The Open Source Software Business Model Blueprint: A Comparative Analysis of 10 Open Source Companies

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Abstract. The success of open source software business models is currently not well understood, leading to poor investment decisions and forcing entrepreneurs to make the same mistake repeatedly. In this paper, we report the results of 10 comparative case studies of open source businesses, using the Software Business Model Framework as the underlying conceptual model. The extracted findings are summarized in a referential business model blueprint and a series of lessons for entrepreneurs and investors. With these lessons entrepreneurs can prevent commonly made mistakes and investors can profile potentially successful companies.

1 Introduction

Starting from the mid-90s, several small open source businesses changed the software industry by offering a cooperatively produced collective good instead of proprietary software [1]. Since then, there has been increasing interest among academics and practitioners in Open Source Software (OSS) [2]. Initially created by the hacker movement [3], the OSS phenomenon has now metamorphosed into a more mainstream and commercially viable product [4] with ground rules defined by the Open Source Initiative [5]. When companies recognized this new type of software as a way to generate revenue, new business models arose.

OSS was starting to be used as a new business strategy to reduce costs and make maximum profits by a large stream of software companies [6]. These companies became well-known by offering cooperatively produced software [1] for free within an already existing corporate market. Due to this cooperative approach to product development, open source is often not seen as a business approach but more as a technology model [6, 7]. Nevertheless, different types of business models have been applied where different types of stakeholders and external factors are playing a role in the start-up phase of OSS producers, distributors and service providers. It is however unclear how these business models are formulated and whether they are unique or contain patterns. Therefore, the research question of this work is "How can a business model blueprint be created for future open source software businesses?".

Currently, companies are focused on the Open Source concept and create considerable revenues through open source software and services [6] but with

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different offering profiles. An example is Red Hat ®and Linux who not directly make money from the open source programs but price complementary services [8]. The OSS business model and its revenue logic are not always as obvious to perceive [9] and there is little to no research performed that looked into the building blocks of successful OSS business models. A large amount of business literature is devoted to the definition of a business model, but this research specifically focuses on OSS businesses and will therefore use a more open source oriented definition of a business model and its characteristics.

Onetti et al. [10, p.224] recognize the lack of a comprehensive theoretical framework about OSS business models and that this is due to the relative newness of the phenomena. This paper contributes to the field by exploring the way open source businesses have entered the software ecosystem and created a foundation for following companies. Additionally, knowledge is contributed to the software business domain by looking specifically at the current business models of B2B focused OSS businesses. A comparative case study is conducted by reviewing the business models and factors for success of 10 OSS businesses. The business models are defined and conceptualized by application of the Software Business Model Framework of [11]. The outcomes of a literature study around the subjects of OSS consortia, their business models, the value exchanges within them, and how success could be measured, are used for a thorough analysis of the determinants. These interviews with expert employees provide information about the success of these OSS businesses and will be used to create an OSS business model blueprint and a guideline for OSS start-ups.

The body of knowledge in OSS research lacks focus on the building blocks constructing business models of successful OSS businesses. This research tries to establish the determinants that make OSS businesses thrive by looking at previous success-stories. In this research the definition of OSS businesses as described by [12] will be used: firms that supply, in various ways, open source based products and services and release them under Open Source licenses. This definition will simultaneously be used with the Open Source Definition, originally acquired from the Debian free Software Guidelines. We aim to further investigate and build a foundation for both OSS and business literature. Literature based on empirical data focusing on OSS entrepreneurs is scarce. This leaves this vulnerable group of starters without sufficient guidelines while entering an upcoming market.

The paper provides the following contributions:

- In Section 3 an **OSS Business Blueprint** is provided, using the e3-value modelling language, that shows the main participants in an OSS business network.
- Section 4 provides insight into 10 case studies of open source businesses and how they are currently implementing the Software Business Model Framework of Schief.
- Section 6 provides advice for OSS entrepreneurs and startups, which can be summarized into finding an appropriate market with a differentiated product, using existing libraries and open source project for your proposition, and find

ways to extract value from the market, typically by offering dual licensing software and support contracts.
– Finally, in Section 6 we extract an OSSS business model blueprint for open source companies and startups.

