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The Need for Systems Development Capability in Design Science Research – Investigating the Role of An Innovation Lab as Part of The Academy

Stefan Cronholm
University of Borås, stefan.cronholm@hb.se

Linköping University

Hannes Göbel
University of Borås, hannes.gobel@hb.se

Mikael Lind
University of Borås, mikael.lind@hb.se

Viktoria Institute, Gothenburg

See next page for additional authors

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Authors

Stefan Cronholm; Linköping University; Hannes Göbel; Mikael Lind; Viktoria Institute, Gothenburg; Daniel Rudmark; and Viktoria Institute, Gothenburg

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Stefan Cronholm[1, 2]
Email: stefan.cronholm@hb.se

Hannes Göbel[1]
Email: hannes.gobel@hb.se

Mikael Lind[1, 3]
Email: mikael.lind@hb.se

Daniel Rudmark[1, 3]
Email: daniel.rudmark@hb.se

[1]School of Business and Informatics
University of Borås
Sweden

[2]Department of Management and Engineering
Linköping University
Sweden

[3]Viktoria Institute, Gothenburg
Sweden

Abstract

Information systems as an artefact-oriented discipline require a strong interaction between researches, developers and users regarding, design of, development of, and the study of the use of digital artefacts in social settings. During latter years performing research in a design science research spirit has gained increasing interest. In larger scale design research endeavours access to systems development capabilities becomes necessary. Such a unit, an InnovationLab, was established in 2006 in a university setting in Sweden. In this paper we are investigating the five years of experience from running this InnovationLab. Our findings point to an innovation lab being valuable for research in general and especially for design science research. However, in order to balance the business of an innovation lab it will be necessary to provide services for other stakeholders (such as administrative units, teachers, and students) as means for developing systems development capability aimed for supporting researchers.

Keywords

Innovation, Innovation Lab, Design science research

INTRODUCTION

Several examples of artefacts stemming from an academic environment exist; two more prominent examples in contemporary innovative artefact development are the search engine Google and the enterprise modelling approach Architecture of Integrated Information Systems (ARIS), (Scheer, 2000). Also, over the last decade the decreasing time gap between research and market capitalization has led to more intense collaboration between the academia and corporations, mainly through the emergence of science parks and innovation clusters, which in turn has sparked economic growth. However, this collaborative trend in innovative systems development, also leads to the coordination and alignment of different stakeholders and their agendas, which need to be addressed in such development settings.

In the identity discourse of the discipline of the information systems some distinct characteristics among different contemporary claims can be identified, such as the strive of ***doing*** things in ***collaboration***, in the process of ***designing*** and ***evaluating*** IT-based ***artefacts*** (Lindgren et al, 2004). The design science research (DSR) paradigm (Hevner et al., 2004; March & Smith, 1995) has lately had large impact on the IS-field and it seems that qualitative action research oriented ways of thinking receives attention in field of information systems research (Mathiassen, 2002). Within DSR the focus is on knowing through designing, constructing, and evaluating artefacts in close interaction with users (Purao, 2002). Exploring usage of IT-based artefacts in authentic settings would potentially stimulate people to expose different patterns of behaviour not known before (or made possible due to the use of IT-based artefacts) and indicate the utility of the designed artefact.

The effects of both artefacts as such and the ***usage of*** these artefacts in organisational practices are thus necessary to study. This puts high demand on both the ability of the researcher and the ability of the organisation to implement and continuously refine IT-artefacts. In larger research endeavours it would thus be necessary to assign someone else, than the design researcher(s) (such as industry/public authorities and/or system developers

within academia), to supply with capability of such realization. Consequently, it will be necessary to have established close collaboration practices between the design researcher(s) and the involved system developers of such systems (Hjalmarsson et al, 2010). It is thus necessary to establish an infrastructure for multi-stakeholder engagement in order to run larger scale DSR endeavours.

