Development and Status of the Information Systems / Wirtschaftsinformatik Discipline

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ICB-RESEARCH REPORT

An Interpretive Evaluation of Interviews with Renowned Researchers: Part II – Results Information Systems Discipline

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Abstract

This report presents the results of a partly explorative and partly hypotheses based interview study with eight renowned Information Systems researchers. The study was performed with the objective to re-construct the development and status of the discipline taking advantage of the diverse perspectives and experiences of respected researchers. They have been in the field from its beginning and have not only observed the field's development but have shaped it, for example through the initiation of conferences and associations, curriculum efforts and by establishing new Information Systems departments. The research results show, that the young Information Systems discipline aimed at overcoming the initial lack of academic legitimacy by adhering to business schools' requirements for "scientific" research. Today, academic credibility to a certain extent has been achieved through highly respected journals and business school support has increased. However, no significant research results that impacted practice could be identified and the Information Systems discipline is – by related disciplines – still not understood as having a valuable academic assignment.

Contents

Tables

Abbreviations

AACSB	Association to Advance Collegiate Schools of Business
AITP	Association of Information Technology Professionals
AIS	Association for Information Systems
AMCIS	American Conference on Information Systems
CISR	Center for Information Systems Research
DPMA	Data Processing Management Association
HCI	Human Computer Interaction
ICIS	International Conference on Information Systems
ISR	Information Systems Research (Journal)
JMIS	Journal of Management Information Systems
MISQ	Management Information Systems Quarterly (MIS Quarterly)
OR	Operations Research
MIT	Massachusetts Institute of Technology
SIM	Society for Information Management
WITS	Workshop on Information Technology and Systems

1 Introduction

Information and communication technology (IT) and information systems have been applied in industry already in the 1960s. Since then IT and information systems have become more advanced, more complex and more interwoven with business processes and strategies. The academic field of (Management) Information Systems (IS) started to be established in the 1970s. Despite the general acknowledgement of the importance of information systems for enterprises today, IS – the discipline dedicated to investigating phenomenon related to the usage of IS in enterprises – went through a series of identity crises (cf. [HiKl03], [KiLy04]). The discussion on the identity or legitimacy of IS as a field of research has been lead in various ways: with respect to relationships to practice (see e.g. diverse articles in MIS Quarterly, Vol. 23, No. 1, 1999), appropriate research methods (e.g. [Lee99], [ApKi99]), a common body of knowledge [KlHi03], common goals and objects of research [BeZm03], and a strong theoretic core [LyKi04].

We took this apparent misfit of, on the one hand, the fast development and rising importance of IT and information systems for enterprises and, on the other hand, a discipline of IS with – apparently – ongoing identification and legitimacy problems, as an opportunity for an in-depth empirical study of the discipline's development and status. Being part of the German speaking research community of IS (*Wirtschaftsinformatik*) we intend to complement the perspectives by comparatively investigating the US-American IS discipline[1] and the German counterpart *Wirtschaftsinformatik*.

Interviews with renowned IS researchers have been one major part of this project. The corresponding research method is introduced in [Lang05b]. It includes a description of the interview partners and their academic and professional backgrounds, the introduction of the interview schedule as well as a brief overview of related work. This research report discusses the research results of the interview interpretation for each topical area. The report starts with the foundation and early developments in the field (sections 2). After discussing the central issue of legitimacy and academic credibility of IS (section 3), the profile of the discipline is described in terms of subject and objectives of research as well as research methods (section 4). Subsequently issues concerning the political and institutional context of IS research are discussed (section 5) and the IS curriculum efforts as well as the attractiveness of the IS degree is described (section 6). An assessment of the discipline's relationships to practice follows in section 7. The interviews ended with a general assessment of the interviewees concerning major weaknesses and strengths of the discipline and forecasts on its future development; the respective interpretation results are presented in section 8. The research report ends with summaries and conclusions drawn on the basis of the previously presented interpretations (section 9). Appendix A gives a short description of the background of each interviewee. Appendix B lists the history of model curricula in IS.

