of charge or against a tax-like contribution, to their benefit. The answer then is that—perhaps contrary to some expectations of more liquid exchange of results and rewards—the models in both cases were closer to the local library metaphor, meaning that it was still difficult to assign rewards or attribute costs to developers of specific components or features based on dynamic needs of their users, especially when it was the business units who took on development or maintenance tasks; instead the old model of making a platform with a centrally planned budget prevailed and although OSS tools or practices might have helped with sharing and reuse, they as such did not directly result in such a demand-driven market that could be seen as a more efficient mechanism for the allocation of resources than the centrally planned model. The case of Philips Healthcare moved further away from the pure library model than Nokia, but we still placed it closer to the local library than the private market metaphor, as was demonstrated by the term component tax that Philips Healthcare used in their vocabulary when referring to the centrally planned charge-back mechanism.

Third, as to the three structures in focus (rewards, decision making, and communication), in both case organisations the reward structures in their “OSS” were still the same old ones: employees under employment contracts being assigned to designated projects with specific tasks, being remunerated by salary and the usual fringe benefits and/or occasional bonuses; however in the decision-making structures more consensus seeking could be observed—perhaps due to more open communication, which definitely had changed with

¹¹ Some would call this frame elasticity or see OSS as a boundary object (Star and Griesemer, 1989), a term we did not employ in Paper 3. Paper 3 instead refers to renegotiating in largely the same sense.

the introduction of discussion forums and collaborative tools, used by a wider audience including partners.

The objective and rationale behind introducing OSS tools and practices was to render the reuse and maintenance of already developed in-house components more effective by increasing sharing, or openness. We can conclude that in a corporate, private firm setting (perhaps excluding so-called pure OSS firms) introducing OSS tools and practices can and most likely does improve upon this goal, but reuse does not occur as freely or without friction as in pure-form OSS projects, as the firm still is a firm with its own organisational accounting, politics and significant institutional inertia. Openness is highly relative and subjectively defined in organisations in ways that suit their trajectories.

4.4. Sharing Source Code with Clients: A Hybrid Business and Development Model

Paper 4: Riepula, M. (2011). "Sharing Source Code with Clients: A Hybrid Business and Development Model," *IEEE Software*, Jul/Aug 2011, pp. 36-41.

In the fourth paper, I have speculated on the possibility of combining the best of both the old closed world and the new open world in a way that specific kinds of software vendors could best appropriate value from the market. This paper specifically takes the standpoint of a software vendor with an already commoditised product.

Any vendor will obviously want to offer something truly differentiating, and their business has perhaps been founded around such an innovation and truly differentiating product and has been able to grow and survive with the revenue from such an offering, or otherwise invested in product development that has resulted in a compelling offering on the market at a particular point in time. Following van der Linden et al. (2009), this is the upper left-hand corner in Figure 7. But if vendors do not keep up with the pace of development and innovations on the market, they will find their offerings gradually sinking from the upper left-hand corner towards the bottom left-hand corner: their offerings become commodities that have no particular competitive advantage over rivals, and margins obviously diminish as a result.

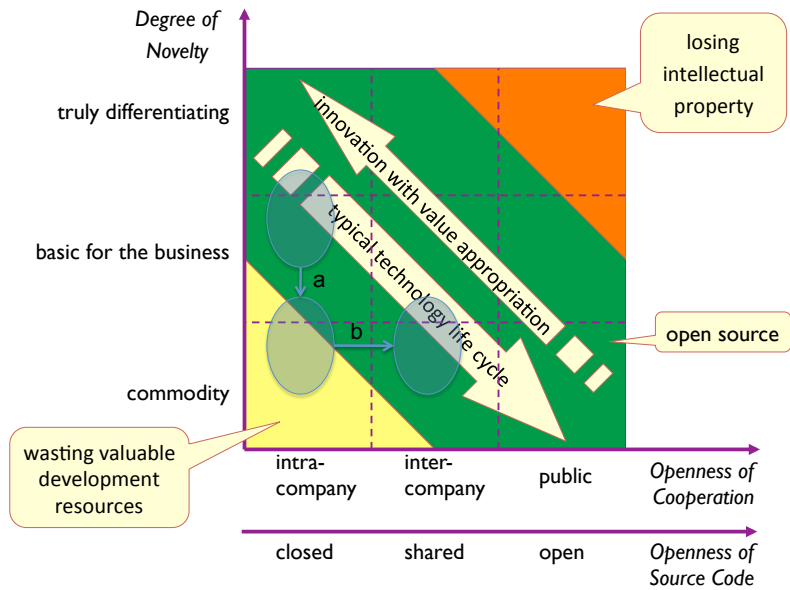


Figure 7. Commoditisation vs. mainstream innovation (adapted from van der Linden et al., 2009)

There are two obvious means of staying in the green zone. First, once the offering becomes more commoditised, it can become close to a public good and certain open source business models may even yield money to the original developer (the arrow pointing down and to the right); however this is by no means guaranteed and while the technology (software) may survive such a transformation into a public good, the company may not. Second, the innovating company can fight the commoditisation by reinventing itself and its products, or at least heavily revamping the product (cf. the arrow pointing up and left in Figure 7), which can be extremely difficult if the offering has already become sufficiently commoditised, i.e. the investment may be akin to starting a new business in the field.

This begs the following question: How could a vendor of a commoditised software product benefit from the open innovation paradigm in other ways than by the traditional open-source model? Is there any commercially viable middle ground between the traditional closed-source model and pure-form open-source business?

Following the earlier research on motivational factors leading to OSS contributions by software vendors (Ven and Mannaert, 2008), user innovations and user contributions overall (Cook, 2008; Nambisan and Baron, 2007; Nambisan and Nambisan, 2008; von Hippel, 2005) and the transformation of OSS from a community phenomenon to a more business-oriented paradigm (Fitzgerald, 2006), as an answer to the above question I have proposed a model that could be a better bet for many vendors than what pure OSS business models promise. In essence, this model, which I have called client-shared source, entails that the vendor selectively opens up the

code base to its clientele, who can thus derive more value from more flexible use of the software, along with its source code, and who then also have the self-interest to contribute source code changes back, mainly in order to keep the future incremental developments aligned with their own custom development. While selling source code also opens up new revenue opportunities to the vendor—it can be priced much higher than run-time code—it is a balancing act in value appropriation and involves a change towards much more relationship-oriented thinking by both the vendor and such clients. The model obviously has many business limitations and should not be adopted by vendors with sustainable revenue streams from highly differentiating software (upper right-hand corner in Figure 7), but for those with declining sales it is an alternative to consider.

Effectively, the model depicted in Paper 4 is one where a client pays an upfront fee for access to the then-current base-line of source code, and a yearly membership fee for on-going access to the central code repository maintained by the vendor.

What are then the implications of opening source code access to clients, e.g. as to the governance or commercial model and development practices? Paper 4 shows how it takes a more profound change in the way the vendor sees its role in the value network with its clients and other suppliers: more open sharing requires more trust on both sides for the model to work. Such considerations are made explicit in Paper 4 in their details. Specifically, a vendor should not expect that it is enough to just give source code to clients: the clients obviously will need support and it is in the vendor's interest to give them access to version control tools, issue tracking, test information, design documentation, description of development practices or policies and so on, i.e. the vendor needs to empower the clients with the proper tools also, or otherwise the clients may just disappear with the source code and never contribute anything back, or only propose inferior-quality contributions.

The client-shared source model is a forward-looking, somewhat speculative one that is seldom seen in use, but interesting first as an opportunity for certain kinds of vendors, and second, as a research topic. If we do not see more of these kinds of models in use in the future, was there something that we did not properly understand in the motivations of corporate OSS, as the earlier research seems to point in the direction of these kinds of semi-open, or hybrid models? Further research questions are proposed in Section 5.3.

4.5. Summary

What is common to all the papers and their findings is that in the present era of ever more open models of innovating, doing business or sharing source code, there are two invariables underlying it all, despite the papers being quite different in their scope and intended audience.

Plus ça change, plus c'est la même chose. The notion of open is very flexible and open to interpretation; institutional inertia is strong and old

habits die hard. Frame elasticity occurs in using the “open” terminology, which takes on various meanings, deep and shallow, and which can thus be considered a boundary object (Star and Griesemer, 1989). For many organisations, it represents a true shift in the way they think about clients, partners and suppliers and themselves in the value network, resulting in business models and organisational cultures that are different from those in the past. For some other organisations, open innovation, open business, open data etc. are only buzzwords that they may use in marketing, but the actual openness remains quite limited and trivial. Openness can be seen as a way to build trust and invest in the client relationships not so much one by one, but all at once. In the end the goal in the relational intent (Grönroos, 1997) is still the same as before: win the client’s trust. In the open paradigm, this can happen faster on a broader front. In the transactional intent (Grönroos, 1997) openness has its place, too, and then more in the innovation phases towards partners and lead users as contributors. Interestingly, openness in the product design and delivery allows the relational intent (trust building) and the transactional intent (volume sales) to be combined.

The client is always right, when it comes to the client’s needs. Customer value is in the end best assessed by customers themselves and vendors are probably wiser involving customers closer in the innovation and development processes than observing them at a distance and telling them what’s best for them. By getting closer to the customer, the vendor can better assess how the customer sees their value, part of which is their perception of the vendor. Even then, this is only a means to an end for the vendor, which is of course interested in maximising its own value in the end. We have pointed out that this is not a zero-sum game.

5. Discussion and Conclusions

5.1. Theoretical Contributions

Overall, one of the theoretical contributions of this dissertation—over and beyond the individual papers—is a definition of the very term innovation (cf. Section 1.1.1.3) that appears to have discriminant power and is usable both in the research context and in practice, both for service and so-called product innovations. Until now, the earlier definitions have been either very vague indeed or been very limited to certain situations: e.g. assumed certain kinds of services, or been very invention- or technology-oriented.

While some authors have separated the definitions of service innovations and purely technological innovations by means of drilling deeper into the specifics of the service industry sectors (Hipp and Grupp, 2005), my approach has been the opposite: to zoom out and see the commonalities in a way that does not prejudice either service or so-called product innovations:

An innovation is a *non-trivial design* change resulting in a *sustainable* increase in *net* customer (user) or supplier value *over time*.

The non-triviality criterion translates to novelty as expected, but also to essential or interesting as opposed to being merely a new embellishment. A design change is required: a single prototype or service delivery instance does not yet qualify. The value can be appropriated by the supplier and/or the customer—most likely benefiting both in accordance with market conditions and pricing in particular (net value), but not always both. However, such an increase in the net value needs to be sustainable over time, even if the added value may shift to the vendor's favour at the customer's expense and vice versa over time. I equated users in non-organisational settings to customers in order to capture user innovations, particularly in open source software.

Second, I also presented a better way of regarding goods and services, not as a dichotomy (alternatives) as earlier has usually been considered, but as goods inherently *being* services (inclusion).

In fact, the unified definition of innovation that equally well works for services and goods is yet another reflection of the view that goods (and intangible artefacts) in trade *are* services. The G-D logic was very limited in trying to view services as goods, but so is the S-D logic (Vargo and Lusch, 2004a) in trying to separate goods and services. Instead of taking further the dichotomisation and characterisation of special features of goods and services, I have tried to focus on the essential and show how all commercial offerings of goods and products in the end *are* service offerings: not only *in use* (Christensen et al., 2005; Vargo and Lusch, 2008b) but also and particularly *in exchange*. This will help the research community to see how the commoditisation of offerings works by the goods component of an offering diminishing in value, while the mandatory service wrapper, in line with Grönroos's (2000) hidden or augmented services, around the good gains more

importance (Rintamäki et al., 2007). The same goes for generalised goods, which may also be of intangible nature. This does not mean that a deeper analysis of the specifics of certain kinds of services or industry sectors could not be beneficial in other ways when seeking competitive advantage, but for more conceptual clarity at the level of innovation research, service research or information systems research, we need to abandon the dichotomy of services vs. goods (as well as the ill-formed question of services vs. products) and see the big picture instead of drilling into the details. Understanding the production and logistic requirements of physical goods is required for reducing costs in the supply chain, but minimising costs exhibits less potential than maximising added value by offerings with an increasingly important pure-service component.

Figure 8 illustrates how the products-or-services discussion has been revolving around a wrong question—a more defensible view is one where products and services lie on different axes, on different dyads or dimensions: separating the nature of pure services from goods would fall on a tangibility axis; “products or not” falls on the standardisation-particularisation dimension, which could also be called productised vs. customised dimension. Services can, and many should, be productised (standardised) for better scalability and also for more customer value, whereas sometimes what many may think of as a product may in fact best be viewed as a high-value adding offering with considerable potential for pure-service development in a relationship and trust building exercise with few key customers (particularised service). If a company’s goal is a scalable product business, but its offering is commoditised, it probably makes more sense to adopt the latter strategy in a quest to innovate, close to the customer, the next big thing worth then standardising later once it has proven to have truly differentiating features. The standardisation-particularisation dimension (Tether et al., 2001) directly parallels with the transactional vs. relational intent of Grönroos (1997), and to large extent also with economies of scale vs. economies of scope (Panzar and Willig, 1977; Teece, 1980).

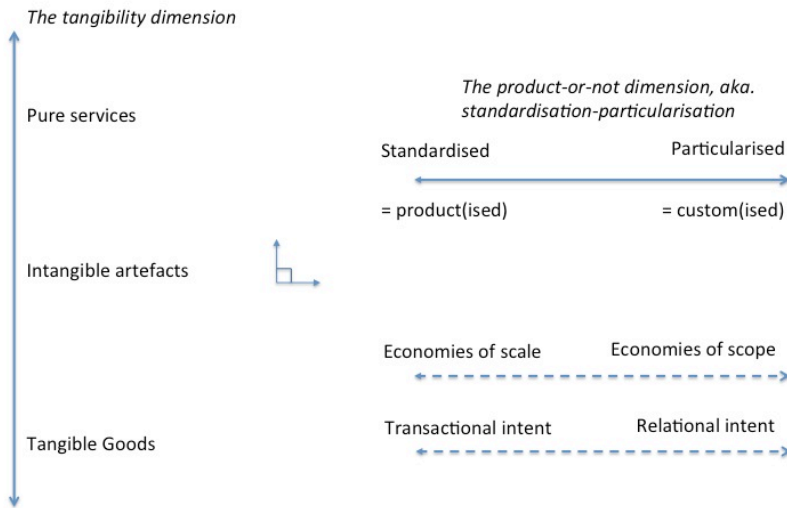


Figure 8. Products and services lie on different axes.

Thereby I claim to have clarified how term service has been used in very different meanings in different contexts: service scientists usually referring to the IHIP qualities of services, thus placing it high on the tangibility dimension in Figure 8 (top left); but then in ICT business authors like Cusumano (2004) are actually referring to a high degree of customisation by the same term (far right in Figure 8). In common business parlance, a product is also a very overloaded term, sometimes referring to tangible goods and artefacts (here the finger points also at service scientists who have traditionally used the term as an antonym to service) whereas I—along with all those who speak about productisation of services—place products in the highly standardised end of the horizontal dimension in in Figure 8. As a further complication, in the software business the “anything-as-a-Service” terms have proliferated when in fact in essence the question has been more about the degree of distribution in processing power, or just the age-old client-server dichotomy. Thus the discussion on products vs. services in ISS in particular has revolved around a false question or has at least used ill-defined terms, and therefore it is little surprise that no clear conclusion or agreement has been reached—unless seeing everything as services, including both productised and customised services, can be regarded as such.

Third, I made a point for re-evaluating what (customer, or supplier) value means and what elements can influence it. Value co-creation has been studied significantly in the past, but usually from an angle avoiding the complications that the price construct brings along with it, which reduces the relevance of such research. However, as I have shown above, the price is not only the watershed of customer and supplier value in a deal or a series of continued transactions, but *per se* affects the value perceived by both sides—indeed a key

insight is the perception of the counterpart's value as a reflection of one's own value: the contribution can be positive or negative depending on the context (cf. Section 1.4). Whereas in Paper 2 we extended the picture from value co-creation with the customer in the service delivery only to value co-creation with the customer starting from the early stages of innovation, in this dissertation in general I have made a further extension and described how we should not only look at value co-creation in innovation and service delivery, but in general examine the mutual value perceptions of the offering or in the relationship, very much including the price component and including marketing, price negotiations, contracting and so on. (Paper 1 also makes an attempt at that but perhaps in less articulate or easily accessible terms.)

Furthermore, this dissertation has hopefully opened the reader's eyes to the fact that not only is value subjective, but so is the assessment of someone else's subjective value subjective to the observer; measurement of this value in monetary terms is nearly impossible, but in its binary way, the customer's choice to buy or not to buy a service or product at a certain price is always an indication of the monetary value he/she/it attaches to the service or product. For one, even if price negotiation and bargaining are present and central in the industrial purchasing literature, the linkage of customer value and the price has been much suppressed or even ignored in the service research literature, and I am making a case for its (re)inclusion in the academic discussion of the field. Otherwise as academics we risk losing the relevance of our research to practitioners—or even other researchers, specifically in economics: More is better but at what price? Where is the point of marginally diminished returns, beyond which innovation or customer co-creation is not economically viable? Secondly, the linkage between customer value and supplier value is more intricate than often thought: the reservation price of the customer can actually vary according to the information he/she has on the supplier's margin or profits. This is an interesting area of further research as explained further below.

