

# Value-Creating Networks Approach to Open Source Software Business Models

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## Abstract

This paper outlines a research project, in which the aim is to study the various business opportunities and business models provided by the open source software. We approach the open source software business from a value-creating network perspective that takes into account the different actors and their viewpoints to open source software. Thus, in the project we will take a wider perspective to the open source software research that has been common to the previous studies, which have been more or less concentrated only on the perspective of the potential user, such as e.g. the public organisations usually represent.

We start the paper by introducing the background of this research theme and by shortly describing the planned outlines of the research project, including e.g. the proposed research questions and the research methods that are going to be used in the study. We continue by reviewing the current theoretical discussion on value-creating networks and business models applied in the specific context of open source software. In this theoretical discussion, we will especially pay attention to questioning the differences between the business models and value-creating networks of the open source software business versus the more traditional, proprietary software business.

In the end of the paper, we will conclude the theoretical discussion and present the next steps to be taken in the research project.

## Keywords

business network, value creation, business model, open source, software

## Introduction

Software plays nowadays an important role in our modern society because of two interrelated reasons. Firstly, the remarkable growth of software business and its influence on the world economy is huge (e.g. Messerschmitt & Szyperski 2003). Secondly, software is strongly present in our every-day life: when we use our mobile phone, travel by airplane or use modern home devices, we are dealing with software.

In all, information and communication technology (ICT) is considered to have been spread into being part of all traditional industries. At the moment, more of the ICT is software rather than actual hardware technology. Also the well-used concept “e-business” is disappearing as the electrification of business has become common in almost all companies. The software that we use in our every-day life is still mostly based on proprietary solutions provided by

such companies like Microsoft. However, the utilisation of open source software<sup>1</sup> (OSS) has increased remarkably in the recent years (Meyers & Oberndorf 2001). Practically, everyone that uses the Internet or email uses open source software as most of the Internet and email servers run on open source software. Open source has also become a serious alternative for the utilisation of proprietary software in the office and personal use as the variety of available software has increased to match proprietary supply. This makes it no surprise that several large companies such as RedHat, Novell, IBM and Sun Microsystems as well as numerous SME's have noticed that open source software offers a wide range of new possibilities to do successful business – it offers a new way to build software solutions to serve customers in an effective and customer-oriented way.

The difficulty of studying the business models of open source software is the fact that the value created in open source projects can often not be “owned” by single companies and thus the business models cannot be studied with the same way as proprietary software business. The value in open source projects is created for the network, not for individual companies or other entities or individuals. As it is, the business models of the companies involved in open source software projects must be linked to the business models of the other network actors and perhaps include some other components outside of the network. It must also be acknowledged that open source does not mean that software can be distributed and used free of all costs. If it would, there could not be any viable business with open source software. Thus, there are pricing models for open source software, too, but their nature is somewhat different than is the case with proprietary software. For example, open source software business models are naturally not so much focused on the software itself, but more on the services package as a whole. In fact, services are often more important source of revenue for the OSS companies than the software itself.

This paper outlines a research project, in which the aim is to study the various business opportunities and business models provided by the open source software. We approach the open source software business from a value-creating network perspective that takes into account the different actors and their viewpoints to open source software. Thus, in the project we will take a wider perspective to the open source software research that has been common to the previous studies, which have been more or less concentrated only on the perspective of the potential user, such as for example the public organisations usually represent.

The aim in the project is to find answers to the following research questions: “What kinds of actors there are in the open source software value-creating networks?”; “Does open source software business require new business models or adaptation of existing ones?”; “What are the components of an open source software business model?”; “Which kinds of business models are possible for the different network actors?”; and “How do these business models of the different network actors relate to each other?”. In order to find answers to these questions, both theoretical and empirical work is going to be carried out.

In this paper, we focus on theoretical debate of emerging business models in the OSS value-creating networks. Before starting the theoretical discussion, we will, however, shortly present some insights regarding the overall research project outline and the empirical part of the research.

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<sup>1</sup> **Open source** or **open source software** (OSS) is any computer software distributed under an open-source license or available under terms meeting the Open Source Definition.

## Outline for the research project

As already stated, the project is consisted of both theoretical and empirical parts to be able to fully answer to the planned research questions.