On the other hand, if one wants to study the evolvement of innovative solutions based on digital technology in use there will be a need for a more "closed" setting in doing this. Many times such processes need to be performed in laboratory-like environments, but still meeting the demands of stakeholder involvement and setting up a similar use situation as in reality. The main challenge for such innovative projects is to create a working model for a team of people ranging from concept builders to high-tech specialists, integrators and evaluators (McKenny et al, 1995).

One, among others, potential setting for design science research artefact development is within the academia. One way of meeting the challenges of enabling close collaboration between design science researchers and systems developers would be to establish a systems development unit for supporting such research. Such a unit, called InnovationLab[1], was established at a Swedish university in 2006. In this paper, we will elaborate on the experiences and insights gotten from establishing such a unit. The establishment of this unit could be seen as a DSR endeavour where the organization as such is to be seen as the artefact being put into use (Romme, 2003).

The main focus of this paper is however to investigate why and how an innovation lab could support the core business of academia by being a part of academia. By supporting core business we especially mean supporting research, but also administrative tasks as well as being a support for preparing students for the future. An innovation lab is however a rather new phenomenon so one needs to know how to set up such an environment in order to ensure that it becomes a valuable asset for its stakeholders closely related to an academic setting. The research question being explored is what the necessary characteristics are for an innovation lab having an ability to support DSR. This introductory section is followed by a description of the idea of the InnovationLab. In the following section we present relevant theory for the study. After that we discuss the research approach followed by our findings. Finally, we present the conclusions drawn.

THE IDEA OF THE INNOVATIONLAB IN ACADEMIA

The original goals of the InnovationLab were to develop and use modern technology (artefacts) in close collaboration with the industry, researchers and students. The InnovationLab entails today seven employees with a mission to organically grow. The head has a background from the industry and from the academy. The co-workers have mainly a background in software development. The main competences of the employees are programming skills, technical infrastructural competence and architectural competence. Recently three professional doctorates have been employed to further reduce the gap between research, design and development.

The original ideas were that the InnovationLab should support research groups in the construction of innovative artefacts but also that it should be able to manage own research projects. The InnovationLab's strong relation to the industry should support the researcher to put their research to practice. Over the years this aim has been broadened. Besides supporting researchers, InnovationLab is also supporting teachers and administrative units within the university. Furthermore, the InnovationLab supports students by offering access to real empirical data from the industry. As in many new organisations the assignment from the board of the university was not exactly clear or concrete when formulated from the start; rather the vague formulations were considered as a strength since it provided a flexibility that initially was desired. In this paper, reflections are being made for the purpose of making a stronger stance towards the role that an innovation lab could have in an academic setting and thereby refining the original assignment.

During the five years that has gone since the establishment of the InnovationLab there have been many "clients" or groups that the InnovationLab has cooperated with. The primary groups have been researchers, administrators and students. There has also been cooperation with teachers, policy makers, business developers, systems developers, companies and system designers who all have experienced InnovationLab as useful for their purposes. From a research perspective, the basic idea of assigning InnovationLab was to get a professional technical support to implement research ideas. Another founding idea, compared to a traditional IT-firm, is that the InnovationLab should have more organisational knowledge about the academy and also more knowledge about different research techniques and how research is performed. Examples of support that researchers may ask for are: development of a demonstrator for a research result, development of an architectural design or

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[1] We are using the term "InnovationLab" when we are specifically refer to the lab we have studied and we are using the term "innovation lab" as a general term.

development of a fully operational IT-system. Related to students, as another stakeholder group, that they may gain access to empirical data (cases) for their thesis work.

INNOVATION AND DESIGN AS FOUNDING THEORY

One of the core concepts in this study is innovation. An innovation is not necessarily a physical object. An innovation can be a new thought, a new service or a new way to proceed. The key word is "new" and the concept innovation means renewal. According to the European Union (2004), there are three different types of innovation: process, product and organisation. Process innovation means that a product or service could be produced with fewer resources. Product innovation concerns improvements of an existing product or development of a new product. Organisational innovation refers to new forms of organisations. One definition reads: "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations." (European Union, 2004). We perceive the establishment of the InnovationLab as an organisational innovation since it constitutes a completely new unit within the university.

