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MASTER THESIS

SPONSORS OF INNER SOURCE CONTRIBUTIONS

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Abstract

Inner source (IS) is the use of open source software development practices and the establishment of an open source-like culture within an organization. In IS, the source code for selected software components is made accessible to developers all over the organization. They can use the software for their needs and contribute changes. Contributing to IS components benefits many parties within the organization. However, it is unclear who in the organization pays for such IS contributions and why. We contribute to the understanding of the economic models behind IS by identifying the internal sponsors of IS code contributions and their interest to pay for it. We performed four semi-structured interviews with developers and managers in an IS context and analyzed the results using thematic analysis to induct a theory of IS sponsoring. Our theory lays out which parties within the organization sponsor IS contributions in specific scenarios and their interest to do so. The thesis provides a qualitative model of IS sponsoring showing the links between consumers and suppliers towards IS communities/platforms, their interests to pay for IS code contributions in the prevailing IS scenarios and contributes to the understanding of the economic models behind IS.

Contents

List of Figures

List of Tables

1 Introduction

1.1 Original Thesis Goals

The main thesis goal was to identify which parties in an organization sponsor IS contributions and what their interest is to do so. Using a qualitative research approach, literature on IS adoption with a focus on development practices and benefits was reviewed. The execution of the thesis method comprised the identification of typical scenarios of IS work, the sampling of fitting interviewees, as well as the development of an interview guideline and the performance, transcription, and analysis of the interviews. The defined thesis results were the following:

- Interview guideline for semi-structured expert interviews
- Transcribed interviews and code systems resulting from analysis
- (Qualitative) theory laying out which parties pay for IS contributions and what their interest is to do so

1.2 Changes to Thesis Goals

The thesis goals were not changed.

2 Research Chapter

2.1 Introduction

Capraro and Riehle (2017) define inner source (IS) software development (SD) as the implementation of open source software (OSS) development practices within an organization. An open source-like culture is established within organizational boundaries and source code for selected software components is made accessible to developers all over the organization (Capraro & Riehle, 2017). According to the authors, developers can use the software for their needs and contribute changes. Contributing to IS software components benefits many parties within the organization (Capraro & Riehle, 2017). While motivations for contributions in OSS development including fun and enjoyment, peer recognition and other motivational factors are frequently subject in the open source (OS) research literature, interests for OSS contributions cannot be transferred directly to motivational factors and interests of sponsors in a corporate setting (Lindman, Riepula, Rossi & Marttiin, 2013). Existing literature discusses the institutionalization of OSS practices inside the organization and indicates how resources could be allocated. However, it is unclear who in the organization pays for IS contributions and why.

The thesis method employed a qualitative research approach. We performed four semi-structured interviews with developers and managers in an IS context. Using thematic analysis according to Braun and Clarke (2006), we analyzed the results to induct a theory of IS sponsoring. Related work was surveyed to differentiate the results from the findings of prior research on IS adoption with a focus on development practices and the benefits of IS adoption. Our theory lays out which parties within the organization sponsor IS contributions in specific scenarios and their interest to do so.

The remainder of the thesis is structured as follows: Section 2.2 discusses previous research and related work on IS and contrasts and compares the findings of the thesis work. The research questions are presented in section 2.3. The following section 2.4 describes the research approach that was used to conduct the qualitative study. Section 2.5 reports on the sampling criteria and used data

sources for data gathering. The following section 2.6 introduces the research results of our qualitative study and in section 2.7 we discuss our research results. Limitations of the thesis, notes for future research work, and the conclusion close the thesis in the sections 2.8 and 2.9.

2.2 Related Work

The first research on IS by Dinkelacker et al. in 2002 was followed by a slow stream of publications elaborating on case studies and examples (Riehle, Capraro, Kips & Horn, 2016). Previous work on IS provides preliminary concepts on sponsors of IS contributions and their interest to sponsor IS. Capraro and Riehle (2017) conducted a survey providing the first broad review of IS literature and systematic arrangement of IS research results. They identified four IS development practices which communities exercise around software and provided a qualitative model of seven identified IS benefits observed by organizations.

2.2.1 Sponsors of Inner Source Contributions

Wesselius (2008) describes the market mechanisms and IS software business models implemented at Philips Healthcare. They intended to implement internal market mechanisms and IS software business models to attract two actors, suppliers and consumers, to participate in its IS software market. According to the authors, the SD practice evolved from reuse of common software assets developed by the platform group who acted as suppliers of the IS software market with a strict cost-sharing approach to a development practice with a software warehouse approach. Software groups that operated as consumers of the platform were invited to engage and share their software assets with the organization (Wesselius, 2008). We also found that sponsors of IS code contributions can be differentiated by their roles in the organization towards the IS community/platform, consumers and suppliers. In addition, we found that the parties who pay for IS code contributions are suggested from the findings of explicit accounting and settlement of development time via negotiation mass which is created by performing IS work without explicit accounting.

Lindman et al. (2013) discussed the internal economics of IS programs and the interests of business units to contribute their development to IS platforms. They identified the metaphors of a private market and a local library based on the cases Philips Inner Source and Nokia iSource when institutionalizing OSS development practices in commercial organizations. The authors found the interest of sponsors contributing to IS work in the private market setting could be the reward by

component taxes. Nonetheless, internal markets as suggested by Wesselius (2008) and Lindman et al. (2013) in their private market metaphor were not found to be implemented in the interviewees' organizations. The findings from opinions on future sponsoring of IS contributions suggests that settings comparable to the local library metaphor of Lindman et al. (2013) are expected to facilitate IS sponsoring in the organization. Organizational units can contribute their components to a library and enable their reuse free of charge with the interest to avoid the effort of negotiations with suppliers of components (Lindman et al., 2013).

2.2.2 Interests for Inner Source Sponsoring

While the findings on IS benefits summarized by Capraro and Riehle (2017) based on the review of publications in the context of case organizations are of higher generality, we focused on the interests for sponsoring IS contributions by employing a qualitative research approach conducting expert interviews. The interests of IS sponsors to pay for IS code contributions identified in the thesis are partially consistent with the benefits from IS adoption.

The sponsoring of IS work with the interest of realizing product/business unit benefits and time/cost savings are consistent with the IS benefit of more efficient and effective software development. It comprises the reduction of the time to market of software products, development costs, and generally the increase of development efficiency summarized by Capraro and Riehle (2017). We found the interests of paying for IS work of realizing benefits for the product/business unit for contributions to components that might become relevant, or benefit the product development, and the interest of realizing time/cost savings when enabling faster releases of software products or faster implementation of changes to IS software components. The benefits of IS adoption regarding enhanced knowledge management and higher employee motivation were also identified as interests for IS sponsoring. While Capraro and Riehle (2017) emphasize the knowledge dissemination by community-based learning and its result in openness and increased provision of knowledge in the organization, the data suggest the interest for paying for IS work of enhancing employee SD knowledge which can directly result in the acquisition of knowledge about SD practices and the applied development tools. Sponsors were found to pursue the interest of facilitating employee motivation which was also summarized as an IS benefit by Capraro and Riehle (2017).

