Open Innovation and Control: A Case from Volvo

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Abstract

The concept of open innovation has gained widespread attention in different research communities. Nevertheless, it is based on a relatively thin theoretical base dominated by aspects of organizational and intellectual property strategies. Building upon a longitudinal case study, this paper provides an example of open innovation from the Volvo Group. The vehicle manufacturer joined forces for inter-organizational collaboration with a telecommunication operator and a telecommunication infrastructure provider in order to nurture the innovation of vehicle services. Ten years since its formation, this study provides an interpretation in terms of open innovation and illuminates several implications. By focusing the case on IT aspects, we show how the chosen system approach inscribes a high level of control that does not nurture distribution of new vehicle services among other stakeholders. The paper contributes to nuance the understanding of open innovation and in particular demonstrates the role of IT.

1. Introduction

Open innovation [1, 2], i.e. organizations opening up their boundaries for inflow and outflow of knowledge, has gained attention as a strategic way of enhancing the innovation process and creating new business models. A number of reasons are driving organizations to adjust themselves toward more open and distributed innovation processes: for instance globalization, technology intensity and complexity, technology fusion and knowledge leverage [3]. More openness in the innovation process has been adopted by organizations with the aim of developing more complex, creative and value-driven innovations in shorter time and with lower costs. The notion of open innovation is often applied in both academia and the industry to define these organizational forms. However, this usage has lacked a shared frame of reference and has been based on relatively thin theoretical base [4]. Despite companies’ increased interest in open innovation and a handful of best-practice examples [e.g. 5, 6, 7], there are still quite few empirical studies in the area. It remains unexplored in which settings open innovation is preferable and what potential consequences and risks it may bring. Not much systematized knowledge is available on how open innovation can be designed or supported through organizational, legal and information technological rudiments. Consequently, the open innovation notion is applied in several different ways, which makes it challenging to provide precise definitions and shared understandings of its theoretical and practical meanings.

This paper aims to contribute to improved discussions on the view of information technology (IT) governing the process of open innovation. Previous discussions have to a large degree been focused on managerial and legal issues. Furthermore, the paper reports on a case study at the Volvo Group, a major global vehicle manufacturer, that in the year 2000 joined forces with a telecommunication operator and a telecommunication equipment manufacturer to spin-off the development of vehicle services into a separate company – WirelessCar. The objective of the spin-off was to capitalize on three core areas that were considered crucial to vehicle service development. In 2008, the vehicle manufacturer decided to spin-in the company and it is since then integrated into the subsidiary of IT operations. The analysis of this paper shows that the initiative with the aim of facilitating vehicle service development can from a structure perspective be labeled as open innovation. However, as the case will also reveal, the rate of innovations did not turn out as expected and external contributions to vehicle services were limited. The paper argues that organizations’ need for control has the tendency to hamper openness, but also that the chosen IT solutions can limit the potential to fully embrace the process of open innovation. Hence, this paper aims to discuss the IT infrastructure as an important mediator of open innovation.
The automotive industry is a well-suited choice for case-studies to explore the role of IT in open innovation. IT has gained a strategic position among most stakeholders in the industry with a high level of IT maturity. Furthermore, it is possible to witness an increasing degree of digitalization of vehicles that springs from the diffusion of software and sensor technology collecting large amounts of vehicle operational data to control and operate the vehicle. The digitalization along with wireless communication opens up for processing operational data off-board the vehicle to provide development of vehicle services such as remote vehicle diagnosticks and vehicle tracking. Vehicle manufacturers and market analysts have for several years expected a growing demand for such vehicle services, but these expectations have not yet been realized.

This paper aims at contributing to the theory of open innovation by, first, providing a longitudinal empirical example of what can be described as processes of open innovation and, secondly, analyzing how the design of IT may affect openness and thus inscribe a gradual level of control into technology which might delimit its capabilities of generativity. Hence, the research question is; "What is the role of IT in open innovation processes?"