The results of each topical area are discussed according to the structure developed in [Lang05b] (see Table 1). In order to give the reader some immediate insights into the interview discussions, each topical section starts with a distinguished quote from the interview transcripts. For better readability the motivations and research questions are repeated at the beginning of each subsection (cf. [Lang05b]). Additionally, the different aspects of the interpretation results – as listed in Table 1 – are presented and discussed. In order to increase the comprehensibility and transparency of the interpretation process, relevant quotations for each section are listed in a structured table, while the discussion focuses on the author's interpretations and terminology.

[1] We restricted our focus on IS discipline in the US and Canada, because the prominent discussions have stemmed from American researchers, the size of the American IS discipline and its influence in highly rated journals and other publication outlets, which are already used to set standards for German research as well.

Motivation	Introduction and motivation of the topical area; if applicable, with brief reference to literature.
Research objectives/ questions	Research objectives and intentions related to the particular topic area in terms of research questions.
Hypothesis (optional)	Propositions or hypotheses developed based on prior research and literature analysis.
Results	
Terminology (optional)	Explication of differences in terminology.
Answers to research questions	Summarized and comparative re-constructions of the interviewees as a descriptive answer to the relevant research question. (The relevant quotations from the interview transcripts are presented in a structured table.)
Hypothesis evaluation (optional)	Conclusions on its confirmation or rejection of previously formulated hypotheses.
Additional issues (optional)	Additional aspects related to this area that have been suggested as relevant by the interviewees.
Derived hypothesis (optional)	Formulation of new hypotheses as indicated by the other interpretation results.
Normative valuations (optional)	Interpretation of statements that given in a normative fashion.
Potential bias (optional)	Explication of the potential bias of the interviewees as indicated directly by the interviewee or indicated from his/her academic or professional background.
Open questions (optional)	Open issues or questions, which either could not be answered unambiguously or were raised in the course of the interviews or the interpretation process.

Table 1: Structure for discussion of results in each topical area.

2 Foundations of IS

"What really drove a lot of the early work in Information Systems was the idea that we were supporting management" (Gordon B. Davis)

"IS basically grew from [the] recognition that to apply computers in organizations required some understanding of the business and the business nature." (Rudy Hirschheim)

Motivation

Information Systems is a relatively young discipline, compared to more traditional disciplines such as the natural sciences. The first publications under the name of MIS can be traced back to the 1970s (e.g. [VanH73]). The first ICIS conference took place in 1980. At this conference, Keen pointed out that "at present, MIS research is a theme rather than a substantive field" ([Keen80], p. 1). Although there are still debates between researchers who consider IS a research field and not a discipline (this is reflected in some interviews), today, there is a community of researchers, who feel part of the Information Systems field (or discipline), represented by an organization (Association of Information Systems, AIS), with regular meetings at dedicated conferences (ICIS, AMCIS), with respected journals (MISQ, JMIS, ISR, etc.), and official degree programs certified by AACSB (Association to Advance Collegiate Schools of Business).

2.1 Most important forces

Research question

Against this background, we intend to investigate, which forces drove the foundation of an academic discipline of IS.

Results: answers to research questions

Three forces can be identified from the discussions. Of these, three are given considerable attention: (1) new business usage scenarios for IT, (2) the need for new skills in business and IT, and (3) demand for graduates (see Table 2).

(1) Realizing and envisioning the new capabilities of IT for new usage scenarios in business organizations has been a major force for the discipline's development. It was realized that information systems could support management by aggregating operational data and presenting it in a form useful for management.

(2) Selected people in academia realized that technological advances and new usage scenarios of IT required new skills combining knowledge on business and IT.

(3) People in organizations had the need for appropriately educated personnel, who would know how to apply computers and have "some understanding of the business and the business nature", because they saw the problem that people educated in business and management and those with a computer background could not communicate.

Considerable technological progress and the ability to create information systems is viewed as a "turning point" that drove the development of the IS field.

Results: additional issues

In this context, one interviewee mentions that IS researchers were also asked for consulting advice by corporations. However, this aspect is not clearly stated as a 'force' that drove the disciplines development: "[Corporations also] went to the professors teaching these [MIS] courses to get [..] consulting advice".

