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A Blueprint for Joint Research between Academia and Industry

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A Blueprint for Joint Research between Academia and Industry

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Abstract

This paper suggests a blueprint for research initiatives between academia and industry. It is meant to stimulate the discussion of the benefits arising from such collaborative work between researchers in universities and practitioners in the field. We show how both rigour and relevance can be ensured in such a collaborative setting. The paper presents a generic model (the CBR Model), developed over eight years and successfully implemented in an existing longitudinal collaboration. The model consists of four different key areas (funding, topic, cooperation, interpretation) as well as three layers relating to time intervals ((yearly, medium term (3 years), long term). The model is designed to provide researchers with a guideline for setting up similar collaborative arrangements between researchers and industry partners.

Keywords: Research Programme, Industry Research, Research Funding, Collaboration, Rigour, Relevance

1 Introduction, Methodology and Research Question

This paper adds to the ongoing discussion on research collaboration between academia and industry. In the academic field of Information Systems (IS) there are different “traditions” or “schools” for conducting research in different countries. We observe an international dominance of the behaviouristic approach (Frank 2006) whereas the

German-speaking IS community (in German called “Wirtschaftsinformatik”), often makes use of the so called design science approach. This extends to a different attitude in the collaboration with industry partners. Whereas in Europe, and especially in Germany and Switzerland, there is a long tradition of industry involvement in academic work however this is much less common in research reported from the English speaking world. The question then is, what can one group learn from the other.

The following paper sheds light on some of the key issues of collaboration between researchers in universities and industry partners. The authors address the problems as well as some possible solutions. The overall objective is to encourage researchers to form mutually beneficial, long-term relationships with industry partners that fulfil the academic expectations regarding rigour as well as relevance.

Research involving industry partners makes an important contribution to advancing both academic and industry knowledge. Working with organisations provides researchers with an opportunity to identify industry trends, investigate current practice as well as increase research revenue. Technological knowledge resulting from the research can be diffused to industry (Poyago-Theotoky et al. 2002; Dooley and Kirk 2007). Equally, industry partners benefit through, for example, identification of trends in their industry, building knowledge about their sector, gaining new knowledge of benefit to the organisation, access to skilled researchers and faster access to new technology (Poyago-Theotoky et al. 2002; Dooley and Kirk 2007).

Van De Ven (2007, 6) describes this as “engaged scholarship”. “Engagement is a relationship that involves negotiation and collaboration between researchers and practitioners in a learning community; such a community jointly produces knowledge that can both advance the scientific enterprise and enlighten a community of practitioners.” The difference between this and other research, Van De Ven (2007), argues is that the research is a collaborative exercise between researchers and industry partners.

There is no question that management and business want relevant up to date knowledge and researchers are keen to engage with industry (Starkey and Madan 2001) yet often researchers struggle to engage adequately with industry and equally industry frequently is unaware of or uninterested in research findings (Van De Ven 2007, 234). There are many reasons therefore why “engaged scholarship” is elusive. There are also however, drawbacks. The type of research being conducted is governed in part by the industry partner and there is an argument that the quality of basic research may be reduced (Poyago-Theotoky et al. 2002).

Engagement with industry partners in research is particularly important for both groups in the field of information technology (IT) where change is frequent as new technologies are developed. This paper describes how a Swiss team engaged and collaborated with industry partners, the outcomes of the research collaboration and describes how the results of this research benefited all involved.

The *research question* addressed in this paper is how to ensure rigour and relevance in collaborative empirical research between academia and industry. The paper uses a hermeneutic approach of presenting problems and possible solutions. It draws from real-world experiences and presents a validated model for collaborative basic research based on a case study.

The paper is structured as follows: In the first section, we describe the challenges of joint academic-industry collaboration as discussed in the literature. We then introduce the Generic Collaboration Model (CBR Model) which is based on and validated by our real-world case of the “Netreport initiative”. We discuss how difficulties of joint academic-industry research can be overcome with the help of the model. The final conclusions discuss our experiences and possible limitations.

2 Researcher and Practitioner Engagement

The literature highlights the lack of long term engagement between industry and academia and presents a number of ways in which universities do partner with industry.