In the individual research papers I did not engage in the discussion of products vs. services, despite it being a relevant discussion that has been going on in parallel for the recent decade in the field of information systems science. In this dissertation I hope to have shown that a more fruitful view from the innovation and customer value view point is that where services are considered a superset of goods, rather than treating the two as distinctly separate constructs or seeing their relationship the other way around. By clarifying the definition of three key constructs—goods, products, and services—and their interrelationships (and lack thereof) in a way that works in the digital world as well as in more traditional so-called products and services industries, I have hopefully helped fellow researchers to lean on definitions and terminology that form a logically coherent picture.

As an inevitable consequence of the way I have treated goods as services, and in line with Grönroos (2000), more focus is clearly needed in the pure-service aspects of goods-based product offerings—both by practitioners aiming

to design and sell successful products and by academics explaining and predicting such behaviour.

The following questions were raised and answered above:

Question: Is there any real difference between software services and software products any more? Does it even matter if an offering is called a product or service?

Short answer: Fundamentally there really is very little ontological difference between software services and software products, especially as the terms seem to be used ambiguously by different groups, which in itself is understandable due to the intangible nature of these generalised goods called “software products”.

All products, tangible or not, can readily be seen as services—in fact I went on to argue that even physical goods, especially when traded, can readily be construed as services.

I’d rather reserve the term product to refer to a high degree of standardisation and thus disentangle it from the tangibility dimension. Also services are being productised to a greater extent, meaning that on the standardisation-particularisation axis the objective is towards standardisation in scalable offerings.

I prefer talking about *offerings* and supplier-client *relationships* (Grönroos, 2000; McKenna, 1991; Rajala, 2009). There, the successful strategy for highly particularised (customised) offerings involves building on trusted relationships; and for highly standardised (productised) offerings the strategy focuses on automating for scalability and packaging for ease of purchasing in addition to instilling trust by open practices.

Question: Is innovation in services somehow different from innovation in products?

Short answer: Parallel to the view of goods and products being services, we can view the so-called product innovation (innovation of tangible products) as a special case of service innovation. In fact this can yield new insights into product innovation and development, when we realise that we need to address the utility of the product in its whole life cycle, including sales and delivery as well as its useful life with the customer.

Earlier literature is plentiful with attempts to find a special meaning and justification for service innovations as opposed to product innovations, which has led to more insights into the detailed activities of pure-service innovations and new service development. But it has also led to an inflation of the meaning of the term innovation and, at least seemingly, to the exclusion of goods-based products from the context of researching high-value-adding offerings with novel service aspects, as if the goods-based product did not matter.

I would rather focus on improving the value of the offering as a whole, including both pure-service components and possible goods components, in a value-adding combination; in the absence of goods this obviously reduces to what has been traditionally called service innovation; however the service component is never absent and thereby goods-based product innovation

activities should also be rather seen as service innovation activities with a good in the core.

Question: Is open innovation in (software) services somehow different from (open) innovation in software products?

Short answer: Referring to the above, the difference between software services and software products is too ambiguous to be a useful way of looking at it; rather, it would be meaningful to observe the differences in the standardisation-particularisation axis. There, a software company needs to be clear of its objectives (Cusumano, 2004; Nambisan, 2001).

Open innovation, even if not the same as crowd-sourcing, requires a certain community or a group of partners around a company; hence, when high scalability is the primary objective, open innovation too means standardised ways of inclusion of a high number of potential lead users and contributors, in order to attract the numbers. If highly customised solutions are the objective, then a sufficient level of openness in innovation activities as well as service delivery is beneficial to building the sought-after trusted relationships as well as to better capturing the customer's requirements.

Looking at the tangibility dimension (goods vs. pure services as non-goods), it is generally easier to involve customers in the process of innovating pure services (Gadrey et al., 1995; Sundbo and Gallouj, 2000), at least in the KIBS context (Howells, 2006). We showed that when there is no extensive human-to-human interaction in service delivery, the customer interaction is in fact seldom extensive in service innovation either and needs to be planned. So, in short, the openness of innovation activities does perhaps not differ so much from goods in the core of the offering to pure services in the core, at least with customers as the group in focus. Although some recent interest has been shown in so-called open services innovation (Chesbrough 2011, 2011b), and we can always drill deeper into specifics of different pure-form service sectors and business models, it remains somewhat unclear whether there are such pure-service-specific ideas or implications behind it that it would be much more than a combination of the terms open innovation, pure-form services, and platforms.

5.2. Practical Contributions

Despite the theoretical discussion that borders philosophical at places, the purpose of this dissertation is also to be of practical utility to researchers and practitioners alike. As Section 4 focused more on the theoretical contributions of each paper in Part II, let me still return to their practical and managerial contributions here, along with those of this dissertation as a whole.

First of all, the clear separation of the term “product” from the tangibility aspect of an offering, along with the separation of the term “service” from the standardisation-particularisation axis gives a very practical tool for managers to discuss their companies' strategies and the positioning of their offerings without getting tangled in the “products vs. services” discussion.

Paper 4 presents an offering, which can be seen as moving against the standardisation goal that many innovative companies would hope to develop their offering towards; instead, it leverages the capabilities and remaining IPR assets of a company with a very commoditised offering by positioning the offering high up in the particularisation dimension. The paper outlines a somewhat speculative, but very practical, scenario on how to arrange software licensing in a way that yields direct economic benefits to the development organisation. The model and offering is in essence a service platform (Gawer and Cusumano, 2013), or more concretely a virtual customer environment (Nambisan and Nambisan, 2008). Paper 4 gives software vendors ideas on how to turn commoditised products into innovations at another level (cf. den Hertog et al.'s dimensions 2, 3, 4 and 5 in Section 1.1.1.2 above), in the relational sense (cf. Section 1.3).

Although the goal of Paper 3 is not to give managers detailed recipes on how to replicate either of the two cases of inner source, or on what mistakes to avoid, it nevertheless gives the interested reader insights into how the maintenance of reusable software components can be arranged in practice, pointing out the practical difficulty of implementing mechanisms very closely analogous to free markets. More importantly, managers should note that widely importing OSS tools will have an effect not only on the detailed ways of working, but on the whole development organisation and its culture. Instead of all the reward, decision-making, and communication structures classically observed in true OSS projects taking over, managers can expect to see frame elasticity and the term OSS to mean different things, adapted to an organisation's own needs. OSS is thus a boundary object, which may pose a challenge for communication. The good news is that importing OSS tools and practices can both increase productivity and still be manageable and legitimised in the corporate setting.

Paper 2 suggests that managers set clear objectives for customer integration, if they operate in a context where supplier-customer interaction in the service delivery phase is by nature very limited: findings show that direct integration of customers into innovation activities can indeed yield several kinds of benefits for the service innovator, but at the same time doing development in parallel and in association with service delivery may not always be viewed as welcome by the customer. Managers should thus also understand the need to limit the exposure and keep in mind why the customer is being involved or even whether the customer should be involved in all different phases. Managers should equally understand the importance of capturing the weak signals during those valuable moments when customers do take part in the innovation process, and consider carefully when close partners can and cannot reliably act as surrogate customers.

Even Paper 1, which is perhaps the most theoretical one of the papers, offers some managerial guidance in the direction of value-based pricing. Who would not want to sell their offerings at the highest possible price? One of the practical insights from that discussion is that in order to defend the high-value adding proposition, the price needs to appear as fair—even if the supplier was

the one appropriating most of the added value of the offering. I also insisted on the inclusion of the price construct the service research, which otherwise risks losing relevance in the eyes of the practitioners. Thinking about the different perspectives on customer value creation, practitioners should be able to recognise one or two that fit their current thinking and, with the speculative links to innovation types and strategies, hopefully the rest of the perspectives will open up the door to new ideas for organising their innovation activities.

Paper 1 also emphasises that in the relationship the two parties gauge their respective net values. It is a common negotiation tactic for the buyer to gauge the marginal cost of the seller in order to offer a price that is only just above it. A smart buyer would make an offer whereby the seller also gets their reasonable and fair share of the added value, in an attempt to make it interesting for the seller also to build long-lasting relationships. The seller obviously tries to extract the maximum of the value added to the client, whereby it first needs to estimate the value to the client and also needs to take into account the competition. A smart seller would settle with a lower price, even leading to a negative margin in some cases, if it estimates that in a competitive environment the sale could lead to a long relationship with the client, protected by the client's high switching costs in the future and motivated by prospects of other add-on sales later. One of the points Paper 1 makes is that, instead of just highlighting the benefits of their offering and demanding a good price for it, the seller should in many cases step deeper into the buyer's shoes: for example, in an interactive relationship with the client, also help the buyer's decision makers to sell the idea within their own organisations, as was further pointed out by data for Paper 2, and build trust in the client relationship by showing that they are in it for the long run. This can in part be done by the seller opening up their own view of how they see their own value. Or, in an opposite negotiation tactic, the client not admitting or revealing how they see their own value. It is never only about the client value as the client sees it—it is also about the fairness of the exchange and how the client sees the seller's value and vice versa—and how they communicate them. Traditional microeconomics may categorise such behaviour as irrational, but it's important to note that it is far from erratic: fairness, pride, shame and other feelings are part of the game and of the subjectively experienced value.

5.3. Limitations and Suggestions for Further Research

This dissertation cannot of course cover all the ground under such a broad topic as its title may first promise. The four individual research papers have made inroads into somewhat different territories each, and as such offer relatively narrow paths in a larger landscape. The papers were written a few years before the publication of this dissertation; the research field has moved on in each of those territories and it would have been impossible to keep track of all development in each of these diverse subtopics. The breadth is a hence a limitation, but I would also see it as an advantage to bring in discussion from

the various different research disciplines—information systems science, service science and innovation research at least, but also from mainstream marketing literature and even organisation studies. The problems and challenges faced by one may have been shared (and even solved) by another; or at least one discipline may offer valuable viewpoints into examining phenomena in another discipline. If there are seemingly contradictory results emanating from two different research traditions, these deserve to be identified and reconciled; after all the aforementioned fields do not represent inherently incommensurable research paradigms.

The methodology employed and the data collection methods obviously also have their limitations: we have relied heavily on the case study methodology in its different forms and thus obtained deeper insights as reported specifically in Papers 2 and 3. The method does not warrant quantitative assessment of the constructs or their interdependencies, nor establishing error margins for such. Nevertheless the breadth of case study selection in Paper 2 was quite significant, as was the depth in the longitudinal studies for Paper 3.

As Paper 1 and this dissertation in general have shown, the linkage between customer value and supplier value is more intricate than often thought: the reservation price of the customer can actually vary according to the information he/she has on the supplier's margin or profits. Drilling into the question of how exactly has been outside the scope of the present dissertation. This would however be an interesting area of further research: for example, is a professional buyer, even in the B2B context, more likely to buy at a given price if he/she considers not only an increase in economic and functional value but also in emotional value by feeling that the supplier's own margin is fair (most of all, not exorbitantly high)? Is the intent (relational or transactional, cf. Grönroos, 1997) a moderating factor? And is a business customer more likely to buy a service at a given price, if he/she believes that the supplier makes a reasonable positive margin, thus investing in the relationship with the supplier?

The linkages between customer value perspectives and innovation types and strategies were very preliminary sketches in Paper 1 and would require further research to be developed and established with more empirical backing.

In this dissertation I hope to have clarified many issues and phenomena around open innovation and services, particular in the software domain, but the elusive question of how exactly to design better-selling offerings has decisively been outside the scope. This could be in part addressed by such research as implied by den Hertog et al. (2010): empirically establishing relationships between firm performance and the dynamic service innovation capabilities would be a good example of how to drill down in the “how exactly” question, by showing which capabilities are worth investing most in. At a more theoretical level, further validation of the linkages between value creation perspectives and types of innovation strategies, as suggested by Paper 1, remains also an area of future research.

Paper 3 takes an organisational viewpoint into the use of OSS in a commercial enterprise and hints at how people, groups and organisations use

the terms OSS, open and openness in a rather loose manner, in ways that best suit their goals. Further such research could be conducted to identify such goals and find out about how the new tools and methods are being used as arguments to advance those goals, e.g. in the context of organisational restructuring seemingly unrelated to the introduction of OSS tools. Discourse analysis and organisational sensemaking could prove to be useful tools for explaining such power struggles.

Paper 4 is of course very speculative in nature and calls for more research into the grey areas or middle ground between pure-form OSS and traditional proprietary licensing. Adams (2010, p. 33) even makes a call for such models in the public and non-profit sectors, claiming that on ethical grounds “in-house software developments should be released under some form of communal access agreement.” There is yet little evidence of such shared-source models gaining ground, which begs for further explanation as to why not—the logical premises and prior research seem to point in that direction, but have they or we overlooked something of essence?

Some guesses as to why the client-shared-source model has not visibly gained more ground would include the following. Perhaps the model is in use by some, but is kept in strict confidence due to the risks associated with it: risk of IPR leakage can lead to sharing cautiously only with very close trustworthy allies; there is also a reputation risk considering the possibility of the model not working. Perhaps vendors are too ashamed to admit the state of commoditisation of their products, or are too ashamed of the quality of code and therefore do not want to reveal it to their valued clients. Perhaps the price negotiations have proven very hard when a vendor and client come in with very different expectations on what the client should be paying. Quantifying the amounts may be very difficult even internally within the vendor, as there are surely diverging views within vendor’s team as to what the client value is and how much the client should be paying for it.

It takes a great shift in thinking to move from traditional proprietary licensing to client-shared source, or any hybrid or OSS model for that matter. The vendors with commoditised products are where they are probably as a result of not having been able to transform in time; how could they make an even bigger transformation now? It is also hard for a client to adopt the mindset of contributing something back to the vendor, if the client foresees the possibility, even if only a theoretical one, of its own competitors benefiting from it.

Most revealingly—and this is my personal guess—perhaps vendors have so much such code in their products that they cannot sell onwards in source code format due to it not being their own: the licence for using a third-party library may well allow its use as part of a product but not to resell its source code; or worse: the vendor is using someone else’s source code without an appropriate licence, or is using OSS code against its licence terms, and would face liabilities in the event that this was revealed.

One could also take some of the ideas developed in the present introduction further, such as studying the parallels between the

standardisation-particularisation axis, the economies of scale and scope, transactional and relational intent etc., which were offered as tentative parallels here. No doubt there will be research opportunities drilling still deeper into the specifics of open services innovation, even if here my intention has been to abstract away from the details.

Openness in general, and in innovation activities in particular, have become the accepted and even assumed norm, which organisations try to embrace at different levels and with varying degrees of seriousness—for some companies it may be more of marketing talk at this point than an all-pervasive and profound change in the way they conduct business from research and innovation to sales and after-sales, but even then the changes in the general business atmosphere will likely lead into that marketing talk becoming the guiding light of organising and conducting the company's business in the end. Even in the marketing of daily consumer goods, the challenge for suppliers has become not so much delivering high-quality goods as such, but winning the clientele's trust that the production process has been as ethical and organic, etc., as it says on the tin—openness seems to be the best way to convince the audience in the end. Marketing messages emphasising the proprietary nature of certain technology or the patents enforced by a company on a single focal invention are becoming fewer. The innovation ecosystems are much more complex today. Those who are open to learn and adopt, and find the right level of openness, are likelier to succeed, both in services in general and in software business in particular.

6. References

The below list of references is provided for Part I of the dissertation. I have tried to follow the alphabetising that the authors themselves would likely prefer. Thus e.g. American authors with Dutch prefixed surnames are alphabetised under the respective prefix (e.g. von Hippel under “V”), whereas for Dutch authors, the prefix is not considered decisive in alphabetising (e.g. den Hertog appears under “H”).

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Appendix I: Primary Data (Interviews)

List of Interviews for Paper 2

Case/Interview Id, Company type, Position, Date.

- A.1.1 Security services company, Development Manager, 21.11.2007
- A.1.2 Security services company, Regional Director, 17.12.2007
- A.2.1 Cleaning services company, Business Manager, 03.12.2007
- A.3.1 Cleaning and security services company, 18.01.2008
- C.1.1 Insurance company, Marketing Director, 26.11.2007
- C.1.2 Insurance company, Credit Manager, 20.12.2007
- C.2.1 Risk management consultancy, Insurance Broker, 09.01.2008
- C.3.1 Bank and insurance company, Director of Asset Management, 29.01.2008
- C.3.2 Bank and insurance company, Development Director, 29.01.2008
- C.3.3 Bank and insurance company, Unit Manager, 29.01.2008
- C.3.4 Bank and insurance company, Investment Manager, 27.02.2008
- D.1.1 Large integrator, Product Management Executive, 29.11.2007
- D.2.1 CRM, ERP solutions provider/integrator, Managing Director, 19.12.2007
- D.2.2 Telecom operator, Sr. Manager, Integrated Enterprise Solutions, 30.01.2008
- D.2.3 Hosting provider, Managing Director, email exchange
- D.3.1 Software and consulting company for manufacturing industries, Managing Director, 31.1.2008
- D.4.1 Telecom operator, Product Manager, 30.01.2008
- D.4.2 Telecom integrator, Managing Partner, 26.02.2008
- D.4.3 Telecom vendor, Account Manager, 30.01.2008
- D.4.4 Telecom vendor, Systems Engineer, 30.01.2008
- D.5.1 Media solutions provider, Managing Director, 02.04.2008
- D.5.2 Media solutions provider, Marketing Director, 27.05.2008
- D.6.1 Postal services company, Global Product Line Director, 01.04.2008 (descoped)

List of Interviews for Paper 3

Organisation code, Name, Position, Location (face-to-face interviews), Date

NSN Mika Kukkonen, Sr. Specialist, Espoo, Finland, 07.11.2006

NSN Pentti Marttiin, Global Concept Owner, Helsinki, Finland, 08.11.2006

PH Jacco Wesselius, Chief Technology Manager, Best, the Netherlands, 21.11.2006

PH Jan Broekhuizen, Programme Manager, Best, the Netherlands, 21.11.2006

PH Wim Pasman, Business Architect, Best, the Netherlands, 21.11.2006

PH Cor Loef, Programme Director, Best, the Netherlands, 22.11.2006

PH Gerard Van Ballegooijen, Team Leader, Best, the Netherlands, 22.11.2006

PH Marco Kemper, Software Engineer, Best, the Netherlands, 22.11.2006

NSN Harri Pääkkönen, Software Configuration Manager, Espoo, Finland, 27.11.2006

NSN Jarkko Jussila, Sr. R&D Engineer, Finland, 27.11.2006

PH Marco Kemper, Software Engineer, Best, the Netherlands, 25.05.2008

PH Cor Loef, Programme Director, Best, the Netherlands, 25.05.2008

PH Jan Broekhuizen, Programme Manager, Best, the Netherlands, 26.05.2008

PH Jacco Wesselius, Chief Technology Manager, Best, the Netherlands, 26.05.2008

NSN Arif Pathan, Product Manager, Espoo, Finland, 25.11.2010

NSN Norbert Kraft, Munich, Germany, 29.11.2010

PH Cor Loef, Programme Director, by teleconference, 21.12.2010

PH Nico Schellingerhout, Manager, Platform Integration and Automation, by teleconference, 14.01.2011

Organisation codes:

PH Philips Healthcare (previously Philips Medical Systems)

NSN Nokia Siemens Networks

Appendix II: Outline of the Interviews

Paper 2

The questionnaire used for Paper 2 is given below. The original used during the research process was written in Finnish. The translation into English is by the author.