The empirical part plays a significant role in the research project as pre-existing research and literature on the topic is at the moment rather non-existing. The empirical data is going to be gathered both by quantitative and qualitative research methods from different kinds of organisations and companies involved in the open source software business. These organisations and companies represent the whole range of OSS network actor roles from the developers to the potential users - including all the possible intermediary roles between the developer community and the end customers.

In the research project, the qualitative research methods are going to be emphasized. However, a quantitative survey is going to be carried out as a preliminary study for the whole research project. Through the survey we aim to explore the current status of open source software utilisation among the different companies and organisations. The aim is to clarify e.g. are companies utilising open source software only as a tool in their software development or are they perhaps basing their whole software development on open source. Thus, by the quantitative survey the depth and the broadness of open source utilisation are aimed to be explored. Based on the findings of the quantitative data we pursue to develop a typology of the OSS utilisers.

We want to point out that for the open source software business, the role of the developer communities is highly important. Thus, the study will take a community-based approach: we will choose four open source communities and through these carefully selected communities the value-creating networks and the business models evolved around the communities are going to be studied. These selected communities and the value-creating networks evolving around the communities are going to form four cases. In studying these cases, qualitative research methods are going to be followed, e.g. semi-structured interviews and participatory observation are going to be used in gathering the data.

We will study the possible business models from the viewpoints of the different identified potential actors in the OSS value-creating networks. In our analysis, we will also consider, what kind of influence do the different kinds of potential end customers (e.g. representative of different industry, public or private organisation) have on the business models evolving in the network.

The concepts of business model and value-creating networks are elaborated before the empirical studies in order to build a theoretical framework that enables to investigate the empirical context. There already exist some researches that have studied business models by utilising network approach (see e.g. Rajala & Westerlund 2004, Westerlund 2004), but in the special context of open source software the issue is still left rather untouched. Moreover, although open source software is in its nature a very networked business as open source software is developed in communities of networked individuals and organisations, the number of studies that have analysed open source software business from a network perspective is almost non-existing. We see that by studying the value creation of an open source network the research questions concerning business models can be answered. We will elaborate and find

interrelation between the concepts of business models and value-creating networks and then apply them into the empirical context of the open source software business.

In next, we will shortly open the key concepts used in this paper:

#### Open source software

In the early times of software programming the software was free. It was developed in universities and it was freely available and usable to anyone. When public companies began to use pieces of software to make business with it, the software was “closed” – the access to the actual code was limited to the employers and partners of the company developing the software. If the customers needed to get some changes in the software, they were bound to order the changes from the owner of the software. To challenge this closed environment, talented programmers such as Richard Stallman (GNU project) and later Linus Torvalds (Linux project) published the source code of their software to the public and the concepts of free software and open source were born. Open source is a registered definition and brand for software that has published its source code and meets the requirements given by the open source community. (Stallman 2002, Raymond 1999.)

#### Business model

There are different approaches to the definition of business model. It can be defined consisting of components such as pricing model, organisation model and revenue model. It can also be defined as an operating model, organisation’s essential logic for consistently achieving its principle objectives. Finally the business model can be defined as the core logic of a company to create value. (Linder & Cantrell 2000) In this research paper, the business model concept is used to describe the operating model of the organisation.

#### Value-creating networks

We define value-creating networks in our study as entities consisted of several directly or indirectly connected individual or organisational actors that transform and transfer different kinds of resources in order to create value not only for the network’s end customer but also to themselves. (see e.g. Kothandaraman & Wilson 2001) In our study, we include to the concept of value-creating networks three interrelated elements that are perceived end customer value, core competencies and business relationships.

### **Value-creating networks in the open source software business**

By reviewing earlier research on value and value creation, one can identify a shift from studying value creation at the level of relationships (e.g. Storbacka et al. 1999a, Donath 1998, Lapierre 1997, Donath 1996) toward studying value creation at the level of networks, nets, and alliances (e.g. Möller et al. 2002, Kothandaraman & Wilson 2001, Möller & Törrönen 2000, Parolini 1999, Doz & Hamel 1998). One possible reason for such a shift might be the notion of the important relationship between one’s own core competencies and the reasonable ways, and number of ways, to try to create value for the customer. In other words, it is not usually reasonable to try to create value for the customer just through the company itself and its limited competencies if there is the option of allying with other companies that can complement the existing competencies in order to together create superior customer value. Thus, in a network, the value that is created for customers should be created in a web of actors

in which each actor does the things related to its core competence. The web operates in order to create value for the end customer, but each actor gives something to the creation process and captures something from the web. If the supplier tries to create maximum value for the customer by itself, in the long run, the supplier might well also do things for the customer that are not related to its core competence and serving the customer might not be profitable anymore. But, when the web is constructed of complementary core competencies needed to create maximal value for the end customer, each supplier actor does not have to make major sacrifices. In the end, each can capture more value from the web than it originally gave away.