2 Research Approach

For this qualitative research, a multiple-case study is selected because it enables the exploration of phenomena within, in this case, the open source ecosystem [13]. The use of a variety of data sources ensures that the unknown field is explored to eventually determine the explicit success determinants of OSS business models. The primary data used for this research is collected from a comparative case study which and is backed by a literature study. Subsequently, internal validation is performed by the interviewees.

2.1 Case Study

The source of evidence is based on individual depth interviews [14] within the sample of OSS companies. The final determinants of success rest on a comparative case analysis of the interview transcripts of 10 OSS companies which are chosen based on pre-determined sample criteria. The case study approach is based on the three phases of the Case Study Protocol(CSP) constituted by [15] which is based on research by Eisenhardt et al. [16]. The authors describe the CSP as a guideline for data analysis containing the procedures for conducting research an is also used as a research instrument.

The second stage of phase one of the CSP depicts the selection of the cases where a specified population is defined. Therefore in this section we have predefined sample criteria for the selection of the cases. For case studies to give significant results, random selection of the sample is neither necessary, nor preferable [16]. The size of the sample for this research is controlled by theoretical and practical considerations [17]. Theoretically, the size of the sample influences the generalizability of the research, therefore a big sample size (around 20) is preferable. Practically, by convenience sampling the sample size is smaller. This is due to response time of the open source companies and the number of interviews that have to be performed within the time constraint of this research.

The sample consists of OSS businesses that are chosen based on particular search criteria. We are interested in companies that follow a certain quality standard in their business and share the interest in OSS. The OSS company that fits within the sample;

1. is registered as a company,
2. is B2B; meaning the business is providing OSS to other businesses,
3. is a software vendor; meaning it creates and offers (open source) software,
4. made the code of the software freely available,
5. hosts an open source community,
6. generates revenue.

In order to develop software under the Open Source name there are some requirements as mentioned in the Open Source Definition as stated in [5]. This means that besides the company criteria chosen by the authors, the companies should follow the rules set by The Open Source Definition.

Phase two of the CSP characterizes the iterative data collection and analysis, which in this research starts by conducting interviews within the sample. The expert-interviews are a combination of open questions and the predefined elements from the Software Business Model Framework of [18]. The interviews are semi-structured and held with practitioners in the OSS field. The participants of the interviews are chosen because of their experiences which reflects the scope [19] and their ability to answer the interview questions. The interview comprises two parts. The first part is based on 10 open questions focused on the background of the company, the entrepreneurial aspects, and the interviewees' view on success. The second part of the interview is based on the work of [18] and gives insight in the particular characteristics of the analyzed business models.

The second stage of phase two of the CSP is the analysis of data within- and cross-case. The interviews are recorded and transcribed to eventually be analyzed with the NVivo tool (see [20] for more information). The answers of the stakeholders are coded within the tool based on the categorized questions and SBMF components.

This comparative case study is based on the comparison of the completed SBMFs by assembling all of them in a single table. Altogether the data is analyzed to derive a blueprint for Open Source start-ups. The data is analyzed to perform the third step of the CSP where the findings are used to sharpen the construct definitions. Moreover, in this stage the data is internally validated by the interviewees. Due to specific business model information the outcomes of this research are anonymised. Table 1 shows the profiles of the interviewees of the comparative case study in random order.

The external validity of this work can be challenged, as a relatively small number of case studies was included and the research is based on a convenience sample. The companies are successful and some of them have gone through an Initial Public Offering. However, the small number of cases does not give any guarantee that the blueprint is a formula for success in open source business. That in effect is also not the goal: we mainly aim to present the current status of open source business models in the field.

Case	Type of software	Founded	HQ	FTE	Interviewee role
A.	Project Management Tools	2015	Spain	10-50	CEO
B.	Integration platform and ESB	2006	U.S.A.	1,000-2,000	Dev Manager
C.	Linux distribution	1992	Germany	1,000-2,000	Regional Director
D.	Application Service Provider	2003	NL	10-50	Founder
E.	Git-repository management	2011	No main office	250-1,000	Product Manager
F.	Government geographic data publishing	2007	NL	10-50	Software Engineer
G.	Content Management System	2016	Germany	10-50	CEO
H.	ERP+CRM	2001	U.S.A.	50-250	CEO
I.	Domain Name system server	1999	NL	250-500	Product Manager
J.	Linux distribution	1993	U.S.	10,000-15,000	Accout manager

Table 1. Case study company details

3 Conceptual Models

A method used to define the characteristics of software business models is the Software Business Model Framework (SBMF) [11]. They state that a business model is composed of a number of strategy elements, and that their model make the strategic choices explicit. The Software Business Model Framework is composed of 5 groups that in turn contain 20 elements that are recommended as guidelines to characterize a business model [18]. The 5 groups are based on an extensive literature research and come together as: strategy, revenue, upstream, downstream and usage. The framework is used to analyze and perform the comparative case analysis. The use of this framework enables us to compare the business models of OSS companies on the same level and define the determinants of success.

