

MANAGEMENT CONTROL SYSTEMS IN POST-INCUBATION OF HIGH-TECHNOLOGY START-UPS: DETERMINATION OF RELEVANCE AND DESIGN OF A FUTURE STUDY

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ABSTRACT

In recent years business incubation of high-technology start-ups have gained increasing academic interest. Entrepreneurship literature discusses the influence of incubators on high-technology start-ups, but so far only few studies have focused on the phase after incubation. The majority of studies on post-incubation only address the success of high-technology start-ups after incubation but not the role that management control systems and stakeholders play. The first objective of this paper is to show that research on management control systems and on stakeholders in post-incubation of high-technology start-ups is relevant. The second objective is to report on our identified research questions, the methodology chosen and our first structure for conducting an upcoming empirical study.

To accomplish these objectives, a literature research was conducted in order to provide a basis for further research on management control systems of high-technology start-ups in the post-incubation phase. The literature research consists mainly of the analysis and comparison of scientific papers of high-ranked journals.

The results indicate that management control systems are of high interest in the field of post-incubation. Especially Simons' four "Levers of Control" were identified as a particularly interesting management control system. According to the research questions found, a qualitative approach seems to be the most appropriate research method. Therefore, a semi-structured interview guide has been developed which consists of six subject matters integrated in the "Levers of Control" framework whereby each subject matter includes one central question. Furthermore, each subject matter will be discussed along the controlling process, which consists of three sub processes.

This paper contributes to the field of technology incubation and entrepreneurship. We point out research topics and describe one possibility of undertaking a further empirical study in this field.

Key words: post-incubation, high-technology, start-ups, management control systems, levers of control, stakeholders

INTRODUCTION

The troubles of start-ups in early stages of their life cycle

Start-up businesses today face many challenges in the early stages of their life-cycle. The ability of the entrepreneur to tackle and overcome these challenges is therefore seen as crucial for success. Brettel *et al.* (2007) and Langenberg (2009) stated, that high-tech start-ups are characterised by relative immaturity, limited resources and a high degree of exposure to external market dynamics leading to an increased business risk. These attributes tend to evoke further challenges and are sometimes referred to as “Liabilities of a Start-up”, the most important of which are according to Brettel *et al.* (2007) and Langenberg (2009):

- i. Liability of age/newness:
Due to the recent establishment and the corresponding early stage of development, companies take on unfamiliar tasks and responsibilities and have to define processes, which are accompanied by a higher risk of default and failure.
- ii. Liability of size/smallness:
The lack of financial and human resources tends to negatively influence the likelihood of surviving the early stages of the companies’ life cycle.
- iii. Liability of adolescence/growth:
Establishing a functional organisational structure and managing internal coordination as well as coping with the challenges of operations are seen as essential tasks to which entrepreneurs should devote their attention.

Brettel *et al.* (2007) and Langenberg (2009) state that these liabilities interact with each other and collectively contribute to increased uncertainty faced by high-tech start-ups. The increased uncertainty can translate into a higher degree of business risk and can potentially cause the failure of a start-up.

To reduce the liability of newness and as a consequence diminish failures of these start-ups, so-called incubators (e.g. business incubators, science parks, technology centres) have emerged. According to Aernoudt (2004), the origins of the term incubator can be found in the Latin language. Literally, “to incubate” means “to breed”, i.e. business incubators have been seen as breeders for start-ups. Hackett and Dilts (2004) define a business incubator as

“(…) a shared office-space facility that seeks to provide its incubates (i.e. “portfolio-” or “client-” or “tenant-companies”) with a strategic, value-adding intervention system (i.e. business incubation) of monitoring and business assistance. This system controls and links resources with the objective of facilitating the successful new venture development of the incubates, while simultaneously containing the cost of their potential failure.”

Storey and Tether (1998) described that the first incubator was founded in New York in 1959 and its name was “Batavia”. Furthermore, they explain that the first European business incubators were coming up in the seventies and becoming popular in the eighties and nineties. There are approximately 7.000 incubators in operation worldwide (Schwartz, 2011). In Austria there exist private and public incubators. This paper focuses especially on the two latter types. The public incubator in Austria is the AplusB (Academia plus Business)-incubator, which was founded in 2002. It

exists of eight AplusB-centers, which are integrated in the Federal Ministry for Transport, Innovation and Technology. Dee *et al.* (2012) state that

“(…) the commercialisation of the Internet and development of the World Wide Web resulted in a dramatic increase in information and communication technology related start-up activity and in the provision of services to support the development of such ventures.”

Hence, incubators are of special interest to high-technology start-ups in the new economies – so called new economy firms (NEFs).

As incubators not only provide the framework for a business to thrive during the initial incubation period, but also provide cornerstones for subsequent development and permanent success, the phase after incubation is also important. The term “post-incubation” can be understood in two ways. First, a certain stage in the life cycle of a start-up can be called the “post-incubation” phase. Figure 1 therefore gives an overview of the incubation process. It starts with the recognition of an idea, moving on to setting up the business and developing it further, and eventually leads to a stage of maturity, which with regard to the business life cycle, is called the post-incubation phase. Secondly the support of former tenants of incubators in the stage after graduation is referred to as “post-incubation”. In this way the activity of supporting start-ups after leaving an incubator is superficial. After start-ups graduate from the incubator a phase called post-incubation or post-graduation starts. Schwartz (2011), for example, defines post-graduation as the phase when the incubated ventures have (successfully) completed their incubation period.

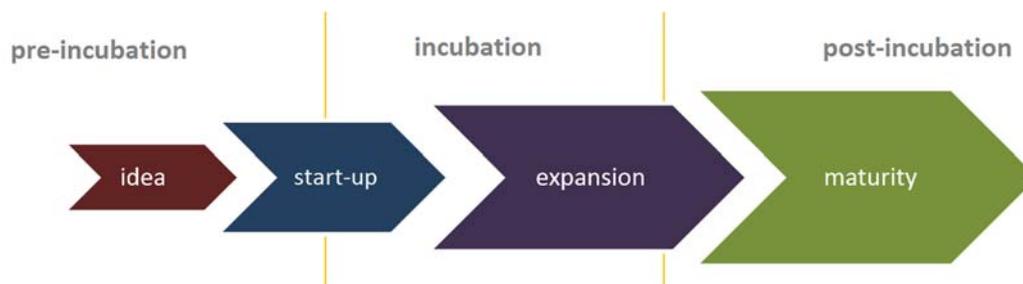


Figure 1: Incubation cycle, Source: Davies (2009)

As we now focused on the troubles of start-ups in the early stages of their life cycles in general and emphasized the special importance of the post-incubation phase, the following section proceeds by describing management control systems for high-technology start-ups. The attempt to highlight the relevance of these systems will subsequently lead to our research guiding questions.