Major forces	Quotations
Realization and envisioning of the capabilities of IT for new usage scenarios in general and particularly for supporting management	"What really drove a lot of the early work in information systems was the idea that we were supporting management" "Everyone became aware that the aggregation of some of operational data into a form that management could use was possible" [mentions MIS, DSS and their role of driving the foundation of IS] "The computer would allow [the executives] to do the models and provide the data. What became interesting very quickly was the idea of a computer-based information system that would support management processes and decision processes."
Realization of need for new skills in business and IT	"IS basically grew from [the] recognition that to apply computers in organizations required some understanding of the business and the business nature." "As a discipline it came about because there were a few people [at business schools] who were sufficiently visionary to say that this is something we ought to be teaching our students."
Practice demand for (M)IS graduates	"You had the business people on the one hand and computer guys on the other hand and they didn't talk and they couldn't communicate and so it created a bad situation in organizations and that's where IS basically grew from: because there was a recognition that to apply computers in organizations required some understanding of the business and the business nature." "The forces were basically driven by corporations or by other organizations hiring graduates of business schools who wanted their graduates, new employees, to have these skills"
Technological progress	"I see a turning point that probably most people don't see with respect to the MIS group that there were actually people creating information systems."

Table 2: Three forces that drove the foundation of the field.

2.2 Root(s) of IS and role of closely related disciplines

Motivation

IS has drawn on existing disciplines heavily since its beginning. This is reflected in ongoing discussions on the role of neighbouring or related disciplines for IS research. The term 'reference discipline' has early been introduced in the discussions of the IS discipline's identity: According to Keen a reference discipline "is an established field to which one looks to get an idea of what good MIS research would look like" ([Keen80] p. 10). The frequently applied keyword classification scheme for IS research literature developed by Barki et al. contains a list of reference disciplines including Behavioural Science, Computer Science, Decision Theory, Organizational Theory, Economics and Management Theory [BRT93]. Architecture and even the Law have been suggested as reference discipline for IS ([MyMy00], [Lee91]). Recently it has been suggested that the IS field itself should serve as reference discipline [BaMy02]. Several publication analyses attempted to identify the role of different reference disciplines applied in IS research (e.g. [FaDr99], [EvKa97] and [VRG01/02]).

Research question

We want to find out, what the origins of the discipline were. The first question in this context is aimed at the roots of the discipline and at identifying if there was more than one root. A subsequent question explicitly aims at related disciplines and their role at the foundation of the IS field. Here,

we suggested a list of reference disciplines and asked for further disciplines, which played a particular role in the disciplines development. Due to the inherent understanding of roots as disciplines contributing to IS by most interviewees, the answers to both questions are presented together.

Hypothesis

We propose that IS has several root disciplines contributing to its development (H2.2.1).

Results: terminology

The term 'root' of a discipline or field of research had – deliberately – not been clearly defined in advance. It is, however, by most interviewees understood as other disciplines, which were the background of early (M)IS researchers and/or contribute(d) to the IS field in terms of concepts, theories and research methods.

Additionally, we omitted a precise definition or understanding of the term "role". From the answers we derived some interpretations for roles of other disciplines at the foundation of the IS field on a rather abstract level: disciplines which serve as reference ("reference disciplines"), which provide material to the field, such as methods and analytical approaches, models etc., or which 'provide' researchers that come into the IS field.

A number of interviewees automatically adopted the term "reference discipline" to name the related disciplines. One interviewee raised the point, that there are no "reference disciplines" in that sense for IS, but the IS field would be a "convergence of interests [..] with people coming from many different directions".

Results: answers to research questions

The IS discipline has multiple roots (see Table 3). The interviewees mention various disciplines as roots of the discipline in terms of the background of early researchers in IS: Organizational Behavior, Psychology, Sociology, Operations Research (OR), Management Science, Organizations and Management. Only one interviewee uses the term 'root' with a different notion. He considers the "information part" of the various related disciplines as root of the IS field.

Some of the root disciplines are separately mentioned with a particular role for the disciplines development (see Table 4). Management Science and Organizational Science are described as important for the disciplines development, because they provided models and theories to the field. While computer systems are mentioned as "the central core", Computer Science is only attributed the role of serving as a means or enabler. Economics is mentioned as root by three of the interviewees, whereas two of them indicated that Economics has just recently become significantly relevant for IS. Accounting is not attributed an important role in the fields development.