As the empirical case will show, much of the lost open innovation opportunities can be derived from control aspects in the system design, since it has been incapable of unleashing the IT and service components in relation to information infrastructures and external stakeholder co-creation. To the IS community these contributions highlight the demand for involving into the discourse on open innovation to more carefully understand the role of IT besides organizational and intellectual property (IP) rights issues. To practitioners, this research paper provides insights on how to more carefully examine the choice and control of IT and how certain technologies better support open innovation whereas others may be considered impediment.

The paper outline includes a brief examination of related research, followed by chapter 3 that provides insights to the methodological approach. Focus is then put on the empirical case which is described in chapter 4 and further discussed in chapter 5, before the paper ends with concluding remarks.

2. Open innovation literature review

Chesbrough coined the term of open innovation to describe how large organizations involve in the development of new technologies through linking internal and external knowledge and/or make use of external paths to market [1]. West and Gallagher [8] define open innovation as to “systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels”. They highlight four distinctive strategic approaches in doing so; 1) Pooled R&D is a joint collaboration among several actors to accomplish innovation, 2) Spin-outs is when a new venture is formed and separated from the parent organization, and 3) Selling complements or 4) Donate complements is the deliberate choice of diffusing knowledge or access for external actors to customize and improve the core product and/or its content.

Gassmann and Enkel [9] point to three core process archetypes related to open innovation; 1) the outside-in process, bringing in new knowledge into the focal firm, 2) the inside-out process, earning profit to the focal firm by transferring knowledge to the outside environment and 3) the coupled process, connecting the outside-in and inside-out by working through ongoing relations with outside actors. Their archetypes are somewhat corresponding to Dahlander and Gann’s [10] three types of openness; 1) sourcing (number and type of external sources of ideas and inputs to innovation), 2) revealing (the way in which firms voluntarily reveal and share internal resources) and 3) engaging (the nature of specific relationships between firms and their external partners).

Open innovation is often contrasted with the more traditional model of closed innovation, where firms keep control over their R&D process, production, marketing, financing etc. [1, 11]. However, Christensen et al. [12] argue that the notion of open innovation not necessarily describes a new phenomenon, and refer for instance to previous work on absorptive capacity [13], i.e. R&D competence to absorb external knowledge, and the cross-disciplinary of innovative learning as described by von Hippel [14]. According to Gassmann [3], the open innovation phenomenon has received contribution from several research streams, such as globalization and innovation, outsourcing of R&D, early supplier integration and user innovation. Linkages have also been made to the notion of regional innovation system [15] and collaborations between the industry and universities [16].

Open innovation is still evolving in an academic field which, at its best, is part of a multifaceted adolescence. Nevertheless, it is a challenging fact that even with a lack of one clear, distinct and prevailing definition the notion of open innovation has received impact on the research community – not at least the
IS research community with its extensive exploration of open source software (OSS) [e.g. 17, 18] and IT innovation [19] and also to some extent open innovation as such [e.g. 7, 20].

As follows, an account of the organizational characteristics and the understanding of IT in open innovation are provided. In relation to the earlier discussed definitions and perspectives, the presented case will have resemblance with Gassmann and Enkel’s [9] ‘outside-in process’ in terms of the formation of a spin-off venture and the ‘coupled process’ in terms of the following attempts of bringing in various stakeholders in building applications and shared content.

2.1. Organizational and IP aspects of open innovation

Chesbrough [21] argues that open innovation is a new way of innovating among companies, where innovation and knowledge creation is not limited to internal ‘silo-like’ knowledge accumulation, but builds upon explicit cooperation with external sources to create innovations [1]. Hence, open innovation stands in contrast to closed innovation, where organizational boundaries define the research and development space. Chesbrough describes open innovation as paradigmatic since firms move from closeness to utilizing external knowledge and ideas or internal and external paths to market to advance. This also means a need to actively rethink the way IP is handled in the firm – from a way of protecting wealth to a more proactive approach of generating wealth. In his book from 2003 Chesbrough [1] outlines six aspects comparing principles for closed and open innovation (see table 1).