Interviewee and Organisation:

Time and Place:

Role of customers in service innovation activities—utilisation of information from customers and collaboration with customers in different service sectors

The research project deals with the development of service innovations in different service sectors. In special focus are the roles of customers and information obtained from customers during the development of various types of service innovations. The chosen service sectors are: financial services (banking and insurance); maintenance and upkeep in manufacturing industries; cleaning and security; and ICT services. The research scope includes only b-to-b services, i.e. services where the customers are other companies/organisations.

The objective of the research project is to increase our knowledge and understanding on the development of service innovations, on the importance of the related customer interaction, and on the challenges of its organisation. At their best, the results will advance the assessment and development of the [interviewee] companies' own activities and bring [them] new insights into service innovation activities. The research forms a part of the TEKES technology programme "SERVE—Innovative Services."

The interviews are strictly confidential and the results will be reported in such a manner, that opinions of individual companies/persons will not be revealed. If you do not wish a certain topic to be dealt, please let us know and we will skip it.

- o. Short description of the interviewee and the company (5 mins)
 - a. How did you end up working in the company?
 - b. What is your job description?
 - c. Would you please briefly describe your role in the development or implementation/delivery of the service innovation in question?
1. Nature of the service innovation in question
 - a. What is new about this service innovation? E.g. with respect to
 - the core service product/concept
 - the way of producing or delivering the service or making it available?

- the way of organising the service process within the company, together with other organisations or with the customers
 - way of marketing the service (e.g. pricing, promotion)
- b. Which benefits does the service innovation or its development bring to the company? And to the customers?
 - c. How 'new' is the innovation? Is it totally new, new in the industry sector, new in Finland (market area)? Do the competitors have anything similar?
 - d. Does the innovation have several customers? Or: Can parts of the innovation or some of its characters be utilised in relationships with other customers/in other activities?
2. The forces initiating the innovation process and the objectives
 - a. How did the idea come about or how was it found?
 - (E.g. within the company, customer, third party; copied from a competitor, from elsewhere)
 - b. What was the central driving force behind this service innovation? What does the company expect to achieve with it?

E.g.:

 - A factor internal to the company (need to cut cost, increase flexibility, better utilise current capabilities, improve capabilities in certain areas or market segments, enhance communications between units, improve upon motivation of personnel, or the like)
 - A recognised market demand (voiced by the customer, identification of market opportunities)
 - The desire to develop or even just to keep a certain client relationship.
 - Responding to competition
 - Disruption of the service sector, change in regulation or the like
 - Desire to make an impact on the market, to develop the market.
3. Description of the Service Innovation Process
 - a. Which central stages and activities were involved in the development and implementation of the service innovation in question?
 - In principle this may be the only question to be asked [under point 3]. In many cases it may be necessary to be more specific and ask the three questions below. In any case it needs to be ensured that responses are obtained relative to the below themes.
 - b. How did you move on from the initial idea stage?
 - The goal is to find out how the process moved onwards. The Interviewer may use a simple stage diagram, e.g. 1) ideation phase (search of ideas, screening, analysis and evaluation) and 2) implementation phase (development, testing, launch) (de Jong et al., 2013)
 - c. Which concreted activities were involved in the development of the innovation? Who did what?

- [In terms of] Planning, research, development, preparation, acquiring, trialling, implementing...
- company's own [internal] R&D (including market research)
- R&D input bought from outside the company (research companies, institutions, other companies)
- Acquisition of other skills/information/services (e.g. consulting, designing/in-licensing) or assembly within the company
- Acquisition of capital goods e.g. machinery and equipment, instruments, software, even physical premises
- Planning of the implementation
- Planning of marketing
- Training and education/motivating and leadership relative to innovation
- Testing, piloting
- Planning and implementation of the launch

d. How has the development of services in general been organised in your company? Do you have a general procedure in place, defining stages, decision making, and responsibilities?

- (The objective of the interview is not to describe these procedures in detail, but to find out how the possible general procedure manifested itself in this particular case of innovation.)

How tightly did these principles or procedures guide the development of this particular innovation?

4. The Role of Customer Information and Interaction in the Innovation Process

a. What kind of role did the customer have in the development of this specific innovation?

- Again, this general question may incite a lot of answers. Sometimes asking it can be sufficient, but often one needs to ask the below questions – in any case it needs to be ensured that answers to those result in.

b. What kind of information from/about the customer or feedback from the customer was acquired and/or utilised during the [development] project?

- Information, understanding on customers not born in direct customer interaction during this innovation process: market research (self-made and made by others), public reports etc., customer feedback in different forms.

c. Did the customer(s) actively participate in the Innovation Process? In other words, did collaboration happen with the customer(s) in order to develop the innovation?

- Collaboration specifically in connection to this innovation process

d. What kind of customer(s) were collaborated with? By whose initiative? What was the skillset/input/role of/from the customer in the different stages and activities in the development process?

- e. How was the customer interaction organised? E.g. under a separate agreement or as part of an existing client relationship?
 - f. How important do you think the input from customers was in the case of this specific innovation?
 - g. If there was no collaboration, then: Why was there no collaboration with the customers during the innovation process?
5. The Usefulness and Challenges of Customer Information and Interaction
- a. What kind of benefits were seen in customers participation to the innovation process?
 - to the service innovation itself, to the development process, to the client relationship or to the [selling] company at large
 - b. Why did the customers have exactly that kind of role in the innovation process as they then had? What kind of collaboration with customers do you think would have been ideal?
 - c. What kind of challenges did the customer interaction pose during the innovation process or after it?
 - d. At the end a general question to be asked, not only in relation to this particular innovation but in general, time permitting: In your own opinion, what kind of roles could customers have in your business, when you aim to develop services to the needs of current and future clients?
6. Other Matters
- a. On our part the questions are now over. Would you have something specific in mind you would like to bring up in this context?
 - b. In this research project, our aim is to interview 2-3 persons who were involved in the innovation project in question. Who else would you recommend we'd interview from your organisation? Would it be possible to interview one of your clients and thus include their point of view?
 - c. Thank you (for an interesting discussion/...)!

Paper 3

The questionnaire used for Paper 3 is given below. The questionnaire was originally prepared in English and is reproduced verbatim, save for formatting, from the later interview rounds. The questionnaire underwent minor variations under the years, but the essence remained the same.

Organization, interviewee:

Interviewer:

Date:

Time allotted: 1h. The interviewer will run through some questions rather quickly when the case is familiar to him/her and just validate earlier data, especially those under "1. Offering".

1. Offering

1. What is the target market of the software?
2. What kind of software do you offer?
 - The researcher can then confirm with the interviewee whether the software is a) part of the firm's commercial offering, or b1) strategic or b2) non-strategic (support) software internal to the firm.
3. What kinds of services are offered to complement the software?
4. For what does the customer pay? What does he/she buy?
5. What type of licensing is used (GPL, LGPL, etc.)?
6. Are there different offerings for different customer groups/segments?
7. How do the end users get the product?
8. Inbound OSS: How do you view OSS components? Benefits? Drawbacks?
9. Outbound OSS: do you contribute incremental developments to any OSS project? (If not, could you? Why not?)
10. *How has the offering changed over the last 2 years?*

2. Resources

1. What resources are needed in the innovation and product development activity?
2. What kinds of resources are obtained from the OSS community?
3. How would you characterize opportunities involved with these resources?
4. How would you characterize threats involved with these resources?
5. *Do you still utilize the same resources as 2 years ago?*

2.5. Organizational changes (new compared to previous round)

1. *Do you think that using OSS has changed your organization in any way? (How?)*

2. Are people rewarded for their participation in OSS projects outside your company? (How?)
3. Is leadership in an OSS project positively recognized in your organization?
4. Can ignorance of OSS or anti-OSS opinions have a negative effect on an employee's career progression in your organization?
5. *Do you think the members of your team have become more tolerant of new ideas/different ways of working after adopting OSS?*
6. *After you started using some OSS or OSS-like processes, have you noticed any change in the **communication** patterns a) within your organization b) towards external parties? E.g. do you meet up as regularly in person as before? Or have your teams become more "virtual"? How? Why do you think this is the case?*
7. What kinds of collaboration tools do you use internally? (For communication, sw design...)
8. *After you started using some OSS or OSS-like processes, have you noticed any change in the **decision-making** patterns a) within your organization b) towards external parties? E.g. do you or your boss seek more consensus before taking decisions? Have technical managers gained or lost business credibility? Have business development positions been filled by people formerly in technical, OSS-related duties?*

3. Relationships

1. How do you (/your team) perceive the OSS community?
2. Does the OSS community affect your decision-making (technological or business)?
3. Who are your key partners in the OSS community? Why?
4. What kinds of relationships do you have with the members in the OSS community?
5. Who are the key commercial actors in your business network?
6. What activities do your key partners in the OSS community and in the business network perform?
7. How do you communicate with the OSS community?
8. How do you stimulate Community involvement?
9. How have you leveraged community (or plan to leverage community)?
10. *Have your relationships to the community or other players essentially changed over the last 2 years?*

4. Revenue Model

1. What are your main sources of revenue?
2. How (on what basis) is the product priced?
3. When do you get paid?
4. What does it cost to use OSS components?
5. Does it cost something to contribute to OSS projects? Is it worth it?
6. What kind of internal accounting or pricing do you exercise? E.g. do other departments pay something to you when they use your components; do you need to pay when you use theirs? Is there some sort of uniform “tax” in place internally that would then be used to finance further development? Or how do you evaluate and set the price per component, if at all?
7. *Have your internal accounting mechanisms in this respect changed over the past 2 years? How stable do you think the model is now?*

6. Other questions or comments emerged during the interview

Appendix III: Abbreviations

API	Application Programming Interface
BaaS	Business Process as a Service
B2B	Business-to-Business
B2C	Business-to-Consumer
CD	Compact Disc
DCV	Dynamic Capabilities View
DNA	Deoxyribonucleic Acid
DVD	Digital Video Disc or Digital Versatile Disc
ERP	Enterprise Resource Planning
G-D	Goods-dominant (logic)
GaaS	Good as a Service
GPL	GNU Public Licence
GPS	Global Positioning System
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
IHIP	Intangible, Heterogeneous, Inseparable and Perishable (about services)
IPR	Intellectual Property Rights
IBM	International Business Machines (corporation)
IPO	Initial Public Offering
IS	Information System(s)
ISS	Information Systems Science
KIBS	Knowledge-Intensive Business Services
LGPL	Lesser (or Library) GNU Public Licence
MacOS	Macintosh Operating System (commercial product name)
NSN	Nokia Siemens Networks
OECD	Organisation for Economic Co-operation and Development
OSS	Open-Source Software
NaaS	Network as a Service
NSD	New Service Development
PaaS	Platform as a Service
PH	Philips Healthcare (previously Philips Medical Systems)
R&D	Research and Development
RBV	Resource-Based View
SaaS	Software as a Service
SLA	Service-level Agreement
S-D	Service-dominant (logic)
TCE	Transaction Cost Economics
TV	Television
XaaS	(or *aaS) Anything as a Service

Part II

Publication 1

Paper 1: Riepula, M., Kuusisto A. (2011). “Different Approaches to Increasing Customer Value by Service Innovation—Linking Customer-Orientation to Innovation Typologies in a Broader Value Concept” in van der Rhee, B. and Victorino, L. (eds), *Advances in Service Quality, Innovation and Excellence, Proceedings of the 12th Int’l Research Symposium on Service Excellence in Management*, Ithaca, NY, June 2–5, 2011, ISBN 978-0578084572, pp. 845–854.

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DIFFERENT APPROACHES TO INCREASING CUSTOMER VALUE BY SERVICE INNOVATION—LINKING CUSTOMER-ORIENTATION TO INNOVATION TYPOLOGIES IN A BROADER VALUE CONCEPT

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ABSTRACT

Customer value and value co-creation have been addressed a lot in recent research literature, and for a good reason. Here we try to categorise different approaches to customer value creation in business services and to relate these perspectives to different types of innovation activities and strategies. We use discriminant value constructs in analysing the perspectives. This is a conceptual paper based on an extensive literature review. The links to service innovation types and strategies are preliminary.

INTRODUCTION

We give an analytical account of the different approaches other authors have had to the creation of customer value, highlighting their different value-philosophical underpinnings, and then examine their links to service innovation. Although we largely share the view that the value of any service to a customer is ultimately realised, created, and determined by the customer itself in the service use situation (value-in-use), we also discuss how value is contextualised and assessed differently by different parties in the service exchange. This is often lacking in the current service innovation literature, which often treats value as a single construct. Our focus is mainly on business services.

First, we identify and characterise the main approaches to customer value creation in the existing service management and service innovation research literature. Second, we suggest links from the above perspectives to different types of service innovations and to different service innovation strategies. This gives practitioners ways to tackle service innovation. We also make an academic contribution by analysing and positioning earlier literature and by making the value constructs explicit.

What is service innovation?

We define service innovation pragmatically as a change resulting in *an increase in net customer value over time*. It may be a high-value adding innovation directly increasing the customer benefits, or it may be an innovation making it easier for the customer to adopt a new service, e.g. through more appropriate procurement, billing or other associated arrangements lowering the inconvenience for the customer. The service provider's internal process innovation may also translate to higher customer net value through a lower price.

WHAT IS CUSTOMER VALUE EXACTLY?

To help understand the underlying assumptions different researchers use and have when employing terms such as “customer value” or “value co-creation”, we will first tackle the basic value concepts.

Definition of Value

Value in services is always subjective in (at least) two ways: 1) the value to the service provider and value to the customer differ; and 2) both of these two values are assessed differently by the service provider and the customer. Table 1 illustrates our simple 2-by-2 division.

Table 1: Four different value constructs. E.g. “V3” refers to customer value as assessed by the service provider.

	Value to the Customer	Value to the Service Provider
Seen by Customer	V1	V2
Seen by the Service Provider	V3	V4

The subjective nature of value—it is always assessed by someone and does not exist *per se*—is very established in microeconomics. The four values are tightly interlinked, but separate constructs.

Skilled salesmen know how to identify the key decision makers, and the total satisfaction of the decision makers *is* the customer's business value: V1 is not only collectively subjective to the customer but individually subjective to all key stakeholders within the customer.

In order to drill deeper into each of these value constructs, we can make a simplification and present net value as a sum $V = B - D + P$, where B is the benefits, D the drawbacks and P the price (positive to the service

provider and negative to the customer), bearing in mind that such a linear conceptualisation may fall short in some aspects. (B and D are very qualitative as such, but implicitly the buyer is quantifying them when deciding whether to buy or not for a certain P. For the service provider, P is an important but not the only component of value, as V4 also depends on the value of customer's name as a reference, learning effect and other harder-to-assess B and D.)

Service exchange will only happen if (1) both $V4 > 0$ and $V1 > 0$ *over time*. Also, (2) the seller's opportunity cost must be lower than V4 and the buyer must not realise a higher V1 with a competing seller. The seller can never truly know the buyer's reservation price V1. Even when the seller has a seemingly customer-oriented view of new service development, there may be a large gap between V1 and V3. Often also (3) V2 must not be disproportionate to V1 (or V3 disproportionate to V4), or otherwise the sense of fairness, pride, doubts or other irrational reasons may override the economic self-interest of the buyer (seller).

The most obvious—and often the hardest—service innovation is that which increases B, but service innovations can also be centred around D (less inconvenience or ancillary costs to the customer) or P: Services that are cheaper to produce can be sold at a lower price, thus translating directly into respectively higher net value for the customer. Condition (3) above can be satisfied by pricing. Innovative pricing models and competitive pricing of new services are a crucial element that no service manager or customer can neglect—neither should the researchers, given how service research is not only interested in radical innovations.

Traditional service development has focussed too much on service providers' own value at the cost of customer value (Grönroos 2008, Heinonen 2010). Although there has been a lot of emphasis recently on how the customer creates value for itself (V1), sustainable V1 is only created if V4 is also created in the long term.