This kind of ideology of joining one's own core competencies and the competencies of the other actors is evident also in the context of open source software. The idea is that by openly sharing the software code with others, each can do the parts that they can best and together the outcome is characterized by high quality. Additionally, when each actor has had the possibility to do such parts of the development work that are nearest to their core competencies, the development work has usually felt easy, fun and rewarding. However, if we consider the issue of creating superior value to the end customer, the role of customer in the OSS environment is not so clear. In principle, each of the software coders can be understood as the customers as they develop software also for their own use. However, they seldom think specific customers for their projects; instead, all who want to utilise their software are free to do it. Thus, customer segmentation is not considered in OSS communities, as on the other hand, it is typical for other kinds of value-creating networks.

Also according to Hamel & Prahalad (1991), value creation in a network depends first on whether the market and competitive logic of the venture is sound, and then on the efficacy with which the partners combine their complementary skills and resources – i.e., how well they perform joint tasks. Each partner then appropriates value in the form of monetary and other benefits. The notion of other benefits besides of the monetary value is very important from the OSS point of view, as money is not the first, sometimes even not the last motivator for the coders participating in the OSS community. Moreover, according to Normann & Ramirez (1993), it is essential to look beyond the immediate boundaries of the social and business systems and to discover new ways to reconfigure these systems in order to reinvent value for the customers. OSS is definitely one of these kinds of new ways to reinvent value for the customers.

The value-creating network approach that we are going to use in our study is based on the previous researches about value creation in networks and strategic nets, especially on such works as Kothandaraman & Wilson (2001), Möller, Rajala & Svahn (2002) and Helander (2004). We will analyse the value-creating networks through different elements that are involved in carrying out value creation processes. The elements that we are going to use in our analysis are perceived end customer value; core competencies; and business relationships. All these elements are equally important for analysing value creation in a business network, but we still need to evaluate how adequate these different elements are in analysing open source software business. In the end, the elements should be such that the open source software business could be better understood. In the following, each of the elements is described as they can be used e.g. in the context of traditional proprietary software business. Later in this paper, we will apply these elements especially to the context of open source software and evaluate their applicability in this specific context.

Value is understood in this study as the trade-off between benefits and sacrifices both in monetary terms and in non-monetary terms. From a traditional point of view, value is understood as something that needs to be created but also must be captured not only by the end customer but also by the value-creating network and its individual actors. (see Helander 2004, Kothandaraman & Wilson 2001).

Core competencies are traditionally understood as strategic resources that are organisationally embedded. They are knowledge and skills that enable creation of value for the customer. Although core competencies are organisationally embedded, they should be regarded as free from exact organisational boundaries in a value-creating network context. In other words, the emphasis is on competencies that the focal network actor is able to utilise, not on competencies that the actor possesses. (Helander 2004)

The concept of business relationship refers to a chain of interaction between two organisational parties. During the interaction, different attributes are exchanged for each other. Relationships in a value-creating network context can be viewed from different actor perspectives – e.g., those of the end customer, intermediary, and developer community. Different types of relationships can occur between the network actors, depending on the nature of the relationship. One can apply classification criteria such as the closeness of the parties; dominance or balance between the members of the network; and the role and weight of different relationship connectors, including information, social ties, and legal bonds between the parties involved. Additionally, the nature of the product/service under exchange influences the nature of the relationship and its stages of development. (Helander 2004)

It needs to be pointed out that through these three elements – value, competencies, and relationships – the elements of actors, resources, and activities are present in the analysis. For example, it is impossible to talk about relationships if there are no actors – i.e., parties participating in the relationship. Moreover, as relationships are identified through interaction events, the notion of activities is already there. Additionally, relationships usually exist for exchange of resources between the parties in the relationship. The existence of actors, resources, and activities is also inherent in and linked to the elements of value and core competencies, as core competencies were defined as organisationally embedded resources that can create differential value for the customer when they are created and used through a chain of activities that are carried out by the network actors.