Traditionally, the business model has been built on strategies based on competition. Firms search for competitive advantages that differentiate them from their competitors [e.g. 22]. By hiding information and know-how, and even sabotaging the opponents’ market opportunities, it is thought to strengthen the firm’s own position in the value network. In the increasingly digitalized economy with non-rival commodities, these competitive and ‘close’ approaches have been challenged. New innovative ways of creating and extracting value from innovations emerge based on for instance mobilizing a critical mass of active and participating users, trading and licensing of IP rights [23]. The evolvement of intermediary markets for matching upstream suppliers with downstream developers has contributed to this movement [2]. In industries marked by globalization, convergence of disciplines and rapid technology escalation, alternative business models turn toward collaborative strategies of open standards, stakeholder involvement and generative technological IT-platforms.

Moving from mainly using IP as an extended way of generating income streams through selling or licensing unused IP-rights to external actors [24], open innovation has been suggested to include a plentitude of new business potentials. Licensing strategies are highlighted as not only bringing in new income streams but also enhancing the organization’s absorptive capacity and freedom to act [25].

According to Chesbrough’s [1] fundamental thoughts, i.e. the mobility of knowledge and ideas, firms should actively search and hire external experts to strengthen their internal innovation processes. User-driven innovation [26], crowdsourcing [27] and wisdom of crowds [28] are related concepts to enhance creativity and market orientation. Firms may also secure external knowledge and ideas through acquisition, which in some examples even have replaced Research and Development (R&D) with Acquisition and Development (A&D) [2]. Spinning off ideas in new companies is described as another way of capitalizing IP that does not fit into the existing business model or requires support by external partners. Venture capital may have a central role to facilitate spin-offs that might even be re-acquired when e.g. technologies are mature enough.

Based on the idea of linking external and internal ideas, there are different challenges that face companies in how to manage open innovation. Open innovation literature has for instance pointed at the need to overcome the ‘not invented here’ syndrome [2, 29]. In general, much of the emphasis has been put on looking at open innovation as a management technique or approach.

The notion of openness is strongly related to control – or rather loss of control – which naturally has managerial implications. Hence being open, it can be argued, challenges the ability to induce control over the process and the end result. Openness aims to involve external perspectives or participants who might not be possible to govern, at least not through the traditional hierarchy mechanisms. These actors do not necessarily have the same agenda, perception or drive, and might not feel obliged to contribute in a planned manner or direction. In this respect, to move from closed to open innovation companies have to release various forms of control. This is not the same as to say that organizations give up the wish to invoke control over others even in open processes, but they have to approach it in more indirect ways, through for instance active facilitation, network
centrality, knowledge generation or technology standardization.

2.2. IT in open innovation

Open innovation has started to grow as a theoretical field. The notion of openness connected to innovation is gaining attention in various academic disciplines, in several different industries and in society as a whole. The focus has, however, to a large extent been put on the management side (i.e. how to organize open innovation) or the IP side (i.e. how to generate and extract value). This paper focuses on further analysis of another important area in open innovation, namely to discuss the role of IT.

Although Chesbrough [1, 2, 21] already includes the perspective of IT in his definition of open innovation by referring to OSS development, he does not go into deep analyses on the specific impact IT has for organizational and legal aspects of open innovation. In this section, different IT concepts that relate to open innovation are outlined. This should exemplify that the role of IT in open innovation is quite diverse.

Lyytinen and Rose [30] provide a differentiated view of IT innovation and introduce the distinction between IT base innovations, system development innovations and service innovations. They argue IT base innovations provide a foundation that is necessary but not inevitably sufficient for subsequent system development and service innovations. It is in the light of this finding, this paper highlights different IT concepts that may constitute IT bases for open innovation.

A frequently used example of open innovation is open source, where Linux is the most prominent examples. OSS is also the category of open innovation most extensively discussed within the IS research community [see e.g. 8, 31, 32, 33]. Ljungberg [31, p. 208] describes open source projects as “[...] loosely coupled community kept together by strong common values such that software should be free.” Even though Ljungberg describes open source as a bazaar that is a mixture of different organizational forms with anti-commercial values, there are a number of business models emerging around open innovation such as consultancies or various add-ons [2]. This results in conflicts between those sharing value and those capturing value from shared innovations [8].