Many of the recent approaches claim to a heavy emphasis on V1 but are in fact emphasising V3. The service provider can try to *gauge* V1 (V2) better, nearing V3 to V1 (V2 to V4), e.g. by ethnographic methods as discussed below, but it can also try to *affect* V1 (V2) by educating the customer on the benefits—basically doing its pre- and post-sales well—without changing V4 or V3. Dissecting the value concept in this manner can help maximise all V1-V4: e.g., by getting deeper and more direct research data from customers' own perception (V1) as opposed to researching service providers or by trying to understand how the customer can also, by potentially small changes in its business

processes, increase V2 and V4 and thus also drive the supplier's ability and willingness to increase V1 and V3 in a symbiotic process.

Literature on value co-creation has mainly been interested in the single-service situation, but business customers want to build long-term supplier relationships: V1 of a particular single new service may even be negative, if the customer is interested in first gauging the provider's capability to adapt its future service offerings.

As researchers we need to get beyond the view of a single, objectively measurable customer-value concept onto a concept (concepts) that has (have) both convergent and discriminant validity as well as pragmatic interest.

DIFFERENT PERSPECTIVES ON VALUE CREATION

We will now identify and position the main approaches to customer value (co)creation in the existing service management and innovation literature. Co-creation means joint value creation over organisational boundaries—not mere inter-departmental collaboration in a single firm. It is thus intricately linked to customers' and users' roles in service use and service innovation.

1. The 'process' perspective

In the traditional 'process' perspective the customer's service use is seen through its contacts to the service provider's processes. The process contacts need to be designed, managed, prevented and/or controlled for failures, as in the service blueprinting method (Shostack 1984) and its later derivatives—it portrays service processes chronologically by depicting each step of the service delivery and the activities in the customer contact points as well as backstage activities and further supporting service elements (Shostack 1992; Bitner et al. 2008).

In this view the service provider is in charge and is assumed to know the customer's (static) needs and requirements. It is as if the most efficient processes—least resources required for a given outcome, or least wasting of resources—were automatically the key to maximising all V1-V4 indistinguishably.

2. The 'whole spectrum interaction' perspective; value-in-use

Grönroos (2000, 2008) among others has extended the notion of the service process to cover not only the immediate core service but also the

ancillary interactions that are needed between the service provider and the customer: how time tables are kept, the timing of deliveries, invoicing, handling of quality problems, etc. Grönroos (2000, 2) refers to these as *hidden services*: “Value for a business customer does not emerge from one resource—the core product—only, but from the whole spectrum of supplier-customer interactions, including hidden services, that support a successful use of this core resource in the supplier’s total market offering.” (Grönroos 2008, 270.) Hidden services usually become visible to service managers only when they fail to work (D).

In Grönroos’s (2008) and Vargo and Lusch’s (2004) view the customer is always *the* value creator: value for customers is (only) created when the customer uses products and services in its processes. The supplier facilitates customer value generation by providing its resources, goods and services for the customers’ use. However, during interactions the supplier can actively engage in and influence the customer’s value generating process, and be a co-creator of value with its customers (“joint value co-creation in which both are engaged”, Grönroos 2008, 274). “The value-creation process is truly the co-creation of value among providers and customers” (Michel et al. 2008, 3).

Grönroos (2008) can be seen to call for more focus on V1 and V3, which undoubtedly would be beneficial to many service providers not thinking about it today, but just as the customer is the one that ultimately judges the value for itself when using the service, so does the service provider judge the value for itself (V4). I.e., all value is assessed subjectively, but is still cocreated: V1 also heavily depends on the service provider’s participation—otherwise no customer-supplier relationship would exist.

3. The ‘relationship’ perspective

Instead of focusing on the various business processes on both sides, the relationship perspective is more interested in the long-term strategic alignment of the provider and the buyer. Instead of buying a service, the customer buys into a potentially long-lasting relationship, which then justifies relationship-specific investments as well.

Advocates of this view include Möller et al. (2008), Gummesson (1998) and many others. Also Tuli et al. (2007) emphasise the importance of future-orientation of both parties, e.g. the customer sees more value in a relationship with a vendor who has a roadmap into the future addressing their needs, or has similar expectations of the future market development.

V1 can never be fully isolated from V2. Specifically, V1 is always based on the customer's contextual information about the present B minus D of using this particular provider's service, but it also bears a component of future expectations of B and D, both very short-term and (potentially very) long term. In non-commoditised markets, buyers understand the importance of paying the correct price as opposed to negotiating a rock-bottom price, i.e. in ensuring that V2 is such that it allows for long-term V1 generation.

The relationship perspective is particularly important in the high-tech and other sectors where disruptive changes to the market are frequent, emphasising operational agility and strategic alignment between the buyer and supplier.

4. Purpose of buying an external service: the customer's strategic intent

Why does the customer choose to buy a particular service (e.g., outsource a previously internal function) in the first place? It could be cost savings, less dependence on a single service provider (or on an internal capability), organisational learning when trying to implement something similar in-house later, or any other of a multitude of strategic reasons. Application of the service with respect to the buyer's own offering (delivered to the end customer or not, with or without transformation) was the primary concern of Wynstra et al. (2006). They got closer to V1 by studying the buyers, not the service providers. Also Christensen et al. (2005) and Ulwick (2002) have focused on what the customer or user is ultimately trying to accomplish when using the service (or product).

This *strategic intent* perspective may reveal large differences between V1 and V3—the service provider may even have no idea of the kind of strategic or political reason the customer chose their service for. (Perhaps even V1>V3!) The provider may waste efforts trying to sell a “perfect” V3 solution without understanding the customer's internal motivations and strategic plans. E.g. a Software-as-a-Service (“SaaS”) solution is usually attractive to customers in part due to lowered capital expenditure. But if the customer is a “lean” telecom operator who shies away from operational costs, even a risky new component service (in terms of Wynstra et al. 2006) may need to be formulated commercially as a capital expenditure to appeal to the management.

5. Ethnographic and other ‘Customer's life’ perspectives

As a way to bridge the gap between V1 and V3, ethnography has recently become more popular amongst researchers and service firms

alike. Traditional ways of observing customers can be insufficient, if the service provider is not able to experience the customer's life *in situ*. The interest is in how the service "becomes embedded in the in the customer's contexts, activities, practices, and experiences" (Heinonen et al. 2010, 53). Even in this approach, the observer always influences the subject, and V1 is only approximated closer by a more educated V3. The "jobs to be done" thinking (Christensen et al. 2005) reflects the same view.

Ethnographic approaches are already being used especially in consumer services. A service company can pick volunteers amongst its established clientele, whose everyday activities—not only the immediate service use situation—an agent then observes from close range, thus developing a much better understanding of the customer's own perceptions of his/her needs and the value he/she would associate with different service solutions.

In business services, the same may readily be achieved by having service provider's own personnel work on customer site. E.g. an aircraft engine manufacturer may place one of its engineers in an airline's maintenance team; management consultants are working mostly at customer site with customer's management and operational teams. The challenge is then in engaging these same engineers and consultants in new service development and innovation activities.

"Because value is created within experiences, focusing only on value creation within the interactions between service provider and customer is too narrow. All experiences are not co-created with the service provider." (Heinonen et al. 2010, 543.) I.e., the customer is the only one capable of determining V1 and in V3 the service provider is lacking some of the contextual information (or "experiences") that forms part of V1.

LINKS TO SERVICE INNOVATION TYPES AND STRATEGIES

We now draw links from the above perspectives to different types of service innovations (den Hertog 2000, 2010) and service innovation strategies reflecting the incremental–radical innovation dimension and customers' role in innovation activities (e.g., Kuusisto and Kuusisto 2010). This part is highly exploratory.

Despite the service provider focus in the 'process' perspective, customers can still actively participate in new service development activities. They are typically *invited* by the service provider to perform *specific* tasks such as providing knowledge and ideas, or evaluating and testing alternatives.

This is likely to lead to *incremental* innovations. The 'process' perspective encourages to innovate the internal service delivery system (e.g., new organisation of workflows, multiskilling of employees, benefiting from ICT) and to innovate new customer interaction (e.g., introduction of new self-service options or building a more personal service). The 'process' perspective works better in mature and standardised (e.g., mass and consumer) services than in low-volume business services, such as KIBS.

The 'whole spectrum interaction' and the 'relationship' perspectives help the service innovator focus on how to innovate the provider–customer interaction in a mutually valuable way. The customer, who brings his/its own capabilities and resources into the interactions over time, becomes an active contributor also in innovating the service. This view is typical in KIBS (e.g., R&D), as the core service is genuinely co-created in customer-provider interactions. Innovation becomes intertwined with the actual service process (den Hertog 2002). This suggests not only incremental service improvements but also radical innovations in several dimensions (den Hertog 2010): new service concepts (new ideas of how to organise a solution to a problem); new customer interface (e.g., automation of interactions); new value integration and specifically, changes in the service provider's and the customer's integrating roles (Michel et al. 2008); and new revenue models (e.g., based on results).

In the 'customer's strategic intent' perspective the service provider aims to build a deep understanding of the role of the service in the customer's business—not failing to consider its emotional, social, and even political aspects. Such a thorough understanding of the customer's needs can even lead to breakthrough innovations (Ulwick 2002). Ulwick (2002) suggests that the service provider is responsible for coming up with new solutions for the customer, based on careful listening and analysis of the outcomes that the customer wants. Customers and users are informants and evaluators rather than genuine co-innovators. This perspective encourages to think in terms of: new service concepts (new ideas of how to organise a solution to a problem); new customer roles in value integration; and, service innovations that are based on an innovative set of business partners (new value constellations; Michel et al. 2008).

Finally, in the 'customer's life' perspective the key question in service innovation is how the service provider can support the customer's value creation in new ways in the customer's network of interlinked activities. In research, building an understanding of how customers create value in their everyday activities calls for ethnographic and participatory approaches (cf. Kuusisto & Kuusisto 2010). Also, systematically making use of innovations that users have developed for their own use (user

innovations) is seen as a fruitful avenue for service innovators (von Hippel 2005). Customers are active subjects in innovation: they define the meaning of the service and shape the desired direction of action with the service provider. In particular, the 'customer's life' perspective stimulates to develop totally new service concepts; service innovations that are based on an innovative set of business partners; and possibly new revenue models.

CONCLUSIONS

Looking into customer value creation from different angles can help the service innovator explore new service innovation opportunities. The view that customer value (service) is essentially co-created by customers and service providers implies that increased value (innovation) requires a change in both the customers' and the service providers' inputs and/or actions (cf. Michel et al. 2008). Further, the interlinked value components (V1-V4) direct attention to the fact that mutually positively experienced changes in value over time are required for service innovations to turn into successful services. The links sketched from the perspectives to innovation types and strategies are highly exploratory and preliminary as such.

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Publication 2

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Customer interaction in service innovation: seldom intensive but often decisive. Case studies in three business service sectors

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Abstract: The purpose of this study was to develop the yet limited empirical knowledge on the intensity of customer interaction and on specific customer roles in service innovation processes. An empirical study of 12 business service innovation projects was conducted in cleaning and security, financial, and ICT services. Overall, direct customer interaction in service development can be characterised as being limited and focused on specific, well-defined tasks in these service sectors, which offer support services to their customers.

In the analysis, three highly important customer roles emerged:

- 1 customers act as catalysts of service development processes
- 2 customer feedback is often decisive in nature, allowing for go/kill decisions and directing other key decisions
- 3 customers have a key role in internal marketing of the new service idea within the provider organisation.

The study also proposes a new variant of a concurrent service innovation process to existing service innovation literature.

Keywords: service innovation; new service development; customer involvement; customer roles; business-to-business services; support services.

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1 Introduction

Customer interaction has been argued to be a key feature of service innovation activities (Gadrey et al., 1995; Hauknes, 1999; Sundbo and Gallouj, 2000). Empirical evidence shows that customers are involved in and provide important contributions to service innovation processes within companies (e.g., Alam and Perry, 2002; Magnusson, 2003; Matthing et al., 2006). Recently, however, the stress laid on customer intensity in service innovation has also been criticised. As Howells (2006) points out, while customer intensity in service innovation seems to be typical of knowledge-intensive business services (KIBS), in which the service itself is co-produced in customer relationships, customer interaction in service innovation may not be as evident in other types of services.

This study examines customer interaction in service innovation in three business service sectors: cleaning and security, financial services industry (FSI), and information and communications technology (ICT) services. The sectors as such are not of primary interest; the purpose is to examine services, *which do not typically necessitate intensive person-to-person interaction in service production*. Rather, the role of the customer can often be characterised as one of ‘making use of’ a service solution organised and supplied by the service provider. Or, in some cases the customer may even wish not to be directly involved at all if and when the service is running smoothly, as the service is rendered vis-à-vis the customer’s physical premises, customer’s money, or customer’s computer equipment. The extent to which the customer needs to manage the service could even be a criterion for the service quality – the less the better.

The purpose of the study is to develop our yet limited knowledge on the intensity and significance of customer interaction, as well as different roles of customers, in service innovation. The underlying assumption is that when the service itself is not produced in intensive customer contact, customer interaction in service innovation may also be less intensive and may need to be organised and managed separately from the service process (see e.g., Sundbo and Gallouj, 2000). As we also know that formally structured innovation processes are relatively rare in service firms (de Jong et al., 2003), it is highly interesting to further explore how customers actually become integrated into service innovation activities, and, whether and how customer interaction within these activities shapes the firm’s innovation process.

In the next two sections, we briefly discuss different models of service innovation (Section 2) and the role of customers in service innovation (Section 3) based on existing research literature. Section 4 defines our research questions. Section 5 describes the

methodology and Section 6 the cases. Research findings are presented in Section 7 and Section 8 concludes the paper.

2 Modelling service innovation processes

There is no single best way to characterise how service innovations are generated, as empirical evidence shows that service innovation processes are multiform (Sundbo and Gallouj, 2000; Toivonen and Tuominen, 2006). When *service innovation processes* have been examined, two basic types of processes have been distinguished: *ad hoc* processes and *formalised* development processes.

Research has shown that formalisation of the innovation process is relatively rare in service firms (for references, see de Jong et al., 2003; Schilling and Werr, 2009). This means that service firms do not typically have a formal new service development (NSD) strategy, nor are their innovation activities managed by a pre-defined procedure and systems. Instead, service development very much ‘happens’ as a response to a particular situation – that is, ad hoc (Gallouj and Weinstein, 1997; Sundbo, 1997; de Jong et al., 2003).

de Jong et al. (2003, pp.28–29) list several possible reasons why innovation in services is mostly ad hoc. Many of the reasons are related to the distinctive characteristics of services. For instance, the intangibility of services, leading to the absence of patent and copyright protection, makes service innovations relatively easy to imitate. This seems to result in placing more emphasis on the firms’ abilities to respond quickly to competitors’ innovations and on adopting less formalised approaches to service development. Further, managers may lack the motivation to follow formal structures and procedures as the time to market becomes of essence, and hence the preference for ad hoc processes. Also, the simultaneity of service production and consumption means that when it is difficult to find ‘natural’ review points in the service development process, it is important to quickly launch the service in order to be able to further develop it based on customer experience and feedback (Sundbo, 2006).

Despite the fact that formalised processes have been rare in service development, some studies have shown that formalisation can lead to beneficial outcomes in terms of both the speed and effectiveness of development efforts as well and the success of new service outcomes (e.g., de Brentani, 2001). Thus, researchers usually encourage innovation managers to develop a formalised process when trying to achieve innovation. As Schilling and Werr (2009, p.32) aptly remark, however, “previous studies are still vague about what this [a more formal service development procedure] means in terms of specific practices and routines. There is also little discussion of different needs and forms of formalisation in different service sectors”.

The *ad hoc* pattern of innovation means that the development of new services takes place as a response to a particular situation (often an immediate customer need) and is organised rather informally around specific individuals or a development team (Coombs and Miles, 2000; Sundbo and Gallouj, 2000). The development activities are very much integrated in the everyday operations of producing and selling the service. The ad hoc pattern of innovation is particularly relevant to professional services: The service production and innovation processes take place simultaneously, and “the client’s problem (in its concrete sense) is the starting point of the innovation process” [Sundbo and

Gallouj, (2000), p.26]. Innovations may not even be the result of any a priori planning, but innovative elements are recognised as such only after the service process (e.g., Toivonen and Tuominen, 2006). However, the service innovation process can be planned but still not be well formalised. The management gets an idea of how to significantly improve its service and forms a team to develop the idea and concept further – without any systematic process model in mind. The incremental nature of many service innovations also encourages ad hoc type of development. As de Jong et al. (2003) argue, service managers may not adequately recognise opportunities for more radical innovation, which would call for large-scale, formally managed innovation processes.

For some firms and service sectors, however, a *formalised approach* to NSD is typical. In the FSI, service development often follows a sequential model, similar to the activity-stage models developed for and in use in manufacturing firms (Alam and Perry, 2002). Evidently, large firms with ‘mass informational’ product-services, in which information technology often plays an important role, benefit from a formalised development process. Alam and Perry (2002), in particular, have contributed to the understanding of the variants of sequential stage models in FSI. In addition to ‘pure’ sequential models, development activities are often carried out concurrently to speed up the development.

Some recent studies have taken to investigate the emergence of innovations in certain contexts ‘in depth’. For instance, Toivonen and Tuominen (2006) identify three different processes leading to innovation in KIBS firms: The R&D model is the traditional development model with a separate development and testing stage before the new service is launched to the market. “In *the model of rapid application*, the idea is brought to the market very quickly, and if it succeeds, a more systematic development process is started. In the practice-driven model, the process does not start from idea generation at all, but the idea is found subsequently to the implementation of a new service” [Toivonen and Tuominen, (2006), p.14]. The practice-driven model is particularly relevant for consultancy services (Gallouj and Weinstein, 1997; Sundbo and Gallouj, 2000).