Management control systems of high-technology start-ups

Management Control Systems (MCS) are defined as “all the devices or systems managers use to ensure that the behaviours and decisions of their employees are consistent with the organization’s objectives and strategies” (Merchant and Van der Stede, 2012). MCS can be distinguished by direct and indirect modes of control, based on how managers interact with their employees. Another differentiation divides the controlling package into “formal control” for written, management-initiated mechanisms and “informal control” for unwritten, typically worker-initiated mechanisms (Haustein *et al.*, 2014).

Hared *et al.* (2013) differentiate between two approaches on how to use management control systems. In the conventional approach MCS are used to collect quantitative data and derive

performance indicators completely ignoring qualitative factors. The more advanced socio-economic approach, on the other hand, does not exclude the external environment. It takes social, political and cultural factors that surround the business into account.

Simons (1995) defines the socio-economic approach as a system of management controls in which “formal information-based routines and procedures are used to maintain or alter patterns in organizational activities“. The framework follows the idea of positive and negative forces that are juxtaposed in opposition. The four main concepts underlying the “Levers of Control (LOC)” framework, i.e. 1) core values, 2) risks to be avoided, 3) critical performance variables and 4) strategic uncertainties are depicted in Figure 2. Each of these concepts is controlled by a particular system (so-called “levers of control”): 1) Belief System, 2) Boundary System, 3) Diagnostic Control System and 4) Interactive Control System. Two of these systems are considered as “positive” (Belief and Interactive Control System), whereas the other two are seen as “negative” (Boundary and Diagnostic Control System). Positive elements should enhance motivation, guide and reward employees and create an atmosphere that fosters learning. Negative elements of control, on the other hand, should promote punishment, control and compliance with rules. According to Simons, both positive and negative elements must coexist in order to enable effective control by creative tensions. Simons argues that a business strategy can only be implemented successfully if all four LOC are applied and combined in a suitable manner.

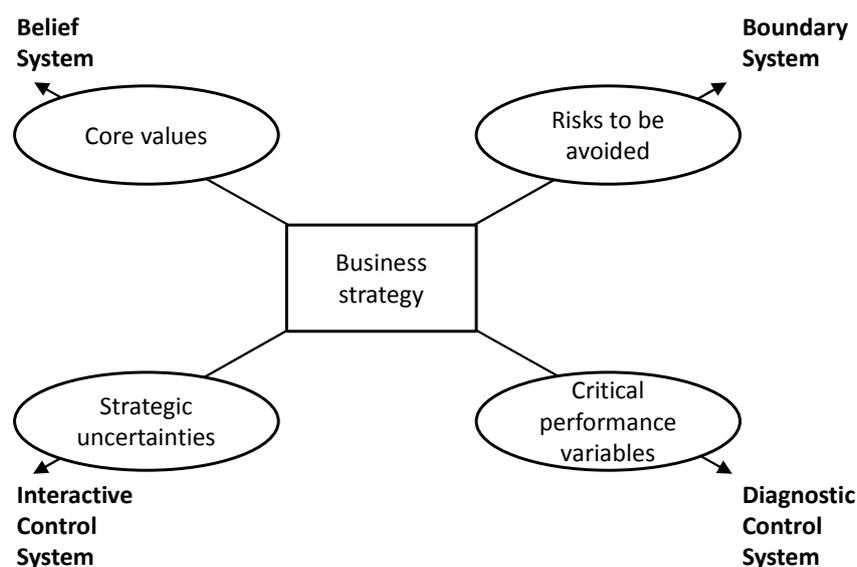


Figure 2: The four “Levers of Control”, Source: Simons (1995)

Other researchers found different frameworks that are related to this socio-economic approach. Examples are the “Performance Management Framework” by Otley (1999), the “Object of Control” by Merchant and Van der Stede (2012), “Management Control Systems as a Package” by Malmi and Brown (2008), “Performance Management Systems” by Ferreira and Otley (2009) as an advancement to Otley (1999) and the “Revised Levers of Control” by Tessier and Otley (2012) as an addition to Simons (1995).

This overview of Management Control systems leads to the following research questions that we address in this paper.

Research questions (RQ)

RQ1: Which aspects of management control systems of high-technology start-ups used in post-incubation are particularly worth exploring?

RQ2: What should an upcoming study that considers management control systems of high-technology start-ups used in post-incubation investigate?

The following section describes the basic methods to analyse relevant literature and to develop a semi-structured interview guide. Afterwards, the findings of the literature research are presented. In the second part of the findings an outline of a semi-structured interview guide for facilitating initial research is presented. In the last section we discuss the results, try to build a conclusion and highlight limitations and proposals for further research.

METHODOLOGY

To answer the questions raised in this paper, relevant literature in the fields of entrepreneurship – with focus on high-tech start-ups, management control systems, incubation and incubators and stakeholders has been reviewed by drawing on information from a range of publications mainly including

- i. High-ranked journals
- ii. Academic thesis
- iii. Scientific publications and
- iv. Textbooks and Encyclopaedias.

The approach of our literature research followed the reversed order of this enumeration. At first we tried to get an overview of this topic by studying reference sources such as textbooks and encyclopaedias. The next step was to examine scientific publications such as papers in conference proceedings as well as academic thesis such as dissertations to enhance a deeper understanding. The last step of our literature research was to focus on journal articles in high-ranked journals. Therefor we used the “VHB-JOURQUAL 2.1” which is a ranking of business-relevant journals based on judgements of the VHB (German Academic Association for Business Research)-members.

Relevant literature was gathered by literature research in electronic databases and search engines, namely *Google*, *Google Scholar*, *Google Books*, *SpringerLink*, *ScienceDirect*, *Emerald* and *EconBiz*. Therefor a number of key words – and several sensible combinations of them – were used in every single research field (e.g. *start-up company*, *entrepreneurship*, *technology-based*, *high-technology*, *incubator*, *incubation*, *life-cycle*, *management control systems*, *levers of control* and *stakeholders*). Besides this, the German equivalent of each key word has been used in addition.