An important question in analysing also the OSS value-creating networks is thus to outline who are the potential actors forming the network. As already stated, the developer communities, i.e. the OSS projects, are central actors in the OSS context. However, there are also various other types of actors that could participate in the OSS business, as identified by Räsänen (2004), see Figure 1.

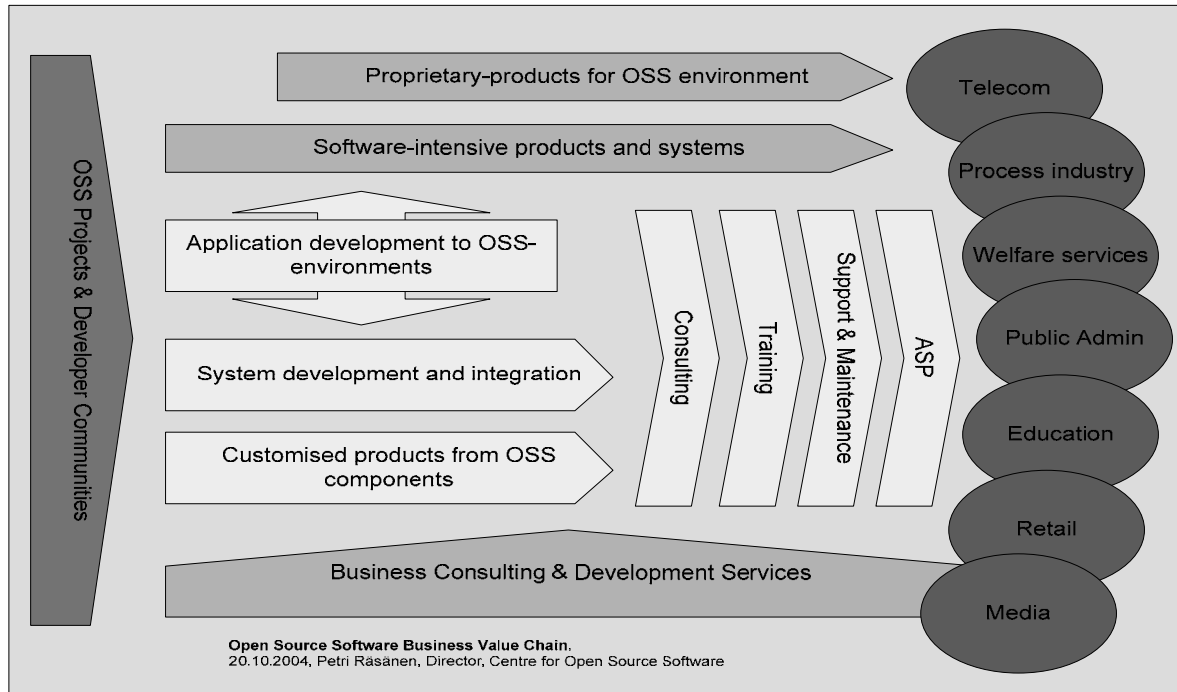


Figure 1. Open Source Software Value Chain (Räsänen 2004).

As we can see from the Figure 1, in the other end of the value chain there are the developer communities and in the other end the potential utilisers for the open source software. However, seldom these potential utilisers representing e.g. different industry segments, public or private organisations, directly interact with the developer communities. Instead, there needs to be certain kinds of intermediators between the utilisers and the developer community. In the figure, there are identified several different kinds of intermediators. There are for example identified such companies that rather entirely operate in the open source software business, either as software developers, integrators, service providers or pure consultants. But, there are also identified such companies that basically are in the more traditional, proprietary-based software business, but are producing software products and systems that are used in OSS environments.