Web 2.0 has established itself in people’s minds to describe mashup services that allow to easily connecting various services to form new value adding services. As O’Reilly [34] states in his conceptualization of Web 2.0, there are a number of characteristics that constitute the difference between Web 2.0 and Web 1.0; from passive viewing to active participation, from desktop to web, from place to space etc. O’Reilly describes Web 2.0 as opening up opportunities for users to become participants and producers, what Toffler [35] would call ‘prosumers’. This is supported by technologies that work similar to modular-based Lego bricks, which allows the creation of new services based on others. One could argue that Web 2.0 provides a platform for open innovation where different technologies and value chains intersect to form mashup services.

Ubiquitous computing ought to be mentioned as an interesting concept related to open innovation in IT. Weiser’s [36, p66] idea of technologies that “weave themselves into the fabric of everyday life until they are indistinguishable from it” requires an organizational support that in much refers to open innovation, i.e. since ubiquitous computing technologies do not take notice of organizational boundaries, new cross-organizational forms such as open innovation are required. According to Lyytinen and Yoo [37] the concept of information infrastructure serves as important facilitator for such ubiquitous computing environments.

As shown, there is a rich variety of different IT concepts and technologies that are applied in open innovation. This makes it challenging to understand IT as one unified concept in relation to the business processes. Rather, IT can be highlighted as a multitude of optional technologies to choose among. Some of the technologies may overlap, but it is evident that concepts such as software platforms and open source technologies differ in how they take control over the use of technology (i.e. what services can be developed) and the associated business model (i.e. how the value creation is defined and distributed).

Pillar and Walcher [38] structure the application of technologies into two continuums; 1) task specificity, i.e. whether the usage of IT is applied in a broad or specific area, and 2) degree of elaboration, i.e. whether the usage of IT is applied in order to have few or several interactions and inputs. Pillar and Walcher use these dichotomies in order to structure the use of IT in user idea competitions, but it is arguably possible to extend the application to also other settings. For instance, intermediary markets (such as InnoCentive) would have higher task specificity than Web 2.0 technologies and patent auctions would have less degree of elaboration than open source development.

Zittrain [39, 40] introduces the term ‘generativity’ as a way to be more precise about the relation between openness vs. closeness connected to IT and
innovation. By generativity he points out the degree that the technology opens up for uncontrolled participation over its continuing development. As an example, PC computers have higher generativity than pure calculators since their content can be added or altered by numerous sources and in numerous ways. In the same way, Google’s mobile operative system Android has higher generativity than Iphone since Apple acts as decisive gatekeeper for the user-generated contend through its single upgrade-channel called App Store. Generativity, and also to a large degree creativity and customization, is, in this respect hampered by organizations’ enforcement of control. The ruling company in a non-generative setting has the choice to close down game-changing inventions that do not serve that company’s interest. This can possibly increase the stability and security of the system, but it also to large degree kills groundbreaking, risky changes.

This paper focuses on further analysis of IT in relation to open innovation. West [41] analyzed how different technology platforms were aligned with the firms’ proprietary strategies in terms of which parts were open and which were closed, but did not go into detail about the enhancement (or hinder) that IT has on the ongoing organizational processes. This paper will show how the choices of IT also have strong linkages to the outcome of the open innovation process. The findings can further influence the understanding for how IT is interrelated with management and IP issues in cross-organizational relations characterizing open innovation.

3. Method and research setting

Benbasat and Zmud (1999) argue that most IS research lacks relevance to practice, since it emphasis on rigor over practical implications and that IS academicians do not expose themselves enough to the business and technological contexts to which their theories would apply. Mathiassen (2002) addresses this problem by presenting the concept of collaborative practice research that recommends close research interaction between practitioners and researchers to enhance the relevance of IS research without giving up the ambition of rigor.

This paper takes the stance in Mathiassen’s approach, with the aim of stimulating academic discussions as well as providing input to practitioners’ reflection. Collaborative practice research is considered suitable for this longitudinal research project since it allows eliciting different types of perspectives and knowledge sources to interpret the multi-disciplinary and complex research topic. Mathiassen (2002) refers to Vidgen and Braa (1997) and their three forms of knowledge creation to describe the corresponding types of knowledge that are created through collaborative practice research. These are: 1) understanding through interpretation, 2) providing support by means of design and, 3) improvement through intervention.