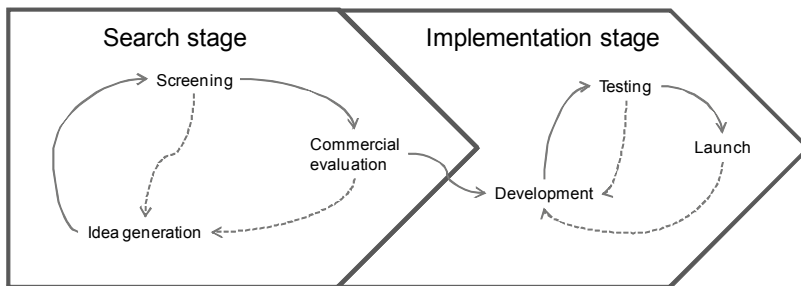
To sum up and to fix some terminology, certain key *activities* or synonymously *phases* are present in all (service) innovation processes. Such ‘basic’ activities include idea generation, evaluation, development, and implementation. However, these activities can relate to each other in different ways, take place in different orders, comprise different more specific activities, which in turn can overlap, coincide and be iterative (de Jong et al., 2003; Alam and Perry, 2002; Toivonen and Tuominen 2006).

This study, too, investigates specific innovation processes and, in particular, customer roles in these processes. Our study set out to examine services, which do not typically necessitate intensive person-to-person interaction in service production. As will be discussed below, we chose the two-stage model suggested by de Jong et al. (2003) as the baseline for our empirical analysis (Figure 1).

The service development model by de Jong et al. (2003) *can be* used to describe very different types of innovation processes in services. Innovation activities can be characterised in terms of two basic stages – a search stage and an implementation stage. The model also identifies six more specific activities. Further, the framework is applicable to describing innovation processes with varying degrees of formality. de Jong et al. emphasise that within the search and implementation stages the activities

are likely to overlap or coincide. However, de Jong et al. (2003) assume a clear transition from the search stage to the implementation stage: NSD properly starts once the commercial evaluation has turned out to be positive, after which the profitability of the resulting service is no longer an issue in the NSD process. We do not wish to take that assumption for granted, nor do we expect to always find all six activities or that they would appear only in the sequence indicated by Figure 1. Instead, we wish to use the model and its constructs as a common vocabulary in order to compare and analyse different innovation processes and, in particular, customer roles in those processes.

Figure 1 A model for NSD



Source: de Jong et al. (2003, p.33)

3 Customer integration in service innovation

Customer involvement in service innovation activities has been examined from several perspectives, but usually in very specific and narrow contexts. Whether, in which stages, and in which roles are customers involved in innovation processes (Alam and Perry, 2002; Sundbo, 2006)? What are the contributions and limitations of customer involvement, and how does the way in which customer involvement is implemented impact the outcome (Magnusson, 2003)? How does customer 'status' – for instance, whether the project is initiated by the customer – influence the innovation process (Toivonen and Tuominen, 2006)? What are the different ways in which customer participation can be organised and motivated (Alam and Perry, 2002; Kristensson et al., 2008)?

This paper views innovation processes through their key activities and their relative positions. The following dimensions of customer involvement will be empirically analysed against this backdrop: customer role in the initiation of the innovation activity; more specific customer roles in and contribution to different stages and activities; and, the impact of customer participation on the whole innovation process itself, e.g., on the order of activities. The present study assumes that the innovation processes examined here are likely to be more 'in-house', that is, organised by the service provider, than co-produced with the customer. However, this does not mean that the processes should always be well pre-structured.

4 Research questions

The primary purpose of the study is to increase our understanding of customer involvement and customers' specific roles in service innovation – specifically, in services with limited provider-customer interaction in the actual service process. Although we do not provide any quantitative measures, we intend to estimate customer participation in terms of its intensity and perceived significance (as perceived by the service innovator), as well as by identifying specific customer roles in the innovation process.

As has been discussed, service innovation processes are multiform, ranging from formalised, carefully managed development processes to what has been characterised as 'just happening' as a response to a particular situation. We believe that it is not possible to investigate customer roles in any innovation process without also describing and understanding the process itself. Thus, this study also sheds fresh light on the types of innovation processes in the three examined service sectors.

Customer roles are typically identified in terms of the activities the customers perform in different stages of a service development process (e.g., Alam and Perry, 2002). Here, we aim to be open to a variety of customer functions and impacts: in addition to the tasks and activities that they carry out in response to the service innovator's needs in different stages of the service development process (such as providing feedback and testing a new service), we carefully look into how customers actually become involved in innovation activities and whether their participation impacts the innovation process in some way(s).

In the context of limited provider-customer interaction in the actual service process, the research questions are:

- 1 To what extent and in which roles are customers involved in service innovation activities? Can new customer roles be identified?
- 2 What types of innovation processes can be found in the examined service sectors? In which ways does customer involvement in service innovation activities impact the service development process?

5 Methodology

The research was exploratory in nature. We thus opted for the extensive case study method (Yin, 1994; Eisenhardt, 1989). We considered it essential to have actual, particular innovation processes as the unit of analysis in order to obtain valid data. Data was mainly obtained by retrospectively interviewing key persons who had been involved in the development of service innovations.

According to Yin (1994), sample selection should be guided by replication logic instead of a statistical one. Each case should be considered as an experiment in itself, subsequent cases being used either to confirm or refute previous findings. Cases should therefore be selected if they are expected to yield similar results (literal replication) or different results (theoretical replication) according to theory. Eisenhardt (1989, p.537) largely concurs with Yin on this.

According to Yin (1994, p.27), in case study research "theory development as part of the design phase is essential, whether the ensuing case study's purpose is to develop or to test theory". Eisenhardt's (1989, p. 536) position again is that "research is begun as close

as possible to the ideal of no theory under consideration and no hypotheses to test". To mitigate the risk of prior theoretical bias, while having *some* theoretically informed guidance for our research, we first examined different innovation process models and chose the model by de Jong et al. (2003) only as a starting point in structuring our analysis.

The choice of the service sectors was guided by our goal of examining services, which do not typically necessitate intensive person-to-person interaction in service production. We took the target of identifying four to five cases in each sector, knowing that time and resources may limit our investigating of more than 15 cases in full. All the interviews were conducted in Finland and in the Finnish language, though some firms were branches of large international businesses. The pre-screening of potential cases was done on the basis of news articles in the daily press, customer magazines, and on the internet. We then e-mailed the representatives of companies. If e-mailing didn't give a response, we tried reaching relevant persons by telephone. At that stage, some cases had to be dropped in the lack of interested informants, but roughly half of the so-initiated contacts resulted in at least one interview in the end. Continuous evaluation of the value of each case resulted in some cases being dropped and others added along the way. In the end, by May 2008, we had pursued 12 cases in the three service sectors.

We conducted 22 semi-structured interviews over six months. More than one person was interviewed in most cases: our goal was to have two one-on-one interviews on each case. At one extreme, we had to content ourselves with one interview, whereas at the other extreme, a single case involved a group interview with three persons, and another with a fourth person from another division in the same company. Sometimes the interviews for a single case were with people from different partnering organisations. Although we tried to include the customer view in many cases, the service providers were not forthcoming for the idea to take place in practice.

Each interview was recorded and then transcribed verbatim in full. The internal validity of the method was further strengthened by the fact that most interviews, in their unabridged form, were read by both researchers. The data was further indexed, coded and analysed in tabular as well as pictorial displays, in which we reused constructs from earlier literature, most notably from de Jong et al. (2003), Alam and Perry (2002), Toivonen and Tuominen (2006), and Sundbo (2006). In other words, the interviews were analysed by identifying e.g., the types of activities anticipated by the model of de Jong et al. (2003) and/or by Toivonen and Tuominen (2006) and by listing the ways in which customer interaction was manifested in the interviewees' responses. Noteworthy particularities of each case were recorded on the side. Most of the cases were then discussed by and between the two researchers in order to gain a fuller picture emerging from the individual cases. In line with the premises of the case study method, we did not only qualify recurring, but also singular, features as significant whenever we believed there was a theoretical ground for including such feature in our analysis and results.

In short, triangulation was done at the level of informants (multiple interviews per case), investigators (two researchers) and theory (use of pre-existing frames of reference).

6 Case description

Table 1 summarises the 12 cases: the type of innovation and the nature of interaction in the service process are shortly outlined.

Table 1 Innovations examined

<i>Service sector, case company</i>	<i>Type of innovation and service</i>	<i>Nature/locus of customer interaction in the service process</i>
Security: int'l group (A.1)	Web based reporting system in a retail setting.	Mainly with the service provider's ICT application.
Cleaning: facility services firm (A.2)	Two existing services combined into one: cleaning and maintenance services for institutional clients.	In the final service product between the service provider and customer's physical facilities. Personal interaction in service specification and quality control.
Cleaning: int'l facility services group (A.3)	A new organisational concept integrating internal working practices, training and communication with customers.	In the final service product between the service provider and customer's physical facilities. Personal interaction when targets are set and outcomes measured.
Security: small integrator (A.4)	A monitoring system for elderly peoples' homes integrating various 3rd-party elements in a patented, user-friendly way.	With the service provider's ICT system, which becomes essential for customer's daily operations. Extensive personal interaction in specification.
FSI: large insurance company/bank (C.1)	Financing that offers synergies to the provider: a loan is targeted at safety improvements in a specific sector, which reduces insurance payouts.	With the service provider's sales representatives and front office.
FSI: insurance broker/consultancy (C.2)	A new type of auditing service in risk management consultancy.	In actual service production process throughout the process.
FSI: large national bank (C.3)	A combination of KIBS and standard investment and other banking products, now also insurances.	As in a KIBS but takes place in punctual appointments face to face or over the phone, which are also sales events.
FSI: large int'l bank (C.4)	Derivative based on foreign exchange options.	Mainly when selling.
ICT: large integrator (D.1)	Communication and other IT services packaged into one: a managed IP-based unified communications and messaging platform.	In the final service product between the service provider's and customer's ICT infrastructures; helpdesk. Personal interaction in service specification and implementation.
ICT: mid-size software house (D.2)	Software as a service and flexible licensing: provider of CRM/HRM/ERP software allows its customers to use the functionality as a service and/or pay for it as in a service.	In final service product between the service provider's and customer's ICT infrastructures. Personal interaction in service specification and implementation; specification of the fee structure.
ICT: small integrator (D.4)	Several ICT services combined into one: IP-based unified communications platform as a spearhead offering; ICT infrastructure management for SMEs.	In final service product between the service provider's and customer's ICT infrastructures; helpdesk. Personal interaction in service specification.
ICT: small software house (D.5)	Software as a service: a media production company turned software vendor now offers its media distribution platform as a service over the internet.	In final service product between the service provider's and customer's ICT infrastructures. Personal interaction in service specification and implementation; in specification of the fee structure.

7 Results

7.1 Types of innovation processes and integration of customers into them

We expected to find mainly innovation processes that would be organised ‘in-house’ by the service provider and that customers would rather be asked or persuaded to participate in innovation activities than be engaged in on their own initiative. This assumption seemed to hold well in the data. In 11 out of the 12 cases the service development *process* can be characterised as organised and driven by the service company, while customers were invited to provide their input.

The innovation processes varied significantly in terms of the degree of formality of innovation activities. In three FSI cases and in two ICT cases the service development followed a relatively well pre-defined structure. In the majority of the cases a multifunctional project development team was set up on an ad hoc basis (as in Coombs and Miles, 2000). Typically, this project team was made up of the service provider’s own employees, and customers were not included. Decisions on the roles and participation of customers in innovation activities were done in the course of the project.

The key phases of idea generation, evaluation, development, and implementation can be identified in the examined innovation processes. Also, they occurred basically in this order, with three precisions: first, we identified what might be called a ‘pre-development’ stage straight after the initiation of the project (see below); second, the new service idea was in several cases evaluated or tested by actually selling the idea to the customer before any further development took place; and, third, the phases of development and implementation very much overlapped in many cases. In all of the cases examined, the new service idea was generated before the implementation – that is, in none of the cases was the innovative idea ‘found’ in the actual service process (the practice-driven model discussed by Toivonen and Tuominen, 2006).

We identified the following type of innovation process as seen from the customer interaction perspective, which, to our knowledge, has not been adequately explained in existing service innovation literature (cases A.3, A.4, C.2, D.2, D.4). It can be seen as a variant of what Toivonen and Tuominen (2006) identify as the ‘model of rapid application’. As in Toivonen and Tuominen (2006), an essential feature here is that NSD is integrated in the normal service transaction right from the start. With our special focus on customer interaction within the development process, we found the following customer functions within the identified stages and customer impacts on the development activities:

- *Incubation stage*: The new idea is incubated for a relatively long period of time in the service organisation. *A concrete customer action triggers* the initiation of the development project, which means that a project team is set up.
- *Pre-development stage*: Straight after the initiation of the development project, the service innovator quickly produces a full characterisation of service elements and the service process in order to be able to make a presentation of the new service to a potential customer.
- *Selling the idea to the customer*: The attractiveness of the new service is evaluated in terms of actual customer decision to take in use or buy the new service. Customer

commitment is needed to make the 'go' decision and to secure resources for further development within the service firm. In many cases, *customers have a key role in internal marketing of the new service idea*. This can mean two things:

- a having gained firm customer commitment is a proof of viability that senior management wants to see before further service development is funded
 - b the customers can help the concept owners to sell the new service concept to their superiors, as well as employees who will be responsible for the implementation.
- *Second development and testing stage*: Referring to Figure 1, in practice the iterative nature of the implementation stage takes the form of either of the two following variants:
 - a a second development round of the new service is conducted within the innovating service firm and pilot customers are sought as evaluators and informants during the process
 - b the second-time development and testing activities coincide with the actual provisioning of the service to the customer.
 - *Launch*: When the service has been successfully implemented, it will be launched to a wider market. Our main finding in this respect was that the launch was a rather ambiguous non-event, as will be discussed in the next subsection.

7.2 Customer roles in key innovation activities

7.2.1 Initiation

In this sample of 12 innovation processes, the idea was more often generated or born within the innovating firm than initiated by customers, partners or other actors (see Table 2). It can be inferred that the need for innovation was due to the strategy rather than a reaction to a particular customer's needs. Key driving forces included increased opportunities created by technology and market development, competitive pressures, pressures to try out new ways of generating revenue, and pressures to reduce costs. In three of the ICT cases, partners took the role of surrogate customers to some extent and were often the source for new service ideas.

The above does not mean that customers would not have an important role in the early phase of service innovation. The empirical case analysis reveals quite the opposite: customers act as important *catalysts* of service development processes. In particular, customer feedback, suggestion or request often *triggers* the initiation of the development project, which means that a project team with concrete objectives is established. Sometimes the customer directly suggests what it would like to see in the future; in some other cases, customer trigger is indirect (e.g., in one case, a long-term contract with an important customer was coming to an end, and there was a threat of losing this customer). It seems that even in service firms, where the speed of innovation activities has been argued to be critical (Alam and Perry, 2002), there is certain inertia until an outside actor or impulse triggers the innovation project. As one of the interviewees said, "This has been in the back of our minds for years, yet, in the end, it was a client comment which galvanised us into action".

Table 2 Source of idea and key drivers

<i>Case company</i>	<i>Customer</i>	<i>Inside the firm</i>	<i>Partner</i>	<i>Key drivers</i>
A.1 Security	X			Need to move away from sheer competition on the lowest price by differentiating the service offering.
A.2 Cleaning		X		Improve internal efficiency by finding synergies in existing service businesses.
A.3 Cleaning		X		Improve quality and efficiency of operations – a response to market pressures (some customers had been lost).
A.4 Security		X	(X) ¹	The founder of a new business was looking for a market niche, and actively developing a new type of solution.
C.1 Insurance co/bank	X ²			Decrease costs and meet new competition on the insurance market.
C.2 Insurance	X			Customer needs, provide new value to customers.
C.3 Private banking		X		Increasing market demand in this field, a strategic decision to increase market share in the segment.
C.4 Derivatives branch of an international bank		X		Unmet demand on the market – customers asked for new solutions. Internal need to make use of investments made in new systems in the bank.
D.1 Large ICT integrator		X	(X) ³	Better communicating a whole solution offering; integrating a bric-brac of piecemeal local solutions
D.2 Software service house		X	(X) ⁴	Pressure to try out new ways of generating revenue. SaaS on the background.
D.4 Small ICT integrator		X		Opportunity created by technology and market development allowing entry to the SME sector.
D.5 Software service house		X		Pressure to try out new ways of generating revenue. SaaS on the background.

Notes: ¹ An actor in the business network suggested a new market segment in which the idea could be applied.

² Not a 'real' customer, but someone who represents customers on the company's customer panel.

³ The platform as a technical product supplied by a partner.

⁴ Two partners are essential for the commercial offering, one supplying software technology and the other financing solutions.

In Figure 1, idea generation is followed by a screening phase. Clear screening activities were not always identified in our data. Obviously, some screening and selection activities had taken place (long) before the service development project team was 'officially' set up. For instance, university students had been employed to survey customer reactions to new service ideas, and these results were later utilised by the project team. However,

there were also examples of a 'traditional' screening phase: customers representing different market segments were contacted for the purpose of obtaining their reactions to alternative service features and assessing purchase intentions. The following FSI example shows that feedback from even one customer can be *decisive*: a customer comment made the service innovator realise that by changing the maturity period of a financial instrument, the new service could reach a totally new market segment. Indeed, the insight provided by this one customer comment led to a highly successful new service.

