A Study of the Factors that Influence Engagement in University-Industry Collaboration Projects

Petra Schubert

Nr. 12/2012

The "Arbeitsberichte aus dem Fachbereich Informatik" comprise preliminary results which will usually be revised for subsequent publication. Critical comments are appreciated by the authors. All rights reserved. No part of this report may be reproduced by any means or translated.

**Arbeitsberichte des Fachbereichs Informatik**

**ISSN (Print):** 1864-0346  
**ISSN (Online):** 1864-0850

**Herausgeber / Edited by:**
Der Dekan:  
Prof. Dr. Grimm

Die Professoren des Fachbereichs:  
Prof. Dr. Bátori, Prof. Dr. Burkhardt, Prof. Dr. Diller, Prof. Dr. Ebert, Prof. Dr. Frey, Prof. Dr. Furbach, Prof. Dr. Grimm, Prof. Dr. Hampe, Prof. Dr. Harbusch, Prof. Dr. Kilian, Prof. Dr. von Korflesch, Prof. Dr. Lämmel, Prof. Dr. Lautenbach, Prof. Dr. Müller, Prof. Dr. Oppermann, Prof. Dr. Paulus, Prof. Dr. Priese, Prof. Dr. Rosendahl, Prof. Dr. Schubert, Prof. Dr. Sofronie-Stokkermans, Prof. Dr. Staab, Prof. Dr. Steigner, Prof. Dr. Sure, Prof. Dr. Troitzsch, Prof. Dr. Wimmer, Prof. Dr. Zöbel

**Kontaktdaten der Verfasser**

Petra Schubert  
Institut für Wirtschafts- und Verwaltungsinformatik  
Fachbereich Informatik  
Universität Koblenz-Landau  
Universitätsstraße 1  
D-56070 Koblenz  
E-Mail: schubert@uni-koblenz.de
A Study of the Factors that Influence Engagement in University-Industry Collaboration Projects

Author:

Prof. Dr. Petra Schubert (petra.schubert@uni-koblenz.de)
Institute for IS Research, University of Koblenz-Landau, Koblenz, Germany

Publication history:
This working paper is a further development of a paper published at the Bled Conference 2009. The original paper received the "Outstanding Paper Award". (http://bledconference.org/index.php/eConference/2011/about/editorialPolicies)
Reference:
This extended version contains a larger set of diagrams that could not be published in the original Bled paper due to space limitations. Additionally, five more interviews were included in the analysis. I was also asked to add an explanation of the IS Research Methods that were used in the interviews.
# Table of Contents

The imperative to publish.......................................................................................................................... 1
Setting the scene: attitude towards university-industry collaboration.................................................. 2
So, how is research with industry seen by IS researchers? ................................................................. 4
Themes in the literature on university-industry collaboration............................................................. 5
  Scholarship of Engagement.................................................................................................................... 6
  Engaged Scholarship............................................................................................................................. 6
  Real engagement through collaboration.............................................................................................. 6
  Drivers for engagement: successful publications.............................................................................. 7
  Barriers to engagement....................................................................................................................... 8
Research methods in collaborative research ....................................................................................... 9
  Design (Science) Research (DSR): developing an artefact ................................................................. 9
  Action Research: intervention in the company project ................................................................. 9
  Behavioural Research: study of human behaviour ........................................................................... 9
  Grounded Theory: building theory from raw data ........................................................................... 9
  Experiment/simulation: laboratory environment ............................................................................. 9
  Case Study: deriving findings from real-world phenomena ....................................................... 10
  Conceptual development: creation of concepts based on reasoning ....................................... 10
Research approach ............................................................................................................................. 10
  Interview Guideline .......................................................................................................................... 11
Taxonomy for university-industry collaboration............................................................................... 12
Findings from the interviews and discussion ..................................................................................... 13
Some final thoughts............................................................................................................................... 21
Acknowledgements .............................................................................................................................. 22
References ............................................................................................................................................... 23
A Study of the Factors that Influence Engagement in University-Industry Collaboration Projects

ABSTRACT

Joint collaboration projects between University and industry partners have always been of particular importance to the IS community. The motivation to study current attitudes towards cooperation was inspired by recent discussions on “engaged scholarship” and “successful publication strategies” in which we can observe a difference in attitudes towards industry collaboration in different regions of the world. The author of this paper was particularly interested in exploring drivers and barriers for engagement with industry partners from the point of view of IS academics. This paper presents the findings from a qualitative in-depth study, in which fourteen experienced researchers from four different continents were interviewed in order to understand the phenomenon of university-industry collaboration in the context of different research traditions, different university environments and different geographical regions. The findings from the interviews show that researchers have very different preferences regarding the ideal setup of such collaborative research projects. Findings also show that Case Study and Design Research are the most common research methods in such projects.

**Keywords:** University-industry collaboration, collaborative projects, practitioners, research programme, research funding

**Paper type:** Research paper

The imperative to publish

The IS research community has experienced a trend in recent years that seems to define “research” as equivalent to “publication output” and that accepts the number of journal publications in the best (most cited) international journals as the only “real” measurement
of research excellence (Straub 2009). Publication output is often the dominant metric for research assessment.

There is growing concern that too strong a focus on journal publications may divert our attention from providing value to our key stakeholders: industry, students and society (Davis et al. 2005). As a response a number of researchers have proposed a “revival” of collaborative research, which is now increasingly referred to as “engaged scholarship” (Van der Ven 2007).

The purpose of this paper is to contribute to the understanding of university-industry collaboration within the discipline of Information Systems (IS). The author investigates factors that influence the decision of an IS researcher about whether or not to engage in joint projects with industry. The research data was drawn from current “best practice” collected from real-life experiences of IS researchers. Specific focus is given to examining typical forms of collaborative projects, the applied research methods and outputs as well as barriers and drivers. The data was gathered in personal interviews with IS researchers who had previously engaged in industry collaboration and agreed to report on their experiences with such projects.