This study is based on a ten year interaction with the evolved venture, WirelessCar, and its relation to the Volvo Group. This has involved ongoing encounters with numerous actors; onsite representation, participation and facilitation in meetings, a vast number of interviews with key individuals and access to intranet, documents, decision protocols and other forms of text material. One of the authors of the paper has also worked on managerial positions at Volvo for more than a decade as well as being a researcher.

Four specific examples of data collection are mentioned with further background found in previous peer-reviewed publications linked to sub-projects within the collaborative practice research project; 1) prototype development of vehicle services [42], 2) field study at call centre and dealers [43], 3) mobile RFID innovation for open systems [44], and 4) vehicle eco-system concept introduced[43].

From a traditional positivistic standpoint, if the aim is to expose the ‘truth’ by eliminating false perceptions through hypothesis testing, other methods than case studies are perhaps more applicable. As a single examination of a limited number of events taken place in a specific context during a specific time frame, it can be assumed that what is reported should not be generalized to a wider population [45, 46]. The ambition of a case study is therefore arguably more applicable when the aim is to provide rich qualitative descriptions and to awake questions to be discussed and further analyzed within the research community.

However, as for instance Walsham [47] suggests, a form of generalization can be achieved through the readers’ interpretation of what makes sense and feels plausible. As such, interpretive case studies can open up for dialogue and debates, provide new opportunities for people to make their own choices and offering new perspectives to academicians as well as practitioners in their professions [48].

4. The story of WirelessCar

4.1. The process of emergence

The Volvo Group is currently one of the world’s largest manufacturers of trucks, buses, construction
equipment, marine engines and aerospace components. Sales exceeded 300bn SEK in 2008 and the global presence embraced more than 100,000 employees. Even though the Volvo Group mainly sells vehicles, it also has experience of sales beyond the ‘classical trucks’.

At the turn of the millennium there was a prevailing belief in vehicle services as the new form of revenue streams within the automotive industry. For Volvo, this meant a need for extended R&D capabilities which at that point to a large extent was situated outside of the organizational borders. Much of the desired know-how was assumed to exist within the telecommunication industry. In 1999 the vehicle company decided to spin-off its ideas on vehicle service development in collaboration with a Swedish telecom operator and a global telecommunication equipment manufacturer. WirelessCar was founded.

WirelessCar was supposed to drive R&D and lead the way for development of new vehicle services. The objective was to create a company that would mix and openly leverage three strands of knowledge areas in order to strengthen the development of vehicle services, i.e. competence on vehicle technology, wireless communication and customer service operations, and communication infrastructure technology. The appointed CEO came from the Volvo Group and had a large experience from the difficulties with trying to cope with developments in a rapidly evolving field:

“Previously at [the vehicle manufacturer] we started R&D activities with those parts that were supposed to be located in the vehicle, such as mobile phone, GPS, embedded software etc. But we realized the problem of how the backend system should work […]. That’s where we identified our business case, to provide a sort of middleware and act as service provider […]. We saw [WirelessCar] as bridging the gap between the vehicle and telecommunication industry” (CEO of the spin-off, interview 2008-12-01)

A venture capitalist provided additional capital to the spin-off. However, for several reasons to be discussed, four years later the vehicle manufacturer took over the ownership of the spin-off company. Re-integration of the WirelessCar venture was supposed to create additional value. This characterizes an important point of change that also caused the CEO to quit.

“One of the reasons why I left the company was that we had to integrate the [legacy Volvo Group vehicle IT platforms] to benefit from the WirelessCar platform. Then I realized that this became too much focus on Volvo Group.” (CEO spin-off company)

The other stakeholders had withdrawn their engagement gradually, partly as a result of the dotcom crisis. Furthermore, during this time the Volvo Group had sold its car division, which also was the major customer to the spin-off. Afterwards, Volvo Cars still remained as customer along with other car manufacturers as well as some commercial vehicle manufacturers. In 2006 the operation of vehicle services for the construction equipment business area of the Volvo Group was added to the ‘internal’ customer list.