"I think it's multiple roots. [..] People got interested in IS who had all kinds of different backgrounds: organizational behavior, psychology, sociology, operations research, economics and so forth."
"I think there were many [roots]. [..] They were Computer Science, management science, organization science."
"Computer science, management science and organizations I think are the three common things."
"It was mostly Computer Science and management science. So those two disciplines basically were the basis of much of the development of IS in the US."

Table 3: Quotations indicating multiple roots (excerpt).

Particular disciplines and their roles	Quotations
Computer Science – enabler	"Computer science [..] was providing support for the computing end of things. You couldn't do all this without languages and methodologies and development methodologies" "Without Computer Science there wouldn't be any IS" "computer and computer systems were the central core"
Computer Science – bringing research topics to the field, but not as closely tied to the field as management disciplines	"Clearly Computer Science played a leading role in the computer and user interface domain and the software engineering domain, and in some of the IT communications domains in terms of bringing that into the IS field." "In the sense of providing material to the IS field my perspective is that Computer Science is not as closely tied as are management science or as organization science" "[Computer Science has been important but is not] the most relevant"
Organization Science – contributor of theory	"Organization Science brings in the organizational theory and organizational behavior types of issues. That clearly is important, particularly if one works in IT management and implementation issues." "Organization Science was very important because information systems are organization systems and affect organization design and organization behavior. Some of the early leaders in the field were from Management and Organization Behavior."
Economics – has recently gained importance	"if I had to look at it today, of course, we would definitely add in Economics, [it] has become exceedingly important" "Economics really didn't have much influence at all [..]. This certainly changed in the 1990's when, I think, concern really started to grow about IT productivity issues."
Operations Research – the view point of early IS researchers	"We were coming at it [i.e. the IS field] through the eyes of Operations Research and improving systems, and providing support for management decision making."
Management – a central organizational function	"The minute you say we're going to provide better systems, then you imply that there will be an organization function to manage all this technology. So management is [another root] discipline."
Management Science – contributor of models	"Management science [is a root], of course, because of the models."
Accounting – no important role	"I don't see [the accounting side] as a major issue. In many cases, the IS department was located in an accounting department. Those two roots really have never been able to work together and they really, I think, are at odds with one another [..] because one sees it as replacing the other, which creates tensions which I think are hard to resolve."

Table 4: Roles of related disciplines in the development of the IS field.

Results: hypothesis evaluation

When interpreting 'root disciplines' as the disciplinary background of early IS researchers, the previous discussions indicate that there is more than one root. Hence, H2.2.1 could be supported. Interestingly, the root disciplines mentioned can all be considered social sciences and organizational management sciences, but Computer Science is – by most – considered (only) as "enabler".

Results: additional issues

One interviewee mentions that the development of the IS discipline has been quite similar to the OR development, because both "started out, if you look at the history of it, with people who had come from lots and lots of places". Another states, that OR and (M)IS have evolved from the management

science domain: "My view is that the root of the IS discipline is the management science domain, which then evolved into the two rather distinct fields of operations research and MIS."

2.3 Perception by closely related disciplines

> "There is a sense of inferiority in chunks of the IS field, which comes from essentially other groups saying, I know how to do a spreadsheet, I use my word processor, what's the big deal?"
> (Paul Gray)

Motivation

The development of a young discipline depends on support from related disciplines, in particularly on those of the schools and departments they are integrated in. The external credibility of a young discipline is then – to a certain degree – reflected in the perception by those related disciplines.

Research questions

Here, our research question aims at identifying how the discipline has been perceived by related disciplines – such as those mentioned in the previous section.

Hypothesis

Diverse publications reflect that there has been a "persistent anxiety about the field's purported lack of academic legitimacy" [KaLy04]. So, we derive the hypothesis, that the early discipline had been perceived with little value by related disciplines, which was leading to those debates on identity and legitimacy (H2.3.1).

Results: answers to research questions

Mostly cohesive answers were given to the question, how the discipline was perceived by the closely related disciplines. The answers can be classified according to a general notion, i.e. speaking of the disciplines in general, or a more personal notion, i.e. speaking of the people in the field and personal experiences with selected researchers from other disciplines. Additionally, we distinguish the time frames the statements relate to (annotated as Past or Present in the respective tables).