A preliminary version of this study report (shorter and based on a smaller number of interviews) was presented at the 25th annual Bled Conference (Schubert and Bjørn-Andersen 2012). Encouraged by the lively discussion and the encouraging feedback the author decided to extend the data to draw a more representative picture of the international community of IS researchers and their attitudes and opinions toward industry research. In the months that followed the conference an additional five one-hour interviews were conducted with researchers representing four new countries and three different continents.

Setting the scene: attitude towards university-industry collaboration

In preparation for the study on current practice the author searched for existing studies in the topic area. Several studies were identified in which either the unit of analysis (in this study the “IS researcher”) or the study object (in this study “factors that either facilitate or impede collaboration”) was different. The following sections review some of these studies.

Bruneel et al. (2010) performed a study on the barriers to university-industry collaboration from the point of view of companies. They found that “[…] relatively few studies have
investigated the nature of the barriers and the factors that might mitigate them” (Bruneel et al. 2010, p. 858). Van de Ven and Johnson (2006, p. 802) point to rising concerns in the IS discipline stating “that academic research has become less useful for solving practical problems and that the gulf between theory and practice in the professions is widening”. They raise specific concerns e.g. that “findings from academic as well as consulting studies are not useful to practitioners and do not get implemented” and they claim that academics are not aware of the relevant (i.e. practice-oriented) research questions. They conclude that, “as a result, organizations are not learning fast enough to keep up with the changing times.” The key issue is to address what they call, the “transfer problem”.

It can be observed that the IS research community appears divided over the question of whether collaboration with industry is something that IS researchers should embrace as a valuable way of knowledge co-creation, or if it has too many distracting facets that it should be avoided. It can be argued we have to provide value to our key stakeholders (industry, students and society at large) if the IS field is to survive in the long run. In other words, we need to become engaged scholars. It can also be argued that there are forms of university-industry research collaboration that are highly rewarding for the researchers involved and that such research can lead to “value co-creation” (Sarker et al. 2012).

The author believes that the prevailing relationship between academia and industry is an important aspect in the discussion around the nature and fundamental understanding of the IS discipline. Provided that the scientific community understands the concept of “relevance” to a large extent as “relevant to practitioners” it becomes clear that a researcher’s attitude towards an engagement with industry has to be a defining characteristic of his/her research stance. This question is isolated from the question of how to communicate the research findings to practitioners. Academic outlets are not suited for this communication because they are directed towards academic researchers and largely not relevant to the concerns of practitioners. This is emphasised by Straub and Ang (2008, p. v) who state: “Any academic journal written by researchers for researchers as the primary audience is simply not targeted for practitioners.” In the study questions regarding outputs were included that are suitable to academic (e.g. papers, articles) as well as practitioners (e.g. project reports, slides).
So, how is research with industry seen by IS researchers?

The motivation for the long-term study on IS researchers’ engagement with industry was further spurred by a number of discussion streams in recent IS journals and at IS conferences. Among these are the following academic discourses:

- The provocative opinion piece “Why the old world cannot publish?” (Lyytinen et al. 2007),
- the debate about the *publication chances* of design science articles in journal publications (Österle et al. 2011; Baskerville et al. 2011),
- the *value from research funding* that stakeholders and society as a whole are deriving (Davis et. al. 2005; Gibbons and Johnston 1974; Hall et al. 2003),
- the stream about the concept of “Engaged Scholarship” which is meant to address the alleged gap between theory and practice (“knowledge production problem”, Van de Ven and Johnson 2006, p. 802),
- the *Scholarship of Engagement*, a movement reacting to the disconnect between academics and the public (Boyer 1996; Pettigrew 2001; Barker 2004),
- the pros and cons of collaborative research endeavours such as *interactive social science* (Orme 2000; Simmons and Walker 2000; Caswill and Shove 2000; Van Buuren and Edelenbos 2004; Hardy and Williams 2011) or *Co-operative Inquiry* (Heron and Reason 2001).

It can be argued that in principle, university-industry collaboration can address all of the above thematic challenges, but it differs substantially depending on academic traditions and socio-economic settings due to different sets of internal and external challenges. The author believes that we can learn from examples of “excellent” collaboration projects with industry and that these may help academics to write relevant (and at the same time rigorous) journal publications and contribute to high quality teaching. It can be assumed that research cultures that favour alternative research approaches (Frank 2006) and more specifically *Design Science* (Hevner et al. 2004) are more likely to actively seek out opportunities for university-industry collaboration.
This paper addresses the following research questions:

*What are forms (or “models”) of successful university-industry collaboration within IS?*

Additional questions that are addressed in this paper:

- What is a typical setup of collaboration projects between IS researchers and industry (funding sources and number of partners)?
- What are barriers and drivers of such projects?
- What research methods are used in these projects and what is the typical form of output?

The remaining paper is structured as follows: In the next section, the literature which led to the research question and the interview guideline is reviewed. Drivers and barriers to engagement are discussed and different forms and methods of collaboration are introduced. The research steps and the development of the survey instrument are then explained. The main section presents the findings from the preliminary study. The author concludes with some thoughts on the current findings and suggestions for further studies.

**Themes in the literature on university-industry collaboration**

Before engaging in a study of university-industry collaboration it is necessary to define the term more clearly. In the author’s understanding “university-industry collaboration” describes a research activity performed by a group of people containing academics and practitioners. The research is carried out together (collaboratively) or, as Heron and Reason (2001) aptly put it, as research “with” rather than “on” people. In doing so, academics and practitioners are co-constructing knowledge (Hardy and Williams 2011). The practitioners in a company or government agency are engaged in the research process – they are not mere study objects. Accordingly, a study of the impact of a particular technology in an organisation common to behavioural studies would not qualify as research collaboration in the definition of this paper. The focus is on research projects that are carried out as a joint work between researchers in universities and practitioners in companies or government agencies.