Informed basic research where the researcher is looking to explain or describe a social phenomenon and seeks advice and feedback from those involved (Van De Ven 2007, 234)

Contract research where an organisation directly engages University researchers in a research and development project in a very formal arrangement. Typically, in this arrangement all intellectual property resulting from the project remains with the organisation (Poyago-Theotoky et al. 2002).

Collaborative basic research involves a much closer relationship between the researcher and the industry partner (Van De Ven 2007, 234). This might take the form of a university and organisation collaborating on the development of a new technology but can also include educational partnerships. These arrangements can be quite formal or very informal (Poyago-Theotoky et al. 2002).

Design and evaluation research might examine policies programs etc. Industry partners are important as they will be directly involved in the research contributing to outcomes and assisting with validation for results (Van De Ven 2007, 234)

Action/intervention research actively engages the researcher and the industry partner in a research program where an issue in an organisation is investigated and changes implemented and further studied (Van De Ven 2007, 234).

For the purpose of this paper the research/practitioner engagement refers to *collaborative basic research (CBR)*.

Working with industry as a researcher, particularly in the IT field, is highly valuable both for the industry and the academic. As Davis (1994) notes for the practitioner it provides access to good students and academic staff who can help with solving business problems. For academics there is the opportunity to explore problems in practice increasing the relevance of the research (Mathiassen 2002).

2.1 Industry Perspective

There are many reasons however why “Engaged Scholarship” is difficult to undertake. From the perspective of industry the issues in relation to engaging with researchers include:

Relevance of research findings to industry. For example research topics that are not addressing the key issues industry is interested in (Starkey and Madan 2001).

Industry partners lacking the *skills, knowledge and interest* in designing the research instruments and how they will participate in the research (Amabile et al. 2001).

Partners from industry are also unlikely to have a *clear perspective on research outcomes* or what might be found (Pettigrew 2001; Starkey and Madan 2001).

Industry and management do not always see the value in a research partnership because they are not *getting access to research findings* which may be published in (for them) obscure journals or conferences (Starkey and Madan 2001; Mathiassen 2002). Van De Ven (2007) reports that less than 1% of managers read academic literature. Part of the reason for this he argues, is that the transfer of knowledge is poorly managed.

Clash of cultures between the organisation and the University researchers. This may occur because there are *different objectives*, different timescales and different expectations from the research outcomes (Dooley and Kirk 2007).

The issue of who owns the *intellectual property* can be a serious problem (Dooley and Kirk 2007).

2.2 Academic Perspective

For researchers the difficulties include:

Building a *successful team* of researchers and industry partners particularly if the partners are from different organisations (Van De Ven 2007, 277). Managing and working with the team can also present challenges (Mathiassen 2002).

A belief that *industry is not interested* or willing to adopt the recommendations published by researchers (Weick 2001).

The *timeframe* in which research is conducted is often much longer than industry's expectations of when they will see results (Pettigrew 2001).

Maintaining relationships with industry partners over a long period of time can be difficult yet critical to success of the research in the longer term (Amabile et al. 2001; Pettigrew 2001).

Research and industry partner *objectives and motivations* can be different. Researchers may for example want to continue work but industry has moved on in terms of what they are interested in (Starkey and Madan 2001; Mathiassen 2002).

True collaboration therefore, where industry partners and academic researchers work together to design, conduct and interpret research results is rare (Amabile et al. 2001). At least in the field of management Amabile et al. (2001) note that academic-practitioner research collaborations are uncommon. It is not unreasonable to assume the same is true in the IT field. A study of ECIS publications 2002-2004 by Backlund (2005) found more than 50% of the papers did not include any engagement with industry. Indications of clear engagement with industry in the form of action research, or ethnographic studies accounted for just 12% of studies.

The research generally involves a research project team or individual investigating a research problem that is of interest to both the industry partner and the researcher. The researcher would typically get access to documents, data and people in the participating organisation. The level to which the industry partner is involved in the research design however is often quite limited. Most reported research has involved researcher engagement with industry using *case study-based research* (Fisher et al. 2007).