The second phenomenon relates to that the output of InnovationLab should be innovations. This is the underlying idea of establishing the unit (see section Characterisation of the InnovationLab). The output can be both innovative processes and innovative products. A consequence of an innovation is a change. A new process (method) means to work in new ways. A new product implies new conditions for action and/or interaction. Rogers (2003) has categorised users based on how quickly they adopt an innovation. According to Rogers, the first category that adopts an innovation is the "innovators". The innovators are willing to take risks and they are interested in new development. The second category is the "early adopters". This group is also highly educated and often social managers. The third category is the "early majority" and the fourth category is the "late majority". Members of the "last majority" are more sceptical and traditional. The last category is called "the laggards" which are the last people to adopt an innovation.

An innovation will survive in an organisation if it contributes to the goal of the organisation. According to Rogers (2003) there are five phases describing how an innovation becomes adopted. The phases can be seen as degrees of acceptances where the first phase represents more of hypotheses and the last phase represent a full confirmation. The phases are:

1) Knowledge: the user becomes aware of the innovation and which problem the innovation is supposed to solve.

2) Persuasion: the user is persuaded of the value of the innovation.

3) Decision: the user decides to implement the innovation.

4) Implementation: The user implements the innovation and tries to utilize its values.

5) Confirmation: The innovation is fully used (or vice versa).

A second important concept is *design* since the main task, according to the original ideas, is to design innovative artefacts. In recent years, framing systems development as design has rendered great interest within the community of information systems research. Although different streams of such research exist (Carlsson, 2007), the by far most cited design research approach is DSR (Hevner et al., 2004; March & Smith, 1995). In DSR, knowledge about and understanding of a problem domain and its corresponding artefact-based solutions are achieved through a scientifically grounded implementation and evaluation of artefacts (Hevner et al., 2004). Hence, in DSR the *researcher-as-designer* is stressed. At the core of DSR thus lies the creation of artefacts solving problems that so far have not been solved. In DSR, the formulation of a problem typically precedes the construction of artefacts (Vaishnavi & Kuechler, 2007), but it has been argued that the opposite also holds true (Nunamaker et al., 1991). Hence, it might be argued that the research problem and the artefact typically co-evolve over time. According to Purao (2002), this co-evolving process requires a sufficient infrastructure to effectively deal with these changes. The InnovationLab analysed in this study is a good example of such a necessary infrastructure – as part of a multi-stakeholder DSR setting – especially when it comes to more large-scale DSR endeavours.

In DSR the artefact may be viewed as a working hypothesis that is tested during evaluation (Liedtka, 2004). DSR is concerned with two major activities (Hevner et al., 2004): 1) develop theories and build artefacts and 2) evaluate what is developed/built through a variety of methods ranging from simulations via case studies to field studies. These activities are influenced both by the environment (expressed as business needs) and by the existing body of knowledge (theories). Kuechler & Vaishnavi (2008) claim that DSR stems from an engineering perspective where DSR researchers are primary designers and experts of the pioneering technology they create and test (typically within a controlled environment). However, DSR is becoming more frequently used as means

in theory-informed intervention (Cole et al., 2005; Lindgren et al., 2004; Markus et al, 2002) and consequently recognizing both the social as well as the technical dimensions of introduction artefacts into an organizational setting. With this broadened research focus, researchers in DSR projects may not be developing technical artefacts solely themselves, but rather participate in a researcher-developer collaboration. Yet, the DSR literature has up-to-date paid insufficient attention how to deal effectively with such collaboration settings (Hjalmarsson et al., 2010). Furthermore, a significant portion of contemporary research is collaborative and includes not only researchers but also actors from industry, non-profit organizations and public authorities. DSR is not an exception from this. Often different types of prototypes, demonstrators and toolkits are needed to demonstrate the research ideas (Paradiso, 2004) in these collaborative settings.