The engagement can occur at all stages, from the definition of the research question and the development of the research design, to the actual research work and the interpretation
of the findings. Pettigrew points out that it is essential that the practitioners are involved early in the research process in saying “The action steps to resolve the old dichotomy of theory and practice were often portrayed with the minimalist request for management researchers to engage with practitioners through more accessible dissemination. But dissemination is too late if the wrong questions have been asked.” (Pettigrew 2001, p. 67).

The following sections present and discuss some of the themes in the literature that are related to university-industry collaboration.

**Scholarship of Engagement**

The idea of collaboration between university and industry is not a new one. Boyer (1996) coined the term “Scholarship of Engagement” (also see Barker 2004). While the current traditional measures of research are the number of academic journal publications, and to some extent the number of citations, there is a growing demand in industry and society for research metrics of benefits to key stakeholders, students, industry and society at large. In line with this, in the next Research Assessment Exercise (RAE) in the UK in 2014, researchers will also be evaluated on whether their research has had an impact on society and industry (Ref2012).

**Engaged Scholarship**

Van de Ven took up the Boyer idea and published a book entitled “Engaged Scholarship” (Van de Ven 2007). In his book he describes a research methodology for participatory research with stakeholders. The content is concerned with bridging the knowledge gap and engaging practitioners in parts of the research process. However, his work does not talk about academic-industry collaboration as such, and it does not provide practical guidance on the necessary organisational framework for such projects.

**Real engagement through collaboration**

However, whilst Van de Ven (2007) acknowledges the engagement of practitioners to ensure a certain degree of relevance and practicability in the research he does not explicitly argue for collaboration with an industry partner over the period of a research project with a defined outcome. There are, however, successful forms of collaboration which have been described in the literature, e.g. *Collaborative Basic Research* (Schubert and Fisher 2009) or *Consortium Research* (Österle and Otto 2010). Such forms of direct collaboration can vary depending on *scope* (number of parties involved, project amount), *length* (time in months/years), *initiator* (research initiated by university or industry), *research object* (ar-
tefact, process, data/information, behaviour, attitudes) and research outcome (software, technology component, method, report).

These influential issues were added to the design of the interview guideline used for this study. It can be argued that collaboration can address many of the before-mentioned problems by engaging the practitioner in the research process as also argued by proponents of field work such as Schein (1987) and Whyte (1984).

Drivers for engagement: successful publications

It has been argued that engagement with industry can lead to successful academic publications if well presented and carried out in a rigorous way (Baskerville et al. 2011; Straub and Ang 2008). Research with industry, when using a suitable research method, can be a very valuable basis for evidence-based research following well accepted paradigms for how to deal with data, measurements, observations, testing, and validation. This perception is in accordance with statements from the provocative opinion piece “Why the old world cannot publish?” (Lyytinen et al. 2007) in which the authors acknowledge a strong industry engagement of European Ph.D. students but criticise their lack of rigour in their academic writing. They say: “Many times, Ph.D. theses are produced to address practical problems within industry; for example, innovative workflow designs or modeling methods.” (Lyytinen et al. 2007, p. 323) They further argue that these projects often end when the industry partner is satisfied with the research outcome, which is often a product, some software or a method without scientifically reporting the results in journal articles.

The analysis of the interviews for this paper showed that collaborative research can indeed lead to high-quality articles if the academic requirements are part of the research design. Rigour and relevance can be improved by raising substantive evidence data and monitoring the research process on a meta-level, which might seem superfluous for the industry partner but is essential for high-quality research publications. It is a prevailing criticism that design research projects often fall short of the last phase, the validation of the artefact in actual practice (Hevner et al. 2004) and it can be argued that this is exactly where university-industry cooperation can help filling the gap. One interview partner stresses the chance to look behind the scenes and see what is really going on in businesses by saying: “Research with industry partners gives us access to practical problems that we do not see from ‘outside the company’.” (respondent #7)
Barriers to engagement

Schubert and Fisher (2009) identify a number of factors that impede collaboration between practitioners and academics from both of their respective points of view.

Among the barriers for industry they mention (1) unclear relevance of research findings to industry (Kabins 2011), (2) lacking knowledge and interest in designing the research instruments (Amabile et al. 2001), (3) lack of access to research results (academic journals not attractive for practitioners), (4) different timescales, (5) different expectations from the research outcomes as well as (6) disagreement on intellectual property rights.

For the academics they mention a belief that (1) industry is not interested or willing to work with universities (Hall et al. 2003), the (2) rather long timeframe for academic research products (Pettigrew 2001) and the (3) tedious maintenance of relationships with industry partners over a long period of time (Amabile et al. 2001). The barriers for academics were tested in the interviews and found some of them confirmed. Aspect three, the tedious building up of trust was confirmed by multiple respondents, one of them e.g. saying: “Research collaboration takes a lot of time and the mutual understanding and trust increases over time. It is an investment that you have to make.” (respondent #7). An experienced EU project participant remarked: “There are path dependencies due to different expectations in different countries. You have to identify overlapping interests with your research partners and build up social capital over time.” (respondent #9). This assessment is shared by Van de Ven and Johnson " (2006, p. 812) who say: “Time is critical for building relationships of trust, candour, and learning among researchers and practitioners”.