This paper describes how industry and academia came together to design a mutually beneficial research programme. Over an eight-year period a research team based in Switzerland built a strong relationship with industry partners such that on a yearly basis industry partners and researchers worked together to design and implement a survey sent to Swiss SMEs. The purpose of the survey was to explore the trends in attitudes to ICT in small to medium-sized enterprises (SMEs). The results of these studies have been published previously (Leimstoll and Schubert 2007).

3 The Netreport Initiative: a Blueprint for Joint Academic-Industry Research

3.1 Background

The label “Netreport” was coined in 2000 at the zenith of the e-business boom. The Netreport stands for a research initiative and consists of a series of reports on the use of ICT in Small and Medium-sized enterprises (SMEs). The basis is a yearly survey for which questionnaires are sent out to companies. From the start, the Netreports (the actual written reports) sought to provide primary data on the use of Information and Communication Technology (ICT) in Switzerland. The initiative was launched by an independent Swiss e-business magazine located in Basel (named Netzwoche). Since Netzwoche was lacking the skills of performing market surveys and raising primary data they looked for a university partner who could provide the necessary skills to raise and interpret the data. They found help in a competence centre for e-business run by the Institute for Information Systems at the University of Applied Sciences Northwestern Switzerland FHNW.

Whereas the teaching in Swiss universities is publicly funded, research must be financially supported by grants or third parties. Hence the Netreport initiative required the university partner to find one or more funding partners who were interested in the findings of the surveys. It was obvious that suppliers of ICT (ERP vendors, telecom companies, hardware providers) would be those most likely to profit from the results of these studies. This is why they were chosen as the funding partners (industry partners). After the research design had been jointly determined by the research team in collaboration with Netzwoche, possible industry partners were invited to join the initiative. This resulted into collaboration between the following three interest groups:

The *e-business magazine* Netzwoche as the originator and publisher of the Netreport

The *research team* at a Swiss *university* (UAS) in charge of project management and the actual carrying out of the survey

A group of Swiss *ICT providers* who carry the project costs and provide the relevant research topics.

The main interest for the *e-business magazine* is the collection of data and text material for articles and related work which makes the magazine attractive for its readers. Additionally, there were financial interests attached to the initiative (e.g. the placement of advertisements and financial sponsorship).

The main interest of the *university* was to better understand the Swiss market for ICT. Researchers are interested in the collection of empirical data for subsequent analysis and publication in conference and journal articles.

The *ICT vendors*, finally, seek a better understanding of their target market and their potential customers with the final objective of maintaining their business or even increasing their market share.

For eight years, between 500 and 1000 completed questionnaires were gathered from Swiss companies (ICT users). The resulting database enables the researchers to pose and analyse a broad spectrum of research questions. Over the years, the research methodology has been refined resulting in better return rates and more reliable data. In the last years, the survey was partly based on a standardised questionnaire in German and French with predominantly closed questions (available in paper and online) with additional telephone interviews (computer-aided telephony). The interviews help to better fill gaps in the demographical distribution of the sample.

Typical topics of recent years included “the use of business software”, “procurement of ICT (outsourcing)”, and “processes and innovation with ICT”. The survey group comprises approximately 40’000 companies with 10-250 employees in business sectors two (industry) and three (services). Each year the Federal Office of Statistics draws a stratified random sample of around 4’300 companies from the universal set, based on sector and company size. The return rate is usually around 20%. For more details see (references removed for reviewing).