As mentioned above, the InnovationLab can be seen as an infrastructure supporting DSR. We argue that this type of organization meets the requirements for conducting DSR in the type of collaborative multi-stakeholder environment described above. Our argument is based on that of the formulation of the problem co-evolves in close relation with the solution as a result of the interaction with the different stakeholders. Further, when DSR addresses research questions encompassing both technical and social aspects of artefacts, there is typically a need for systems development capability.

RESEARCH APPROACH

In order to answer the research question we have applied a qualitative approach. That is, we are primarily interested in explaining the role of the InnovationLab. According to (Kvale, 1989; Silverman, 1970) a qualitative approach is preferable when the researcher is interested in a deeper understanding of a phenomenon. Our qualitative approach embraces two phases. The aim of the first phase was to understand the current situation (is-state) and the aim of the second phase was to suggest goals for a future situation (wanted-state).

In the first phase, we have tried to understand what are the primarily working tasks performed by the InnovationLab today, and what are the stakeholders' perceptions of the current situation. Data have been collected from major assigners/clients of the InnovationLab: managers, researchers, teachers, and representatives of internal administrative units. In this paper, we call these clients for voices. All together 32 interviews have been conducted (see table 1). We have used semi-structured questions (Patton, 1990) and the interviews can be characterized as being of a conversational character.

Table 1. Distribution of interviews

Category (voice)	Number of interviews	Roles
Managers	10	Head of school, head of department of computer science and business, financial manager, vice principal, three directors of study, head of the department of education and research support, director of the library, director of the administration manager, director of centre of entrepreneurship, and the director of the InnovationLab.
Researchers	14	Five professors, three associated professors, three employees with a doctoral degree and three PhD candidates.
Teachers	4	Four senior lecturers.
Representatives of administrative units	4	Two system owners and two persons that are responsible for system resources.

Data have been collected and analysed according to SWOT-analysis (Kotler, 2005). That is, we have collected and categorised data according to strengths, weaknesses, opportunities and threats from all the voices mentioned above. The argument for choosing SWOT-analysis is that we wanted to illuminate the current state from different aspects. We wanted to understand strengths and opportunities as well as weaknesses and threats in order to support a broad understanding. In the second phase, we have used a focus group in order to improve the SWOT-analysis and to suggest future goals of the InnovationLab. A focus group can be seen as a form of qualitative research (Denzin & Lincoln, 1994). A group of people are interacting and are asked about their perceptions, opinions, beliefs and attitudes towards a particular topic. Focus groups are often used in order to obtain feedback about the studied phenomenon. The moderator of a focus group usually follows a discussion plan that has the questions, prompts, tasks, and exercises for the group (Greenbaum, 1993). The participants are free to talk with other group members.

The focus group has consisted of representatives from all the voices mentioned above. Participants have been selected according to their knowledge about and interest in the InnovationLab. The aims of using a focus group have been 1) to spread knowledge about different opinions, 2) to refine and improve the analysis from the first

phase and 3) to suggest future goals. In the focus group meeting the output from SWOT-analysis was presented, discussed and refined. In order to suggest goals, all four analysis categories (strengths, weaknesses, opportunities and threats) have been considered. The suggested goals have been related to each other in terms of ends and means and by using Goal diagram (Goldkuhl & Röstlinger, 2005). Furthermore, the results of the SWOT-analysis have been related to the phases of innovation adoption suggested by Rogers (2003). The aim of this exercise was to understand in what phase the different voices seem to relate to and to get ideas for appropriate goals. By using the two phases described above, our aim has been to "move" from "how it is" (is-state) to "how it should be" (wanted-state).