We also define a value model to create understanding of what characterizes OSS business. First, the *actors* or *market segments* exchanging value in a business model are defined. Following the guidelines of the e3 value model of [21, p.48], "an actor is perceived by his/her environment as an economically independent (and often also legal) entity". The authors define the market segment as a: "concept that breaks a market (consisting of actors) into segments that share common properties" . The following actors and market segments are recognized who each execute activities:

- **Developers**: The developers write the code as the base of an OSS product. Additionally, they offer free support through the OSS community.
- **Investors**: Investors play a fundamental role for OSS start-ups and non-profit foundations offering funding for the development of OSS.

- **Customers**: The customers are the end-users of the OSS and purchase the product and close services and/or support contracts with OSS vendors.
- **OSS vendor**: The OSS vendor providing the product, services and/or support.
- **Foundation/ Association**: The non-profit software foundation works as a collaboration enabler between the OSS community and the commercial OSS vendor [22].
- **OSS community**: The community operates like a hub since it directs the value directed towards the OSS vendor, the customers and possibly an OSS foundation.

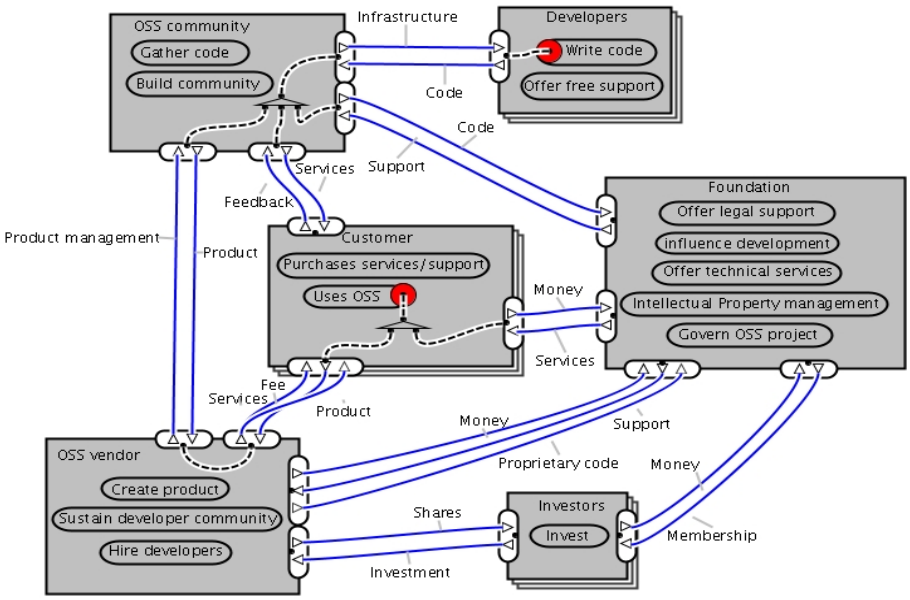

Fig. 1. E3-value model of OSS business model stakeholders and their value exchanges.

Figure 1 shows a value exchange between the community and the OSS vendor where the community exchanges the value object "product" since they develop a product based on the value object "code" offered by developers. According to [23], the community creates the value by developing a product for the OSS vendor leveraging a faster time-to-market and low development costs. In return, the OSS vendor helps the community to market it and offers "product management" to make it marketable as a professionally developed product [23]. Additionally, the OSS vendor often provides a platform for the OSS community to communicate and exchange code in order to sustain the community activities. OSS vendors might receive monetary investments from investors in exchange for company shares. These vendors take advantage from the tight connection with the OSS

community by hiring the best developers from this community to work full-time on their product.