In addition, the interest for IS sponsoring of creating negotiation mass in terms of expected benefits and compensation for the dedicated product/business unit was identified in the thesis. Negotiating higher priority, additional dedicated IS work, or the generation of transparency for undertaking IS work from the project in regards of additional effort are expected to be realized by sponsoring IS

code contributions. Nonetheless, the interest for IS sponsoring was not found by Capraro and Riehle (2017) as a benefit of IS adoption. In addition, they summarized benefits of IS adoption of overcoming of organizational boundaries, more flexible utilization of developers, better software products compared to traditional setups of development, and more successful software reuse (Capraro & Riehle, 2017). However, we did not find comparable interests for sponsoring IS code contributions.

2.2.3 Inner Source Scenarios

In the prevailing IS scenarios of our interviewees' organizations, sponsors of IS contributions have different interests. Consumers of IS work act as reusers of IS software components from the IS community/platform. In the case of participatory reuse, Capraro and Riehle (2017) summarized their findings of IS SD practices as the scenario of individual developers who are enabled to contribute patches to the software components they want to reuse. They contribute to the IS community to meet their particular business needs as part of their work, while they do not self-select the components they contribute to based on their interest or their qualification (Capraro & Riehle, 2017). Our data also suggest that sponsors pay for contributions to reused components in order to meet business needs by realizing product/business unit benefits, time/cost savings, or creating negotiation mass. We additionally found that sponsors in the role of consumers could also pursue the interest of facilitating employee motivation when allowing their developers to contribute to IS.

Suppliers for the IS community/platform in the scenario of forward patching have the interest of realizing time/cost savings when contributing to IS. Developers patch forward adapted components to the reusers, which involves the active access to consumers' code base. The scenario was found in addition to the IS SD practices identified by Capraro and Riehle (2017). Sponsors in the scenario self-selection of tasks were found to act as consumers or suppliers towards the IS communities/platforms. Sponsors pay for IS contributions by enabling their developers to self-select which development work to execute during a defined amount of work time. They also summarized their findings on the scenario of self-selection of tasks as an IS SD practice in which organizations allow their developers to select which development work to perform during their work time (Capraro & Riehle, 2017).

2.3 Research Questions

The main thesis goal was to identify which parties in an organization pay for IS contributions and what their interest is to do so. We defined sponsors of IS contributions to be organizational units that support persons, organizations, or activities aimed towards IS by providing resources (Gabler Wirtschaftslexikon, 2018). In the scope of this thesis, the interest of sponsors of IS contributions was defined as the reasons for involving and desiring to gain advantages from facilitating IS contributions (Oxford Dictionary online, 2018). The initial term motivation was rejected. We preferred the term interest to emphasis the focus on reasons for facilitating IS contributions by sponsors in terms of involvement and advantages. Consequently, the thesis addresses the following research questions:

- RQ1: Who (which sponsor) pays for IS contributions?
- RQ2: Why (with which interest) does a sponsor pay for (sponsor) IS contributions?

2.4 Research Approach

The thesis research method employed a qualitative research approach. The qualitative research interview is the most commonly used method of data collection in qualitative research (King & Horrocks, 2010). We applied thematic analysis to identify, analyze and report on themes within the gathered data and to organize and describe the data set (Braun & Clarke, 2006).

2.4.1 Literature Review

We reviewed IS literature on IS adoption and IS SD practices. In order to find related work about IS SD practices, sponsors of IS contributions, and their interests to sponsor these contributions, we focused on the state of research on IS adoption in organizations. According to Lindman et al. (2013), interests for OSS contributions cannot be transferred directly to motivational factors and interests of sponsors in a corporate setting. Therefore, the literature on benefits of IS adoption was reviewed for contrasting and comparing of our findings of interests of IS sponsors in a corporate setting.

2.4.2 Expert Interviews

For development and conduct of the expert interviews we followed the guidelines laid out by King and Horrocks (2010). They provide recommendations for the development of interviewee samplings, the creation of interview guidelines, and instructions for data gathering. Following their guide that features the introduction to thematic analysis referring to Braun and Clarke (2006), the creation of an appropriate base for the analysis of the gathered data was ensured.

Interview Guideline

In order to ensure the flexibility of the interviewers and enable them to react to issues that emerge in the course of the interview or to explore the perspective of the interviewees according to King and Horrocks (2010), we performed the interviews using a semi-structured guideline. We outlined main topics and provided flexible phrasing of questions and order to allow the participants to lead the interaction in unanticipated directions (King & Horrocks, 2010). Interview questions were built around the following main topics:

- A: Interviewee background
- B: Collaboration practices
- C: Sponsors and interests that were related to our research questions

We aimed at learning about the work history of the interviewees, IS context, and IS experience to clarify the classification of the participants in our sampling dimensions and the expert definition. We developed the interview guideline to understand IS and collaboration practices in the software development exercised in the interviewees' organizations and to find answers to the research questions, see appendix A.

Data Gathering

Given the scope of the thesis, we performed four semi-structured interviews with developers and managers in an IS context for data gathering and analysis. The interviewees having consent to the audiotaping, transcription and use of the interview data, see appendix B, were interviewed between 30 and 60 minutes. We recorded the interviews and transcribed them using MAXQDA, a software package designed for qualitative and mixed methods research. The interview guideline remained unchanged throughout the process of carrying out the interviews. We followed the transcription approach suggested by Mayring (2016). In order to achieve a high level of readability, they suggest to transcribe audio recordings of interviews in a verbatim style but transfer them to standard German. According to the author, we adjusted the dialect, resolved mistakes in construction, and straightened the language style. As the interviewees impersonated experts, we

followed the method of transferring the interview transcripts to standard German as we considered the content-related level of the interview as paramount (Mayring, 2016). In addition to that,we applied further basic transcription systems according to Dresing and Pehl (2018) to ensure consistency of interview transcripts as the base for data analysis, see appendix C. Thematic analysis was performed based on four interview transcripts and one supplement to interview 4 which was given via email.

2.4.3 Thematic Analysis

Using thematic analysis according to Braun and Clarke (2006), we analyzed the results to induct a theory of IS sponsoring in organizations. They suggest thematic analysis as a research method used for the identification, analysis, and report of themes within gathered data. Themes capture important findings in the data that are related to the research questions and are expected to represent a level of response or meaning within a data set (Braun & Clarke, 2006). We based the systematic analysis on the authors' suggestions of finding patterns in recurring themes in the gathered interview data and categorization of found themes. Analysis was performed in a recursive process between the six phases of the qualitative analysis guideline suggested by Braun and Clarke (2006).