FINDINGS

The findings in the first phase consist of results from a SWOT-analysis representing the four different voices (stakeholders). The voices represent a repertoire of strengths, weaknesses, opportunities and threats. In order to present a reviewable description of the findings we have limited to an extract consisting of the most frequent opinions. The findings from the second phase consist of a comparison of the voices, a suggestion for future goals and the voices in relation to DSR.

The voices of the managers

One of the foremost opinions brought forward by the managers is that hosting the InnovationLab brings a certain status to the university. Managers also agree that the InnovationLab attracts talented national and international researchers in the same way that the InnovationLab attracts students to the university. Another interesting point of a university hosting the InnovationLab is that the InnovationLab creates revenue to a university by developing and selling products and by attracting students. The managers also think that the InnovationLab increases the possibility on research projects to get funded.

Many of the managers did not perceive any weaknesses in hosting the InnovationLab at the university. The few weaknesses mentioned were that there is some scepticism about the InnovationLab because it often already exists an IT department in the university. The IT department is primary responsible for internal infrastructure and maintenance. The managers believe that the InnovationLab already is positive to the university but that there is potential for the InnovationLab to bring additional value to the university through adding more support for training students and give even more support to researchers. One recurrent threat mentioned is that the InnovationLab can become too institutionalized and thereby become positioned too "far away" from the researchers and consequently lose its attraction. Another threat is that no guaranteed long-termed financing has been established (see Table 2).

Table 2. The voices of the managers

Strengths	InnovationLab promotes the university. The employees have an excellent knowledge about information systems development. Attracts skilled researchers and students. Make it easier to get funded.
Weaknesses	The employees at the InnovationLab have not sufficient time for doing research. The dialog between research leaders and the manager of the InnovationLab about how to conduct innovative research projects can be improved. There is some scepticism about the InnovationLab within the organization.
Opportunities	Generate income through research funding. Coordinate IT-related issues in the University. Act as the official developer of new systems while the IT-department should work with maintenance of existing systems. Apply for own research founding.
Threats	Research projects have a weak funding for overhead costs. The lab can't entirely support research. Relations to other departments must be preserved since there is a high variation in funding concerning research. The InnovationLab can be too institutionalized and over time lose its innovation ability. There is no long-termed financing.

The voices of the researchers

Given the difficulty to turn to the private sector for support in developing artefacts for research purpose, the interviewed researchers believe that the greatest strength of the InnovationLab is that it is possible for them to turn somewhere for technical support and development capability. According to the researchers, the weakness is that not all employees in the InnovationLab have a research education. Just as in industry, the InnovationLab

often works under time pressure why researchers believe that sometimes there is not enough time for the employees to reflect upon their work and thus contribute to science. Furthermore, some researchers perceive it as a weakness that the InnovationLab charges for services. Another identified weakness/opportunity is that researchers would prefer that the staff in the InnovationLab have a research education that would support the collaboration.

The researchers believe that many opportunities exist to further improve the InnovationLab as an infrastructure supporting research, especially for design science research requiring the realisation of artefacts. The InnovationLab is also offering an open environment where researchers and employees can come together to test new ideas. There is a great concern that the InnovationLab may not be available when the researchers actually need it. The fear is that the InnovationLab will be occupied with assignments from the administrative departments and thus has to prioritize among tasks not in favour for the research (see Table 3).

Table 3. The voices of the researchers

Strengths	Can accept assignments with a short notice. Willing to accept "high-risk-projects".
Weaknesses	The role is unclear. Is the role to act as a supplier to research projects or can the lab manage own research projects. All the employees are not educated researchers. There is not sufficient time allocated for doing research. The goals of the InnovationLab are not clear. The Innovation charges for its services.
Opportunities	The employees should be knowledgeable concerning the latest technology. Solutions to problems should be of innovative character. Working procedures should be planned and conducted as research. The InnovationLab should be an open environment free to use for employees who want to test or try out new "things". The InnovationLab should market their services.
Threats	The InnovationLab will be occupied by internal administrative assignments. There is a high variation in research funding over time.