By focusing on the post-incubation phase of high-technology start-ups, the field of research is limited and relevant literature is scarce. The information extracted has been used to provide a basis for further research on management control systems of high-technology start-ups in the post-incubation phase.

The methodology to develop a structure and a first draft for a semi-structured interview guide for an upcoming study is the goal of the research question 2 and therefore is explained in detail in the second part of the following chapter.

FINDINGS

The results section of this paper is structured in two different parts. First, empirical evidences will be structured, analysed and summarized based on the literature review. Second, it describes how the structure of an interview guide was developed and gives a concrete example for one part of the interview guide.

Empirical evidences

The empirical evidences are structured into different parts and explain how results from it will be used for an upcoming study.

The post-incubation phase of high-technology start-ups

To understand the integral and sustainable benefits that the incubator provides, it is important to not only analyse the incubation phase, but also the period after the company has left the incubator. There is a high risk of failure in post-incubation according to Schwartz (2008).

The post-incubation phase is essential for a holistic understanding of how incubators benefit the corporation, is supported by different researchers: Peña (2004), for example, emphasizes this circumstance with regard to incubators in Spain. Moreover, Studdard (2006) indicates that the research interest on the impact of incubators should not be limited to the period until the exit of the incubator. Reinisch *et al.* (2012) state, that there is a need for post-incubation. Their results are based on a quantitative research design with 500 Austrian high technology firms, which are or were tenant of high technology incubators. Two years after the start-ups left the incubator the influence of the incubator rose again significantly. Schwartz (2009) highlights in his study of 352 companies supported by German incubators that the period upon the exit of the incubator is characterized by a significantly higher chance of failure lasting from graduation until up to three years after the exit. At the same time, most companies that successfully navigated through this critical period were also able to perform well in subsequent years. Virtanen und Kiuru (2012) who evaluated data from 203 companies located in the Aalto Start-up Center in Finland also highlight the importance of post-incubation. 86 % of all companies successfully navigated through the post-incubation phase and 27 % even managed to grow at a substantial rate during that particular period. These results are indicative of the sustainable benefits that incubators can bring about far beyond the actual period of incubation.

In recent years the focus on both the political and academic level has shifted, indicating that remarks from numerous academics pointing out this shortcoming have led to a change in attitude (see Colombo and Delmastro, 2002; Hannon and Chaplin, 2003; Hackett and Dilts, 2004; Peña, 2004).

Granlund and Taipaleenmäki (2005) state that new economy firms (NEFs)

“(...) include businesses targeting at fast growth or already fast-growing firms that operate in the information and communications technology business and biotech (life sciences) industry, and are characterized by their R&D and knowledge intensity (...)”,

this could be understood as a definition for a NEF.

In sum, it can be said that the post-incubation phase of high-technology start-ups has been attracting increasing interest due to its importance for the success of a business company.

Particularly the first to the third year after graduating from the incubator seem to be crucial and therefore worth studying. Furthermore, it can be seen that especially high-technology IT-start-ups as well as high-tech start-ups that are knowledge intensive and service based are of high interest.

Management control systems in high-technology start-ups

NEFs get into financial distress on a rate that is above average, which hinders their growth potential and can subsequently lead to a failure of the project. On the one hand, it is the aforementioned “Liabilities of a Start-up’ and the challenges associated with establishing a start-up company that contribute to this circumstance (Brettel *et al.*, 2007; Langenberg, 2009). On the other hand, the absence of a management control and well-integrated management control systems is considered as a main contributor to potential failure. Transforming management control from an informal to a formal way can be seen as crucial for success according to Davila *et al.* (2010). Such a transformation implicates the implementation, use and development of management control systems.

Researchers addressed the use of management control systems (MCS) in high-technology start-ups in several studies. This paper reveals two different approaches relating management control systems and the capabilities of firms to innovate. In the academic literature this relation is controversially discussed. On the one hand, the traditional approach postulates that there is a conflict between MCS and the ability of firms to innovate, and that these two cannot be reconciled. Davila *et al.* (2009) – as adversaries of this approach – describe the apparent conflict as seen by many other researchers:

“The traditional view of management control systems is at odds with the dynamic nature of entrepreneurship and innovation. For the company to have any chance to grow and succeed, accounting and control within start-up companies has to be limited to bookkeeping under this view. Innovation is associated with taking advantage of unexpected opportunities, exceptions, new relationships, uncertain outputs, risk and the possibility of failure. Tools designed to eliminate variation and control routine activities have little role in these settings. Traditional control tools encourage a command and control approach based on explicit contracts, hierarchical organizations and extrinsic motivation. In fact, they are designed to eliminate innovation (an inefficient process because of the likelihood of failure) and deliver pre-determined objectives as efficiently as possible.”

On the other hand, the more recent approach has brought about a paradigm that highlights the significant benefits that come with implementing a MCS. In contrast to the traditional view, Davila *et al.* (2009) claim to have found indicators that date back more than 40 years, highlighting the importance of MSC regarding the benefits of these systems for enhancing innovation. Greiner (1972) who introduced the “Five Phases of Growth” as a life-cycle model demonstrated, that the growth of a business is characterised by long stages of constant development, being interrupted by short-term internal crises. The crisis marking the end of Greiner’s first stage of the business life cycle is considered the “Crisis of Leadership”, which describes the collapse of the personal and rather informal style of management at this stage. Greiner stated:

“Increased number of employees cannot be managed exclusively through informal communication, and new employees are not motivated by an intense dedication to the product or organization. (...) New accounting procedures are needed for financial control.”

Thus, Greiner already observed back in 1972 that the ability of a business to grow is linked to the implementation of a MSC in the early stage of the business’ life cycle and its constant development

over time. This observation was not stressed against the traditional view on management control systems and innovation for decades.

Reinisch *et al.* (2012) do not only highlight the need for post-incubation in their study, they also explore the use of particular management control systems (planning and control tools, e.g. budgeting, cash-position analysis, deviation analysis, customer profitability analysis, customer acquisition costs) during and after the incubation period. Whereas the implementation of these systems is supported by the corresponding incubator during the incubation period, companies are supposed to be able to develop and use planning and control systems by themselves after having left the incubator.

Davila *et al.* (2009) conclude that there is

“(...) significant room for further research. From the demand side, control has been shown to be relevant to innovation and entrepreneurship suggesting the need to go deeper in understanding the phenomena. [...] The overall thrust of the paper is to identify accounting and control in entrepreneurship and innovation as a promising field of research not because of the infancy of the field but most important because of its relevance to the world of management.”