Following the guideline by Braun and Clarke (2006), we familiarized ourselves with the data by transcribing the interviews and making notes of initial ideas by reading and rereading the transcripts. As suggested by the authors, interesting features of the transcripts were coded in a semantic analysis approach reviewing the entire data set and relevant data extracts that represent potential themes or patterns were assigned to the identified codes using MAXQDA. Beside the codings in MAXQDA, we created and maintained a code system which reflects the themes and their descriptions. We searched for themes by assigning codes to potential themes and gathering all data that were relevant to the identified themes (Braun & Clarke, 2006). As suggested by the authors, we reviewed and refined the identified themes to ensure they reflect the meanings that were evident in the entire data set and defined the themes. Following the guideline, we selected data extracts to provide evidence of the themes within the data and produced the report of the findings. We followed the 15-point checklist of criteria for thematic analysis during the analyis of the gathered data (Braun & Clarke, 2006).

2.5 Used Data Sources

For data gathering and analysis, we performed four semi-structured interviews with developers and managers in an IS context which were selected based on

defined sampling dimensions. King and Horrocks (2010) advise researchers to sample and recruit participants who represent different attributes of dimensions that are expected to be related to the research topic in qualitative research. Our interviewees were sampled along the dimensions type of IS work, interviewee's role in the organization, and IS scenarios worked in:

- We considered the *type of IS work* for sampling in order to identify sponsors and their interests:
  - *Attributes of type of IS work* were defined as code contributions, discussion contributions, other contributions, as well as project provision and contribution review.
  - We suspected that different types of IS work are sponsored by different parties or some are not sponsored at all. Also, the interests for sponsoring were expected to vary e.g. an ad hoc code contribution to fix a bug serves a different interest then the strategic provision of a new IS project, which is a software project that aims at the development and maintenance of IS software (Capraro & Riehle, 2017). For the scope of this thesis, we limited ourselves further to only consider code contributions.
- The *role the interviewee* has or had *in organizations using IS* was sampled:
  - *Attributes of the interviewee's role in the organization* are individual contributors, e.g. developers, architects, documentation responsible persons, managers of code contributions, e.g. project managers, disciplinary managers, and IS responsible persons, e.g. corporate champions, or IS consultants.
  - We suspected that interviewees filling management roles might have deeper knowledge about interests to sponsor, e.g. project managers who decide to allow their employees to contribute to IS projects can give more insights then one of their developers. Also, interviewees acting as individual contributors were suspected to have deeper knowledge about the de facto sponsors, e.g. a developer might contribute under the radar and post IS work to an arbitrary cost center.
- The *IS scenarios* the interviewee worked in, observed, or oversaw were considered as another sampling dimension. In the scope of the thesis, we defined an IS scenario as sequence of events and its context in which IS contributions occur (Duden online, 2018):
  - *Attributes of IS scenarios* were defined according to prior research work by Capraro and Riehle (2017) which identified the four IS scenarios participatory reuse, self-selection of tasks, volunteering, and collaborative development projects, and others that fit none of the prior

identified IS development practices.

– Depending on the scenario, we suspected different parties within the organization might be the sponsor, e.g. there might be no sponsor in the case of volunteering, but a sponsor in the case of participatory reuse. For the scope of this thesis, we therefore limited ourselves and ignored the IS scenario volunteering.

We considered experts in regard to our research questions either by having in-depth knowledge about existing IS programs or by practical experience. Organizations utilize IS programs which represent the coordinated effort for running and maintaining one or multiple IS projects (Capraro & Riehle, 2017). We considered individual interviewees as experts if they exhibited at least one of the following attributes:

- Demonstrated practical knowledge of IS. The interviewee contributed to IS projects, led, or coordinated IS programs, or worked on IS programs, or in IS environments.
- Demonstrated OS knowledge.

For the identification of an expert in the scope of our research topic we did not require our interviewees to use the term *inner source* if IS elements were present. We recruited potential participants by providing information on our research topic, on the accessibility and use of the gathered data to avoid coercion, and to ensure proper informed consent and the decision about participation (King & Horrocks, 2010).

Interviewee Number	**Role in the organization using IS**	**IS scenarios worked in, observed, oversaw**
1	IS Responsible Person	Participatory Reuse
2	IS Responsible Person, Individual Contributor, Manager of Code Contributions	Participatory Reuse, Forward Patching
3	Individual Contributor	Participatory Reuse
4	IS Responsible Person, Individual Contributor	Participatory Reuse, Self-Selection of Tasks

Table 2.1: Sampling dimensions for interviewees

Four interviewees were recruited from three independent organizations with more than 1,000 employees. They represent the sampled roles in the organization using IS, see table 2.1. Three interviewees are or were individual contributors in IS projects, three belong or belonged to the group of IS responsible persons, one represented managers of code contributions. The IS scenarios participatory reuse,

self-selection of tasks, and forward patching, which was identified as a scenario that fitted none of the surveyed IS scenarios in literature, are exercised in the interviewees' organizations.

2.6 Research Results

Following the thematic analysis approach suggested by Braun and Clarke (2006), we inducted a model of IS sponsoring in organizations based on the four conducted interviews. The themes and descriptions reflect the findings from the thematic analysis and the resulting code system. Figure 2.1 illustrates the identified links between the concepts of *sponsors of IS contributions*, their *interests to pay for IS work*, and the prevailing *IS scenarios* as well as the total number of codings for each theme and the interviews they were identified in.