The "foundation" actor offers developers several services like legal support and intellectual property management. The foundation is a separate entity which is able to host and govern a software project [24] when the vendor is offering the services to the end customer. The company exchanges value in return in the form of sponsorships and support to both the community and/or a foundation [22]. [22, p.408] explains that assets like proprietary code, financial resources and hardware can be donated by the vendor to a foundation, and in return some foundation offer a membership as a sponsor with an advisory role. The same role is apparent for investors who want to support OSS foundations by offering money or intellectual property. The customer has two possibilities when it comes to choosing the source of support and/or services. The OSS vendor offers paid support and/or services while the OSS community offer this for free. It is up to the customer whether they want to sign a SLA with a vendor or to find help from the community. Here, the foundation often works as a middle-man between the customer and the community. The OSS community receives value from the feedback given by the customers which in turn makes it possible to offer the users and vendor a better product.

4 Case Study Analysis

The data compelled from the interviews is based on the five building blocks of Schief's [11] Software Business Model Framework: Strategy, Revenue, Upstream, Downstream and Usage.

Strategy The value proposition is aiming at the competitive advantage of a company's offering. Three companies agree on the importance of being an innovation leader, which is achieved by offering new and disruptive software and services [11, p.72]. Three companies focus on the functionality of their product with its available features. The value proposition on which most companies agree on is the quality of their product, meaning that they aim for high consistency and dependability. Being an innovation leader in the open source ecosystem means that even under conditions of market failure, innovation is achieved by the collaboration of the community working on a public good [1]. Hippel and Krogh see that OSS business models "present a novel and successful alternative to conventional innovation models" (p.212). Only one company has a value proposition focused on their image in the market or tries to differentiate through their price-scheme. In the *investment horizon* there is a clear time strategy that most companies use: the growth model. According to [25, p.731] the growth model is based on a start-capital including investment with later on a reinvestment in order to grow the value of the firm. This model aims at growing to achieve capital gain for new investors.

Interviewee of company F. addresses that they want to grow in number of employees but do not have a clear strategy to do so. Company E. on the other

hand, has a clear strategy to grow in terms of revenue, trying to go public at the end of 2020. Company B. also measures growth in terms of revenue, wanting to have generated a billion dollar revenue for 2020. Company I. also tries to grow but just to meet the vision of the company and not to create such revenues. Company D. envisions growth in the number of partners and users. Usage is also measured by company G. which is trying to acquire more users to be visible in the market and to advertise their services. Company F. uses the Income model, working up to a point where they can sustain the business without making a lot of profit. Only company G. follows a social model, meaning that they are not focused on making profit but on specific clients such as governmental- and other non-commercial institutions.

Revenue For all companies the revenue source is directly paying customers. This is partially due to the fact that service agreements are offered for long-term and based on direct sales [26]. %50 of the companies use a hybrid combination of both usage-based and usage-independent pricing. Company B. bases their prices on the through-put when the platform is used. Company I. bases the price on the number of subscribers which the client connects to their product. The majority of the companies have chosen for recurring payments, similar to subscription fees. Explained by the interviewee of company I., a subscription model is necessary because developers have to be paid on a steady base. Besides that, companies need a constant cash-flow to pay the partners and for other services. Only one company has an upfront payment flow structure, and two have a hybrid combination of upfront and recurring structures. Company E. states that it is very motivating for the sales department to close large deals, and will even try to offer multi-annual contracts.

Upstream The *Upstream* component defines the development of a product and/or service. Many of the companies provide cloud computing solutions which gives a clear view on the current trends in the software ecosystem. As this research is focused on open source business models it is expected the companies apply either Copyleft Licenses (e.g. GPL), Permissive Licenses (e.g. BSD) or a dual model of both [11]. Six out of ten companies use the GPL license for their software, this corresponds with the fact that GPL is the most used license for OSS [27].

Four of the OSS companies offer both open source solutions and a proprietary solution next to each other. This complies with the dual license business model where a company markets the software product with the choice of either an open source licensed software product or a commercial/proprietary one [28] as described in section. Five companies produce their software in bulk and four in batch. Company E. addresses that they never make something for one customer. When the customer indicates that they want a certain function, the interviewee asks which problem they want to see fixed and sees if they can create something that is interesting for more clients, so in bulk.