In summary, it can be stated that there is no doubt about the usefulness of the implementation of MCS in high-technology start-ups nowadays. Start-ups ignoring the required change of the management style from an informal to a formal way are much more likely to get stuck in the above-mentioned “Crisis of Leadership”. Although literature on management control systems in the post-incubation phase of start-ups is very scarce, they can serve as starting points for further research.

Using the “Levers of Control” framework as a priori specification of constructs

Eisenhardt (1989) describes that a priori specification of constructs can help to shape the initial design of theory-building research. Investigators should formulate a research problem and if it is possible some important variables can already be specified.

The main objective for high-technology start-ups to overcome their obstacles is to try to analyse and filter the different approaches described above and to implement the most relevant and suitable approach in order to control the value creation activities of the business. As the LOC concept, in contrast to other MCS frameworks, emphasizes on aspects of newly established businesses, research activities in this area is particularly useful as Lövstal (2008) states:

“Simons’ levers of control (1995) may be seen as (...) control system which considers entrepreneurial aspects such as innovation, renewal and development. Simons is also a researcher who argues that management control systems actually may encourage entrepreneurship and may work as a lever for innovation, by e.g. stimulating dialogue and learning and by directing attention to strategically right things.”

When looking at the goal of this concept, which is to provoke deviations rather than to eliminate them, one can make a strong case for the importance of controlling innovation in young business.

Using the controlling process as a process-oriented view on the “Levers of Control” framework

Bürgel *et al.* (2006) and Giese (2012) state, that controlling (management accounting or managerial accounting) was created by industry needs. There exists no clear definition of the term “controlling” and its purpose. In this study we rely on the definition of controlling as seen by Horváth *et al.* (2012)

and Blazek and Eiselmayr (2007). They define controlling as the process of defining goals, creating plans to achieve these goals and creating corrective activities in order to ensure the achievement of these goals, which is done based on a target-performance comparison.

There are different definitions of controlling in German literature vs. management accounting in English literature, but most of them contribute to three steps: Define, Plan and Control. These three steps are illustrated in Figure 3 where the controlling process is understood as to define or set goals, to plan those goals and to control those goals.

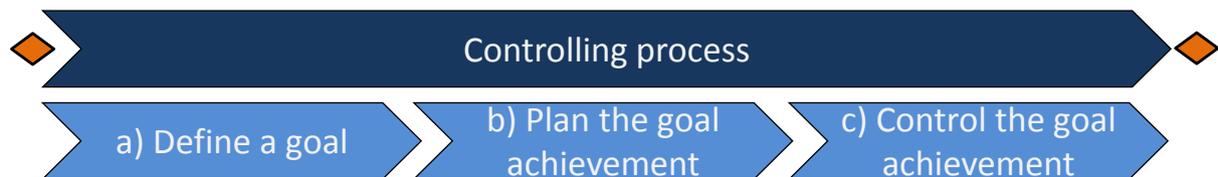


Figure 3: Controlling process, Source: based on the definition of Horváth et al. (2012), Blazek and Eiselmayr (2007)

Stakeholder orientation on management control systems of high-technology start-ups

MCS are essential for start-ups as a stable framework of reference in order to be able to navigate through their dynamic and volatile environment. Simons (1995) found out, that growing firms with an innovative strategy use more MCS than defensive firms. Lövstal (2008) said that managers of high-technology start-ups, on the one hand, have to improve existing products and processes, and, on the other hand, have to support risky new experiments. Thus, the main challenge is to balance between the opposing elements of entrepreneurship and controlling. Lövstal also interviewed employees without a formal management position. These interviews can be seen as an attempt to strive for distance and reflection in the interpretation process.

Flammer and Kacpercyk (2013) state that whereas

“(...) literature focuses on how shareholders can provide appropriate incentives for executives to pursue innovation, the role of stakeholders (...) has remained mostly unexplored. With the exception of a few studies that examine the potential influence of employee-friendly policies on innovation (...), very little is known about the impact of stakeholder orientation (i.e., the attention to non-financial stakeholders) on innovation.”

Concerning stakeholders in this stage of a start-up’s life cycle it seems that Lövstal (2008) is the only one who has addressed this issue at all when she also put employees into consideration. Therefore, gaining better understanding on the external view on how other stakeholder experience and influence management control systems is a very interesting subject area.

Looking on existing and failed start-ups

Schwartz (2008) states that

“(...) unfortunately the lack of necessary data on former tenant firms (e.g. firm address after the graduation) constrains appropriate research designs. Hence, research on (post graduation) issues (i.e. organizational growth, or network persistency) has been mostly restricted to surviving firms only, which leads to a considerably survivor bias.”

According to Lövstal (2008), the companies and interviewees should be chosen since they “seem to provide good opportunities for e.g. extending an emergent theory, replicate a previous case, or for filling theoretical categories.” According to Lövstal, researchers should choose extreme or polar types.

Research mainly centres on successful firms as opposed to unsuccessful ones. As literature also discusses the difference between successful and unsuccessful, an upcoming study aims to focus on existing companies and failed companies. Failed companies will be regarded as companies that became insolvent in post-incubation and do not exist anymore or companies that became insolvent in post-incubation and still exist. Existing companies will be all other start-ups. It is quite hard to find samples for an upcoming study that will get insolvent in the time when they will be interviewed. Therefore another possibility to get those samples is that for an upcoming study companies who became insolvent and still exist will be asked to the time when they were in trouble and became insolvent. For those companies who became insolvent and don't exist anymore it is obvious that they will be asked to the time they became insolvent.