All in all, the past and present perception by other disciplines in general is rather poor (see Table 5). The discipline had little credibility in its beginning and researchers had to "struggle" for acceptance in business schools. This negative perception was due to the impression of insufficiently rigorous ("too soft") research methods. (M)IS had not been perceived as an academic discipline and was not assessed to ever become one. The relationship to Computer Science is described as (still) being rather indifferent and even hostile ("expansion territory"). Only one general statement is given in a particularly positive notion: it is argued that in the last ten years related disciplines have come to see value in the results of IS research.

The statements given in a more personal notion draw a rather optimistic picture regarding the perception by other disciplines (see Table 6): the Computer Scientists were "puzzled" because of the different research methods applied but nevertheless "supportive" and there was "appreciation". People from Organization Science considered IS an interesting function with new interesting problems for management. One reports on his experience that there is IS faculty that is respected by the school. One interviewee indicates that with people in IS who had originally come from these neighbouring disciplines the perception by other disciplines is rather positive.

Results: hypothesis evaluation

On a general basis, the hypothesis (H2.3.1) could be supported: IS was considered not a discipline itself, too soft in its methods and not interesting by related disciplines. However, it should be

noted, that on an individual basis, there are IS researchers who are particularly well respected by researchers of neighbouring disciplines.

Potential bias

The personal experiences do not give a picture of the discipline as a whole. However, it should be noted that personal experiences reported at this point have been largely positive w.r.t. the perception by members of other disciplines.

Perceptions (general notion)	**Quotations**
Little credibility, rejection, not a discipline (Past)	"we had very little credibility in the early days; it was a real struggle to get courses introduced into MBA programs" "In places where new faculty were brought in to start this new discipline there was sometimes rejection. [..] It was not Economics. It was not Computer Science. It was not Organization Science, etc. So we had to make a mark before being accepted." "For many schools, the area that emerged (IS) was perceived to be an area which was either part of an applied Computer Science or something that wasn't really [..] a discipline" "many [people who remained behind in their own traditional disciplines] felt that it was an upstart that would never be an academic discipline"
Insufficient rigor (Past)	"Many of the people in the fields themselves, I mean the traditionalists in those fields, looked at it as not maintaining the same level of rigor"
Too soft (Present)	"Operations Research, Operations Management type of people, they clearly view the MIS people as being too soft in terms of their analytical skills."
Expansion territory (Present)	"Computer Science sees us as expansion territory"
No interest (Present)	"I think Computer Science [still] totally ignores [the IS field] and couldn't care less about it."
Little use (Present)	"Management Science broadly speaking has very little use for IS"
Valuable input from IS research (Present)	"I think the other disciplines are seeing, in fact, that they can get a lot of value out of IS research. That transition has occurred maybe in the last 10 years."

Table 5: Perceptions by related disciplines (general notion).

Perceptions (personal notion)	**Quotations**
Exciting new areas of research (Past)	"[interested researchers from other disciplines (Economics, Organization, Psychology) moved to the business schools because they] thought that there was a much more exciting opportunity to look at a broader set of issues than what they could if they had to adhere to the constraints of their field." "There were a relatively small number of people in each of those disciplines that were attracted to MIS"
Interest (Past)	"All the people [from Organization Science] I knew [..] saw this as a new function arising, an interesting function, interesting problems of management. They were interested in how those systems affected the ability of managers to make decisions."
Puzzled, but supportive (Past)	"[The computer scientists] were puzzled by our emphasis on organizational issues, and the fact that we would do experiments. We didn't focus on building things and I think all the people I knew thought building things was most important. They were supportive, however. I have been involved in ACM and I am a Fellow of the ACM. There was an appreciation, but it was because we were users of their basic stuff."
Respect (Past)	"It really depended on the faculty members [of the respective schools]. Where the faculty members came over from other places into IT, they were well-known and well-respected."
Appreciation (Present)	"When a Gordon Davis goes out and says there's really interesting things in MIS and there's this idea of information accounting and we're really in the computing business and so on. He had personal validity to the accounting people. That kind of validity helps establish the legitimacy of the discipline." (not by Gordon Davis)

Table 6: Perceptions by related disciplines (personal notion).