The voices of the teachers

The lecturers believe that the foremost benefit of the InnovationLab is that it is easy for teachers and students to get access to real empirical projects. The projects involved can be both internal business development projects for the university but also research projects that involve external parties. Furthermore, teachers believe that it is an opportunity for them to work in the vicinity of the InnovationLab, as it generates many reports and essay topics for students. It is also a strength that the employees at the InnovationLab have extensive technical skills. That is, they can act as co-educators in courses and teach modern programming techniques.

According to the teachers, the weakness with the InnovationLab is that teachers, students and employees at the lab do not have a general model for cooperation. Today, there is a collaborative approach that is specific for each situation. Opportunities for the future are that the InnovationLab work more closely with teachers in order to simplify and support information transfer to students. This transfer can consist of information concerning real empirical projects, methods, as well as technical knowledge. The primary threat identified is that there is a risk that the InnovationLab fails to support this category because they spend more time fulfilling other stakeholders' interests (see Table 4).

Table 4. The voices of the teachers

Strengths	The external relations provide a link between the education and the industry. Easy accessible (located in the same building). The assignments conducted by the InnovationLab can be part of bachelor and master topics.
Weaknesses	Teachers and students don't know how to cooperate with the InnovationLab. The InnovationLab is not sufficiently integrated in the education.
Opportunities	The relations to education should be tighter. Lesson learned from in real life project should be discussed in the classroom. The InnovationLab should be accessible for students who want to test or try out new "things". All on-going projects should be researchable for students.
Threats	The InnovationLab will be a unit entirely for serving researchers.

The voices of the representatives of administrative units

The voice from representatives of the administrative units says that the experience they have of working with the InnovationLab is very positive both in terms of interpersonal skills but also the InnovationLab's capability to fulfil projects on time and with the right quality. According to the voice of the administrative units this arises from that the InnovationLab has a great knowledge of the business of the university. One weakness that administrative voices seem to see is that the InnovationLab does not follow up projects in a way that the industry in the private sector is doing. By this they mean that the InnovationLab is not trying to do additional sales by, for example, propose changes and be proactive. A threat is that the university chooses to shut down the InnovationLab due to that they believe they might not see that great value of the InnovationLab would contribute with to the core business (see Table 5).

Table 5. The voices of the representatives of the administrative units

Strengths	The InnovationLab has knowledge about the university's organisation and procedures. New knowledge generated from research is accessible.
Weaknesses	The InnovationLab is part of a bureaucratic organisation. Ineffective ways of decision-making.
Opportunities	Become the natural choice for other departments who need IT-development support. Establish a close relationship with the IT-department. Provides business consulting through collaboration with researchers.
Threats	The university is not willing to host the InnovationLab.

A comparison of the voices – suggestion for future goals

In order to reach a consensus about the future of the InnovationLab we had to 1) inform the stakeholders (voices) that different opinions exist and 2) make a collective decision about the future goals for the InnovationLab. In this second phase of the study we used a focus group including representatives from all the four stakeholders. Not surprisingly, the analysis of the four categories of voices reveals that each voice brings forward strengths from their own perspective. It is obvious that the managers have a broader perspective on the InnovationLab than the other voices (see table 1). They perceive the InnovationLab as 1) a status symbol that promotes the university and 2) as strategic competitive advantage that will attract both researchers and students to the university. The researchers perceive the InnovationLab as a supporting infrastructure for the development of artefacts. That is, the InnovationLab can be seen as a condition for achieving research goals. The voices of the teachers stress the importance of supporting education such as the opportunity in using the competence of the InnovationLab in the classroom and having access to real empirical project. The voices from the administrative units within the university stress the importance of having access to developers with high-qualified technical skills and are familiar with the bureaucratic procedures of the university.