These network actors, which can be different kinds of organisations, companies or even individuals, are thus an important aspect in our study. Although the role of individual developers is more visible in the OSS networks than is the case with proprietary software, companies still form the basic economic actors in value-creating networks when we consider OSS as business. The purpose of the existence of any company is to create added value to its owners. Companies are thus very selfish in pursuing their goals, although it is acknowledged that value cannot be created to the company owners without first serving the customers well. In other words, companies need to create value for their customers and by succeeding in that they can capture added value for the company owners too. Although the business model concept has many different interpretations, the concept is defined in this paper through the value creation perspective: business model is the organisation's logic for consistently achieving its principle objectives – creating added value to its owners. For single companies, the business model can be defined with a variety of business model components that enable the previously described logic for the company. The business model components have been

divided by different researchers into revenue model, marketing & sales model, product development model and servicing & implementation model (see e.g. Rajala et al. 2001) or revenue model, pricing model, channel model, commerce process model, organisational form and value proposition (Linder & Cantrell 2000). The business model components that best describe open source companies will be discussed in next.

## Open source versus traditional software business models

The basis of OSS business models is in the traditional, proprietary software models. The principle that the source code of the OSS must be public has created series of characteristics that an open source business model has to meet, however. A distinctive characteristic of software compared to other products is that it is not physical but a product consisting of information. Information or digital products have unique cost characteristics as they are typically rather expensive to produce, but very cheap to reproduce. In addition, the production costs are seldom reusable with forthcoming development projects, as the software production requires mainly labour resources from highly qualified experts. (Rajala et al. 2001) This leads to a situation, where the pricing cannot be based on production costs added with a premium. The pricing is instead based on the vision the owner of the intellectual property rights of the software product has on the maximum revenues that can be gained with a certain price-quantity combination. In Figure 2, is presented an imaginary example of the price-quantity curve of a product and the total revenues that can be gained with different pricing options.

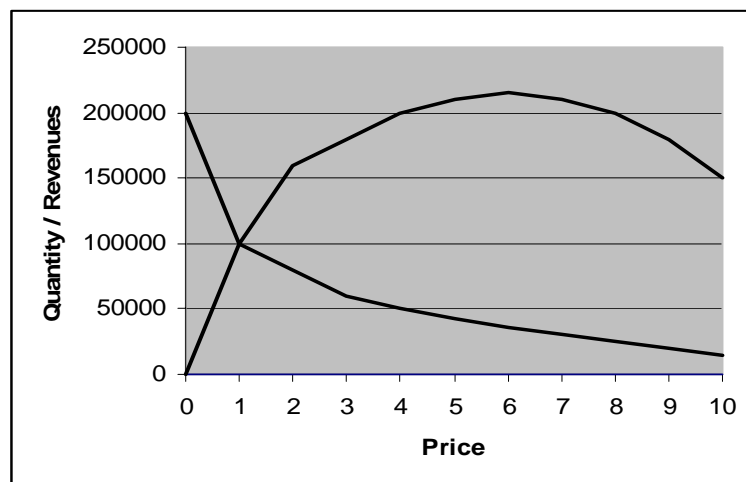


Figure 2. An example of the pricing of a software product (curve starting from 0,0 represents supply and curve starting from 0,200 000 represents demand)

The natural decision from a software company that gets the price-quantity -diagram presented in the Figure 2 from a market research would be selling the software for the price of 6. If we assume that the total costs from the development of the software were €50 000, this pricing would generate a remarkable revenue of €160 000 from selling the software to 36 000 customers. However, 2/3 of customers that would pay the price of 1 and 5/6 of customers that would like to use the software, but are not willing to pay anything for it, will not get the software in this procedure. If the product would be a typical, physical product, this would be natural, as the pricing would have some connection to the production costs. In the case of software (or other digital products), however, the reproduction of additional copies of the

product does not create any additional costs and leaving part of interested customers without the software product is a business decision. The feel of added value is created often (especially in B2C market) by selling the software in big cardboard boxes including a CD, user manual and a lot of air. Even though the same product could be distributed through the Internet, the look and feel of a physical product is used to explain the pricing of the software.

The ideology behind open source software supports the free availability of the source code of software. Thus anyone can obtain the code and use it for own purposes as long as the requirements of the open source license are met. The most common license, GPL (General Public License) states that all derivative work using software that is under GPL is also under GPL and thus the source code must be distributed the similar way as the original software.