Summary of the empirical evidences

Figure 4 summarizes the above described chapters and highlights the following points:

- i. Investigating at high-technology start-ups in post-incubation at two specific points (in time) (~1 year and ~3 years after graduation from the incubator) (see (1) in Figure 4)
- ii. Investigating at different stakeholders with different views; internal view (specially founders) and external view (investors, consultants or employees) (see (2) in Figure 4)
- iii. Using the “Levers of Control” framework as a priori specification of constructs (see (3) in Figure 4)
- iv. Using the controlling process as a process oriented view on the “Levers of Control” framework (see (4) in Figure 4)
- v. Investigating at existing and failed start-ups (see (5.1) and (5.2) in Figure 4)

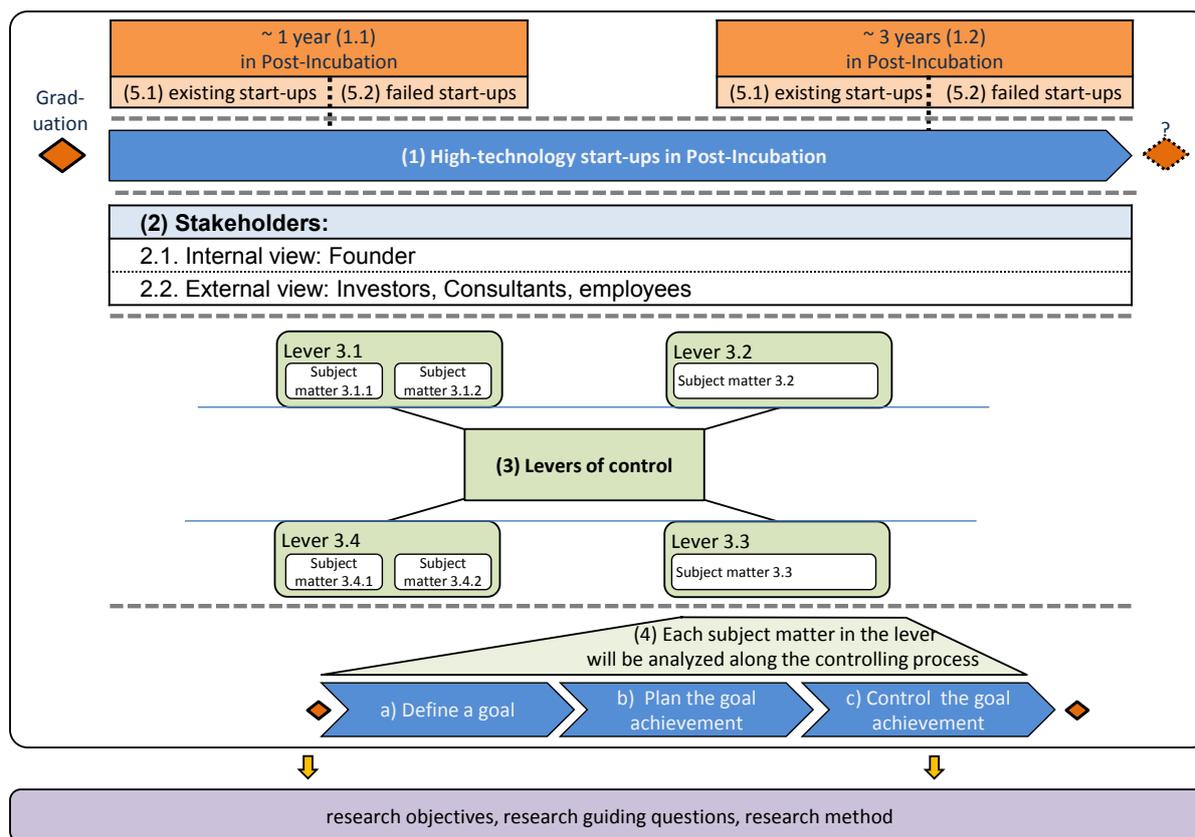


Figure 4: Field and structures for an upcoming study

To facilitate future research containing management control systems (and the “Levers of Control” framework), the role and influence of stakeholders (e.g. investors) in the post-incubation-phase of start-ups as well as to differentiate between existing and failed start-ups, the following section introduces a structure for an interview guide and its development.

Development of an interview guide

To develop the interview guide we first we defined the research goals and derived the research guiding questions. We then selected a proper research guiding method, developed the structure and drafted the interview guide for the upcoming study.

Central research goals and research guiding questions

Based on the empirical evidences from the literature review we identified two main research goals (RG) and four overall research questions (RQ).

- i. RG 1: Describe how management control systems of high-technology start-ups are used in post-incubation.
 - a. RQ 1.1: How are management control systems used in post-incubation of high-technology start-ups?
 - b. RQ 1.2: How do successful/failed start-ups agree on how (and which) management control systems are used in post-incubation of high-technology start-ups?

- ii. RG 2: Describe how stakeholders (e.g. investors, consultants, employees) influence management control systems of high-technology start-ups in post-incubation.
 - a. RQ 2.1: How are management control systems used in post-incubation of high-technology start-ups that are influenced by stakeholders (and which ones)?
 - b. RQ 2.2: How do successful/failed start-ups agree on how (and which) management control systems are influenced by stakeholders in post-incubation of high-technology start-ups?

Research guiding method

In the field of corporate entrepreneurship, the main used research methods are those based on hypothesis testing. Khan (2004) emphasizes that, in order to investigate management practices in entrepreneurial organisations, we need to use multiple research methods, and not only the traditional hypotheses testing method, borrowing for instance research methods from other fields such as sociology.

The main function of qualitative methods are finding hypotheses and building up theory plus evaluation, pilot-studies, single case studies, process-analysis and classification (Mayring, 2010). The difference between qualitative and quantitative methods is that the last one is based on numbers and facts. That means searching for the answers to “what”, “why” and “how”.

Cresswell (2014) states:

“Although the processes are similar, qualitative methods rely on text and image data, have unique steps in data analysis, and draw on diverse designs (...). Qualitative methods demonstrate a different approach to scholarly inquiry than methods of quantitative research.”

Qualitative methods start with the exploration of a specific area, collection of data and finally finding hypotheses of this data (Mays and Pope, 1996). Hence qualitative analyses are useful for finding hypotheses and building up theories. It is not important which type of qualitative information researchers use. All of them are qualified for finding theories in context of sociology (Mayring, 2010). Researchers use qualitative methods unconsciously (Sumathipala *et al.* 2003). They use them often in structured interviews. The reason for that is the suitability of qualitative methods for getting personal thoughts and feelings about a topic. These are the advantages of qualitative methods. The researcher gets an impression into human behaviours.

Derived from the research guiding questions an inductive method will be chosen with a qualitative method approach. Also the findings from the literature review suggest that this method will be useful in studying the neglected field of management control systems of post-incubation of high-technology start-ups. Following Creswell (2014) and Lillis and Mundy (2005), we aim to gain a rather high research depth and a rather low research width (see Figure 5).