3.2 The Generic Collaboration Model (CBR Model)

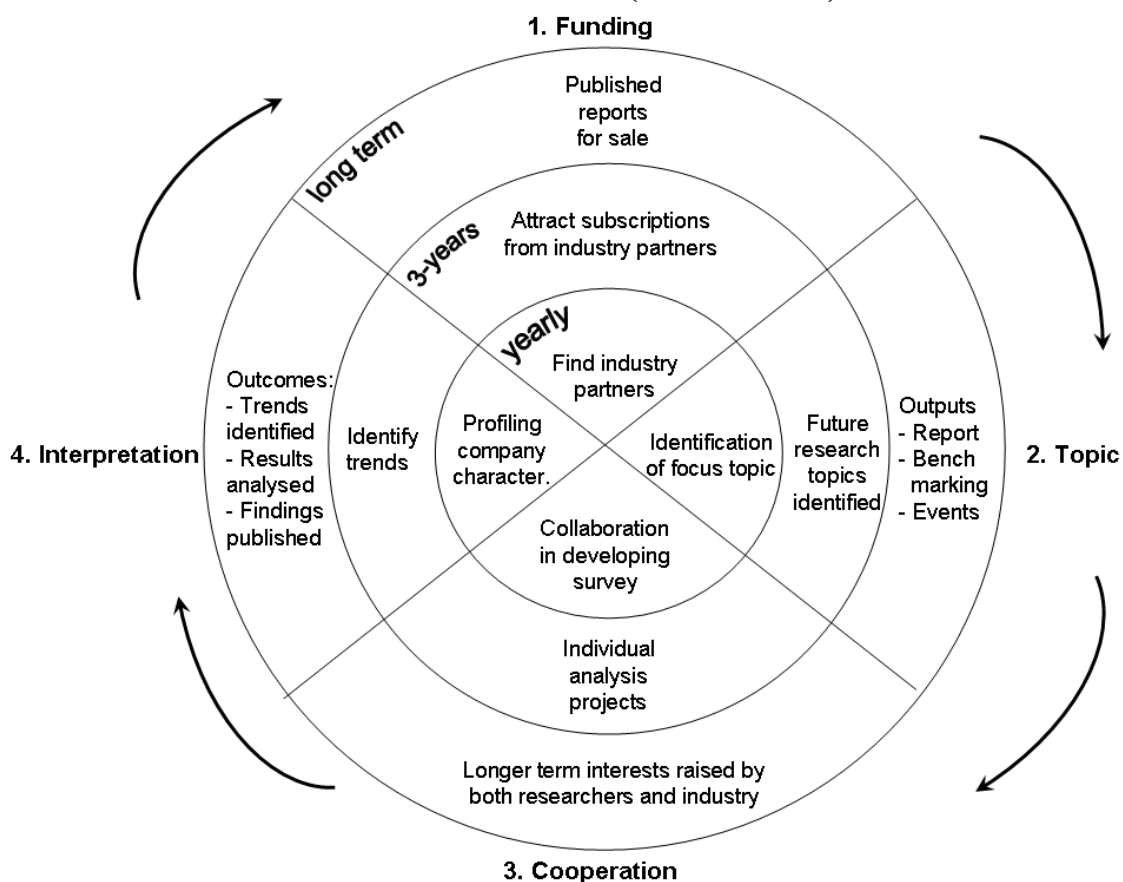


Figure 1: Generic model for collaborative basic research (CBR Model)

The following section introduces and describes the Generic Collaboration Model (CBR Model). Figure 1 describes the different components of the model. The model includes

four basic aspects (funding, topic, cooperation, interpretation) with different intervals (yearly, 3-years, and long term). The model describes the emerging sectors.

The areas are numbered according to the sequence of events in the project cycle. They are subsequent to each other and the following one cannot start without the successful implementation of the previous area. After one year, the cycle starts again but as the project setup matures the work involved in the basic steps reduces each year.

The following section describes in more detail the areas and their content.

Funding

As mentioned above, one of the basic issues of a joint research project with industry is funding. Each year, industry partners need to be defined. They act as „sponsors“ and their financial contribution covers the cost of the project. Finding industry partners is a very demanding and time-consuming process and therefore a “subscription-based” model where industry partners are engaged over more than a year was proposed. The Netreport initiative demonstrated that a three-year-period is a suitable timeframe for companies. The companies are bound by project contracts covering payment, organization of the project, and research outcomes.

The final research reports serve as an additional source for funding as they can be sold at a price lower than the subscription fee paid by the actual partners. This is possible as one of the main values a subscriber gets is the involvement in the research design (e.g. selection of topic and questions). The report provides only results with no opportunity to contribute to data collection or to gain insight into the background of the research.