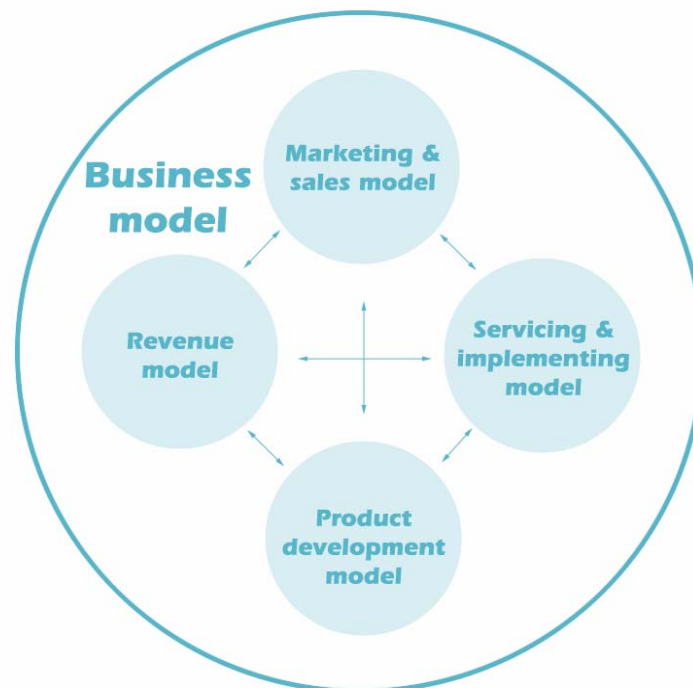


Figure 3. Elements of a business model (Adopted from Rajala et al. 2001, 51)

Traditional software business model can be divided into four interrelated elements as presented in Figure 3.

1. **Product development model** defines how the process that creates the value proposition is structured
2. **Revenue model** includes the organisations idea of how the revenues are gained
3. **Marketing and sales model** reflects the decisions on marketing strategy and distribution
4. **Servicing and implementation model** represents all the installation and deployment activities required to achieve a working solution based on a software product. (Rajala et al. 2001)

**The product development** of proprietary software is typically a structured process in which the value for the customer is created. The term product itself refers to a piece of software, which is not customized according to any individual user. Proprietary product development

aims also to quality that is high enough to guarantee the basic functionalities. (Rajala et al. 2001) Open source software development is not based on a product but on a project. Each participant of the project has the right to tailor the software to his/her own needs as long as the license conditions are met. The value is not created for a customer but for the software developers themselves. The open source community distributes the best changes to the software for everyone. Also open source ideology encourages to publish the source code early and often, which leads to the fact that the software is not ready when it is published, but on the other hand there is a lot of possibilities to make it better and in that way create value for the users.

**Revenue models of proprietary software** can be divided roughly into four categories: licensing, profit sharing, loss leader and media model. **Licensing** means that the customer is sold the right to use a piece of software. **Profit sharing** is a sort of licensing, but the revenues are tied to the customer's performance when using the software. **Loss leader** implies to a model, where the piece of software is distributed for free, but the revenues are collected by selling related products or services. **Media model** means that the piece of software is used to provide an advertising or marketing forum by creating a base for a group of users. (Rajala et al 2001)

**The revenue models of open source software** are not based on limiting the availability of software, but other aspects. The business models can be divided into numerous different categories some of which are similar to proprietary revenue models. The following lists the most used revenue models: (Rajala et al. 2001, Ingo 2004)

1. **Support selling**, in which revenue comes from selling support materials such as books, manuals, CD's and support services such as training. The software can be acquired for free from the Internet, but despite of that, companies can generate revenues by selling software and support manuals through regular distribution channels.
2. **Give software for free, sell services**, which is self-explanatory. Services concerning open source software include training, installation support, user support, updating software. For example, when the City of München wishes to install Linux operating system to 14 000 workstations (which they have done), it is natural that they need someone to guarantee that the process is done effectively and efficiently. It would be free to cut one's hair by oneself, but for some reason quite many people use the services of barbers and hairdressers.
3. **Loss-leading**, in which the software is made open source in order to stimulate interest and demand for other products the company is offering
4. **Widget Frosting**, in which the company's main business is hardware and the incentive of making the drivers needed open source is to ensure that they are up to date. Hardware can also be sold with pre-installed open source software, which lowers the producer's costs and creates an opportunity for additional revenues or competitive pricing.
5. **Open source with a hook**, in which the software is distributed as open source, but it contains some crucial parts, such as updating or installation service that are not open source and can be sold to the users of open source software. Typically the user can get by without the costly parts of the software, but it requires a lot of extra work.