7.2.2 Evaluation

We found out that evaluation was not a separate activity but an overarching one. When service development followed a pre-structured model (C.1, C.3, C.4, D.1, D.4), market size and profitability were to an extent evaluated before a separate development stage. In other cases, evaluation of the new service was very much done along the way. In practice, customer commitment to take in use or buy the new service was often needed for the service innovator to make the 'go' decision. Indeed, customer commitment to the idea could be essential for the innovating team to secure resources to development: to convince important stakeholders, such as managers, and to overcome resistance to change from employees (and partners) responsible for the new service implementation. Hence, *customers can have a key role in internal marketing of the service in the innovating firm.*

When the new service needed be offered to customers at an early stage, as outlined above, this led to a high pressure to quickly define key service elements and the service process. Here, a 'pre-development' phase existed before evaluation. One of the interviewees characterised this as follows: "What we had was no more than a power-point presentation, but the customer 'bought' the idea. Then we really started to put flesh on the bones of the idea".

Thereafter, profitability of the service continued to be evaluated when the service was implemented for the first customer. After that, the service provider had a proof of concept that they could (better) price and start offering to other customers as well, but still opportunistically. On the whole it seems that no such up-front investments were made in these development projects that would necessitate careful investment calculations: instead small steps are taken whenever there is a paying customer at close range. In case of small firms in particular, they may have to try to opportunistically do business with *any* service concept they find traction for, and then try to replicate that.

7.2.3 Development and testing

Two FSI cases with a pre-structured development process (C.1, C.4), differed from the rest of the cases in terms of customer involvement in development. In the former, customers did not have role in the actual development phase; their feedback had been obtained by earlier screening of desirable features.

In all the other cases, customers were involved in development. In some of the cases, development was first conducted within the innovating firm, and then pilot customers were sought and used to assess and provide feedback for further specification of the service (also, in Toivonen and Tuominen 2006). In the other cases, development, application and testing very much took place simultaneously. This resembles the ad hoc model of innovation described by Sundbo and Gallouj (2000, p.26). However, these were not necessarily "innovation projects tailored for a customer" [Toivonen and Tuominen

(2006), p.10] in a sense that the “client’s problem (in its concrete sense) [would have been] the starting point of the innovation project” [Sundbo and Gallouj, (2000), p.26]. Rather, the decision to merge development with implementation in a real customer context was viewed *by the service provider* as the best way to develop the new service. Sometimes customers were willing to pay for a project involving development and testing activities and thus shared some development risks. In one instance, the customer was not even aware that the service process included extensive development. As the interviewee said: “You don’t want to say to the customer, ‘This is the first time we do this, so you are a kind of guinea pig here’. No, that’s not possible”.

In case of ICT services, concrete work input from customers was needed in development: detailed requirements have to be captured from customers, and ultimately customers have to test the service – either explicitly (when errors or mismatches are found) or implicitly (when things run smoothly for the first time in real life).

7.2.4 Launch

The activity of launching was rather ambiguous. There was often no clear separation between testing, implementation, and launching of the service to a wider market. When development was intertwined with implementation of the service for the ‘first’ customer, subsequent launch could mean offering the service ‘one by one’ to most potential customers – and further development of the service continued to take place while ‘spreading’ the new service to the market (as also indicated by, ‘after-innovation’ in Sundbo, 2006; and, ‘the model of rapid application’ in Toivonen and Tuominen, 2006). Here, launch is a gradual process, not something taking place at a particular point in time. Often, after the service had been tested with potential customers or implemented for the first time, the service provider formalised the service a bit more, produced marketing material and made publicity for it, sometimes with its partners. The most concrete signs of something being launched onto the market included: pushing out a press release, adding the service to the company’s website, and starting to offer the service for customers as a part of normal tendering process.

8 Summary, contributions and conclusions

The study set out to examine direct customer involvement in service innovation activities in three business service sectors, when there is limited provider-customer interaction in the actual service production process. As expected, innovation processes were mainly initiated and organised by the innovating service provider (cf., Tether, 2003), and customers were invited to provide their input into specific activities. Overall, direct customer interaction in service development tends to be limited and focused on specific tasks in these service sectors, which offer support services for their customers.

However, customer input in service development can often be highly useful for the service innovator – even *decisive* in many cases. The study confirms that customer involvement is most important at the early stages of the innovation process (Alam and Perry, 2002), even if it was not extensive. We identified two particularly important customer roles in the ‘search stage’ (de Jong et al., 2003) of service innovation activity. First, customers act as *catalysts* of innovation processes. The new service idea may have been incubated within the innovating service firm, but a concrete customer trigger is

needed to initiate the innovation as a formal project. Second, customers have a key role in the *internal marketing* of the new service idea within the provider organisation. Indeed, positive customer response in terms of commitment to take in use or buy is often needed for the development team to obtain resources for actual development in their own organisation. Lacking a signed service contract, such commitment can in some cases be successfully replaced by middle managers bringing in a customer in person to demonstrate the business case and customer commitment to more senior management. Early support from senior management is obviously important for the time to market and to reduce internal coordination costs.

The study sheds new light on the early stages of service innovation activities. The study shows that not only is the speed of innovation activities important (e.g., Alam and Perry, 2002; de Jong et al., 2003), but right timing is essential as well. When a concrete customer action triggers the innovation process, customers are more likely to be receptive to the new service idea. Further, evaluation should not be a priori regarded as a separate stage in a development process. In many cases evaluation is an overarching activity: Evaluation can very much become intertwined with the selling of the service to a potential customer, and evaluation continues throughout service implementation with pilot, or the first customers. On the whole, it seems that when no extensive up-front investments are needed in development, new services can be implemented opportunistically.

Somewhat unexpectedly, we also identified several instances in which the development, testing and implementation activities took place simultaneously. Such a pattern has been demonstrated in 'consultancy'-type KIBS (Sundbo and Gallouj, 2000; Drejer, 2004). The important distinction here is that these were not 'innovation projects tailored for a specific customer', but rather the decision to merge development with implementation was viewed by the service provider as the best way to develop the new service. While it can be seen as a low cost strategy mainly in use in small companies, this approach can be valid in other contexts as well. As von Hippel (2005, pp.64–76) argues, information about customer need or use environment may otherwise be too expensive to acquire. The question on when such learning in a customer setting can be successfully implemented, and when customers actually welcome extensive development as a part of the service process, deserves careful analysis.

The study suggests that the intensity of customer interaction in innovation activities is not linked in any straightforward way to perceived significance of customer contribution to NSD. Rather, different types of objectives for customer interaction may better explain the intensity aspect of customer interaction in the process. Overall, one of the key tasks of innovation managers is setting clear objectives for customer integration: This seems to be a point worth emphasising, as recent research findings show that direct integration of customers into innovation activities can indeed yield several kinds of benefits for the service innovator – for the new service, for the development process, and for customer relations. Some type of customer potential goes easily unnoticed if it is not specifically looked into – for example, the longer term impact of mutual learning from customer interaction in individual innovation projects.

On a more practical level, considering how even the weak signals from clients can be critical in the early stages, managers should use available methods to improve the 'signal-to-noise ratio', either by quantitative analysis or qualitative, deeper probing of a single case, in order to avoid wasting resources on the one hand, and to more receptively capture new opportunities on the other. Motivating customers to get involved more and

earlier in the process is an issue managers should pay attention to. As demonstrated by one case company, this can be done by trying a consultative approach with customers rather than adopting a sales attitude in the beginning. Particularly in the ICT sector, managers need to carefully consider when partners can provide *valid* 'customer feedback'. One should also leave sufficient room in formal innovation process models (or allow breaking away from them) for potentially ad hoc customer involvement, not to forgo any valuable opportunities of mutual learning from and relationship building with one's customers.

To policy-makers our research confirms that service innovation processes are indeed multiform. After all, innovation happens also in the way innovation projects are managed and structured. And most certainly, rather than focusing on how to boost innovation of any particular kinds of firms, policy-makers, too, should note how innovation happens in the intersection of different economic actors: typically between clients and vendors, but also more and more (as our cases in the ICT industry have demonstrated) by and between multiple actors in the value network (clients, vendors and their respective partners).

The academic contribution of the research is three-fold. First, we provide fresh data on customer roles in NSD in the context of services that do not typically involve intensive provider-customer interaction in the service process. Our study confirms earlier findings that customer involvement is most important at the early stages of the innovation process, provides more fine-grained analysis on customer roles in development activities, as well as shows that customers can and do impact the proceeding of the development process. Secondly, we have demonstrated how seemingly insignificant (not intensive) customer involvement can be highly influential to the overall innovation process, contributing to the debate (see e.g. Howells 2006). Third, the study suggests that the decision to merge development with actual service provision can be exploited in various service innovation settings. We think that the questions of what type of customer interaction is most relevant and how it can be best obtained, organised and integrated into service development and provision, continue to deserve future analysis. An important theme for future research is analysing different formalisations of service innovation processes from the point of view of customer involvement.

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Chapter 7

Open Source Technology in Intra-Organisational Software Development—Private Markets or Local Libraries

Juho Lindman, Mikko Riepula, Matti Rossi, and Pentti Marttiin

Abstract This chapter explores how two organisations have changed their software development practices by introducing Open Source technology. Our aim is to understand the institutional changes that are needed in, and emerge, from this process. This chapter develops a conceptualisation building on the insights of entrepreneurial institutionalism, concentrating on the changing relationships of organisational groups in the areas of decision-making, rewarding and communication. We identify the links between the (1) emerging, yet embedded technology and (2) the underlying institutional decision-making, reward and communication structures. We move the Open Source 2.0 research agenda forward by concentrating empirical work on the nuances of institutional change that open source brings about in large hierarchical organisations. We will discuss the appropriateness of internal accounting organised according to the principle of an open market vs. a local library. We believe that both of these metaphors can support innovation, but different groups will find different approaches more appealing.

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7.1 Introduction

The topic of this chapter is how *open innovation technology*, rather than *open innovation* as such, changes an organisation. We study the institutional transformation caused by the introduction of Open Source Software (OSS) technology (practices and tools) within traditional software development organisations.¹ OSS literature often assumes a “bazaar” of development in a virtual organisation characterised by loose control, openness and community orientation. However, inside a single large organisation, where contributions come from employees or subcontractors, the setting is different. The companies introduce OSS practices and foster the creation of communities to serve their business needs, that is, to create quality products. Such arrangements often imply a looser structure, more open documentation, feedback from the user community and the introduction of agile practices. These developments are corroborated by business arguments of partial outsourcing to the developer community, cost savings from using common (sometimes external OSS) platforms and the possibility of creating industry standards through a wide availability of the finished products.

The phenomenon is important because open source technologies (1) are adopted in large organisations based only on a partial understanding of the nature of the institutional change they enable, drive or necessitate, and (2) are not adopted in organisations because their consequences are seen to include unnecessary or unknown risks. We believe that building a conceptualisation based on extensive fieldwork will enable a better evaluation of these technologies and their contextual appropriateness.

Therefore, our research questions are:

- How can the introduction of open innovation technologies, such as OSS technologies, be leveraged to improve development practices?
- What are the institutional effects of these changes?

To answer these questions, we analyse two cases of OSS technology being introduced within a large corporation. Our goal is to build a conceptualisation of what happens in a hierarchical systems development organisation when OSS

¹We use the terms “OSS-style development” and “OSS practices” synonymously, encompassing “OSS technologies” as a form of open innovation technologies. Our main interest is how these can be used within companies developing products, not necessarily OSS as such. By “OSS technologies” we do not mean the licence of the developed software, but the common infrastructural tools used in OSS communities. The tools include concurrent versioning systems, issue trackers, email-driven and archived communication, and web presence, which all support software development practices similar to OSS in creative commons, but in our cases within a single organisation.

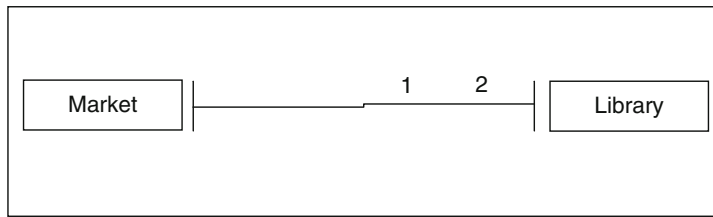


Fig. 7.1 Relative positions on continuum between a market and a library

technology is adopted.² Based on institutional theory (Scott 2001; Greenwood and Hinings 1996), we seek to identify the inertia caused by old institutional forces and the changes in reward structure and the developer and manager mindset needed to realise the benefits of more open development.

This chapter is organised as follows. In the second section, we review relevant literature on OSS technology in commercial organisations. In the third section, we develop a conceptualisation to explain the transformation. The fourth section is about the research approach used. Case findings then demonstrate the links between the embedded technology decision-making and communication and reward structures. In the final section, we conclude how OSS technology is leveraged in the case companies' systems development and identify the accompanying institutional changes.

7.2 OSS Technologies in Commercial Organisations

OSS technologies have been successfully implemented in different organisations and OSS-style development based on distributed and global practices has gained industrial credibility (Fitzgerald 2006). OSS as such is used more and more as an integral part of all kinds of products. OSS development is often characterised by a modular software architecture, distributed global development teams, meritocracy, voluntarism, often elaborate decision-making mechanisms and the technical and legal openness of the code which enables code inspection, bug reporting and maintenance (Fitzgerald 2006). OSS as such is traditionally defined as software licenced under an OSI-approved software licence (Välimäki 2005). OSS practices are practices that emulate development in an OSS community (technical infrastructure enabling communication, reward structures, supporting work and knowledge transfer). OSS practices often include the use of email (and the archives thus

² One of the main reasons for companies to adopt OSS technology is their interest in improving software reuse. At the same time, companies are adopting distributed and virtual teamwork practices and changing their software development processes from waterfall to iterative, thus adopting agile practises (about traditional, agile and open source practises in Barnett 2004). These two changes favour the adoption of OSS tools, but failed to address the challenge of reuse.

available) as the primary communication tool, availability of the code from a source code repository via concurrent versioning system (CVS) or similar, web presence (e.g. SourceForge) and some kind of issue tracker. The main difference between traditional (closed source) and OSS development is that the latter can sustain non-commercial communities as the source code is available to all. The source code might belong to its developer or the community in a way that prevents traditional software licence sales (Dahlander and Magnusson 2005). However, the availability of the source code outside the organisation is not a prerequisite in implementing practices similar to OSS, which are limited to inside a company (Fitzgerald 2006).

Inner source (van der Linden et al. 2009; Lindman et al. 2008) and corporate source (Dinkelacker et al. 2002) as terms refer to OSS practices limited inside companies. Often the introduction of OSS-style development starts with these tools, but as “tools are not only tools” their productive application might require fundamental changes in software development (Sharma et al. 2002). Inside a large organisation (Wesselius 2008; Gurbani et al. 2010) or in a business-to-business setting (Fink 2003) the fundamental differences between OSS and traditional software are smaller than inside small software companies. The licence and corporate policies and processes define how software is acquired, procured, installed, used, maintained and discarded. Furthermore, company guidelines, contracts and/or licences also define how software is developed, remuneration acquired and benefits divided (Välimäki 2005).

In the first phase of OSS commercialisation, companies were interested in ways to directly benefit from the revenue stream created by OSS (Rajala et al. 2006). OSS research has traditionally focused more on individual motivations of the developers and community-driven development than OSS in hierarchical organisations (Stol and Babar 2009). Now in the second phase of OSS commercialisation, the use of OSS-style development processes is gaining a foothold in large commercial organisations (Gurbani et al. 2010; Fitzgerald 2006; Santos 2008).

7.3 Conceptual Framework

Organisations are struggling to balance the possibilities offered by OSS technology, but research efforts have only recently started to focus more on organisational issues in large hierarchical organisations. We draw on literature streams of institutional theory and focus on entrepreneurial institutionalism to understand the phenomenon in organisational context.

7.3.1 *Institutional Theory*

Institutional theory views institutions as “*multifaceted, durable social structures, made up of symbolic elements, social activities, and material resources*” (Scott

2001, p. 49). Institutional structures, such as reward and communication structures, are set up by regulative, normative and cultural elements or pillars (Scott 2001). Institutional theory (Powell and DiMaggio 1991) has been accommodated to explain change (Greenwood and Hinings 1996), even though it has been criticised for mainly focusing on “convergence” (similarity). It should be noted that institutional theory is far from a monolithic tradition (for a more thorough discussion about “old” and “new” institutionalism, see Powell and DiMaggio 1991; Greenwood and Hinings 1996).

Institutional theory underlines the “relationship” between an organisation’s normative context and the varying interests of the groups (stakeholders) within the organisation. Functionally, different groups in organisations are not neutral towards each other, but instead the technical boundaries of the groups are reinforced cognitively (Greenwood and Hinings 1996). Our conceptual framework draws on institutional theory (Scott 2001) and social constructionism by analysing the concept of an “organising vision” (Swanson and Ramiller 1997). There are tensions between the traditions of institutionalism and social constructionism, but as Scott (2001) notes “choice [in organisations] is informed and constrained by the ways in which knowledge is constructed...” We posit that while normally the actors and proponents of organisational change truly subscribe to OSS inspired values for the better, “the OSS spirit”, they are also renegotiating the exact meaning of OSS to fit the organisational context. These negotiations can be understood better by analysing the term “OSS” as a justification for organisational change. The exact meaning of adapted OSS is renegotiated and implies changes in the allocation of resources and the division of work between units.