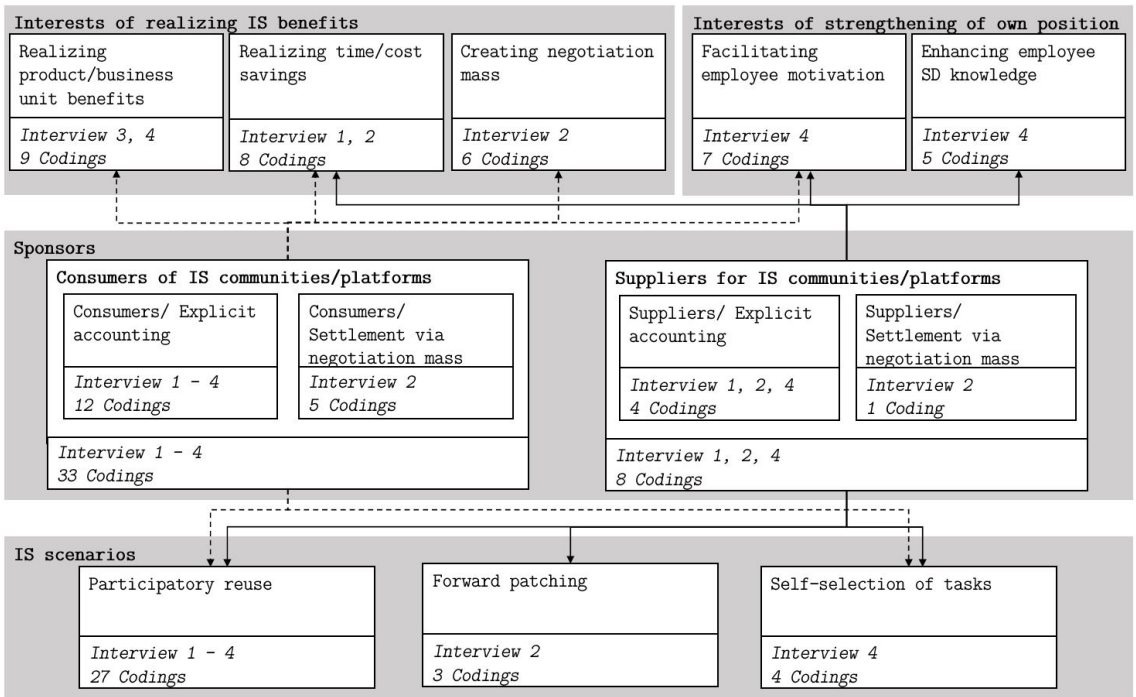

Figure 2.1: Qualitative model of inner source sponsoring

White boxes represent the concepts that illustrate the themes and their names found in the data which are related to the research questions. They indicate the interviews in which they were mentioned and the number of codings in MAXQDA that are associated with them. White boxes within superordinate white boxes with names in bold print indicate that their codings are combined with those of the superordinate white box. Gray areas represent the superordinate concepts

of the themes. The dotted lines highlight the associations between the concepts of the theme of consumers of the IS community/platform, while the solid lines underline the associations with suppliers for IS communities/platforms.

Key findings are the link between *consumers of the IS community/platform* and the IS scenarios *participatory reuse* and *self-selection of tasks* on the one hand, and the connection to the interests for paying for IS code contributions of *realizing product/business unit benefits, realizing time/cost savings, creating negotiation mass*, and *facilitating employee motivation* on the other hand. The IS scenarios *forward patching*, *participatory reuse*, and *self-selection of tasks* are associated with the role of a *supplier towards the IS community/platform* and the interests for paying for IS code contributions of *realizing time/cost savings, facilitating employee motivation*, and *enhancing employee SD knowledge*.

2.6.1 Sponsors of Inner Source Contributions

The parties in an organization who pay for IS contributions can be differentiated by their role towards the IS community/platform. We selected the name IS communities according to Capraro and Riehle (2017) who defined them as informal organizations of individuals communicating and collaborating across organizational units. We defined platforms along the definitions of Pohl, Böckle and van der Linden (2005) and Riehle et al. (2016) as a set of shared reusable assets which enable the development of software products from reusable components and comprise software libraries, components, and frameworks, and other artifacts of the development process. Sponsors are differentiated between suppliers and consumers towards the IS community/platform.

- **Suppliers for IS Communities/Platforms**: The role in the organization as a supplier towards the IS community/platform or tasks related to the provision of IS work for the IS community/platform. The role of the supplier of IS work towards IS communities or platforms differs from the role of consumers in terms of the provision of IS software components without direct reuse intentions for the own business unit products by contributions.
- **Consumers of IS Communities/Platforms**: The role in the organization as a consumer towards the IS community/platform can be associated with the consumption of IS work with direct reuse intentions.

Overlapping with the role towards the IS community/platform, the explicit accounting, or settlement via negotiation mass suggests the specific sponsors of IS code contributions.

- **Explicit accounting**: Code contributions are paid by posting of development time to specific projects or cost centers, or by undertaking develop-

ment work using the own projects or cost centers, or, in a scenario in the case of interview 4, using an overhead cost center dedicated to IS development. Projects in the context of posting of development time and cost centers are defined as billing units for which expenses are planned, recorded, and monitored autonomously (Coenenberg, Fischer & Günther, 2016):

  - **Suppliers/Explicit Accounting:** Suppliers for IS communities/platforms post their development time used for IS code contributions to their own projects or cost centers.
  - **Consumers/Explicit Accounting:** Consumers of IS communities/platforms post their development time used for IS code contributions to their own projects or cost centers, or to an overhead cost center dedicated to IS development work.

  Explicit accounting of IS code contributions by posting of IS work to specific projects or cost centers can be observed for both suppliers as well as for consumers of IS communities/platforms.

- **Settlement via Negotiation Mass**: Settlement of IS code contributions via negotiation mass is found in the case of interview 2. IS work is performed below the radar which means that work is not posted explicitly and separately on specific projects or cost centers and is performed without explicit accounting of the development time. Negotiation mass is used to generate benefits and compensation for the dedicated product/business unit:
  - **Suppliers/Settlement via Negotiation Mass:** Suppliers undertake code contributions done by consumers without explicitly and separately posting the development time.
  - **Consumers/Settlement via Negotiation Mass:** Consumers of the IS community/platform perform IS work without explicitly and separately posting their development time. Settlement of IS work is performed via negotiation mass. While the business units pursue interests of *realizing time/cost savings*, or the *creation of negotiation mass*, project leaders who could be unaware of IS contributions benefit from the *realization of time/cost savings*.

2.6.2 Interests of Realizing Inner Source Benefits

The identified interests to pay for IS code contributions of *realizing product/business unit benefits*, *realizing time/cost savings*, and *creating negotiation mass* can be summarized as interests of realizing IS benefits.

- **Realizing Product/Business Unit Benefits:** General, unspecified benefits for the dedicated product/business unit were identified that are expected to be realized by sponsoring IS work. In the scope of our interviewees' organizations, business units account for products and/or projects. The general contribution to products by engaging in IS, the potential of IS software components which could become relevant for the dedicated product/business unit, the benefits for product development, and profit from contributions to the product/business unit can result from sponsoring IS work and are summarized in the theme *realizing product/business unit benefits*.
- **Realizing Time/Cost Savings:** *Realizing time/cost savings* is another interest for paying for IS contributions identified in the data. Sponsoring IS work is expected to result in the faster release of software products or faster implementation of changes to IS software components.
- **Creating Negotiation Mass:** The *creation of negotiation mass* is an interest of IS sponsors for paying for IS code contributions. It was identified as a pursued interest for IS sponsoring by settlement of IS work via negotiation mass. Benefits and compensation for the dedicated product/business unit by negotiating higher priority, additional dedicated IS work, or the generation of transparency for undertaking IS work from the project in regards of additional effort are expected to be realized by sponsoring IS code contributions.

2.6.3 Interests of Strengthening of Own Position

The identified interests to pay for IS code contributions of *facilitating employee motivation*, and *enhancing employee SD knowledge* can be summarized as interests of strengthening of own position.

- **Facilitating Employee Motivation:** The *facilitation of employee motivation* was identified as an interest of IS sponsors to pay for IS contributions. Enabling developers to contribute to IS work is expected to result in higher job satisfaction and the possibility to retain skilled developers by enabling them to participate in the IS community for motivational purposes.
- **Enhancing Employee SD Knowledge:** Paying for IS code contributions is done with the interest of *enhancing employee SD knowledge*. When contributing IS work, developers can acquire knowledge about SD practices and the applied development tools.