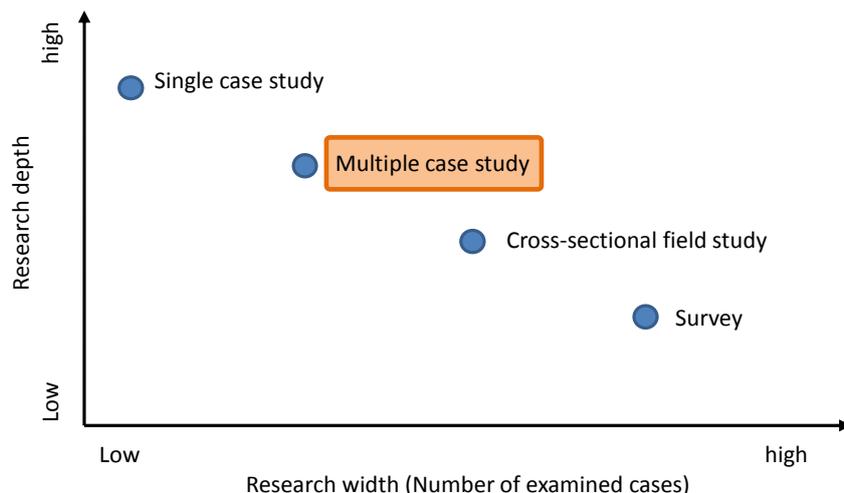


Figure 5: Comparison of the research methods according to the research depth and research width, Source: Lillis and Mundy (2005)

As the literature review highlights the importance of having not only an internal view, this study aims to integrate an external view on an embedded multiple-case design as seen in Figure 6.

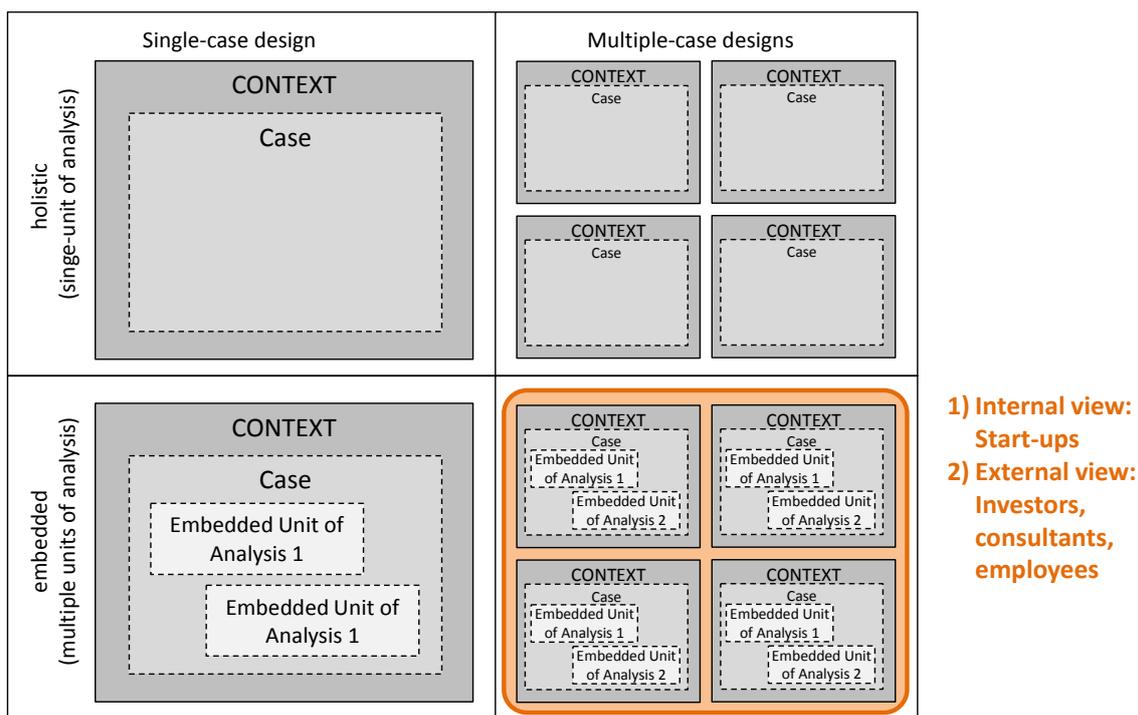


Figure 6: Holistic vs. embedded single- and multiple case design, Source: Yin (2011)

For the upcoming study the internal view of founders and the external view of investors will be explored in more depth. Investors are either business angels or venture capitalists. The reason for choosing investors is twofold. First, after graduating from the incubator start-ups are at least 1.5 years old and usually in this period start-ups have already produced their first prototype. And usually in this phase start-ups are searching for and integrating investors in order to finance their expansion plans. Second, after graduating from the incubator start-ups officially have no contact anymore to their AplusB scientific or business consultants. From previous studies we know that these

consultants influenced management control systems. Therefore, it is interesting to see if other stakeholders such as investors take over the role from the consultants from the incubator. With this setting it is clear that start-ups need to be selected for the qualitative interviews in a way that all of them have investors integrated. We propose a qualitative embedded multiple case-study research design which explores the internal view of founders and the external view of investors in more detail.

Structure and first draft of the interview guide

As described above, this paper aims to develop a structure for a semi-structured interview guide, based on Simon's "Levers of Control" framework. Figure 7 shows the four "Levers of Control" and the different subject matters with the corresponding questions. We will focus on all six subject matters.