We consider these diversified perceptions both as strengths and as weaknesses. The strength is that many important stakeholders at the university believe that their business is improved by the services of the InnovationLab. The weakness is that that InnovationLab can be too divided since there are too many tasks with different character. Thus, the InnovationLab can be too unfocused and too inefficient. The main result from the focus group was that the research support should be prioritized and that all other business should be means to develop excellence in this task. All the goals, expressed by the focus group are illustrated in figure 1.
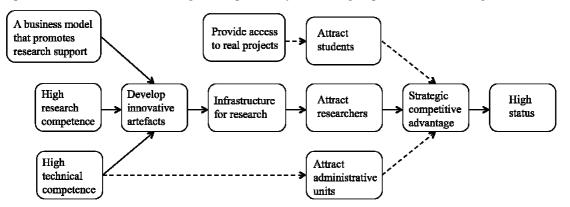

Figure 1. The future goals and means of the InnovationLab

To achieve the ultimate goal requires that the InnovationLab simultaneously works with three strategic business areas: support for research support for education and support for administrative systems development. The

reason for that the InnovationLab cannot place all eggs in one (research) basket is that there is a high variation in research funding over time. In figure 1, the goals connected with solid lines represent what should be prioritized. This priority does not mean that the InnovationLab should not serve the other voices. Other voices can be served if time and space can be allocated or if this service can be strategically motivated. We have used dashed lines to illustrate the goals for attracting students and the administrative units.

Furthermore, other tasks that are not directly related to research projects should as much as possible be carried out as research, i.e. other development tasks might also be a basis for reflecting upon as research endeavours. That is, if the InnovationLab for example is developing or maintaining an application for an administrative unit it should be investigated if this work could be combined with a research interest. In this way, the services performed by the InnovationLab can be seen as a means for fulfilling research goals.

The relation of the voices and design science research

The voice of the managers' view of the InnovationLab as a status symbol has nothing to do with DSR as a research approach. Possibly, they would be happy with any research approach as long as it attracts researchers, students and can be useful for other internal administrative groups. A criticism toward this broad view is that it can be interpreted as anything that generates an income is welcome. The risk of applying such a broad perspective is that the full potential of the InnovationLab is not utilized. To use a more focused perspective and to prioritize the understanding that the InnovationLab is an infrastructure for design research will legitimatize the view of the researcher-as-designer and that the research problem and the artefact typically co-evolve over time. This view of co-evolvement is also stressed by Nunamaker et al. (1991).

The researchers are also followers of this view. They are interested in using the InnovationLab for technical support. They need access to technical skills in order to distribute the development of innovative artefacts. That is, the construction of the artefact is not based on an old-fashioned requirement specification where all the characteristics of the artefact are specified in beforehand. Rather, the artefact is evolving from knowing through building by designing, constructing, and evaluating (Purao, 2002). Therefore, there is a need for a close collaboration between the researcher and the developer.

Performing research in the spirit of DSR also means that there will be a strong need for generating and collecting data for justification. In order to secure that the right data is collected; it is a challenge to set up procedures of collaboration for the two actor roles involved (researcher and system developer). This is especially important since the research question (research interest) might become refined throughout the design research process (Goldkuhl & Croholm, 2003).

The voices of the teachers are not explicitly addressing DSR, but they are addressing issues such as using the competence of the InnovationLab in education contexts. The full potential of this quality is not used. The InnovationLab could systematically document knowledge from collaboration in DSR-projects. This knowledge would be described from the developer's perspective and can therefore be seen as a valuable complement to knowledge described from the researchers' perspective. We believe that this added perspective will be useful in education contexts since knowledge described from the researchers' perspective is not always easy accessible. That is, this knowledge source can be used by teachers in order to: 1) improve their own competence and 2) to educate students. Acting in this way will also satisfy demands from the Swedish Agency of Higher Education that encourage universities to transfer research findings to master and bachelor education. Finally, the voice of the administrative units is not discussing DSR at all. They are primary interested in getting support with maintenance of existing applications.