Topic

The second key issue is the selection of the research question. For each survey (on a yearly basis) a focus topic is selected. The selection process takes place in a joint workshop between industry partners and academics. The discussion is moderated by the academic project leader. The research team investigates research on current topics and issues and presents suggestions to the industry partners. In these workshops, often future topics are identified and saved for later discussion in subsequent years. In the long run, the datasets on the different yearly topics allow for comparative reports, benchmarking or even information events where selected results are presented to the general public.

The outcomes from the research help the partner companies in the development of their individual company strategy.

Cooperation

Cooperation is one of the key strengths of this collaborative model; it is where the knowledge and the experiences of academics and industry partners are combined. In joint workshops and in the following feedback rounds the survey instrument is developed. The questionnaire is first developed and presented by the academic research team where issues of rigor and validity are considered. The industry partners then add their own ideas and suggestions, request changes and discuss possible outcomes of the survey. The development is an iterative and interactive process which is performed in physical meetings as well as in e-mail discussions.

In addition to the reports containing the analysis of the yearly focus topic research partners can ask for “individual analysis reports” based on their specific information needs. Over a longer period of time the academics can use the accumulated data to look at specific questions (e.g. a certain industry or a limited company size). This way, the industry partners receive tailor-made research results. In the long term, the cooperation includes looking at research questions that are interesting to both academic and industry partners and which are derived from the datasets of different years.

Interpretation

After funding has been secured, the research questions have been developed (focus topic) and the cooperation has been established with the partners, the last area finally contains the actual research outcomes. For each survey, there is a yearly identification of company profiles. The company profiles are identified with the help of a cluster analysis and describe typical characteristics of the companies surveyed in that particular year. Over time, these profiles are used to identify trends and changes in the behaviour of ICT users. The long term results of the research project are scholarly papers (findings published), industry reports (results analysed), and the final identification of trends over time. One trend for example, identified in recent years is that company size does not matter for most decisions regarding ICT use (Leimstoll and Schubert 2007).

3.3 Establishing a Research Collaboration

Reflecting on the experience of the Netreport initiative a number of issues arose over time. Next we describe those issues and how they were addressed.

Finding the first industry partner to participate in the initiative required considerable effort in the first year driving the cost of acquisition up. It was too expensive to run just one survey. After the first year the contracts with the industry partners were changed to a longer term basis (three years) - the “subscription based model”.

Cost of the study. The actual implementation of the project requires human resources – employed and paid by the university. Tasks include: project management; developing the survey; sending out questionnaires; data entry; data analysis; report writing. This can only be done by highly qualified research staff (Ph.D. candidates, senior lecturer or professors).

Collaboration between industry partners. Some of the partners are fierce competitors and it was interesting to see if they could be brought together. Through the process established however all industry partners have been actively engaged in the process, the discussions and worked constructively together during meetings.

Managing partners to ensure rigour in the research is guaranteed. Typically, industry partners want to convert results into sales figures and have practical questions such as: where are the potential customers, what do they need, how much are they prepared to spend (budgets)? This sometimes leads to conflicting interests with academic partners which are more interested in academic output. Both perspectives have to be included.

A successful project manager was the key to bringing the partners together and to meet the established deadlines. In order to carry out the research project different roles were identified and staffed with people:

The following roles were identified:

1. *Project leader* (typically a senior lecturer or professor), leads the team and must have a high academic profile.
2. *Project manager* (typically a senior lecturer or Ph.D. candidate) who is in charge of the operations of the project
3. An *interdisciplinary research team* in charge of data collection and analysis. Members of the team need statistical skills (e.g. SPSS), management/computer skills as well as writing skills (typically Ph.D. candidates supervised by lecturers/professors).
4. *Communications expert* for the management of the Web site, organisation of public events, etc.

Other issues which needed to be addressed were the organisation and preparation of meetings with the partners, facilitating meetings, managing tensions, resolving conflicts among competitors, as well as sorting out different areas of interest.

3.4 Overcoming the Difficulties of Joint Academic-Industry Research

The following table describes how the CBR model addresses the issue raised in the literature and illustrates how rigour and relevance is also addressed.