In 2008, WirelessCar was insourced back to the Volvo and became an integral part of Volvo IT.

4.2. IT aspects of WirelessCar

As stated in the previous section, WirelessCar was supposed to become a vehicle service provider bridging the gap between the vehicle and the telecommunication industry. Thus the objective of the spin-off was to develop a communication platform upon which different services could be implemented. However, the choice of architecture hampered such an approach of acting as a general service provider.

“We made a very good job when launching the first service in a short time period. But when we submitted our first tender to an external car manufacturer, the development costs were ridiculous high. That was when I recognized that our platform was not open enough and we had built too much of a system solution adapted to [legacy Volvo Group vehicle IT platforms] that was not generally applicable.” (CEO spin-off company)

At Volvo Action Service (a call center) services are provided in order to take care of unexpected vehicle break-downs. There are cases of serious delays caused by difficulties as simple as relating to locating the driver. Even though, some of the affected vehicles do have a vehicle tracking service subscription, the Volvo Action Service personnel cannot access this information. As the previous example indicates the choice of system architecture resulted in a platform that does not allow easily sharing services. Likewise, an example in relation to system functionality relating to a case on continuous maintenance planning:

“We have to ask each customer about the current mileage when they arrive for service. This information we enter into a central system and then our financial service company uses the information to adjust service and leasing contracts. If the mileage differs from previous estimations this sometimes causes trouble. Customers call us and are angry about being invoiced without expecting it. We then
have to explain that they have exceeded their forecasted mileage.” (Belgian workshop owner and manager, interview 2007-04-17)

There are numerous of these examples which indicate a demand for vehicle service development, which cannot be met since service offerings are part of system structures that cannot be shared. Another example confirms that the level of flexibility by design has been low, which hampers diversification of innovations and flexible vehicle service development.

“The information has been designed for an end product, which makes it difficult to design new services with different requirements.” (Project manager product development, interview 2007-09-03)

The development cycles have difficulties to match each other, which puts large challenges on the platform development in order to act as a middleware spanning between the vehicle and service developers. Special system adjustments have often had to be implemented.

“We managed to implement remote vehicle diagnostic services but the vehicle industry’s software development cycles are too long. I guess it is still not implemented” (CEO spin-off company)

“[…] when we just get these minor business development assignments we can of course just work with trying to fit adjustments into the current platform.” (business development manager WirelessCar, interview 2007-09-03)

Difficulties in making changes to the service platform as well as adding novel services also resulted in extensive costs to make these changes as the following example shows.

“[…] there is nothing to get under […] € to make changes to the current system” (product development manager Volvo Group, interview 2007-12-03)

Similar feedback has been gathered from other representatives during observations in different departments of the Volvo Group as well as on supplier visits. Potential business cases have been rejected a number of times due to the large cost of implementing them on the platform. This may result in reduced competitiveness, as confirmed by a sales manager complaining about the difficulty to sell the existing services:

“It seems to me that we are always a step behind”. (Belgian sales manager, interview 2007-04-17)

5. Discussion

As a way to start summarizing this paper on open innovation and control it is possible to ask the questions: Has this case adhered to the Chesbrough principles for open innovation? How is IT treated in this example of open innovation? As follows the paper elaborates on these questions.

5.1. WirelessCar as an example of open innovation

As an initial answer to the first question, Table 1 below is utilizing the Chesbrough principles of open innovation, in respect to the case of WirelessCar.

Table 1: Closed and open innovation principles in relation to the WirelessCar case.