A related barrier that emerged from the interviews was the time and energy that has to be invested by the senior researcher if Ph.D. students are involved in the project. Exemplary quotes are: "Industry projects are labour-intensive for the senior researcher (the professor) because he has to lead and guide the project." (respondent #9). These remarks are in accordance with the observation made by Lyytinen et al. who argue: “[...] intense research-industry engagements sap time and energy away from publication and decreases Europeans’ motivation to publish in elite journals” (2007, p. 324). Their conclusion, however, is not shared by the respondents. Most of them agree with the following assessment: “I gained access to valuable empirical data and was able to write a high quality paper with it.” (respondent #9). This is also confirmed by the high number of publications in top journals (as will be shown in the findings section below).
Research methods in collaborative research

Part of the investigation was the study of research methods that are typically used for collaboration with industry. The author assumed that approaches that call for an industry partner, such as Design Research or Action Research would score highest in the list. The following choice of research methods was derived from the literature and presented to the interview partners. Although interview partners were actively encouraged to name additional methods, no further methods were added by the interviewees.

Design (Science) Research (DSR): developing an artefact

*Design (Science) Research (DSR)* represents the development of an IT artefact (e.g. a software programme or method) as the main objective of the joint project. DSR has been a topic of considerable interest in the IS literature in recent years (Hevner et al. 2004, Österle et al. 2011, Gregor 2006, Lee and Hubona 2009).

Action Research: intervention in the company project

*Action Research* is used to describe a situation, in which a researcher is actively engaged in a (company) project and, instead of just being a mere observer, intervenes in it over time (Baskerville and Wood-Harper 1996, Gregor 2006, Lee and Hubona 2009).

Behavioural Research: study of human behaviour

The term *Behavioural Research* is used to indicate the study of human behaviour with quantitative methods. Research projects in this category make use of statistical analysis often in the form of hypotheses models showing causal relations (e.g. Lee and Hubona 2009, Österle et al. 2011).

Grounded Theory: building theory from raw data

*Grounded Theory* is an inductive method for theory-building. This kind of research is aimed at developing theory from data raised during the project “from scratch” i.e. without the existence of a prior model or theory (Glaser and Strauss 1999, Urquhart et al. 2009).

Experiment/simulation: laboratory environment

The term *experiment/simulation* refers to the use of special simulation software or a laboratory setting to test or predict certain outcomes (Hartmann 1996). Simulation is typical for problem situations in which the algorithms are very complex (e.g. dynamic system behaviour).
Case Study: deriving findings from real-world phenomena

Case Study is used when an object is either studied in-depth (single case, e.g. a company or organisational unit) or when multiple cases (multiple-case study) are compared to derive generisable conclusions (Eisenhardt 1989, Yin 2009). Case studies follow a holistic approach, target multiple perspectives and describe real-world phenomena. They are usually seen as descriptive and exploratory and ideally include an explanatory analysis.

Conceptual development: creation of concepts based on reasoning

The development of ideas and concepts can be built on a “mere” formal or conceptual deductive analysis (hermeneutics). This form of research is mostly fact-based and makes use of reasoning with a strong focus on the explanation of semantics and the interpretation of correlations which results into the development of ideas and concepts.

The author expected that some researchers work with mere formal or conceptual deductive analysis (hermeneutics) but none of the participants selected this as an applied research method.

Research approach

This section describes the steps that were followed in order to develop the research instrument. In the first step an inductive, qualitative research approach was deployed in order to understand the factors surrounding successful collaboration with industry from the point of view of IS researchers. A semi-structured interview guideline (a questionnaire with closed and open questions) based on the themes identified above was developed.

Interviews were used in order to give the interview partners the opportunity to raise important aspects and identify issues and factors during the conversation. The interviews were also used to identify categories and terminology. Uncertainty about terminology and semantics could directly be solved during the interview.

In total, fourteen personal interviews were conducted in the years 2010 to 2012 of between 30 and 60 minutes in length with researchers who had carried out collaborative research projects. The interviews were recorded and partly transcribed. In the interviews respondents were asked to indicate their level of agreement with the proposed statements contained in the interview guideline. These items were developed from the literature on drivers and barriers to university-industry collaboration discussed above.
Interview Guideline

The content of the interview guideline is listed below (cf. Table 1). Some questions are simple selections from a list of items. Questions on opinions or attitude are phrased in statements and responses are measured on a five point Likert scale from “I fully agree” to “I fully disagree” (or “no response”). The complete interview guideline is available from the author on request.

<table>
<thead>
<tr>
<th>1. Demographic information</th>
<th>2. Types of industry collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position, role, size of group, academic age, country</td>
<td>Engagement in the past</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. One successful project</th>
<th>4. Project experience in general</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics of the successful project</td>
<td>Overhead</td>
</tr>
<tr>
<td>Initiating party</td>
<td>Satisfaction of industry partners</td>
</tr>
<tr>
<td>Motivation to start project</td>
<td>Drivers for engagement</td>
</tr>
<tr>
<td>Research methods used</td>
<td>Barriers to engagement</td>
</tr>
<tr>
<td>Publication output</td>
<td>Problems/challenges encountered in the past</td>
</tr>
<tr>
<td>Output for practitioners</td>
<td>Experience with of Ph.D. students</td>
</tr>
<tr>
<td>Success factors</td>
<td>Perceived trend towards more or less industry research</td>
</tr>
</tbody>
</table>

Table 1: Contents of the interview guideline

Demographic information was collected in order to identify correlations between project characteristics and the outcome/attitude of the researcher. Previous experiences of the interviewee were investigated to understand the range of projects he or she had been engaged in.