Eight out of ten companies mostly spend money on Research & Development, so the personnel costs for the development of the software. The Interviewee of

company G. states that they hire developers from the open source community to spend a certain amount of their time on the product. The interviewee says that the developers like this because they usually use their spare time to write code but now use that time to spend it with their families. This shows that OSS companies use free labour of the community and combine this with the work of in-house developers. They do this to ensure that the project is not dependent on the work of the community. Besides the research and development costs, companies B., G. and J. state that they also spend a lot of money on marketing.

Downstream The *Downstream* component is focused on the customers by characterizing the target market and distribution areas. The target customer for the companies are typically large organizations. Company E. explains that as a B2B company you earn the most money with offering your product to large clients. That is also why many of the OSS products have an open source solution and a separate enterprise product to offer companies that are willing to pay. Interviewee A. states that you need success with smaller companies to convince the larger ones, therefore the company is currently focusing on small and medium sized companies. The *target industry* component is obtained from the Standard Industrial Classification [29]. The option "All", which is mostly picked, conceptualizes companies which sell horizontal solutions that can be applied in any chosen industry [11]. Next to the options provided by Schief, most companies admit being very active in the field of digital marketing through online advertisement.

Usage The final component *Usage* concerns how the software can be offered, implemented, and used. The *implementation effort* is based on the effort that is required to install and configure the software. The software of the stakeholders seems mostly to be medium since the customers will not always be able to install the software themselves and might need some assistance. Some of the interviewees admit that especially the open source versions seem to be harder to install if the user has no prior knowledge of software. The *operating model* on which the software is deployed differentiates between two main deployment models: on premise and on demand. The hybrid combination of both on premise and local systems is the most often chosen option.

A company's *support model* depends on the support contracts signed by the customer [30]. Standard support is the same for all customers while the customer specific support model offers a customized individual support contract. The majority of the sample offers different types of support contracts. This mainly has to do with the fact that OSS companies cannot ask money for the software, therefore business models of OSS companies are primarily built around software related services [31].

5 Suggestions for OSS Entrepreneurs

It is possible to create an OSS start-up without having an existing open source community. We have seen that companies from the sample started offering a

proprietary product and opened the product later in the development process of the product. Nevertheless, not all interviewees agree on the benefits of Open Source and whether offering an OSS product will be sufficient for start-ups to grow. Nevertheless, these companies have grown into successful companies and [12, p.19] confirm that Open Source "makes it possible for small firms to be innovative and find sustainable revenue streams".

The sample data shows us that not all companies from the sample have received investments. Additionally, none of the stakeholders has mentioned investments as a prerequisite for a start-up to become successful. Therefore we disagree with the statement that *OSS businesses rely on investments because they offer free software*. This has also to do with the value exchanges between the different stakeholders in a OSS business model. As [32, p.6] state; "[In OSS businesses] resources are accessed through collaborative relationships between two or more parties". Reviewing the e3-value model based on these relations in Figure 1 we can state that *different value streams are needed to create a successful OSS company*. Moreover, the interview transcripts and the e3-value model show us that *OSS enables a growing customer base* because the customers are not the only users. The developers from the OSS community are often partially working on the product for their own benefit. When the community grows, the customer base is also grows. Additionally it is known that OSS can be offered for a lower price since the software is provided by an outside party [32] and in turn low software prices attract new customers. The OSS contributes in another way, where we can state that *the strategic advantage of OSS is the already existing network bounds offered by the communities*. Interviewees agree with the idea that being Open Source accommodates the establishment of a business and its OSS product. We can conclude that no matter which OSS business model is chosen, a business can choose to make the source code freely available and still serve its business interests as a for-profit organization [33, p.46].

To be able to create a model for entrepreneurs that have the aspiration to start an OSS company, question 10 of the interview aimed at tips given by the experts from the OSS market. According to interviewee F., company F. extracts its revenue from new features in their core products. Nevertheless, the interviewee recommends start-ups to use libraries that are already available to create your own product and to build your own marketing idea around it. Or shortly, take available code from the web and create a special offer. The fact that the software is being used helps in the improvement of the product. On a certain moment in the development phase, it will be time to invest in the core product. This is needed to improve the core layers in your own software product and to keep the whole community rolling. The interviewee has a critical view on start-ups because he sees that some do not "grow up" at a certain point in time, staying for a long time in the initial development phase.