<table>
<thead>
<tr>
<th>Closed innovation principles</th>
<th>L</th>
<th>Volvo case with WCar</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>The smart people in our field work for us.</td>
<td>The triad did assume that by opening and forming Wcar synergies would be greater than if they only would have formed and controlled a strategic alliance.</td>
<td>Not all the smart people work for us. We need to work with smart people inside and outside our company.</td>
<td></td>
</tr>
<tr>
<td>To profit from R&amp;D, we must discover it, develop it, and ship it ourselves.</td>
<td>Wcar should be the driver for R&amp;D, backed up by the external R&amp;D from the triad participants.</td>
<td>External R&amp;D can create significant value: internal R&amp;D need to claim some proportion of that value.</td>
<td></td>
</tr>
<tr>
<td>If we discover it ourselves, we will get it to the market first.</td>
<td>Even though Volvo had great experiences in vehicle services, it was obvious that additional knowledge would strengthen the development.</td>
<td>We don’t have to originate the research to profit from it.</td>
<td></td>
</tr>
<tr>
<td>The company that gets an innovation to the market first will win.</td>
<td>Wcar was set-up with an assumed business model and had no intent to change that business model.</td>
<td>Building a better business model is better than getting to market first.</td>
<td></td>
</tr>
<tr>
<td>If we create the most and the best ideas in the industry, we will win.</td>
<td>Wcar were merging ideas from the triad organizations, however, less from other organizations.</td>
<td>If we make the best use of internal and external ideas, we will win.</td>
<td></td>
</tr>
<tr>
<td>We should control our IP, so that our competitors don’t profit from our ideas.</td>
<td>Wcar has opened up for other players to contribute to usage and improvements of Next Generation Telematics Protocol.</td>
<td>We should profit from others’ use of our IP, and we should buy others’ IP whenever it advances our own business model.</td>
<td></td>
</tr>
</tbody>
</table>

The X signifies the summarized and weighted view of WirelessCar (WCar) in relation to Closed and Open innovation principles. X in L column illustrate more of Closed innovation and X in column R more of Open innovation principles (XXX = strong weight, X = weak weight).
equipment manufacturer, and telecommunications operator), it can certainly be aligned with the Chesbrough definition of open innovation principles presented in the table. The focal firms understand that the smart people in generating vehicle services are not necessarily solely within their own organizational borders. Through alignment of R&D between the firms, the potential for generating value is considered to be highly improved. This setting would facilitate ideas generated between the diverse sets of knowledge skills, and open up for utilization of research from each parent company. Although WirelessCar could be seen as having a rather strict business model based on own control over all the revenue streams, they also invited other players to contribute to the process in various degrees.

The WirelessCar case thus also shows resemblance with Gassmann and Enkel’s [9] ‘outside-in process’ in terms of the formation of a spin-off venture and the ‘coupled process’ in terms of the following attempts of bringing in various stakeholders in building applications and shared content.

However, over the almost ten years of development, the concrete result of the open innovation process seems rather scarce; both in terms of generating new vehicle services and implementing them on the IT-platform. The table below illustrates what vehicle services were envisioned by WirelessCar in 1999 as well as those that existed in a proprietary Volvo context. Further, the table illuminates whether or not they had been implemented in 2008 and if other services were added instead. It shows that most of the early ideas have been realized. It also shows that some of the most promising services, such as remote diagnostics and software update, have not been implemented. From a point of innovation, very few other ideas than the original ones were added over time, thus not matching the expectations of a rich variety of vehicle services. This indicates a rather low level of creativity and difficulties in implementing ideas in practice. Driver follow-up and geo-fencing are examples of implementation of new services, in which the geo-fencing is argued to be the most innovative. Additionally it shall be mentioned that the creation of WirelessCar brought telecommunication industry competence and resulted in some back-end services too (e.g. pan-European billing capabilities, roaming features).