The main section of the questionnaire explores the respondent’s experiences with a “successful project”. The author believes that the motivation/output for the practitioners largely defines the research design and thus the choice of the research method. This part of the research draws on previous work by Perkmam and Walsh (2009), who performed an inductive study and identified four typical goals of collaboration from interviews with academics. The findings showed that companies had approached the researchers with issues regarding (1) problem solving, (2) technology development, (3) ideas testing and (4) knowledge generation. Accordingly, this classification of motivations was used. The reasons why the selected project was considered successful (“success factors”) were also explored. The “general experience” section explores the drivers and barriers for collaboration as discussed in the literature review above and the role of Ph.D. students (in response to the criticism voiced in Lyttinen et al. 2007).
Taxonomy for university-industry collaboration

The initial search in the literature for a useful classification scheme for collaboration projects remained largely unsuccessful. As a consequence, the author used a self-developed taxonomy in order to be able to identify archetypes (Schubert and Bjørn-Andersen 2012). The following matrix was developed to classify research projects (cf. Figure 1). During the work on developing the taxonomy, it became apparent that in the academic literature some authors focus on the funding aspect (Hall et al. 2001, 2003; Cohen et al. 2002; D’Este 2007), while others focussed on the parties involved in the project (Schubert and Fisher 2009; Österle and Otto 2010). As a consequence, the starting point was put on the development of a classification scheme for parties involved and external funding sources. It was decided to only include external funding (industry partner or government agency) although the University, in most cases, contributes to the overall cost either as “in kind contribution” (e.g. their already employed staff) or in the form of additional financial resources. In the end the taxonomy contained three dimensions:

1. Number of universities involved
2. Number of companies involved
3. Industry funded, government funded or co-funded

In order to illustrate the matrix, examples of typical projects are provided that would fall within each category.

Figure 1: Taxonomy for University-Industry Research (parties and external funding)
Information about how often the different types were encountered and which fields of the matrix were seen as the “most successful” project setups will be presented below.

Findings from the interviews and discussion

The following section presents the findings from the study. The figures in round brackets (n) indicate the number of responses in this category.

All respondents are either the head of their research unit (13) or the head of their own research group (1). The majority of their research groups include 6 to 15 researchers (10). They are experienced researchers; the average number of years since their Ph.D. graduation is 21 years. The sample includes researchers from Europe, Australia, Asia and North America, i.e. Finland (2), Germany (3), Switzerland (1), The Netherlands (1), Australia (1), South Korea (2), Singapore (1) and Taiwan (1), Canada (1) and USA (1). The typical project budget has an average of 437,195 ranging from 7,718 to 1,500,000 Euros. Most academic institutions deduct overhead cost from the project funding, i.e. they charge the project for costs such as staff workplace, rent of rooms, telephone, stamps, library, maintenance, etc. The overhead rate ranges between zero and 43% with an average of 23% (9).

The classification for collaboration projects revealed typical combinations (cf. Figure 2). The “1:1, industry funded” emerged as the most frequently used type (7). Generally, the respondents had been engaged in all funding forms of “1:1 projects” (total of 14). The collaboration type “n:m, government-funded” was placed second (6). The n:1 combinations with one company and multiple Universities were the most uncommon (2).

The successful projects had an average of 1.7 universities (minimum: 1, maximum: 4) and 3 industry partners (minimum: 1, maximum: 10). This suggests that most projects that are ranked as “successful” are run by only one university (9) but may well include more than one industry partner.
The interviews showed that the respondents were not particularly driven by the financial prospect of the joint project. Only two interview partners named funding of staff or equipment as an important motivation to engage with the industry partner. In 60% of the cases the research challenge (i.e. the research topic) was the main driver for the engagement.

The funding sources varied according to the different forms of collaboration (Figure 3). 41% of the funding came from government sources, 43% from industry and only 17% were paid by the University itself.

Figure 2: Experiences: types of industry engagement

Figure 3: Experiences: types of industry engagement
The dominant research approach was Case Study (8) followed by Design Research (7), Behavioural Research (6) and Action Research (3). Experiments/simulations (2) and Grounded Theory (1) were only named in two respectively one case. Mere deductive analysis was not used at all.

The findings confirm that projects with industry partners are best suited to look at one particular case in detail and develop artefacts and evaluate them in practice (cf. Figure 4). The single Case Study allows academics to transfer the qualitative results of the projects into an accessible form. Industry projects are also a source for empirical data, as the company/government agency can also be seen as a study object for Behavioural Research (Positivist) Research. As expected we also see the application of Action Research in which the researcher is part of the research process and actively influences the outcome.

Figure 4: Research methods used

Peer reviewed conference publications (44 %) are the most frequent academic output of projects with industry. The high number of articles in the AIS senior scholar basket of eight (18 %) followed by other peer-reviewed journal articles (17 %) demonstrates clearly that findings from industry projects can be used to produce high quality publications (cf. Figure 5). Where Ph.D. students were involved in the projects the senior researcher made sure that there was a high synergy between the project outcomes and the findings of the Ph.D.
theses (15%). “Other publications” (6%) are mostly books which were authored or edited by the research consortium.

It is remarkable that basket-of-eight journal articles are in second place even ahead of “other” peer-reviewed journals. This could confirm the increasing importance of journal rankings and the changed awareness for a need to publish in highly ranked outlets.

Figure 5: Type of publication in % of total amount of resulting publications

The findings of the study show that there is a wide spectrum of outputs that are relevant for the industry partner (cf. Figure 6). The most important outputs for practitioners are reports (i.e. the actual findings, artefact documentation, figures, interpretation and advice for action) and complementary sessions in which the findings are presented to senior management. Direct support in the form of consulting (10) and presentations (10) was also highly welcome in the majority of the projects.
Factors that Influence Engagement in University-Industry Collaboration

Figure 6: Output for practitioners (total numbers)
The perceived value to the industry partners from collaborative projects varies substantially (cf. Figure 7). Almost half of the respondents felt that the partners received a value that was much greater than what they had invested (6). Another four classified the perceived value still higher than the input (4). In two cases, however, the respondents felt that the resulting value was much less than the industry partners had expected. Both researchers said in the interview that such research projects carry the risk of failure and that in many cases the industry partner might pay for the development of an artefact that will never be successful in the market (respondent #5 and #6).

Figure 7: Perceived value for industry partners
However, a separate question on the satisfaction of the industry partners depicts an even more positive picture. With only one exception (1) the respondents agreed that their in-
Industry partners are very satisfied (7) or satisfied (6) and are likely to engage in another industry project with this university group again (13).