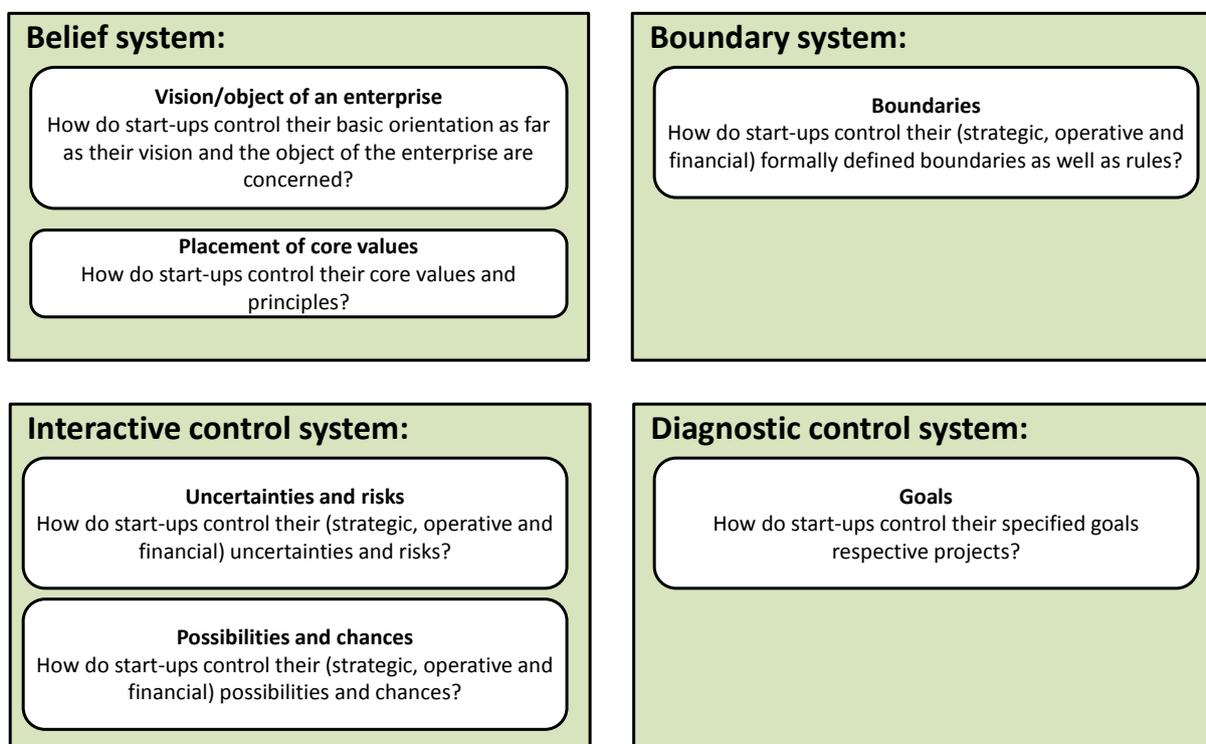


Figure 7: Subject matters in the "Levers of Control" framework

Each subject matter will be discussed following the controlling process, which consists of the following sub processes: (a) define a goal, (b) plan the goal achievement and (c) control the goal achievement. Every sub process intends to answer certain questions as depicted in Figure 8.

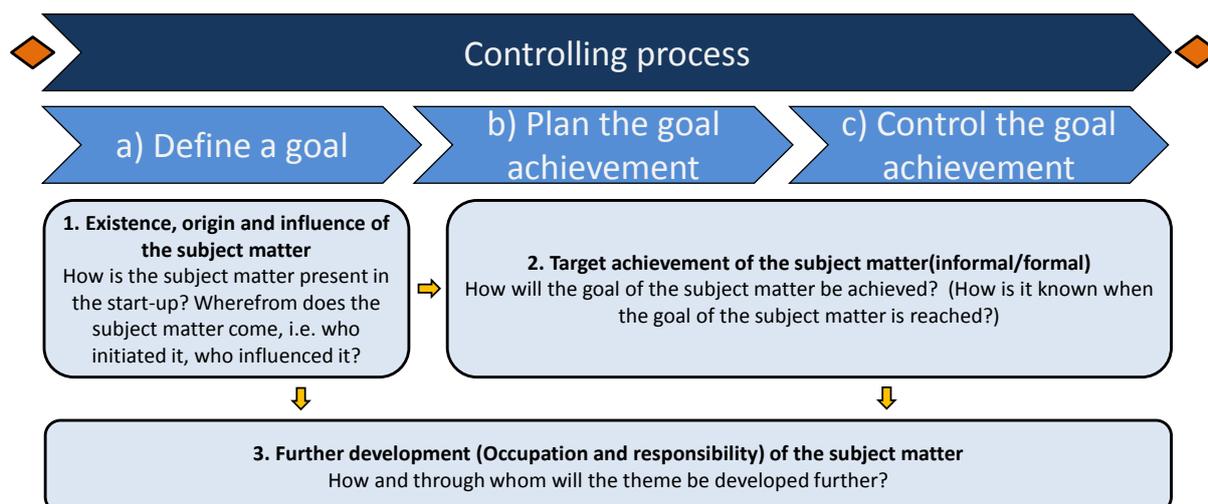


Figure 8: Process subject matter and questions in the controlling process

Figure 9 shows the final structure for one lever of control and gives a first draft on how the interview guide and its questions may look like. It describes the structure and some questions for the interactive control system to interview a founder of a start-up. The interviewer asks the sub questions to the founder. That means also that the interviewee will not be asked directly about the interactive control system, the subject matter question and how the interviewee defines a goal, plan and control the goal achievement.

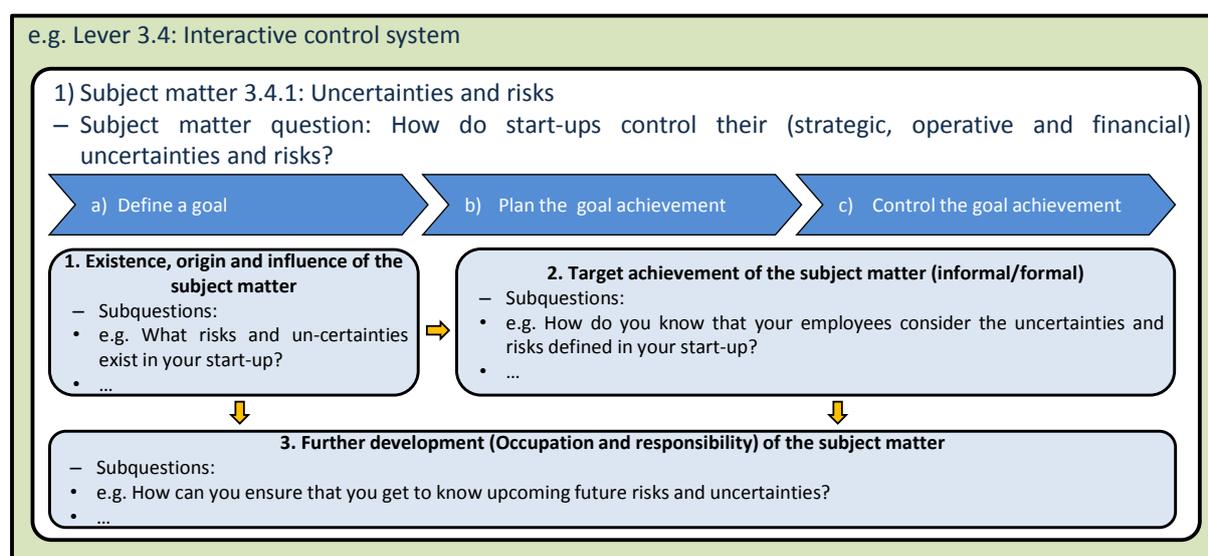


Figure 9: Structure of the semi-structured interview guide (for example for the Interactive Control system)

Figure 10 describes the intended form of evaluation of the interviews. Basically, two different comparisons are possible for each point in time (first and third year in post-incubation): First, a vertical comparison between the existing and the failed start-ups and second, a horizontal comparison between the internal and external view. Another horizontal and vertical comparison between the first and third year will be conducted as well.