6. **Brand licensing**, in which the software is open source, but the company keeps exclusive rights to the brand name
7. **Software franchising**, in which a successful *support seller* sells other companies the right to use its *brand* in other geographical areas or markets.
8. **Pay for work**, in which companies are paid for designing a specific solution for customers by utilising open source software. The distinction from similar business model with proprietary software comes from the fact that utilising open source software leads to the requirement of distributing source code of the generated solution. So the company that pays for the software gets the solution by paying for the programming work, but others get it for free.
9. **Tipping**, in which the users have a voluntary opportunity to donate money for the programmers or the community that has provided the open source software
10. **Dual license**, in which there are two license versions available from the same software. The other license is a GPL-license and thus free for the user of the software. The other license is not free, but the users are not bound to the GPL license requirements eg. are not required to publish the source code of their own work by the open source rules.
11. **A mix between open source and proprietary**, in which proprietary software is offered as additions to open source software, for example, integrating open source software to Microsoft environment.
12. **Turning proprietary into open source** in which proprietary software is turned into an open source project in order to develop it and generate indirect business. Mozilla firefox and Open Office.org are great examples of this approach.

In the early times of open source software, the business was quite modest and concentrated in support selling and loss-leading models. Most well known business was made by selling Linux operating systems in big cardboard boxes including CD's and support manuals, which was quite ironic as you could download the software and get support for free from the Internet. In recent years, the business models have widened as the Internet has made the physical distribution of software in CD's almost obsolete. As the previous list shows, there are other ways of doing business with open source software than selling CD's. It also shows clearly that open source does not equal "free as in beer but free as in speech" (Free Software Foundation 1996).

**Marketing and sales model** of a proprietary software company is the company's idea of defining and segmenting the markets and customers. The model describes how the customers are made aware of the software and how it is sold to them. (Rajala et al. 2001) With open source software it is clear, that marketing and sales such as with proprietary software, cannot be made. The marketing of open source software follows often informal channels as the purpose of the software is usually to create value to the developers rather than customers. The sales and marketing in a regular way can be done with open source software also, if the revenue model in use allows it (e.g. dual license for paying customers or provision of support services).

**The servicing and implementation model** of proprietary software ties the service to the actual software. These services include implementation, consulting, training, hosting, maintenance and technical support, product updates, new modules and new products. The servicing and implementation can be a revenue model for companies as well. (Rajala et al.

2001) Because of the nature of open source software, there is even more business made in the sector of servicing and implementation than with the proprietary software.

### **Value-creating networks approach to OSS business models**

In the previous chapters, we have discussed the elements of value-creating networks in a rather general level and compared the traditional software business and the open source software business through an analysis of the elements forming the business models. In this chapter, we will sum up our theoretical discussion by applying the value-creating network elements to the context of open source software. Furthermore, we will open up preliminary thoughts on the OSS business model discussion from a value-creating network point of view.

The element of core competencies is not so organisationally embedded in the open source software environment as it is in the traditional proprietary software business. In a way, the OSS business is more characterized by individual people and their competencies than is the case in the traditional software business where companies and organisational structures play more significant role. However, OSS also offers a possibility to a huge base of different competencies, as different kinds of people, no matter what their age, gender or official education is, are offered the possibility to develop software and to share the developed code with others. This kind of diversity of people participating in the development project causes, new kinds of challenges in leadership and steering of the OSS as part of one's business, however. In all, the question how to motivate the different individuals to do specific feature wanted e.g. by a potential end customer, is not an easy task. What is a clear benefit instead of a challenge related to OSS development and to the element of competencies is the fact that as the OSS is tested all the time, only the best enhancements are adopted to the open source project. Thus, although there is no actor denying less competent coders to develop the software, the community accepts only the best solutions as part of the actual project.