Figure 8 shows the most important drivers for academics to engage in industry collaboration. The most important one is to “get access to empirical data” followed by “get access to relevant problems/research questions”. The responses to this question confirm the lack of financial orientation regarding funding for “academic staff for your group”. Not surprisingly, academics seem to be rather driven by their individual career than by the managerial urge to enlarge the existing research group.

Other drivers that came up in the interviews but were not included in the original list are “the prestige that such projects give to the University”, “competitive advantage over other researchers”, that “findings are an important input for teaching” and that “such projects provide evaluation opportunities (to try artefacts in practice)”.

![Most important drivers for academics involving themselves in industry collaborative projects (N=14)](chart)

Figure 8: Most important drivers for academics (sorted by importance)

Figure 9 shows the most important barriers for academics. The first two barriers are related to external factors and are hard to influence by the researcher. These are “Scepticism in industry towards academics” which scores as the number one barrier followed by “Acquisition cost of getting projects is too high or takes too long time and effort”. The respondents also see difficulties in obtaining funding for their work from external or public sources.

Possible unfavourable conditions for acquiring collaboration projects are positioned in the mid-field. They are: “Few opportunities in the environment of where my university is located”, “Lack of recognition from colleagues/deans” and “Unfavourable (or negative) repu-
tation of industry research for personal promotion”. Especially in the German speaking countries, a positive general attitude towards cooperation can be identified. One respondent describes this as: “I think you only get an unfavourable reputation when you engage exclusively in research with industry partners. The portfolio has to be mixed. Universities are not meant to be consulting companies but joint projects with industry partners can lead to high quality findings and this is highly respected in our place.” (respondent #8)

It is interesting to note that the respondents did not feel that they lack expertise. The three questions that contain a self-assessment of the researcher’s skills, i.e. “Lack of proper methods / ideas for how to do it”, “Lack of necessary practical knowledge” and “Inability to speak the practitioners’ language” were rated as unimportant. The one respondent who rated them “important” later explained that he was referring to other IS researchers and not to himself. All in all, the findings show that there is no perception of lack of personal skills to work with industry but that collaboration is rather impeded by external factors such as attitude of colleagues/practitioners and funding/acquisition costs.

Additional barriers that were mentioned in the interviews are: “Board of University is now careful about direct collaboration with industry due to the risk of researchers becoming consultants and not doing research”; “It is too time consuming”; “Too short time perspective from the company’s side. Companies want too concrete results.”; “University administration makes it difficult to run such projects (too expensive).”; “Overhead costs on industry projects too high”.

There is no agreement on a trend towards more or less research collaboration with industry. Six respondents perceive a trend towards less, five towards more collaboration. Two respondents do not perceive a trend at all. The interview partners were unanimous in their assessment to an increase in measuring and assessing of research output. One says: “We observe a drive to a metric-based world. This makes it harder to succeed as a researcher, it reminds me of a tennis match” (respondent #14). Another researcher comments on the trend question: “With worries I perceive a trend to counting, weighing and measuring and an obligation to publish in A-journals. This could lead to a trend of less engagement with industry” (respondent #6).
Factors that Influence Engagement in University-Industry Collaboration

In the study of the “most successful setup for a collaboration”, the “1:1, industry funded collaboration” came out as “the most successful type”. It was favoured by five of the 13 researchers that responded to this question (cf. Figure 10). Two researchers favoured the “n:m, co-funded model” and two others the “1:m, industry-funded”. Four types were mentioned only once. The ninth respondent stated that only a mix of types could sustain a successful research group and thus claimed that there was no unique most successful type (respondent #9).

Exactly half of the respondents selected an industry-funded model (either 1:1 or 1:m) as their most successful approach. The problem in acquiring public funding was unanimously expressed by all participants during the interview. It is not surprising that the findings
show that researchers value projects in which the industry covers the full cost. Such projects can start immediately after the decision has been taken by the industry partner and there is no need to go through the awkward grant application process that is in most cases connected with a long waiting time for an uncertain outcome. The 1:1 approach can, in these cases, be used for small, agile projects where confidential topics are researched or new innovations are developed that cannot be shared with competitors.

It is interesting to note that of the three respondents of n:m projects two stem from Finland (co-funded) and one from Singapore (government-funded). The n:m paradigm is a typical EU project profile which will most likely lead to large, complex projects with a lot of exchange of ideas, possibly interdisciplinary groups and the need to openly discuss ideas and share thoughts.

Figure 10: Most successful type of collaboration

These findings were underlined by a respondent who argued for consortium projects as the best form because “researcher teams can achieve a higher efficiency and more interesting output with multiple partners” (respondent #7). The researchers responded unanimously to the last question: They would all engage in an industry collaboration project again.

Some final thoughts

This study investigates attitudes and experiences of IS researchers from four different continents (North America, Europe, Asia and Australia) regarding collaboration with industry.
The findings show that the attitude of researchers is largely determined by the prevailing research culture and dependent on the personal experiences that an individual researcher has gained from such projects. As Baskerville et al. (2011) argue, top journals only accept top publications characterized by contribution to theory and novel findings based on a (rigorous) analysis of data (evidence). It can be argued that with the right set of methods, researchers can derive findings that are highly relevant (for academics and practice) as well as highly rigorous at the same time.

It is the author’s firm belief that the pursuit of relevance constitutes a condition sine qua non for IS research. Without it industry will lose interest in research findings and the public spending on IS research will be wasted.

A second implication of engaging in university-industry collaboration is that we might avoid the many articles/projects, where the researcher is using a convenience sample of students from his/her class, which are often problematic proxies for real users/managers.