Interviewee of company E. emphasizes client communication, and if you do not have any clients as a start-up: just find one client. This aligns with what interviewee H. says; identifying the right kind of customers and making them happy. Interviewee E adds that entrepreneurs must make sure that a business

model covers the costs and provides decent profit margins. Also, engaging the open source community and being honest and transparent with all stakeholders is mentioned by company H.

Interviewee E. has a simple suggestion, stating: *"Just create a product that 1 person thinks is good, a product that 1 person likes and iterate on this product until they get to the point they are very happy with it and want to give you money for it."*. The other option suggested by interviewee E. is to attract venture capital, but they are often not interested in an OSS product. Nevertheless, according to interviewee J. venture capital can be attracted and obtained by giving lots of presentations for possible investors. What the interviewee sees, is that successful companies which originate from the open source world, first created an open source project which became very popular and then started to build a business around it. The interviewee concludes that it might be better to establish a start-up around a proprietary product to earn money and open the software in a later stadium. He states: *" I think that that is a important realization, you can make things open source only one time."* There is the possibility to change the license, but every time you do that the community will not like it. After the company created an enterprise product, the challenge was to price it right. It is easy to make your product very cheap, but company J. never lost any clients by raising the price of their product. Nevertheless, the pricing should be appropriate and according to the quality of the product. Interviewee B. states that, if they look back at the open source product in the initial phase, it was too good which caused the problem that enterprises did not want to make the step to using their paid enterprise edition. Because of their ambition to grow, the company decided to put less focus on the open source version and more on the enterprise software. The interviewee says that in the end it entrepreneurs must focus on what the client currently and in the future wants.

Interviewee J. agrees with the before mentioned idea of creating a product which is interesting for the market. You should differentiate your company from others and the interviewee sees three ways to do so:

- **Comparative differentiators**; The other company has features A, B and C, so we have features A, B and C.
- **Unique differentiators**; We can do what the other company cannot.
- **Holistic differentiators**; These are the aspects like the company culture and how you are perceived in the market. This comes up later in the sales processes after the acceptance of a client to start using the software. These differentiators are less seen in the begin phase of the acceptation because there is a need for awareness on the vision of the company and the changing technology trends.

6 Findings

The Software Business Model frameworks show several correlations between combinations of business model components. First we recapitulate the main findings

from the completed SBMFs. In terms of strategy, the OSS companies have quality as their value proposition, which correlates with the fact that "development" is identified most often as the main component in the value chain. The sales volume of the sample differs between medium and high but comes directly from the source. The pricing assessment base is a hybrid combination of usage-based and usage-independent pricing. We recognize a subscription model in the recurring payment flow structure. We see that mostly the companies offer Application software, with Cloud Computing software coming second. The platform on which it is offered is a server and the product is usually standardized in bulk. The license model used on the open source part of the offered product is a Copyleft model. Nevertheless, some of the companies offer both proprietary and OSS simultaneously by applying a dual licensing model. The key cost driver is based on costs spent on Research & Development. Localization is mostly worldwide and the type of customers are typically large organizations (¿250 employees) from varying industries. The target end-users are mostly Business dedicated specialists. The marketing channel is maintained by sales agents. The usage component is composed of the offered services. The operating model is a hybrid combination of on premise and on demand, based on what the customer prefers. Also the support model is a hybrid combination, the choices for customers are standard or customer specific support.

The enterprise editions supplied by the case companies form a contradictory business model category called "commercial open source businesses" [23, 34]. The definition of companies that apply this model is given by [23, p1.]: "Commercial OSS projects are owned by a single firm that derives a direct and significant revenue stream from the software." In the commercial open source business model, commercial OSS companies foremost focus on providing services around the software product [34]. The majority of the sample offers their clients SLAs next to the open source or built in a commercial version. The payment flow structure used by the sample is either recurring or hybrid which is a characterizing feature of a subscription.

Altogether, the SBMF data shows that the sample has corresponding components that form a particular business model. This combination can be molded into a blueprint for a hybrid open source business model (see Figure 2). The companies from the sample can be categorized as commercial open source vendors. This specific combination of business model components is based on the success of the sample and forms the proposed blueprint revealing the building blocks of their open source business model.