Table 1: Comparison of deficiencies and possible solutions in joint research

Existing deficiencies in joint research	Solution in the CBR Model
Relevance of research findings for industry	Joint identification of focus topic (industry partners and academics) and availability of tailored reports (relevance)
Lack of industry skills, knowledge and interest regarding research design and instruments	Academics provide the necessary skills to ensure research rigour.
Lack of perspective on research outcomes	Research outcomes are described by academics and discussed in workshops; long-term perspectives helps industry partners understand the research directions; research outcomes are analysed and transformed into usable results (e.g. trends, market analysis).
Lack of knowledge and access to research outlets (“obscure journals”)	Dedicated research outputs in the form of reports, benchmarking and events (relevance)
Clash of cultures	Working on jointly agreed topics with a group of industry partners and academics helps overcome misunderstandings.
Intellectual property issues	Agreed upon in the cooperation contract

Existing deficiencies in joint research	Solution in the CBR Model
Building a successful team of researchers	Professional project management in place including academics (rigour)
Belief that industry is not interested in academic research	Industry partners have an innate interest in the results, they influence the research topic (relevance).
Timeframe in universities too long	Deadlines are jointly agreed upon and strictly adhered to.
Difficult to maintain long-term relationship	The yearly cycles bring about long-term relationships; regular meetings followed by networking sessions ensure getting to know each other.
Differing objectives and motivations	Objectives are jointly agreed upon.

4 Discussion and Conclusions

The literature and the experience of working within the CBR Model highlights the importance and the benefits of joint academia and industry research activities. Collaborating closely with industry ensures research is relevant, not just to industry but also to academics. For us, in the academic community, help with identifying current and relevant topics is critical both for our research and our teaching. The involvement of academic researchers in developing the research instrument helps ensure rigour. As we understand this is not a skill set those in industry are likely to have or even necessarily be interested in. In the words of Van De Ven (2007, 296) "Researchers who adopt the engaged scholarship model of involving relevant stakeholders in problem formulation, theory building, research design and problem solving should produce research findings that make more significant advancements both to science and practice than the traditional approach of going alone." The issue we have sought to address in this paper is how this can be done.

For many researchers, the opportunity to work closely with and in collaboration with industry over a long period of time is not usually possible. As highlighted in the literature there are many obstacles to successful collaborations. The experiences of the research collaboration presented in this paper describe one approach to establishing and maintaining a successful collaboration over a nine year period. Many lessons have been learned from this experience including:

The need to establish a *longitudinal approach*. Once a collaboration such as this has been established for a period of time it is then possible to identify industry trends, conduct cluster analyses and undertake benchmarking. Most other studies are limited in their findings because time is an issue. The Netreport initiative can identify trends because the results can be compared over time.

To be successful, *strong industry commitment* is required. There must be a willingness within industry to respond to the questionnaire regularly.

A *culture of wanting to understand* more about IT must be fostered. The companies that were surveyed need to have a vested interest in the questions and the results

provided must meet their needs. Industry participates because they are interested in the benchmark (they want to know their position in relation to the other companies in Switzerland for example).

Meetings with industry partners inevitably involve some level of conflict, tension and then changes and these must be managed. Over time our model has been refined to improve the decision making process.

The *process for selecting topics* is critical to success. Often industry interests are quite narrow and some topics industry partners have requested have not been covered. The researchers tend to have broader interests, a wider view of industry and the industry participants need to be encouraged to think more widely. Equally not all topics academics are interested in, industry wants to pursue. For example, from an academic perspective mobile is an interesting topic but there were no industry partners willing to support this topic and it therefore has not been investigated. There must be compromises on both sides for academics some topics will remain on the back burner but often industry will come around.

The *team* is very important to the success of raising funding, attracting industry interest and producing a report that has credibility both academically as well as from an industry standpoint.

Our paper describes one approach to building and maintaining a long term industry/academic research relationship. The key, we believe, is that industry has seen the benefit over time. Often industry is not engaged because they do not see the relevance, and timelines are often too long to see tangible results. For researchers, the approach provides strong academic oversight ensuring research rigour. We understand that this approach not only takes time to set up but requires significant investment from industry partners, researchers and research institutions, however, in the long term there are substantial rewards.

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