Thirdly and most importantly, university-industry projects are much more likely to produce value to our key stakeholders (industry and students) than research carried out exclusively at the desk. In collaborative projects with practitioners in industry, value will almost automatically become centre stage. Value to students is also likely to be higher. It is argued that in most situations, the marginal value to students of learning about one more taxonomy and/or one more theoretical perspective is likely to be substantially less than working with real cases/data/persons. In that way, students will be better prepared for the reality awaiting them after graduation, and they will be better able to survive, develop and contribute value indirectly justifying our role as teachers/co-learners.

Acknowledgements

The study of attitudes and experiences required to collect a lot of primary data which was quite labour-intensive and also required a lot of travelling due to the international nature of the research. The author of this working report would like to give her thanks to a number of people who contributed to this work. Firstly, I would like to thank the interviewers (Niels Bjørn-Andersen, Norbert Frick, Matthias Bertram and myself) who conducted the interviews and turned in the recordings. I am also indebted to the research personnel who transcribed the interviews and made them ready for coding and analysis. My special thanks go to the research participants, the people who agreed to be interviewed and share their valuable experiences and attitudes.
Factors that Influence Engagement in University-Industry Collaboration

References


Bisher erschienen

Arbeitsberichte aus dem Fachbereich Informatik
(http://www.uni-koblenz-landau.de/koblenz/fb4/publications/Reports/arbeitsberichte)

A Study of the Factors that Influence Engagement in University-Industry Collaboration Projects, Arbeitsberichte aus dem Fachbereich Informatik 12/2012

Kurt Lautenbach, Kerstin Susewind, Probability Propagation Nets and Duality, Arbeitsberichte aus dem Fachbereich Informatik 11/2012

Kurt Lautenbach, Kerstin Susewind, Applying Probability Propagation Nets, Arbeitsberichte aus dem Fachbereich Informatik 10/2012


Harald von Kortzfleisch, Ilias Mokanis, Dorothée Zerwas, Introducing Entrepreneurial Design Thinking, Arbeitsberichte aus dem Fachbereich Informatik 5/2012

Ansgar Scherp, Daniel Elßing, Carsten Saathoff, Integrating Multimedia Metadata Standards and Metadata Formats with the Multimedia Metadata Ontology: Method and Examples, Arbeitsberichte aus dem Fachbereich Informatik 4/2012


Mark Schneider, Ansgar Scherp, Comparing a Grid-based vs. List-based Approach for Faceted Search of Social Media Data on Mobile Devices, Arbeitsberichte aus dem Fachbereich Informatik 1/2012


Oleg V. Kryuchin, Alexander A. Arzamastsev, Klaus G. Troitzsch, Natalia A. Zenkova, Simulating social objects with an artificial network using a computer cluster, Arbeitsberichte aus dem Fachbereich Informatik 15/2011

Oleg V. Kryuchin, Alexander A. Arzamastsev, Klaus G. Troitzsch, Simulating medical objects using an artificial network whose structure is based on adaptive resonance theory, Arbeitsberichte aus dem Fachbereich Informatik 14/2011
Oleg V. Kryuchin, Alexander A. Arzamastsev, Klaus G. Troitzsch, Comparing the efficiency of serial and parallel algorithms for training artificial neural networks using computer clusters, Arbeitsberichte aus dem Fachbereich Informatik, 13/2011

Oleg V. Kryuchin, Alexander A. Arzamastsev, Klaus G. Troitzsch, A parallel algorithm for selecting activation functions of an artificial network, Arbeitsberichte aus dem Fachbereich Informatik 12/2011


Daniel Eißing, Ansgar Scherp, Steffen Staab, Formal Integration of Individual Knowledge Work and Organizational Knowledge Work with the Core Ontology struct, Arbeitsberichte aus dem Fachbereich Informatik 10/2011

Bernhard Reinert, Martin Schumann, Stefan Müller, Combined Non-Linear Pose Estimation from Points and Lines, Arbeitsberichte aus dem Fachbereich Informatik 9/2011

Tina Walber, Ansgar Scherp, Steffen Staab, Towards the Understanding of Image Semantics by Gaze-based Tag-to-Region Assignments, Arbeitsberichte aus dem Fachbereich Informatik 8/2011

Alexander Kleinen, Ansgar Scherp, Steffen Staab, Mobile Facets – Faceted Search and Exploration of Open Social Media Data on a Touchscreen Mobile Phone, Arbeitsberichte aus dem Fachbereich Informatik 7/2011


Ansgar Scherp, Carsten Saathoff, Thomas Franz, Steffen Staab, Designing Core Ontologies, Arbeitsberichte aus dem Fachbereich Informatik 5/2011


Klaus G. Troitzsch, Anna Lantsberg, Requirements for Health Care Related Websites in Russia: Results from an Analysis of American, British and German Examples, Arbeitsberichte aus dem Fachbereich Informatik 3/2011


Klaus G. Troitzsch, Natalia Zenkova, Alexander Arzamastsev, Development of a technology of designing intelligent information systems for the estimation of social objects, Arbeitsberichte aus dem Fachbereich Informatik 1/2011


Claudia Schon, Linkless Normal Form for ALC Concepts, Arbeitsberichte aus dem Fachbereich Informatik 12/2010

Marc Santos, Harald F.O. von Kortzfleisch, Shared Annotation Model – Ein Datenmodell für kollaborative Annotationen, Arbeitsberichte aus dem Fachbereich Informatik 10/2010

Gerd Gröner, Steffen Staab, Categorization and Recognition of Ontology Refactoring Pattern, Arbeitsberichte aus dem Fachbereich Informatik 9/2010

Daniel Eißing, Ansgar Scherp, Carsten Saathoff, Integration of Existing Multimedia Metadata Formats and Metadata Standards in the M3O, Arbeitsberichte aus dem Fachbereich Informatik 8/2010