The interests for paying for IS code contributions as a supplier towards the IS community/ platform were identified as *realizing time/cost savings, facilitating*

employee motivation, and *enhancing employee SD knowledge*. For a consumer of the IS community/platform we found the interests of *realizing product/business unit benefits, realizing time/cost savings, creating negotiation mass*, and *facilitating employee motivation*.

2.6.4 Associations with Inner Source Scenarios

Three IS scenarios were identified from the data as SD development practices associated with the sponsors of IS code contributions and their interest to pay for them. Sponsors who are in the role of consumers of IS communities/platforms have interests for paying IS code contributions associated with the IS scenario *participatory reuse* and *self-selection of tasks*. One further IS scenario described as *forward patching* is additionally connected with sponsors acting as suppliers towards the IS community/platform and their interests.

- **Participatory Reuse:** Cases of SD practices are described in which developers do not only consume existing components, but they also contribute to the software they reuse. Contributions to the IS community are made to meet particular business needs as part of their project/business unit work, while components contributed to are not self-selected based on interest or qualification. The IS scenario of the described *participatory reuse* was identified for SD collaborations where consumers of IS communities/platforms contribute to the reused components.
- **Self-Selection of Tasks:** The SD practices described in the data also showed cases where organizations allow their developers to self-select which development work to execute during a defined amount of work time. The IS scenario *self-selection of tasks* can be identified by performed development tasks that did not exclusively concern the dedicated product/business or scope of the developers' every-day work.
- **Forward Patching:** Further SD practice was identified. Sponsors of IS code contributions acting as suppliers towards the IS community/platform are enabled to contribute to consumers of IS components. While consumers would contribute to IS components they want to reuse and that need code changes to meet particular business needs, suppliers patch forward adapted components to reusers. The IS scenario *forward patching* was found to involve active access to the consumers' code base to contribute code.

The data show that *forward patching* is associated with suppliers pursuing the interest of *realizing time/cost savings* by paying for IS code contributions, while sponsors in the IS scenario of *self-selection of tasks* consider the interests of *facilitating employee motivation* and *enhancing employee SD knowledge*. In addition, consumers in the scenario of *self-selection of tasks* have the interest of *realizing*

product/business unit benefits. *Participatory reuse* is associated with both roles which sponsors were found to have in this study with the pursued interests of *realizing product/business unit benefits*, *realizing time/cost savings*, and *creating negotiation mass*.

In addition to the research questions, we emphasize the findings from opinions on the future organization of the sponsoring of IS contributions. The simplification of the accounting processes by introducing overhead cost centers for IS work and the avoidance of the implementation of complicated cost structures to organize the accounting of IS code contributions was suggested to facilitate IS sponsoring. Interviewees suggested the prevention of associated constraints from a process perspective of developers' contributions, the concession of work time dedicated to IS contributions, and the grant of additional budget for sponsoring of IS work to encourage contributions to IS communities/platforms.

2.7 Results Discussion

Sponsors of IS contributions have different interests for paying for IS contributions in the prevailing IS scenarios in organizations. Interests concerning the *realization of IS benefits* are associated with the IS scenarios of *participatory reuse* and *forward patching*. The interests of *strengthening of own position* are associated with the IS scenario of *self-selection of tasks*. We discuss the research results we emphasize of global IS benefits that can be transferred to the local level of interests for IS sponsoring, the interest of negotiation mass, and the IS scenario forward patching that were found in the study.

Global Inner Source Benefits on Local Level

The identified interests are partially consistent with global IS benefits surveyed by (Capraro & Riehle, 2017). While OSS development motivations cannot be transferred directly to interests of internal sponsors of IS contributions (Lindman et al., 2013), we found that IS benefits identified in IS literature can be transferred to interests to pay for IS contributions on a local level of individual business units acting as sponsors of IS contributions. Focusing on the realization of benefits for the own product/business unit, or the creation of negotiation mass to generate benefits for individual products or business units, and the realization of time/cost savings, sponsors pursue interests that are partially consistent with global IS benefits of an organization. Strengthening of own position of developers by facilitating their employee motivation or enhancing their SD knowledge are interests pursued on a global as well as on a local level in the organization. Further interests of IS sponsors which are also considering global IS benefits and focus on the overarching objectives of an organization could not be found in the scope of

this thesis. Nonetheless, we believe that further IS benefits according to Capraro and Riehle (2017) of overcoming of organizational boundaries, more flexible utilization of developers, better software products compared to traditional setups of development, and more successful software reuse from a global level might be consistent with interests of sponsors on a local level in the organization.

Negotiation Mass for Avoiding Complicated Accounting Processes

A case was found in which IS code contributions are paid without explicit accounting of the development time, but IS work is performed with the interest of creating negotiation mass. Sponsors use negotiation mass to obtain higher priority, additional dedicated IS work, or to generate transparency for undertaking IS work. Sponsoring of IS code contributions is done with the interest to obtain benefits without explicit accounting of the development time, but with compensation by undertaking IS work. The avoidance of complicated accounting processes to facilitate IS code contributions and to realize interests pursued by undertaking IS work are consistent with the findings from opinions on the future organization of IS sponsoring. The prevention of associated constraints from a process perspective of developers' contributions and the simplification of the processes for accounting of the development time are suggested to facilitate IS work. While the sponsoring of IS code contributions and performance of IS work to have the interest of creating negotiation mass facilitate IS work, we suggest a simplifying organization of IS sponsoring by introducing overhead cost centers for IS work, the concession of work time dedicated to IS contributions, and/or the grant of additional budget for sponsoring of IS work as proposed by the interviewees to encourage contributions to IS communities/platforms.

Realizing Inner Source Benefits by Enabling Access to Software Components Dedicated to Inner Source Work

We identified one further SD practice in which developers belonging to business units who act as suppliers towards the IS community/platform are enabled to contribute to consumers of IS components. While consumers would contribute to IS components they want to reuse and that need code changes to meet their particular business needs, suppliers patch forward code contributions to reusers. Developers have active access to the code base. Sponsors were found to have the roles as consumers or suppliers towards the IS community/platform. The possibility to realize benefits of time/cost savings by accessing the code base of consumers and contributing code by forward patching benefits both consumers and suppliers towards the IS community/platform. Interests that are pursued when sponsoring IS code contributions in the IS scenario of participatory reuse could be transferred to the interests of sponsors in the IS scenario of forward patching. We suggest to facilitate contributions to software components dedicated to IS work from consumers and suppliers towards the IS community/platform by enabling active access to their code base to realize interests of IS sponsoring.