7.3.2 Entrepreneurial Institutionalism

Research in institutionalism, which focuses on change, is called entrepreneurial institutionalism. It is a response to the call for institutional theory to focus more on agency and organisational change (Garud et al. 2007). Work on institutions has traditionally focused on continuity (Garud et al. 2007, p. 960). In contrast, work on entrepreneurship has focused on change. In institutional theory, this contrast of structure and agency has been identified as the paradox of embedded agency (DiMaggio and Powell 1991). One solution to this paradox is to view structures as platforms for change rather than constraints (Garud and Karnøe 2003).

Any new technology is a change in the status quo, with winners and losers. The meaning of organisational visions (Swanson and Ramiller 1997) is renegotiated within the boundaries of a certain language community and draw on local discursive resources. OSS technology is an organisational tool that stresses local issues regarding software production in the context of a certain organisation. OSS also provides ways of addressing these issues. It can be seen as a metaphor used in an organisation that is making sense of its changing business environment so that it is able to operate in it. OSS often offers a promise of a more agile development

approach, more contribution, more open discussion and less hierarchy in software development. In short, it gives certain justifications, reasoning and opportunities to a decision-maker faced with difficult decisions concerning reorganisation or introducing a new organisational innovation (Van de Ven 1993).

We use the institutional entrepreneurship lens to identify how the meaning of OSS technology changed during implementation and how our two organisations evolved when OSS technology was institutionalised. We aim to provide insight on the process of OSS technology institutionalisation and the underlying changes. In order to explain the institutionalisation of OSS technology, we focus on three structures within the companies: the reward, decision-making and communication structures. However, we do not claim that these would be easily separated entities.

We chose the different organisational groups to highlight their different interest and incentives in the process. The different selected groups (stakeholders) are (1) the technology provider unit (the central group), (2) the technology user unit (business unit) and (3) the developer/users.

7.4 Research Approach

The nature of our research problem, human behaviour and interaction led us to use a qualitative research approach (Seaman 1999; Klein and Myers 1999). We chose a case study approach and adopted the principles of interpretive case studies.

Practical Tip

When planning organisational changes, understanding the current situation makes transitions processes smoother. This is especially true when a specific technology related to innovations is being adapted. Identifying and mobilising the different stakeholders require on-site research of the different organisational groups involved.

We applied semi-structured thematic interviews as the main data collection method. Two to three people per case organisation were interviewed on three occasions over two-year intervals to better capture the nuances of the changing organisation. We stopped interviewing after the 14th interview, because recent interviews did not convey additional information regarding the actual events. Research design can thus be considered longitudinal. The first interviews were gathered in 2006 and the second round of interviews was conducted in 2008. The final round took place between 2010 and 2011. Most interviews lasted about 1 h.

The interviewees represented three different organisational groups, one person from the service provider group, one from the service user group and—except for the last round—one from the developer/user group. We chose managerial

respondents from the business and central groups to gain an understanding of the management rationale for introducing OSS technology. The developers were included to bring in the user viewpoint.

One of the researchers works in one of the case companies and was therefore able to provide access to the organisation and, as a “native”, reflect on the organisational context. We were very careful to eliminate any bias this connection might bring to the setting. In addition, we used secondary data obtained in the course of the industry research project, such as project descriptions, manuals, portal usage data, documentation and visits to the sites to familiarise ourselves with the setting.

In the first two rounds, we analysed the interviews by first recounting the organisational history and change as described by the respondents. We circulated the transcribed interviews back to the respondents, so they could correct the views should they have been misinterpreted. The last round mainly focused on what had changed since the previous rounds of interviews.

The systematic analyses were based on pattern matching recurring themes between different interviews and then categorising the data according to the themes.

The themes we focused on were how the respondents talked about (1) instituting new technology, (2) changes in the communication media and the reward structures between units and individuals and (3) changes in the different ways the respondents described their group involvement. The authors extracted all the instances where the respondents talked about the themes and reported their findings.

We classified the findings into three areas: (1) how OSS technology is renegotiated to fit the organisational context and how OSS infrastructural tools are used inside companies, (2) how the respondents saw the change between business units and central unit and (3) how the respondents described the reward, decision-making and communication structures as both a platform and driver of change.

7.5 Cases

The two cases were selected among the partner companies of the ITEA-COSI project, which also set the context and enabled access to the case companies. ITEA-COSI was a joint academic and industrial project focused on software commodification.

7.5.1 Philips Inner Source

The offering of Philips Healthcare (PH) consists of a wide variety of medical systems, for example, X-ray technology, ultrasound, magnetic resonance and

information management. The factory-pre-installed software is customised and configured, but not sold separately. PH normally maintains the software for 10 years, which often leads to a large installed base and makes large changes very complicated. PH is maintaining and developing a large software base including a set of software components reused in all business units.

Historically, components were developed in a central software group (Wesselius 2008). In this configuration, it was difficult to manage the different development activities and unaligned roadmaps. Lack of required domain knowledge in the central group made asset reuse difficult.

To solve these two issues, the business units started to contribute to developing new software assets. This would enable the business unit with the best domain knowledge to develop the software and then add it to a shared portfolio. Business units would not have to wait for the central group to develop the (often rushed and high priority) asset. OSS technology (tools and practices) was introduced in PH to legitimate the change.

The division of work was based on the idea that the central group was responsible for the common platform and business units to develop add-ons, customise and configure the software. Components are distributed via intranet, email, ftp and CD. Business units choose the components for use, customisation and configuration. Different groups offer services to each other (e.g. support and maintenance) based on agreements between internal customers. Developed software was also made available to other business units. One of the main benefits of a common platform is that it would avoid duplicate work and promote the reuse of software. Co-development activities with business units and central group were favoured in order to benefit from organisational learning.

There were also certain risks involved mainly dealing with the distributed setting. The central group would become more dependent on several business units at the same time. The overall quality would be more difficult to control, if business units only made stand-alone add-ons. Business unit incentives were also un-aligned, as it seems that there is no guarantee that units would actually contribute back and not only use the resulting code. This applies also to the maintenance of the software asset and balancing the maintenance between business units. The scenario where one business unit is putting a lot of resources and effort into development and maintenance, but all the business units would use the outcome was considered problematic.

The communication plan was to be as explicit as possible and share information with all the interested parties. Co-development activities required informal discussions between developers, but broader issues were decided in formal settings, such as steering groups and operational teams. There were also formal architect meetings and a monthly platform group meeting in which all interested parties could participate. Information was also posted on the intranet and PH mailing lists. Marketers who were chosen per business unit acted as a back channel of communication to gather feedback in case of problems. Development work is somewhat controlled by steering groups and operational meetings, but development was mainly driven by business groups which need new functionality.

A few years ago, a new scheme was developed for sharing the development costs. The old model was based on centralised component development and a component tax where the central group did not have profit targets (Wesselius 2008). The central group performed maintenance of the components. The component tax levied from business units was based on component development and maintenance activities and on an agreed upon roadmap on a yearly basis. Based on the relative amount of component usage and the size of the unit's external sales, the estimated costs were then distributed among the business units. Users of old component versions paid more for maintenance to offset the burden of maintaining many old versions.

When moving to an inner source approach, the component tax model is not ideal since it does not promote contributing to the shared component base. A business unit that contributes a reusable component has to make an extra effort to make the component reusable. Business units have profit targets, and investing resources to make components reusable is conflicting with these targets. It was not clear which group was expected to perform maintenance for the contributed component or allocate the maintenance resources. If the contributing business unit has to do the maintenance, this will again add costs to the unit. However, making the central component group responsible for maintenance would require this group to build competences for maintaining software components developed by other groups. The central group would be enlarged and take away the domain experts from the business units.

7.5.2 *Nokia iSource*

Nokia is one of the leading mobile communications companies. It is a publicly held company with listings in five major exchanges and in 2004 (prior to the merger of its Network unit with Siemens to form Nokia Siemens Networks or NSN) its net sales totalled EUR 29.2 billion. We study the organisational changes from the viewpoint of technology adoption and focus on the role of the source code portal called iSource.

The idea to adopt collaborative development utilising open source software practices was presented to Nokia in the early 2000s. It was encouraged by the positive experiences when adopting open source practices in a company context (Dinkelacker et al. 2002). The aim was to tackle the challenges of reuse and cost-effective re-development of software with multiple parties. These challenges are typical of centrally developed platforms that multiple services use for a long period. At a time of the study, Nokia had several application platform concepts. Several research projects contributed to MITA (Mobile Internet Technical Architecture), Mobile Platforms unit delivered platforms to mobile phones and Nokia Networks had worked with, for example, DX200, NMS, NEMU, Flexi- and TSP platforms.

The iSource portal, meant to support collaborative development, was piloted in research projects and promoted company wide. A corporation-wide iSource service

was established in 2003 by the Nokia IT department to support infrastructure and to promote the portal tool. A service level agreement was made between the IT department and the business units. Creation of the iSource service adds the third organisation group which we use in our analyses, in addition to the perspective of business unit and individual developer.

iSource is a corporation-wide source code portal for agile, fast cycle, multi-site software development (Lindman et al. 2008). The main idea behind iSource is to provide a portal enabling visibility of software and the source code inside the company. The goals are to increase engineers' awareness of software developed inside the company and to boost innovation by avoiding the problem of reinventing the wheel. iSource's origins are in the free version of SourceForge that has been later upgraded to GForge. The web portal integrates a set of tools for use by projects, including version control tools (Subversion, CVS), issue tracker, mailing lists (Mailman), forums and file management. Today both Nokia and NSN have their own corporation-wide instances of iSource.

The adoption of iSource can be divided into two phases: "bottom-up" adoption (2001–2006) and "top-down" introduction (2007-). These phases also reflect the need for portal tools, the maturity of the environment and the company's trust in open source software.

First adopters of the portal have been leading edge research projects that were co-working with universities and research institutes. iSource has been easy to implement in small projects, especially if co-workers were using the same tools. The iSource service released projects from the need to manage their own tools and infrastructure. The portal also provided a controlled way to work with external parties. Several projects that were first developed inside a company were open sourced later (e.g. Maemo and Python for S60).

Since the joint merger of Nokia and Siemens in 2007, the focus of the service has been on launching subversion for company-wide use. During the "top down" phase the iSource portal was deployed for traditional software development driven by cost optimisation and simplification needs. Business units started to make their decisions to transfer to iSource from more complex and expensive commercial tools.

7.6 Analysis, Findings and Discussion

On examining the cases in our study, it seems that OSS *technology* has become institutionalised in both organisations, even if detached from the classical style of developing OSS as an open endeavour. New tools have gained acceptance, provided inspiration and become familiar to the developers. Both case companies use OSS tools and processes as a way to promote software projects inside the organisation.

Table 7.1 Renegotiating the term “OSS”

	Classical “OSS”	Renegotiated “OSS” both at NSN and PH
Reward structure	Mostly voluntary task assignment, peer-recognition, occasionally sponsored development.	Designated projects, contributions based on employment contracts and task assignment, development costs shared based on negotiation between actors, if at all.
Decision-making structure	Meritocracy, loose command structures, debates sometimes leading to crises; developers walking away from poorly functioning projects and contributing to the more attractive ones.	Hierarchical, traditional corporate chain of command, partly based on technical expertise. Some signs of seeking more consensus, though. Resources assigned to projects in project/matrix organisations.
Communication structure	Open discussion email-lists, open message boards, web-presence of projects, open documentation, open training materials. Email and instant messaging.	Intranet, visibility to selected partners who share the development costs. Use of modern <i>de facto</i> corporate communication tools such as email, instant messaging, voice calls, video conferencing etc. Some constraints due to not all information being public.

7.6.1 *The Meaning of the Term “OSS” Is Re-negotiated Locally*

In retrospect, we can see a process of implicitly renegotiating the meaning of the term “OSS” to suit the organisational context. The adopted practices do not resemble OSS as understood by the “classical OSS movement”, which was based on voluntarism, peer recognition and public discussion. Instead, the OSS technology institutionalised in these two cases supports designated projects based on employment contracts. Costs are made visible and cost sharing between units is based on agreements between units. The differences are summarised in Table 7.1.

As summarised by Table 7.1, the reward and decision-making structures are quite different, whereas the communication structure remains largely the same when we compare the two cases to pure-form OSS projects.

In one of the two case companies, promotion of OSS technologies was a way to sell the organisational innovation—the inner source approach—to the affected parties by aligning the change process to fit the agendas, and to serve the interests of three key groups: the business units, the central unit and developers. As a result, the changes needed for the new software development processes seem to have been easier. Despite this, some groups are interested only in the tools per se and ignore the opportunity to share components on the inner source platform. One of the interviewees suspected that the main reason for such reluctance to share the results is in the traditional project resourcing: if a group’s task is, and its success is measured by, the delivery of projects in a given time, budget and scope, then this gives no time or money to maintain or support the components in the library.

Once the component projects have already been finished, the resources will have been moved on to new projects and support is no longer available from the developers most familiar with the component.

Practical Tip

How “OSS” is renegotiated locally emphasises how important it is to reserve enough time to go through the change related to the local practices in any innovation technology. The process of learning related to the new technical infrastructure and in the way of working is likely to take some time and organisational effort.

In the other case company, the promotion of the inner source approach was done more explicitly as a process change: a rationale for enabling easier reuse. Along with this process change came the technologies that are now de facto standard corporate tools (such as SVN as the version control tool). Their challenges have been on a higher level as the organisation has grown through acquisitions and thus the development practices have been quite heterogeneous to start with.

7.6.2 The Market Versus Library Metaphors

The inner source approaches were specifically geared towards enhancing reuse, but they present the management with an incentive issue: basically, why would a business unit contribute its developments to the inner source platform?³

We saw that bundling attractive tools to the platform is a way to sell the proposition of sharing. Nevertheless, the issue of support and maintenance remains—what is in it for the contributing group? We identified the metaphors of a private market and a local library to highlight two very different ways in which these technologies become institutionalised.

In a private market, the internal units can place their components on sale in the inner source system, and see who, if anyone, is willing to buy the component at the given terms addressing use, support and maintenance. Unlike in a public market, we'll assume that in a private market there is no (or at least much less) fraud, and therefore the components can be posted openly for anyone to view, inspect and try out, but as soon as the component ends up in another group's product, this will have an internal accounting implication as per the terms and conditions agreed between the buyer and seller units. This can solve the basic incentive issue, but still leaves

³ In the classic, pure-form OSS development the motivational factors are quite well known, including fun and enjoyment, peer recognition and so on, but these do not directly transfer into the corporate setting where business unit leaders make such decisions.

the resourcing problem with support and maintenance: typically, a contributing unit would move on in its product development and the resources previously allocated to a given component will be reallocated to another project and other components, not allowing much time to be spent on support and maintenance of the old components. However, the currently prevailing model is still far from a marketplace and closer to a local library model. The old component tax model is still effectively in use and brings in a price element from the market metaphor, since at least the heavy users need to pay more.

The practical difficulties of adopting such a model aside, if a particular group's components are in such high demand that others are willing to buy them at a premium, seen from the perspective of overall efficiency, it would make sense for this group to focus on maintaining these components instead of starting new projects. Additionally, in hopes of more revenue, units would be promoting their components and their development on the intranet (if not globally and for all on SourceForge, for example) already before they are finalised, and thus one could expect the search costs of the users to be lowered.

The library metaphor is closer to the classic OSS licensing model: use of components is free; someone just needs to develop and contribute the components to the library. In a corporate development hierarchy, one can find platform units that get their annual budget irrespective of the *actual* and immediate use of their components in the library. This obviously does away with the time and effort needed to negotiate between the contributor and user, but the main issue is now in central decision-making: How much should be budgeted to what kind of development, and who are the people that will get the budget to perform the job? And who should make that decision?

Perhaps we should view the private market arrangement as a promising one for highly differentiating and value-adding components, whereas “corporate commodity” components could be freely distributed in a library without complicated negotiations. If the market and library metaphors are seen as extremes of a continuum, then the two cases could be placed on that continuum roughly as follows. (1 = PH, 2 = NSN).

The private market metaphor is an appealing one—although it is in contradiction with the classical OSS spirit—and it is not surprising that in the other case company this was seriously considered. After all, it does present some benefits of open innovation (ideas flowing freely, quick diffusion of inventions to enable incremental innovation, reuse) while addressing the appropriation in a fairly practical manner.

7.7 Conclusions

In this chapter, we have identified and described different ways in which OSS development practices can become institutionalised in a commercial organisation. The literature emphasises the changes brought by OSS-style development when

compared to traditional development approaches in hierarchical organisations, but our data suggests that the introduction of OSS technologies and development practices has changed the two case organisations surprisingly little. However, the meaning of the term OSS has undergone considerable changes. We identified the metaphors of private markets and local libraries as to how resources should be allocated inside organisations. Our respondents explicitly used both these metaphors when they made sense of the organisational change.

These two development organisations are embracing OSS technology in a way suitable for them: more tools, components and terminology are being adopted little by little, but the basic mode of operations still remains the same. There is no radical shift to the OSS mindset, but a slow one towards a more open and collaborative working style, coinciding with more open communication (and, simply, more communication) and a more democratic, consensus-seeking decision-making. Rather than claiming that OSS as such or OSS technologies would have changed everything in the organisational ways these corporations do software development, we would argue that the same technological and societal developments that have contributed to the proliferation of OSS are now becoming institutionalised in hierarchical businesses.

The organisational inertia—most notably the one resulting from the way budgeting and project management are performed within a large development organisation—can be used to explain how large development organisations mould and redefine “OSS” to fit their old trajectory. It seems that companies have considerable leeway and interpretive flexibility in determining what their processes are like, even if they were labelled as open.