The element of business relationships is applicable in the open source software context, although the OSS network consists of several such relationships that cannot be purely named as "business" relationships. In fact, the OSS network does not necessarily need any business relationships – it can be formed of few loosely connected relations between individual actors. However, when we talk about OSS as business and look it through the framework of business models, there is a need for more commercial actors that form a business network. The special characteristic for OSS value-creating network is that it can include a large number of volunteers and actors that do not pursue monetary benefits, even some actors in the network are doing that.

The element of perceived end customer value that is applicable to be used as such in the traditional software business is not as suitable to the context of open source software business. We argue that the idea of specifically identified end customers and value creation *for* them is not so clear in the OSS networks. Although the intermediators between the developer communities try to identify and segment suitable end customers, the developer community itself is not so interested in this kind of end customer focused thinking. It can be even stated that initially the value is created for the coders them selves, but that the value for them is not measured in monetary terms. Instead, they value non-monetary benefits like the fun of coding, the ideal of high-quality software, the glory to have name within the community and last, but

not least, the question of honour. The element of value creation as a combination of very personal issue and community and shared issue is also visible when we consider the main purpose of publishing open source. Publishing open source includes a hope to maximize the value creation through a large community: If I give away the source code of my software, I don't lose anything (I still have the functioning software), but I can gain good ideas and improvements from other competent programmers.

We argue that from a value-creation network point of view, there are highly contradictory views for the different network actors. The developer communities are representing rather non-monetary values and aims, sometimes they may be even strongly against any commercial interests. In the other end of the value chain, there are the potential OSS utilisers that usually choose OSS instead of proprietary software for monetary reasons, not for ideological reasons. Thus, these end customers have more monetary oriented approach to the OSS than the developer communities have. In between these two ends of the value chain, there are the intermediators who need to balance between the developer community's non-monetary and non-commercial orientation and the end customers' high service and product expectations that should not cost a lot. Naturally, the intermediators have also their own interests in the OSS value-creating network and these interests are very much monetary ones, as the intermediators are companies that aim to create wealth to their owners.

In a complex value-creating network setting, there are more than one intermediators either forced or volunteered to co-operate. It is also possible that there are such intermediators that need to do co-operation with more than one developer community. As the developer communities may have different kinds of ways to operate and different kinds of license agreements to be agreed and followed, the intermediators are facing a challenged field in which to operate.

Nevertheless, we want to point out that although it would seem that the OSS business is hard business for the intermediators as they need to balance between different aims and ways to operate, OSS can also offer such a new and innovative business possibilities for them that the costs of learning to deal with the complex OSS network is worth of money. In the end, the community takes care of part of the company's software development costs almost for free.

## **Conclusions**

In this paper, we have focused on discussing the theoretical insights to the research topic of business models in the OSS value-creating networks. We have opened up the concepts of value-creating networks and business models especially by comparing the situation in open source software context versus more traditional proprietary software business context. Based on our theoretical analysis, we are able to draw the following conclusions and to enlighten the future guidelines for the next steps of the research project.

Firstly, we have found that the concept of value-creating network as discussed through the actors involved in the network, the relationships formed between the actors, the competencies of the actors and the logic of value creation within the network is applicable also in the context of open source software, not only in the context of traditional proprietary software business. However, these elements of relationships, core competencies and value creation do

have unique characteristics and manifestations in the open source software context. Additionally, the different actors involved in the OSS value-creating networks have such operations models and intentions that are sometimes very contradictory. Thus, there are various kinds of motivations involved in the OSS value-creating networks, leading to highly dynamic and sometimes even unpredictable situations in the OSS value-creating networks. An important theme to be studied in our research project is this kind of motivation aspect of the different actors in the OSS value-creating networks and the social dynamics between the actors.

Secondly, based on our comparison of the traditional software business models and the evolving OSS business models we argue that there are surprisingly many similarities in the business models of these two different kinds of contexts. However, the level of similarity depends rather much on the license under which the OSS is published. For example, GPL sets more strict guidelines to the marketing & sales model and the revenue model than some other open source licenses. Nevertheless, this finding sets interesting challenges for our OSS study to explore what are the things that in the end really differentiate the traditional proprietary software business from the OSS business. For finding answers to these kinds of questions, we need to carry out empirical analysis that takes into account the different actor perspectives, including the ones of the developer community, the end customers' and all the intermediators' in the network.

In all, open source software seems to offer an interesting research field for a network study, in which the concepts of value creation and business models are taken under careful consideration.

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