2.8 Limitations and Future Work

We conducted our research based on the data gathered from a limited number of four expert-interviews. The interview participants do not cover all defined attributes of the sampling dimensions in the scope of our research questions. In the scope of the role in the organization using IS, only one representative of the group of managers of code contributions could be collected for the study. In the scope of thesis, we limited the attributes of the sampling dimension type of IS work to code contributions. None of our interviewees' organizations employ the IS scenarios collaborative development projects and volunteering. The limited number of interviewees and organizations lead to a limited data base for thematic analysis based on Braun and Clarke (2006). The interests of creating negotiation mass when paying for IS contributions, facilitating employee motivation, and enhancing employee SD knowledge were each found in one organization. Forward patching as an IS scenario that could not be identified in prior work and self-selection of tasks were each found in one case in the organizations. The interest to pay for IS contributions in the role of a supplier in the scenario participatory reuse could not be identified in the data. We provide an overview of the sponsors of IS contributions and their interests to pay for them in the prevailing IS scenarios in the scope of a limited number of interviewees and their organizations. Nonetheless, additional case organizations could reveal further sponsors, interests to sponsor, and IS scenarios. Prior identified and additional interests could be present for sponsors acting as suppliers in the IS scenario participatory reuse. Future research applying the research approach with additional interview partners and organizations which cover attributes of the sampling dimensions that were not covered in this thesis could contribute to and confirm our findings.

2.9 Conclusion

We identified the sponsors of IS contributions in organizations and their interest for IS sponsoring. Using a qualitative research approach, we reviewed literature on IS adoption with a focus on IS development practices and prepared, executed, and analyzed four semi-structured interviews with developers and managers in an IS context. Typical scenarios of IS work, the sampling of fitting interviewees, as well as the development of an interview guideline were conducted. The thesis provides a qualitative theory that lays out which parties pay for IS code contributions and what their interest is to do so. A qualitative model of IS sponsoring shows the links between consumers and suppliers towards IS communities/platforms and their interests to pay for IS code contributions in the prevailing IS scenarios and contributes to the understanding of the economic models behind

IS. We suggest future research with additional interview partners and organizations which implement an IS approach that represent attributes of the sampling dimensions that were not covered in this thesis to contribute to and confirm our findings.

3 Elaboration Chapter

3.1 Designing the Interview Study

For development and conduct of the expert interviews we followed the guide laid out by King and Horrocks (2010). They provide advice on designing the interview study including the framing of research questions, defining the sample and recruiting participants, and developing the interview guideline:

- **Framing the Research Question:** They emphasize the necessity of framing the research question and determining the kind of knowledge the study seeks to produce and the range of experience the study seeks to examine. The type of question and its scope is framed as a base for the design of the qualitative interview study. In qualitative interview study, they suggest determining the type of research question with a focus on meaning and referring to particular groups of interviewees.
- **Defining the Sample and Recruiting Participants:** While statistically representative samples are necessary to achieve generalizability of the conclusions in quantitative research, King and Horrocks (2010) suggest different forms of generalizability or transferability of conclusions in qualitative research. The authors propose diversity as the most commonly used criterion to emphasize meaningful differences in the experiences acquired from the interviewees. They emphasize the impact of the choice of sampling dimensions from which to select the interviewees on the effectiveness of the sampling strategy. They recommend selecting the group of interviewees based on one or two aspects that define the group to achieve diversity. When recruiting participants for the study, the authors emphasize the importance of providing information in order to enable the decision about participation and the avoidance of coercion to ensure a proper informed consent.
- **Developing the Interview Guideline:** King and Horrocks (2010) recommend enabling the flexibility of the interviewer as a key aspect for the interview study. The interviewer can explore the perspective of the

participants if enabled to react to issues emerging in the course of the interview. While fixed questions in predetermined order, which are applied in quantitative research, are inappropriate for qualitative interview studies, the authors suggest outlining the main topics to create an interview guide. Flexible phrasing of questions and order enables the interviewee to lead the interaction in unanticipated directions (King & Horrocks, 2010). For identification of topics for the interview guide, they suggest main sources. The personal experience of the researcher can be used as a resource for finding topics in the form of first-hand experiences, or stories and anecdotes of people known by the researcher. Consulting the research literature on the topic of the qualitative study is suggested by the authors to identify the topics for the guideline. The scope of comprehensiveness for covering the relevant topics is suggested by King and Horrocks (2010) to be limited by choosing three to four broad areas that are addressed in the interviews. In order to ensure the flexibility of the interviewer, short phrases and single words as reminders of the topic should be used for the guideline. Follow-up questions can be used to encourage the interviewee to elaborate on the given answer, while prompt questions included in the interview guideline can ensure interventions to gain clarity about the information the questions were used for. For the start of the interview, King and Horrocks (2010) recommend using unthreatening and simple questions as good practice to ease the participant into the interview. In relation to the topic, the interviewer can gather descriptive information about the interviewee. For the end of the interview, the authors emphasize the importance of transferring the control over the interview to the participant. They suggest asking questions about desired future changes or development, and further additions to the interview. King and Horrocks (2010) recommend inviting the interviewee to ask questions about the research project and their part in it.

3.2 Thematic Analysis

Thematic analysis is a qualitative research approach which is flexible, easy and quick to learn and do and which allows a wide range of analytic options (Braun & Clarke, 2006). The systematic analysis in the thesis was based on finding patterns in recurring themes in the gathered interview data and the categorization of found themes. Analysis was performed in a recursive process between the six phases of the qualitative analysis guideline suggested by Braun and Clarke (2006):

- Following the instructions on the *first phase* of the guideline, we familiarized ourselves with the data. As suggested by the authors, we transcribed the interviews and made notes of initial ideas by reading and rereading the

transcripts. The transcription of the data provided the base for the information of the early stages of the analysis as well as the development of a thorough understanding of the interview data.

- The goal of the *second phase* was to generate initial codes. As suggested by the authors, we coded features of the transcripts that were relevant for the research questions in a semantic analysis approach reviewing the entire data set and assigned relevant data to each code using MAXQDA. We assigned all data extracts that represent potential themes or patterns to the identified codes in order to emphasize the content for later conclusions related to the research questions. Following the guideline, we coded data extracts inclusively considering the surrounding data and assigned, uncoded, or coded data extracts repetitively.
- The *third phase* of the thematic analysis approach is the search for themes. As suggested by the authors, we assigned codes to potential themes and gathered all data that were relevant to each identified theme. Existing codes were reanalyzed and considered to be combined in order to form overarching themes. Following the guideline, relationships between codes, themes, and different levels of themes were considered.
- In the *fourth phase*, we reviewed the identified themes. Using the set of theme candidates from the third phase, the identified themes were refined. Following the guideline, we sorted out themes if the data were too diverse or did not provide enough evidence, or collapsed into each other if they formed one theme, or separated if they were too broad. The data within the themes were reviewed to ensure meaningful coherence and clear and identifiable distinctions between themes (Braun & Clarke, 2006). As suggested by the authors, we reviewed the candidate themes to ensure they reflect the meanings that were evident in the entire data set. Additional data were coded in a recursive process to ensure data extracts were not missing from earlier coding stages (Braun & Clarke, 2006). Following their guideline, we stopped reviewing and refinement of the coding after recoding did not add additional substantial data.
- Goal of the *fifth phase* was to define and name the themes. Detailed analysis was prepared for each individual theme to find the broader context of the data and the relation of the identified themes to the research questions (Braun & Clarke, 2006). As suggested by the authors, we clearly defined and named the themes to describe their scope and give an overview of their meanings.
- The *sixth phase* comprised the production of the report of the findings. Final step of the thematic analysis was to write-up the story the data tell and provide a concise, coherent, logical and non-repetitive description of

the findings within the data set (Braun & Clarke, 2006). As suggested by the authors, data extracts were selected to provide evidence of the themes within the data. The selected extracts were interconnected in an analytic narrative to conclude on the findings in relation to the research questions and literature in a scholarly report of the analysis (Braun & Clarke, 2006).