### Table 2: Comparison of vehicle services year 1999 and 2008.

<table>
<thead>
<tr>
<th>Wcar Vehicle services</th>
<th>Status 1999</th>
<th>Status 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web browsing</td>
<td>Vision</td>
<td>Not implemented</td>
</tr>
<tr>
<td>Remote alarm</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
<tr>
<td>Remote diagnostics</td>
<td>Vision</td>
<td>Not implemented</td>
</tr>
<tr>
<td>Crash detection</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
<tr>
<td>Vehicle tracking</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
<tr>
<td>Software update</td>
<td>Vision</td>
<td>Not implemented</td>
</tr>
<tr>
<td>Remote door unlocking</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
<tr>
<td>Remote immobilization</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
<tr>
<td>Concierge services</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
<tr>
<td>Driver follow up</td>
<td>Implemented</td>
<td></td>
</tr>
<tr>
<td>Digital tachograph</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
<tr>
<td>Geofencing</td>
<td>Implemented</td>
<td></td>
</tr>
<tr>
<td>Messaging</td>
<td>Vision</td>
<td>Implemented</td>
</tr>
</tbody>
</table>

5.2. IT as a hinder for openness

When innovation processes fail to deliver, it is common to search for explanations in poor management and wrong organizational strategies. As shown in table 1, the open innovation principles are to large extent colored by management and IP strategies and challenges. For sure, the low level of development of innovative vehicle service offerings in WirelessCar may be discussed in relation to management and IP strategies following a relatively closed approach (i.e. closed in relation to the potential of opening up for participative collaboration with inter-organizational external stakeholders other than those forming the triad). In this paper, however, it has been highlighted how the system architecture and information infrastructure in itself may be a hinder for openness. The empirical case shows that choices in relation to the role of IT inevitably led to a resistance for openness and open innovation irrespectively of any business management intentions.

The main objective for the spin-off was to develop a shared communication platform where new services could be added, but as it turned out, the implemented platform became a rather complex system which mainly handled IT and service components as one entity. This may result in high
costs for modifications on either IT or vehicle service development. Also the information design was affected by the system design, which several examples indicated. Hence, the level of flexibility by design turned out to be very low, which resulted in a low level of innovative services emerging.

Zitrain's [40] notion of 'generativity' is helpful to understand the lack of innovation contribution from external parties over time. Since the different parts and levels of the developed IT-architecture were highly intertwined and interdependent of each other, implementations of new services required heavy and costly modifications of the whole platform. This, together with that the spin-off company remained as a gatekeeper in deciding about any changes or potentially added services, made the technological infrastructure to incorporate a high level of control which possibly has reduced the level of innovation. Still, WirelessCar seems to remain at least as competitive in the market as for example T-Systems.

In short, even though the decision to spin-off the operation of vehicle service development can rhetorically be aligned to Chesbrough's concept of open innovation, the new innovation process was built around a rather closed system that to a large extent may have hampered the innovation of vehicle services. Technology thus turned out to be a highly important factor for the success or failure of the open innovation process – a factor that should have been dealt with in an as thoughtful way as their organizational structure and IP-strategy.

6. Concluding remarks

Open innovation has gained widespread interest among different research communities, including the IS research community. However, the theoretical underpinning is relatively thin with focus on organizational and legal aspects of open innovation. IT is foremost used to exemplify descriptions of tools applied to open innovation settings. As pointed out in this paper, the link to studies of open source is evident. However, open innovation research has mainly looked into the OSS potentials for how to manage extended networks in terms of creativity, motivation, culture and handling intellectual property rights. The actual use of IT to succeed with open innovation has a weak theoretical foundation to rely on.

Based on an empirical case from the automotive industry, this paper aims at nurturing a discussion with more perspectives in order to facilitate a better understanding of open innovation in general and on the role of IT as a governing principle for open innovation in particular. First, the paper adds an empirical study of open innovation to give lights to new qualitative aspects of open innovation challenges in practice. Secondly, it highlights implications on the notion of control in open innovation, which provides a more complex understanding of open innovation than the diametric interpretation by openness and closeness. Thereby, the paper contributes to as well as extends the theory of Chesbrough [1, 2]. The case shows how control is inscribed in IT and varies among different concepts. Thirdly, the paper highlights the need for a deeper understanding on how the choice regarding IT in itself is a crucial aspect of success or failure in open innovation initiatives. This is a suggested area for further research. The need to induce generativity, as described by Zitrain [39, 40], into the system design may be a critical factor to pair with the balancing act of control in the innovation process. Without focus on reaching sustainable generativity, the innovation capacity will utmost likely be challenged no matter what managerial approach one chooses to label the initiative with.

7. References