Based on the investment horizon component of the framework we can state that the sample is looking for growth in company size, number of customers, and community size. This disagrees with the findings of [12] who states that Open Source is a production paradigm that does not support company growth. Since the sample consists of mostly medium and large companies we can state that these companies have grown since the start-up phase while offering an OSS product.

For practitioners, we extracted the following advice from the case studies:

Strategy				
Value proposition: Quality	**Investment horizon:** Growth model	**Value Chain:** Development	**Degree of vertical integration:** Medium	**# of cooperation partners:** Few
Revenue				
Sales volume : Medium High	**Revenue source:** Direct	**Pricing assessment base:** Hybrid combination	**Payment flow structure:** Recurring	**Revenue distribution model:** Medium
Upstream				
Software stack layer: Application software	**Platform:** Servers	**License model:** Open source - Copyleft	**Degree of standardisation:** Bulk production	**Key cost driver:** Research & Development
Downstream				
Localization: All	**Target customer:** Large organisations	**Target industry:** All	**Target user:** Business-dedicated specialists	**Channel:** Sales agents
Usage				
Implementation effort: Medium	**Operating model:** Hybrid combination	**Maintenance model:** Monthly Yearly	**Support model:** Hybrid combination	**Replacement strategy:** Few releases

Fig. 2. A OSS business model blueprint.

- Find a good balance between business oriented employees and open source developers.
- Use the open source community to find developers that can work in-house on your product.
- Funding is not necessary but creates possibilities, otherwise look for incubators.
- Create a clear vision for your company and establish your differentiators.
- Stick to the open source idea, this will keep the community close to the company.
- When the community does not kick-off, start with offering proprietary software and make it open source after a while.
- Communicate frequently with your clients to establish their needs.
- Decide your revenue stream: Services, support, dual licensing, enterprise editions etc.
- Medium and large customers are willing to pay large amounts of money for services, so do not sell yourself short by offering services for low prices.

We suggest the following adjustments to the Schief framework to make it up-to-date and applicable for more specific types of business models.

- **Sales channel**; The interviewees agreed on having sales agents who accommodate the sales and marketing department, but additionally mention their use of online advertising to market their products. Details on the type of the (online) advertisements could give an indication of the revenue creation initiated by advertising.
- **Support model**; details around the support model could be specified by looking at the specific price modules, payment flow structure, if it is based on a stand-alone subscription model or part of a large set of services in- or excluding the product. This is also interesting for the construction of their revenue stream, where we could review how much of the revenue is coming from services versus from the software product itself.

7 Conclusion

In this study we examined and compared the business models of 10 B2B OSS companies. Business models have proven to be useful as a conceptual tool to analyze the revenue logic. The comparison was established by using the Software Business Framework of [11] for the interview protocol and analysis of the business models. The information provided by the interviewees has showed us that it is not harder to establish a business around OSS than around a proprietary product.

We can place the applicability of this research in the field of OSS software, entrepreneurship, OSS businesses and strategy. The blueprint and guideline together are useful for entrepreneurs who want to start a business around an existing open source project, or for who want to change their business model when growth is not part of the long-term picture anymore. Furthermore, investors can compare the business model of prospective start-ups they want to invest. Overall, this research provides an overview of the current used business models in the OSS market and mentioned in literature. This overview is offered in the shape of a blueprint for current OSS practitioners, start-ups and researchers.

In this case study, the use of the SBMF could threaten the internal validity because of the interviewees' lack of knowledge in the use of the framework. Threats to the construct validity can be found in the extent to which the experiment setting, in this case B2B OSS businesses, reflects the construct under study. The sample could be expanded to B2C companies by applying additional sample criteria. External validation of the blueprint can be expanded by be applying it on the business models of OSS start-ups. To eliminate the threat on external validity, the blueprint can be put into use on businesses that do not have a business model yet, or on businesses that want to change their current business model and strategy. Future research could possibly focus on the influence of the community on the business model and the development of the product. Ultimately, more research on OSS business models should for start-ups is needed. The field of OSS, start-up strategies and investments should be further explored to add to the current body of knowledge.