3.3 Inner Source Adoption

We reviewed literature addressing the adoption of IS. Dinkelacker, Garg, Miller and Nelson (2002) defined IS as the application of an OSS development approach and the utilization of its benefits in SD within an organization. The adoption of IS is characterized by leveraging practices of OSS development in IS and a limited participation of developers in the IS community who could be e.g. employees of an organization (Dinkelacker et al., 2002).

Inner Source Scenarios

Capraro and Riehle (2017) identified four IS development practices in the surveyed literature which communities exercise around software:

- *Participatory reuse* is based on the definition of Vitharana, King and Chapman (2010) as a collaborative SD of software components where existing components are not only consumed by developers, but they also contribute to the software they reuse. They summarize the description of this kind of collaboration by Wesselius (2008) and van der Linden (2013) as the development from a one-way street of consumption to a two-way street of contribution to reused software. Wesselius (2008) compares the collaboration in OSS communities where software reusers who are part of the community can contribute the software assets they need with the implementation of IS development practices within closed organizational borders (Capraro & Riehle, 2017).
- *Self-selection of tasks* is summarized as an IS scenario in which organizations allow their developers to self-select which development work to perform during their work time. They provide an example of the application of self-selection of tasks at Google from Whittaker, Arbon and Carollo (2012) and Hamel and Breen (2007). Google provides 20 percent of developers' working hours to enable them to perform development work on projects outside of the scope of their everyday work. According to Whittaker et al. (2012), developers can use 20 percent of their work time to contribute to open projects outside of the scope of their everyday work in the organization-wide open code repository of Google which turns them into IS projects.

- *Volunteering* is summarized based on the research of Gurbani, Garvert and Herbsleb (2006), Riehle et al. (2009), and Stol, Avgeriou, Babar, Lucas and Fitzgerald (2014) as an IS scenario in which developers contribute to IS projects in contrast to *self-selection of tasks* outside of their work time in their spare time motivated by fun, the development of their professional skills or the possibility to gain reputation and visibility within the company and outside their current primary projects. The IS scenario can be differentiated from *self-selection of tasks* by the time the development work is performed. Developers use their spare time to contribute to the organization's IS projects in *volunteering*, while they use their work time for performing self-selected development work in the IS scenario of *self-selection of tasks*.

- *Collaborative development projects* differs from the reported IS scenarios. While contributions by developers in the reported practices are based on patches to the IS projects and the acceptance or rejection by the owners of the IS software component, *collaborative development projects* in which developers perform development work on components collaboratively similar to OSS development can be observed. Capraro and Riehle (2017) report on the surveyed IS literature that different organizational units collaborated in *collaborative development projects* by joining resources and developing IS software components they had a shared interest in. They provide an example from GlobalSoft from Höst, Stol and Oručević-Alagić (2014) which describes the development of new, or the enrichment of existing components in collaborative development projects which resulted in teams collaborating temporarily and virtually (Capraro & Riehle, 2017).

Benefits of Inner Source Adoption

Capraro and Riehle (2017) found that besides the publications of Stol, Babar, Avgeriou and Fitzgerald (2011) and Riehle, Capraro, Kips and Horn (2015) which focused on IS benefits and challenges, most of the surveyed IS literature reported about IS benefits in the context of case organizations. Capraro and Riehle (2017) provided a qualitative model of seven identified IS benefits from the surveyed literature:

- Benefit of IS is the potential realization of *more efficient and effective software development* by the reduction of the time to market of software products, development costs, and generally the increase of development efficiency.

- IS can provide benefits by enabling the *overcoming of organizational boundaries*. In large organizations, boundaries between organizational units can become hard to cross. In the context of codevelopment (collaborative development) projects as described by Wesselius (2008), cost and risk sharing among the organizational units that cooperate in IS projects can result in

the strengthening of an organization-wide focus and increased trust between organizational units.

- They summarized several benefits that lead to *more successful software reuse*. They refer to Gurbani et al. (2006) and Gurbani, Garvert and Herbsleb (2010) who report about providers of components using competences and resources outside their organizational units which can result in higher quality of provided components and therefore in components which can be made fitter for the individual business needs by contributions of the reusers. In contrast to traditional software development, the organization can benefit from the decrease of the dependence between reusers of components and their providers. They refer to van der Linden (2013) and their description of the IS adoption at Philips Healthcare to clarify the benefit of relief of component providers that resolved the organizational issue of platform providers acting as bottlenecks in the platform component development.
- Adopting IS development practices can result in better software product compared to traditional setups of development. They summarize findings in the surveyed literature that report about expected increase in code quality and more innovative development.
- The authors summarize their findings on the IS benefit of *more flexible utilization of developers*. Developers in IS can be deployed in a simplified approach to new or additional IS projects and collaborate even if they are detached. They refer to van der Linden, Lundell and Marttiin (2009) and van der Linden (2013) to clarify that open communication mechanisms in IS enable developers to collaborate independent from geographical conditions, and to Melian and Mähring (2008) in order to clarify the IS benefit in terms of temporal conditions.
- Enhanced knowledge management is another benefit that can be observed in the adoption of IS development practices. They emphasize that IS enables knowledge dissemination by community-based learning and can result in openness and increased provision of knowledge in the organization.
- They reported about higher employee motivation when adopting IS development practices. The authors refer to Riehle et al. (2015) who found that higher motivation and job satisfaction can be realized in IS. They give an example of an experience report of a Google developer from Google Blog (2006) clarifying the motivational aspect of IS in the scenario of self-selection of tasks within their 20 percent time (Capraro & Riehle, 2017).

Internal Economics and Business Models for Inner Source

After starting with an initiative that was based on the reuse of components from the platform group by paying component tax that provided the funding of

the platform and on the raise of the reuse incentive for groups with increasing component reuse and component taxes, Philips implemented a model with fixed annual fees (Wesselius, 2008). According to the author, both initiatives did not show the anticipated effect of consumers becoming active suppliers in the internal market. Also, the platform development was predetermined by a steering team, which encouraged the implementation of a model that enabled systems groups to pay additional fees for dedicated platform work to meet their business needs. While opening the market to the influence of customers on the platform program, the amount of work was limited because of the group size and skills of the platform (Wesselius, 2008).