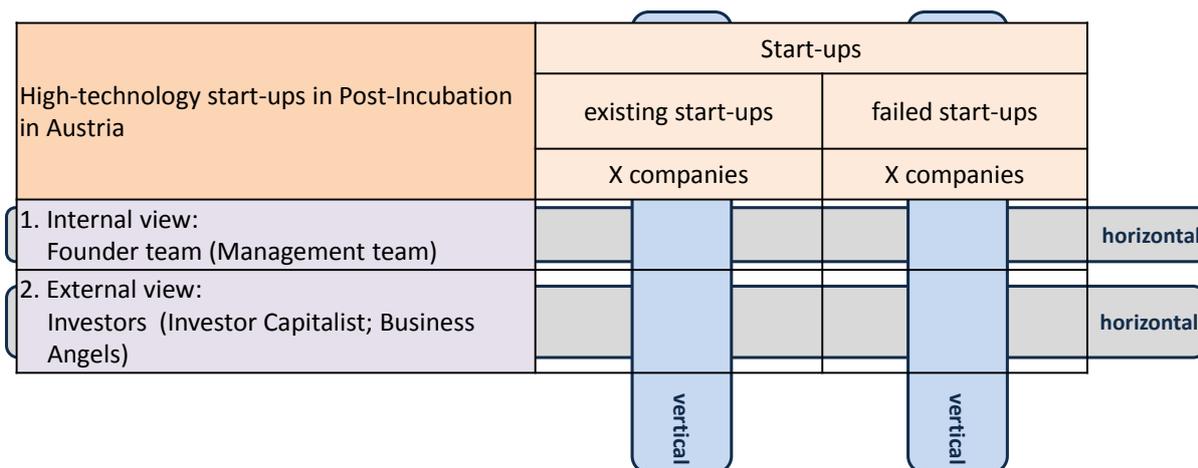


Figure 10: Analyzing the data

CONCLUSION

The main objective of this paper was to examine the post-incubation phase of high-technology start-ups and the relevance of management control systems and stakeholders. Although literature hardly describes why start-ups do have a need for support in the post-incubation phase so far, this paper tries to reveal the scientific and practical relevance. Practical problems like relative immaturity, limited resources and a high degree of exposure to external market dynamics lead to an increased risk of failure. These challenges can be summarized under the so-called “Liabilities of a Start-up”. The liabilities are newness, smallness and growth. The ability of an entrepreneur to tackle and overcome these challenges can be crucial for success.

In the sixties and seventies of the past century the first incubators emerged in the US and spread out to Europe where they became popular in the eighties and nineties. The main objective of these incubators was to support start-ups in their early life-cycle stages. They tried particularly to reduce the liability of newness. On the other hand, incubators should set a cornerstone for their tenants, enabling successful performance and long-term growth even after leaving the incubator. Therefore, it is crucial to investigate the so-called “post-incubation” phase and the initial incubation phase. This leads to a better understanding of the integral and sustainable benefits of incubators. Extensive literature on the incubation phase and on the influence of incubators has been provided by a number of researchers but there is little empirical evidence addressing the stage after graduation.

The purpose of this study is to provide some meaningful answers to the following research questions.

RQ1: Which aspects of management control systems of high-technology start-ups used in post-incubation are particularly worth exploring?

RQ2: What should an upcoming study that considers management control systems of high-technology start-ups used in post-incubation investigate?

Concerning the first question, the results of our literature review indicate a critical stage for graduated start-ups lasting from the first to the third year after leaving an incubator. The influence of an incubator rises particularly in the second year after graduation. Hence, further support in this stage would probably lead to a higher chance of surviving and could facilitate sustainable growth.

Derived from these results we can address a recommendation for action to external stakeholders. They should be aware of these facts in order to support start-ups in a proper way. Especially governments should also focus on the stage after the graduation of a start-up by creating programs to ensure long-term success of graduated start-ups.

Furthermore, this paper contrasts two approaches describing the relations between management control systems and the ability of organizations to innovate. Whereas the traditional view regards management control systems as harmful for enhancing innovation in high-technology start-ups, a new paradigm emerged, pointing out the need for implementing management control systems. This need occurs the first time in a certain stage of the start-up's life cycle in which the management style has to be transformed from an informal to a formal one. Ignoring this requirement may lead to a stagnation of growth and the start-up is likely to get stuck in the so-called "Crisis of Leadership". In this way we can address a recommendation for action to a managerial implication to implement, use and develop management control systems if it is no longer possible to manage a company in an informal way. There is almost no literature addressing the use and importance of management control systems as well as the identification of influential stakeholders in the post-incubation stage.

In the second part of this paper, an interview guide was developed in order to provide a tool for conducting some primary research in this area. We decided for a qualitative approach based on Simons' "Levers of Control", a concept of a management control system using positive and negative forces to create creative tensions. This framework is seen as particularly useful for research activities in entrepreneurial environments because it focuses on innovation, renewal and development. Furthermore, an upcoming study will be conducted at two different points in time in post-incubation. One will be one year after graduating from the incubator; a second one will be three years after graduating from the incubator. The goal is then also to focus on failed and existing start-ups including an internal and external view. Therefore interviews will be conducted with founders and investors of the same company. Overall six subject matters of the "Levers of Control" framework were identified for further research whereby each subject matter will be analysed in depth. It is planned to conduct this study as soon as possible for high-technology start-ups tenured by an Austrian incubator called AplusB.

Our findings indicate that the area of post-incubation of start-ups in general as well as the influence of management control systems and stakeholders in this phase of the life cycle have not yet attained a lot of attention by researchers. This paper tries to widen the discussion and to provide a basis for further work in this area.

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