Stefan Scheglmann, Ansgar Scherp, Steffen Staab, Model-driven Generation of APIs for OWL-based Ontologies, Arbeitsberichte aus dem Fachbereich Informatik 7/2010


Christoph Ringelstein, Steffen Staab, PAPEL: Syntax and Semantics for Provenance-Aware Policy Definition, Arbeitsberichte aus dem Fachbereich Informatik 4/2010


Maria Wimmer, Dagmar Lück-Schneider, Uwe Brinkhoff, Erich Schweighofer, Siegfried Kaiser, Andreas Wieber, Fachtagung Verwaltungsinformatik FTVI Fachtagung Rechtsinformatik FTRI 2010, Arbeitsberichte aus dem Fachbereich Informatik 2/2010

Max Braun, Ansgar Scherp, Steffen Staab, Collaborative Creation of Semantic Points of Interest as Linked Data on the Mobile Phone, Arbeitsberichte aus dem Fachbereich Informatik 1/2010


Carsten Saathoff, Ansgar Scherp, Unlocking the Semantics of Multimedia Presentations in the Web with the Multimedia Metadata Ontology, Arbeitsberichte aus dem Fachbereich Informatik 19/2009

Christoph Kahle, Mario Schaarschmidt, Harald F.O. von Kortzfleisch, Open Innovation: Kundenintegration am Beispiel von IPTV, Arbeitsberichte aus dem Fachbereich Informatik 18/2009


Andreas Fuhr, Tassilo Horn, Andreas Winter, Model-Driven Software Migration Extending SOMA, Arbeitsberichte aus dem Fachbereich Informatik 16/2009

Eckhard Großmann, Sascha Strauß, Tassilo Horn, Volker Riediger, Abbildung von grUML nach XSD soamig, Arbeitsberichte aus dem Fachbereich Informatik 15/2009

Kerstin Falkowski, Jürgen Ebert, The STOR Component System Interim Report, Arbeitsberichte aus dem Fachbereich Informatik 14/2009

Bernhard Schueler, Sergei Sizov, Steffen Staab, Querying for Meta Knowledge, Arbeitsberichte aus dem Fachbereich Informatik 8/2008

Stefan Stein, Entwicklung einer Architektur für komplexe kontextbezogene Dienste im mobilen Umfeld, Arbeitsberichte aus dem Fachbereich Informatik 7/2008

Matthias Bohnen, Lina Brühl, Sebastian Bzdak, RoboCup 2008 Mixed Reality League Team Description, Arbeitsberichte aus dem Fachbereich Informatik 6/2008


Rüdiger Grimm: IT-Sicherheitsmodelle, Arbeitsberichte aus dem Fachbereich Informatik 3/2008


Markus Maron, Kevin Read, Michael Schulze: CAMPUS NEWS – Artificial Intelligence Methods Combined for an Intelligent Information Network, Arbeitsberichte aus dem Fachbereich Informatik 1/2008


Christoph Wernhard: Tableaux Between Proving, Projection and Compilation, Arbeitsberichte aus dem Fachbereich Informatik 18/2007
Ulrich Furbach, Claudia Obermaier: KnowledgeCompilation for Description Logics, Arbeitsberichte aus dem Fachbereich Informatik 17/2007


Rüdiger Grimm, Anastasia Meletiadou: Rollenbasierte Zugriffskontrolle (RBAC) im Gesundheitswesen, Arbeitsberichte aus dem Fachbereich Informatik 15/2007


Ulrich Furbach, Markus Maron, Kevin Read: Location based Informationssystems, Arbeitsberichte aus dem Fachbereich Informatik, 11/2007


„Gelbe Reihe“
(http://www.uni-koblenz.de/fb4/publikationen/gelbereihe)


Kurt Lautenbach, Stephan Philippi, and Alexander Pinl: Bayesian Networks and Petri Nets, Fachberichte Informatik 2-2006

Rainer Gimmich and Andreas Winter: Workshop Software-Reengineering und Services, Fachberichte Informatik 1-2006

Rainer Gimnich, Uwe Kaiser, and Andreas Winter: 2. Workshop "Reengineering Prozesse" – Software Migration, Fachberichte Informatik 15-2005


Reinhold Letz: FTP 2005 – Fifth International Workshop on First-Order Theorem Proving, Fachberichte Informatik 13-2005

Bernhard Beckert: TABLEAUX 2005 – Position Papers and Tutorial Descriptions, Fachberichte Informatik 12-2005

Dietrich Paulus and Detlev Droege: Mixed-reality as a challenge to image understanding and artificial intelligence, Fachberichte Informatik 11-2005


Pascal Hitzler, Carsten Lutz, and Gerd Stumme: Foundational Aspects of Ontologies, Fachberichte Informatik 9-2005

Joachim Baumeister and Dietmar Seipel: Knowledge Engineering and Software Engineering, Fachberichte Informatik 8-2005

Benno Stein and Sven Meier zu Eißen: Proceedings of the Second International Workshop on Text-Based Information Retrieval, Fachberichte Informatik 7-2005

Andreas Winter and Jürgen Ebert: Metamodel-driven Service Interoperability, Fachberichte Informatik 6-2005

Joschka Boedecker, Norbert Michael Mayer, Masaki Ogino, Rodrigo da Silva Guerra, Masaaki Kikuchi, and Minoru Asada: Getting closer: How Simulation and Humanoid League can benefit from each other, Fachberichte Informatik 5-2005

Torsten Gipp and Jürgen Ebert: Web Engineering does profit from a Functional Approach, Fachberichte Informatik 4-2005

Oliver Obst, Anita Maas, and Joschka Boedecker: HTN Planning for Flexible Coordination Of Multiagent Team Behavior, Fachberichte Informatik 3-2005

Andreas von Hessling, Thomas Kleemann, and Alex Sinner: Semantic User Profiles and their Applications in a Mobile Environment, Fachberichte Informatik 2-2005