As from 2006, Philips Healthcare focused on codevelopment (collaborative development) projects to enable cooperation between the consumers and suppliers of the IS software market to create assets for reuse by the participating systems group, funded by the systems group (Wesselius, 2008). According to the author, the proposed models were planned to be adapted to encourage the participation of the consumers in the IS software market as suppliers. Direct financial revenue for active participation in the IS software market by the consumers was intended to be enabled. Wesselius (2008) reports that fixed component taxes should be reduced for systems groups that actively contribute software components in the codevelopment projects. According to the author, costs for maintenance and support were intended to be distributed across the organization when the platform group takes over delivered software assets. However, code contributions from the systems groups did not occur without the involvement of the platform group within a codevelopment project (Wesselius, 2008).

Lindman et al. (2013) discussed the internal economics of IS programs and the interests of business units to contribute their development to IS platforms. They identified the metaphors of a private market and a local library based on the cases Philips Inner Source and Nokia iSource when institutionalizing OSS development practices in commercial organizations. In the private market setting, organizational units can supply reusable components in the IS platform and consumers are enabled to pay for their reuse in their products (Lindman et al., 2013). The authors report that while contributing organizational units are rewarded by component taxes in the prevailing model, they are left with the issue of incurred costs for support and maintenance of components. In the local library setting, an organizational unit can contribute its components to a library and enables their reuse for free (Lindman et al., 2013).

However, while suppliers and consumers are released from the effort of negotiations, central decision making will be necessary to decide on the available budget for the kind of development, which organizational unit will be given budget to create reusable components and finally who should make such decisions (Lindman et al., 2013).

Appendix A Interview Guideline

Topic	ID	Question
		Acknowledgement: *- The time* *- Approval of audio recording* *Introduction of participants:* *- Names and occupation (Max, Research Assistant, Isabel Master's Student)* *- Affiliation: FAU + OSR Prof. Dirk Riehle* *Explanation of study objective:* *- We want to learn what parties in an organization pay for code contributions in collaborations and what their interest to do so is*
A Interviewee Background	A1	What have been your positions until now?
A Interviewee Background	A2	What is your current position / responsibilities?
B Collaboration practices	B1	How do you / your team collaborate with other departments?
B Collaboration practices	B2	How did you / your team collaborate with other departments in previous positions?
B Collaboration practices	B3	How can you start your own projects / ideas in your current / previous positions?
C Sponsors, interest	C1	(For each scenario) Who paid for it? / How did you post it?
C Sponsors, interest	C2	(For each scenario) Why did you post it there?
C Sponsors, interest	C3	(For each scenario) Why did sponsors pay?
D Extras	D1	In an ideal world, how would sponsoring look like?
D Extras	D2	Is there anything else you would like to tell us?
End of interview		*- Do you have any questions about the research project and/or your part in it?* *- Acknowledgement of participation*

Table 3.1: Interview guideline

Appendix B Informed Consent

For the establishment of the contact to potential interview partners, we first sent emails to request general interest and time for an interview with the focus on IS sponsors and their interest to sponsor IS contributions. As our interview partners speak German as their first language, the following email was sent to inform the interviewees about the topic and enable the informed consent:

Hallo/ Sehr geehrte/r Frau/Herr [Name],

mein Name ist Isabel Schröder. Als Masterandin forsche ich gemeinsam mit Maximilian Capraro und Prof. Riehles Open Source Research Group an der Friedrich-Alexander-Universität zu Zusammenarbeit in der Softwareentwicklung und Inner Source.

Danke, dass Sie unsere Forschung unterstützen! Wir freuen uns schon auf unser Gespräch am [XX.XX.2018], [XX:XX] Uhr [via LiveMeeting, via Circuit, bei Ihnen im Haus].

Im Gespräch wollen wir praktische Einsichten darüber gewinnen, welche Parteien im Unternehmen teamübergreifende Zusammenarbeit zahlen und warum. Dabei werden wir über Ihren Arbeitsalltag, die Zusammenarbeit mit anderen Teams in der Organisation und den dazugehörigen Buchungsprozess der Arbeitszeit sprechen. Wir haben offene Fragen vorbereitet, für die es keine richtigen oder falschen Antworten gibt. Vielmehr interessiert uns Ihre Sichtweise und Erfahrungen.

Für eine präzise wissenschaftliche Auswertung der Inhalte möchten wir - Ihre Zustimmung vorausgesetzt - gerne eine Audioaufzeichnung und Gesprächsnotizen anfertigen. Alle personenbezogenen Interviewdaten werden streng vertraulich behandelt und auf einem besonders geschützten, dedizierten Server gespeichert. Auf alle Projektdaten, einschließlich der Interviewdaten, können ausschließlich Isabel Schröder, Maximilian Capraro und Mitglieder der Open Source Research Group zugreifen.

Wir bedanken uns für Ihre Zeit und Ihr Interesse. Falls Sie Fragen haben, zögern Sie nicht mich zu kontaktieren.

Viele Grüße
Isabel Schröder

Appendix C Transcription Rules

We applied further basic transcription systems to ensure consistency of the interview transcripts as the base for the data analysis. Focusing on gathering the experiences and opinions of experts, we ignored transcription rules emphasizing emotional, non-verbal statements. Dresing and Pehl (2018) concretized and enhanced transcription rules based on feedback given by transcribers of hundreds of processed interview hours:

- Transcriptions are performed in a verbatim style. Dialects are transferred to standard German. If there are no equivalent standard German words, the words are not translated.
- Interleaved words are brought into line with written German. The form of the sentences is retained even if there are syntactical errors.
- Cancellation of words or sentences and stammering are revised or omitted. Duplicated words are only included as a stylistic element for purposes of emphasizing the meaning. Sentences that are not completed are included with the termination character /.
- Punctuation is revised to support readability. Fall of the voice or ambiguous intonation is marked with a dot rather than with a comma. Syntactic units are retained.
- Signals of reception that interrupt the flow of speech of another person are not transcribed. If they are a direct answer to a question, they are transcribed.
- Pauses from approximately three seconds are marked with three suspension points in brackets (...).
- Each contribution of a speaker is separated in its own paragraph.
- Incomprehensible words are marked with *(unv.)* and a time stamp. Longer incomprehensible extracts are marked with a reason. Unclear words are included in brackets and annotated with a question mark.
- The interviewee is marked with a *B* and the interviewer with an *I*. If there are multiple interviewers, identification numbers are assigned.
- The transcripts are saved in rich text format. Transcript Data Name: YYYY-MM-DD - IS Sponsors - Interview [No] - [Lastname]

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