CONCLUSIONS

In this paper we have investigated the role of an innovation lab in a university setting. We have explored five years of experiences from setting up and running such a unit. Our study has revealed that there are different opinions brought forward by different voices. Not surprisingly, these voices bring forward strengths from their own perspective. One message in this paper is that an innovation lab cannot equally serve all voices. If one makes a standpoint of the necessity for the field of information systems research to facilitate innovation in a DSR-spirit an innovation lab should primary be a support for research. Consequently, all other business should be seen as means for establishing a systems development capability aimed for research. We are not saying that the opinions of the other stakeholders are unimportant but the foremost aim of an innovation lab is to support research. Findings in research can then be transferred to the education. Other administrative units should be able to engage an innovation lab only if the InnovationLab is not engaged in research projects. An important finding from this investigation, however, is also that development projects for administrative purposes might also be a valuable source for research. This is however only possible when there are enough researchers involved and engaged in the business of the InnovationLab.

The establishment of the InnovationLab can be seen as an innovation in itself. According to Rogers (2003) users can be categorised how quickly they adopt an innovation (see section "Theory"). Our opinion is that the stakeholders (the voices) have reached different phases in adoption process. The administration units have reached phase 5 "Confirmation". That is, the innovation (the InnovationLab) is fully adopted and used by them. The teachers and the researchers have reached phase 4 "Implementation". That is, they are trying to utilize its values and they are succeeding to some extent; but so far they cannot fully utilize the InnovationLab's potential. According to Rogers (2003) an innovation will only survive if it contributes to the goal of the organisation. Therefore, it is important that the voices of the researchers and the teachers are able to maximize the benefit of the InnovationLab. The reason why the administrative unit has reached a higher phase is that the character of the service they are using is not as complex as the character of the services the researchers and teachers want to use.

We characterise thus an innovation lab primarily as an infrastructure for research. That is, an innovation lab constitutes a means that supports the researcher in fulfilling research goals, i.e. innovative artefacts (Hevner et al., 2004; March & Smith, 1995). It is important to have a proficient research-supporting system development infrastructure since the developers of the artefact may actively contribute to the research findings (c.f. Markus et al., 2002). Therefore the role of an innovation lab should not be reduced to be a mechanical infrastructure that unreflected acts upon predefined requirement specifications. The staff in an innovation lab should rather be seen as active partners in the process of problem formulation and artefact construction. In DSR the "researcher-as-designer" is discussed, but equally important is to view the "designer-as-researcher". Since the artefact is evolving in close collaboration between the researcher and the developers (Purao, 2002) developers at an innovation lab need research competence that both simplifies the communication with the researchers and increases the possibilities that projects meet the objectives from a research perspective as well as collecting relevant data about the design process (which may become important when writing up the findings). Having these pieces in place we believe that the ideas and hypotheses of the researchers may be effectively realized and tested (Liedtka, 2004). As DSR researchers we strongly believe in that an innovation lab would serve as a valuable and essential resource for running large-scale DSR endeavours where it become necessary to do things in collaboration in the task of designing and evaluating artefacts. One challenge for the future would be how to facilitate such collaboration when researchers and practitioners from other organisations are invited. In this way an innovation lab would become a valuable asset in a neutral arena in open innovation (Chesbrough, 2003).

The conclusions are based on a case study of one innovation lab. Despite this, we believe that the findings are possible to transfer to other organisations with the same conditions. According to Yin (2003), "case studies, like experiments, are generalizable to theoretical positions and not to populations or universes. In this sense, the case study, does not represent a sample, and in doing a case study, your goal will be to expand and generalize theories (analytical generalization) and not to enumerate frequencies (statistical generalization)". That is, the researcher should generalise beyond the theory's empirical base. We believe that our findings are valid for other universities, colleges or research institutes with similar conditions.

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