References

1. Hippel, E.v., Krogh, G.v.: Open source software and the private-collective innovation model: Issues for organization science. Organization science **14**(2) (2003) 209–223
2. Lee, S.Y.T., Kim, H.W., Gupta, S.: Measuring open source software success. Omega **37**(2) (2009) 426–438
3. Raymond, E.S., et al.: Open sources: Voices from the open source revolution. (2000)
4. Fitzgerald, B.: The transformation of open source software. Mis Quarterly (2006) 587–598
5. : The open source definition. (1999)
6. Krishnamurthy, S.: An analysis of open source business models. Making sense of the Bazaar: Perspectives on Free and Open Source Software (2005) 279–296
7. Chesbrough, H.W., Appleyard, M.M.: Open innovation and strategy. California management review **50**(1) (2007) 57–76
8. Lerner, J., Tirole, J.: The open source movement: Key research questions. European economic review **45**(4) (2001) 819–826
9. Androutsellis-Theotokis, S., Spinellis, D., Kechagia, M., Gousios, G., et al.: Open source software: A survey from 10,000 feet. Foundations and Trends® in Technology, Information and Operations Management **4**(3–4) (2011) 187–347
10. Onetti, A., Capobianco, F.: Open source and business model innovation. the funambol case. In: Proceedings of the first International Conference on Open source Systems. (2005) 224–227
11. Schief, M.: Business models in the software industry: the impact on firm and M&A performance. Springer Science & Business Media (2013)
12. Bonaccorsi, A., Giannangeli, S., Rossi, C.: Entry strategies under competing standards: Hybrid business models in the open source software industry. Management Science **52**(7) (2006) 1085–1098
13. Baxter, P., Jack, S.: Qualitative case study methodology: Study design and implementation for novice researchers. The qualitative report **13**(4) (2008) 544–559
14. Yin, R.K.: Case study research: Design and methods (applied social research methods). London and Singapore: Sage (2009)
15. Pervan, G., Maimbo, M.: Designing a case study protocol for application in is research. In: Proceedings of the Ninth Pacific Asia Conference on Information Systems, PACIS (2005) 1281–1292
16. Eisenhardt, K.M.: Building theories from case study research. Academy of management review **14**(4) (1989) 532–550
17. Robinson, O.C.: Sampling in interview-based qualitative research: A theoretical and practical guide. Qualitative Research in Psychology **11**(1) (2014) 25–41
18. Schief, M., Buxmann, P.: Business models in the software industry. In: System Science (HICSS), 2012 45th Hawaii International Conference on, IEEE (2012) 3328–3337
19. Cooper, D.R., Schindler, P.S., Sun, J.: Business research methods. Volume 9. McGraw-Hill Irwin New York (2006)
20. : What is nvivo?
21. Gordijn, J., Akkermans, J.: Value-based requirements engineering: exploring innovative e-commerce ideas. Requirements engineering **8**(2) (2003) 114–134
22. OMahony, S.: 20 nonprofit foundations and their role in community-firm software collaboration. (2005)

23. Riehle, D.: The commercial open source business model. In: Value creation in e-business management. Springer (2009) 18–30
24. Rosenfall, T.: Open Source Vendors Business Models. PhD thesis, Linköping University Electronic Press (2012)
25. Morris, M., Schindehutte, M., Allen, J.: The entrepreneur's business model: toward a unified perspective. Journal of business research **58**(6) (2005) 726–735
26. Hoch, D.J., Roeding, C., Lindner, S.K., Purkert, G.: Secrets of software success. Harvard Business School Press Boston (2000)
27. Stewart, K.J., Ammeter, A.P., Maruping, L.M.: Impacts of license choice and organizational sponsorship on user interest and development activity in open source software projects. Information Systems Research **17**(2) (2006) 126–144
28. Onetti, A., Verma, S.: Licensing and business models. Technical report, Department of Economics, University of Insubria (2008)
29. SEC: Securities and exchange commission: Form 10-k. (2013)
30. Buxmann, P., Diefenbach, H., Hess, T.: The software industry: Economic principles, strategies, perspectives. Springer Science & Business Media (2013)
31. Whichmann, T.: Floss final report: Firms' open source activities: motivations and policy implications. (2002)
32. Lindman, J., Rajala, R.: How open source has changed the software industry: Perspectives from open source entrepreneurs. Technology Innovation Management Review **2**(1) (2012)
33. Hecker, F.: Setting up shop: The business of open-source software. IEEE software **16**(1) (1999) 45–51
34. Popp, K.M.: Leveraging open source licenses and open source communities in hybrid commercial open source business models. In: IWSECO@ ICSOB. (2012) 33–40