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Sharing Source Code with Clients: A Hybrid Business and Development Model

Mikko Rieppula, Aalto University

// A practical hybrid licensing model helps both business-to-business software vendors in vertical domains and consultancies that maintain separate quasi-products to benefit from interaction with select clients. //



USER INNOVATION AND customer-centric development are hot topics in software and almost all service sectors, manifested by growing interest in crowd-sourcing and user-contribution systems.¹ However, success stories of companies that have switched from a traditional closed-source to an open source software (OSS) business remain scarce.

Access to source code will likely increase—especially in commoditized software markets—but without the software being released as OSS. Companies are becoming more comfortable working with inbound OSS and adopting OSS-like processes. For certain

types of products and vendors, *client-shared source*—a hybrid between the traditional and OSS business logic—can present a new opportunity.

Consider a business-to-business (B2B) software vendor whose clients are willing and able to modify source code. The client-shared-source model is particularly applicable when the vendor must customize or extend the product for many clients—for example, in different regions or industry sectors. In this situation, the customizations or extensions are many and varied, yet potentially reusable by other clients not in direct competition.

The client-shared-source model is a potential development and business model with practical implications for software architects, developers, and especially development managers. It's not yet common, but I predict its emergence on the basis of recent OSS and innovation research as well as my own research and experience in telecommunications software. This model can be implemented by vendors of less differentiated products and by consultancies and integrators doing similar projects for different clients, the results of which have been traditionally maintained as separate quasi-products.

In the client-shared-source model, the vendor lets clients access the source code—and more—through a common platform. Scott Cook uses the term *user contribution system* (UCS).¹ Satish Nambisan, Priya Nambisan, and Robert Baron urge us to profit from *virtual customer environments* (VCEs) in product idea generation, development, testing, and support in almost any business domain, not just software.^{2,3} Both approaches aim to engage clients in product or service development and delivery. We can regard the client-shared-source model, or its supporting infrastructure, as a case of implementing a software-specific UCS or VCE. However, giving clients access to source code has fundamental implications for a firm's business logic and how it should design, develop, and manage its software.

The Changing Landscape

In the early stages of any high-tech industry, market success depends on product innovation based on proprietary technology. Most software vendors share this background. However, once a dominant design emerges, commoditization begins. To remain competitive, companies must innovate

with marketing, efficient operations, after-sales support, and so on. The focus moves from product innovation to business innovation. This is where many software vendors stand today. For them, this has typically meant services around the core product.⁴ However, it increasingly means new types of licensing and delivery methods—for example, software as a service (SaaS), cloud computing, or even OSS—that is, new business models. Client-shared source can be such a differentiating aspect for some vendors.

Open Source Is Here to Stay, but Not Everywhere

Today, the question is no longer whether OSS can survive but mainly what kind of software might become available as OSS and under which kind of license. We haven't seen OSS much in industry verticals—that is, in low-volume, complex, domain-specific applications.^{5,6}

Various OSS business models have emerged. The usual model is based on services—for example, support and maintenance, or customizations. Another is *dual licensing*, in which the same software is simultaneously available both for free under a viral license such as the General Public License and for a fee under a nonviral license that probably requires assigning rights to any incremental developments back to the vendor.

User innovation is a distinct benefit of OSS to both the original contributor (vendor) and the user. Knowledgeable, motivated “lead users” can often best determine how to improve a product and, sometimes, even how to modify the source code.⁷ Because they aren't in a position to market their own small incremental developments, they're happy to contribute them back. Also, companies participating in OSS projects often want the community to maintain their incremental developments so that future versions remain compatible with

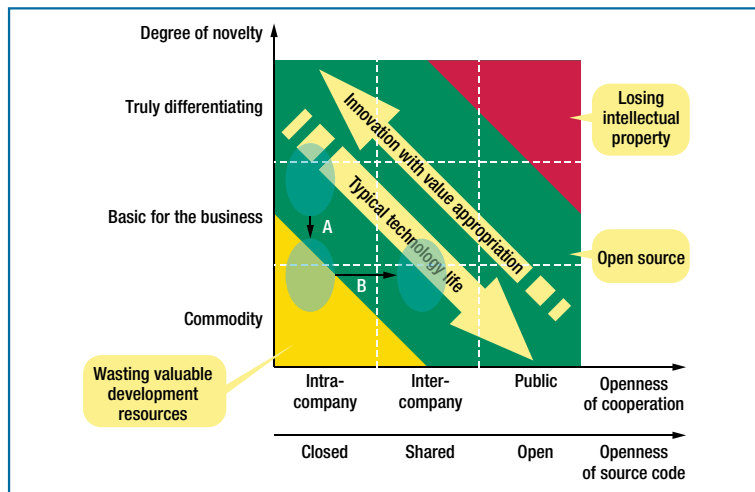


FIGURE 1. The shift from differentiating software to commodity over time, with the two corners to avoid. The x-axis represents the level of openness in cooperation; the y-axis indicates the software's degree of novelty (adapted from the work of Frank van der Linden and his colleagues⁹).

their needs. Such companies are driven by commercial self-interest as opposed to purely intrinsic motivation.⁸

Most Software Is Fast Becoming a Commodity

A good recipe for business failure is to market a product while remaining unaware of how other solutions address the need. Development managers should realize that the most cost-effective way to address their clientele's needs is often with someone else's software.⁹

Figure 1 demonstrates how the typical technology life cycle results in commoditized software. The development of already commoditized features is a waste of resources (yellow). By definition, such functionality is cheaper to obtain through licensing or might even be available as OSS. Releasing differentiating software too openly is asset leakage (red). The x-axis can be regarded as a question of code ownership and source code availability, not just as a question of technology sourcing.

Traditionally, software development has fallen in the left column. Too many software businesses have unwillingly descended into the yellow zone

(transition *a*) and entered fierce price competition.

When lacking product innovation capability, a software vendor should examine how the other two columns relate to its business. Instead of discussing pure OSS (the right column), I focus on involving your clients (the center column, transition *b*) as a way to stay in the green zone in the present era, in which many companies are comfortable adopting OSS-like practices and collaboration tools.

Client-Shared Source

The term *client-shared source* refers to this arrangement:¹⁰

- Access to source code becomes part of the business arrangement at a price that's typically higher than that of a runtime license. Thus, the client pays for the right to have the source code and participate in a restricted client/developer community. The vendor continues to sell regular runtime licenses.
- Suppliers (employees and outsourcing partners) provide their work as nonclient participants in the

community, using OSS-like processes and tools.

- The software vendor requires, or at least expects, participants to assign copyright to all incremental developments back to the vendor, as in OSS dual licensing.
- The participants can't further license the source code to third parties.

The license agreement might be limited to the client's internal use, or it can even allow granting runtime licenses to third parties, whether under the original vendor's or client's (reseller's) brand. So, resellers and integrators can similarly act as participants. The vendor should also use the same technical platform for sharing much of the documentation from requirements analysis all the way to testing.

The vendor might even pay a motivated client who substantially contributes to product development. However, for access to the platform, vendors

to contribute, lower maintenance and support costs, and so on. Such licensing can instill the client's trust in the vendor¹¹ and naturally eliminates the need to negotiate separate, potentially costly, source code escrow arrangements. However, don't expect clients to pay high premiums until you have a working community!

You can extend the basic model to cover, for example, joint requirements analysis and testing, which would be good examples of customer-supplier relational processes¹² or a case of "an overarching VCE."³ Empirical research has also found that interactions by and between clients in value co-creation can be an important source of value and shape their future participation in such co-creation.³

The closest equivalents to client-shared source in current industry practice are the development licenses software vendors grant to their close partners—for example, integrators. Unfortunately, these usually don't capi-

By opening up your bug- and issue-tracking tools to clients, you further instill trust in the client relationship.

should charge clients a positive fee, whether fixed, recurrent, or proportional to the client's use of the product. The price can no longer be tied to a specific software version. The vendor should then award any particular client's contributions on a per-task or results basis, just as it would reward subcontractors, if at all.

So, clients will support the software vendor, which can still extract more license revenue owing to the higher value associated with a source code offering. Too good to be true? The higher value to the client is explained by user innovation and the participants' self-interest

to contribute, lower maintenance and support costs, and so on. Such licensing can instill the client's trust in the vendor¹¹ and naturally eliminates the need to negotiate separate, potentially costly, source code escrow arrangements. However, don't expect clients to pay high premiums until you have a working community!

Finally, I must mention Microsoft's "shared source" initiative. The reasons for Microsoft's offering their "shared source" differ considerably from the above logic as Jason Matusewicz outlines.¹¹ We shouldn't generalize on the basis of any example set by such a dominant vendor; few Microsoft clients could ever expect to get their own incremental developments incorporated into subsequent product versions.

Challenges and Limitations

Client-shared source can only be envisaged in a B2B setting in which the clients are willing to work with the source code, either with in-house or outsourced development resources. Clients might have vested interests in, for example, critical operational support systems over which they need great control or resale opportunities. In both cases, the clients benefit from direct access to the source code and the closed development community.

Not all the motivational factors that have led to successful OSS projects are automatically present in the client-shared-source setting. Clients might well expect the original vendor to provide the mundane but necessary support tasks. Research in a similar context revealed that the primary motivations for contributing code were reciprocity (the obligation or desire to conform to the community's norms) and future improvements (to retain compatibility and benefit from expert discussions).¹³ Less surprisingly, participants were clearly driven by need as opposed to fun and enjoyment, as is often the case in OSS projects.

In the beginning, clients that aren't used to working with OSS projects can be expected to jealously hide their new developments against their own best interests. Dialogue and facilitation are recommended.

The software vendor must take an active role in quality assurance and resolving conflicts among participants' incompatible developments. There's a definite need to find the right balance in how the vendor handles the community because the participants' sense of fairness can supersede their economic self-interest.^{3,14}

Implications for Developers and Managers

The client-shared-source model poses additional requirements for internal developers and development managers.

Managers should be happy to see these being taken into account, considering the promise of benefiting from external resources in exchange.

Software developed in a shared-source community must exhibit a fairly clean, modular structure if paying clients are to further develop it—for example, by writing add-on modules or localized implementations. Clear APIs are nice, but when sharing source code, you don't necessarily need to implement them as runtime or linked libraries. The most important thing is to document the interface design, which, for performance and convenience, can still be implemented in compile-time code.

Designs based on widely adopted programming paradigms stand the best chance of success. If your company has developed an elaborate programming framework with a steep learning curve, consider whether your clients will make the effort to learn it. The more clients you expect to attract, the simpler it must be and the more universal the required tools should be.

Revision control and configuration management are cornerstones of any well-working collaborative environment; by now, the industry has learned how to master them even in distributed environments. Tool support exists, whether based on de facto tools such as svn or others, and many tool vendors offer complete platforms for collaborative development—for example, CollabNet.

However, some subtle points can be of major importance. The style of the documentation, including code comments, might need cleansing to avoid revealing business secrets, offending particular clients, containing strong language or any “self-incriminating” text, or inadvertently infringing on any third parties’ (secrecy) rights or interests. Managers should make a high-level code review to ensure that what’s being sold as source code is actually the

vendor’s property. If parts aren’t, the company must procure or negotiate a license that lets them be shared in the source code, if necessary.

Finally, by coordinating testing among clients, you can better benefit from their help in all areas of testing. Develop testing plans that clients can execute on those pieces of software that

zaar. Here are three options.

The first is to incorporate the changes into your main branch of development; your clients have a clear interest in giving you the source code to maintain so that they don’t lose the respective functionality in subsequent upgrades. Because you gave them access and incentives, they can even do this

After all, what your company is
(or should be) selling
is a transparent relationship.

they’re most interested in using. Establish policies as to what level of testing you expect them to perform before they make their incremental developments visible to the rest of the community. If you can centrally manage the information on your clients’ testing, you can direct your own testing into areas they haven’t covered, while winning time with your limited testing resources. By opening up your bug- and issue-tracking tools to clients (while managing their rights at the appropriate level), you help them fix issues critical to them (even if those issues were less critical to you and others) and further instill trust in the client relationship. After all, what your company is (or should be¹²) selling isn’t just the product or the source code but a transparent relationship in which clients have a concrete say in your product roadmap.

By now, you’re probably worried about your ability to manage the software as it evolves with different clients. In business terms, if your clients have the need and ability to customize the software, then having multiple variants out there satisfying different needs is fundamentally a good thing! As software engineers, we obviously prefer a common codebase, whether it’s a vendor-controlled one or an OSS-like ba-

mostly by themselves. You just need to decide how much control you want to retain over such code commits. At minimum, you should oversee who’s allowed to do what in the meritocracy of your own developer community.

The second option is to conditionally include client-specific features. If you suspect not everyone would be thrilled about the changed functionality, let your clients choose their preferred way, be it on a separate user-settings page, in a configuration file, or even by compile-time directives. Even mutually exclusive features can be reconciled into a common codebase—the question is just at what level.

The last option is to isolate client-specific changes from main development. Occasionally, you might come across a quick-and-dirty workaround to a strange client-specific problem you’d rather not see in your code. First, think twice—has the product found an unanticipated application area? If not, isolate it, but help your client reapply their local patches systematically whenever they upgrade the software.

The point in setting up a shared development environment is, of course, to promote the first two options over the third. When you decide to market a certain baseline as a new version, don’t

forget your existing shared-source clients who already have access to the latest code but might have deferred deployment of newer versions precisely because they have custom developments they want to protect. By convincing them to upgrade, you might not get much immediate cash from them. How-

vendors and clients.¹² They challenge the predominant view of a solution as a customized, integrated combination of goods and services for meeting a customer's business needs, and they demonstrate how suppliers' and customers' views of solutions typically differ. According to their empirical study,

This also allows for more freedom in choosing support and maintenance partners. The service house might lose in short-term turnover but win in development costs and long-term competitiveness.

In vertical domains, business requirements are more complex and demand more specialized knowledge. Compared to general-purpose, horizontal OSS, much less OSS has emerged in and for vertical domains.^{5,6} This might imply that we're going to see more client-shared source and other hybrid models still leaning toward the traditional, closed value appropriation models than OSS, particularly in vertical domains. Certain types of businesses also exhibit what researchers call *network externalities*: the more users, the more value to each user. Technically compatible companies can benefit from such network effects; an alliance formed around the same software is the most compatible of all.

In business terms, having multiple variants satisfying different needs is fundamentally a good thing!

ever, you have the ideal opportunity to exercise the first two options for both your and their benefit: your product gets the new functionality, and they get compatible upgrades.

Getting Started

In the beginning, the vendor must alleviate its new shared-source clients' concerns and provide them with a gradual transition until the offering is solid and self-evident. Some clients might regard the license terms as fair up front. Others might see it as an interesting partnership opportunity but need to be offered small perks as they cling to the old mindset: "If I give you something, you should give me something in exchange." Carefully plan how the up-front premium for getting the source code, the associated limitations, the yearly membership fee, and so on will evolve over time and number of participants. To ease bootstrapping, you might want to entice the first customers by not charging extra license fees, just to show you have a community. After all, your offering's value grows with the number of active participants in your community.

Discussion

Kapil Tuli and his colleagues have examined what "a solution" means to

customers tend to view a solution more broadly as a set of customer-supplier relational processes.

In Tuli's and his colleagues' research, "a supplier had noted the importance of flexible source-code software as an enabler of effective solutions."¹² Client-shared source shouldn't be viewed as an end solution to the problem of declining profits or resource-consuming maintenance but as an enabler of and means for truly client-serving solutions and lasting client relationships.

Client-shared source could also be a way for IT consultancies to capitalize on their client-specific projects and quasi-products. The same market change factors are at play for service houses as for software product vendors. Although IT systems are critical, they're seldom differentiating in the banking or telecommunications sectors, for example. Service house clients no longer have a strong interest in requiring strict confidentiality and sole ownership of their custom information systems when the systems in question aren't strategically differentiated anymore. The clients' investments are lower and better secured if the systems aren't custom ones but are maintained (even if in low volumes) as products whose development and maintenance costs are shared across multiple par-

Despite the recent interest in purely free open models, user innovation and participation are not a priori incompatible with premium licensing schemes. Market pressures might well make the client-shared-source model more popular among vendors whose commodity products are suitable for such collaborative development and even among consultancies, who could thus better leverage their quasi-products. Programming is no longer such a rare or expensive skill that someone with a specification and the willingness couldn't devise a software product similar to (or better than) yours. So, don't be so jealous about your source code! There's probably much more value in your client relationships (just as there is in knowing your clients' specific requirements), and client-shared source is one way to nurture them.

I've tried to assess the client-shared-

source model's applicability in terms of product type and company and market attributes. The challenges aren't insurmountable to many innovative companies. Most (successful) companies shouldn't open up their source code even as widely as suggested by client-shared source. Client-shared source is a mid-tier solution for the "me too" companies, particularly in vertical domains, who don't have or foresee significant differentiators in their core product. It will enable them to survive and develop new profitable business by incremental improvements. Client-shared source certainly doesn't represent such a radical leap of faith as a transition to a pure OSS model would require. At the other extreme, given enough commoditization, one of the pure OSS business models might be a better bet even if the chance of success is slim—but that's what commoditization in the extreme implies. Besides, nothing prevents doing that later, so if you've been contemplating releasing something as OSS, you should probably first try client-shared source. ☺

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Innovation activities in product and service development, not least in the software sector, have become and are still becoming more open and customer-oriented than before.

Part I of this dissertation clarifies how we should increasingly view all goods as services, how services are and often should be productised, and how in information systems science the products-or-services discussion and terminology have taken on special meanings that are not always shared by innovation researchers and service scientists. It also presents a more robust definition for the very concept of innovation in general.

Part II comprises four research publications on the details of value creation and perception, service innovation typologies, approaches to customer involvement, implications of adopting open-source tools and practices, and hybrid licensing models or limited openness in commoditised products with scarce innovation opportunities.



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