3 Legitimacy

"[Legitimation] has been our theme from the beginning." (M. Lynne Markus)

"I think the major [effort for legitimation] was improving the rigor of the research and improving the perceived quality of the journals." (Robert Zmud)

Motivation

We have shown that debates in the literature reflect a tendency in the IS field to question its identity and legitimacy from the view point of other disciplines. We therefore, want to investigate to which extend efforts for developing the field are driven by the need for an increased legitimacy.

Research questions

Firstly, we look at the role of legitimation efforts for the disciplines development in general. We then aim at classifying particular efforts that have contributed to the disciplines legitimacy. Here, the interview schedule suggests the following particular efforts:

- success or acceptance of research results,
- demand by students, and
- demand by practitioners, including demand for graduates and funding.

Hypotheses

We formulate the hypothesis that efforts for increasing legitimacy have been discussed in the discipline on a broad scale, indicating a prominent role of legitimation efforts in the disciplines development (H3.1). Additionally, we propose that demand by practitioners for graduates, and in this way by students has largely contributed to the disciplines legitimacy (H3.2).

Results: terminology

The terms "credibility" and "getting respect" were applied by the interviewees as synonyms for legitimacy or legitimation.

Results: answers to research questions

Legitimation efforts have played an important role in the field since the very beginning (see Table 7). Particular legitimation efforts mentioned relate to research results and methods, student and practice demand, but also to external funding, research associations, publishing outlets, and the importance of IT in general (see Table 7, Table 8).

We asked directly if there had been any outstanding research results in the IS field. None of the interviewees thought that there have been major results that lead to legitimation. While research results might be adopted by industry, these particular results would not help to increase academic credibility in the "broader academy". Hence, only to a very limited extent, did research results contribute to legitimate the IS field. Research results itself or the topics studied were not as relevant to this respect as the process, i.e. the methods applied. Another important factor is the application of theories from related disciplines. This way earlier largely descriptive research could be enhanced to be more legitimate from an academic view point.

Respected academic journals are considered highly important for becoming a "more acceptable discipline in the academy". It is stated that "improving the perceived quality of the journals" was the major effort for improving legitimacy.

Demand by practitioners and consequently by students is generally attributed a high relevance for legitimating IS, if only on an "informal" level. Several interviewees point out that demand for IS

graduates was high, consequently students realized that they "certainly could get jobs" with an IS degree which has lead to large student numbers in IS. It is argued that the impact of IS researchers in business schools has highly been influenced by student numbers, since high demand by students "gets the recognition of deans and administrators".

Two interviewees reported positive experience with grants from industry and their contribution to legitimating the IS field. One talked about the involvement of the Society for Information Management (SIM) and IBM in the early days of the discipline, particular the IBM grants were considered as "seed money" that helped to establish academic programs and improve research in IS. Additionally they fostered the community by bringing people together in meetings with "IBM schools". SIM had supported ICIS through sponsoring the doctoral consortium for several years.

The role of the Association for Information Systems and the ICIS conference was assessed differently by the interviewees. While AIS and ICIS have played a certain role in forming the discipline, it apparently has not helped to improve legitimacy in the eyes of other faculty from business schools. While the community shaping role of an association and an annual conference is attributed only a limited relevancy for legitimating the field, it is clear, that the highly respected publication outlets played a major role for increasing legitimacy.

Other issues that were mentioned, but generally not attributed a high relevance for improving legitimacy are the societal acceptance of the importance of IT, exemplified by the e-commerce boom and the availability of the PC.

Results: evaluation of hypotheses

H3.1 could be supported. From the answers given it can be derived, that efforts for improving legitimacy were indeed discussed in the discipline on a broad scale. It was stated quite clearly that student demand was important for increasing legitimacy, in particular, at business schools. So, H3.2 can also be supported. However, additionally, the results show that improving the quality ('rigor') of research methods and establishing highly respected research results has been attributed very high relevancy for contributing to the discipline's legitimacy as well.

Legitimation efforts	Quotations
General importance (earlier and today)	"It has been a very introspective field." "[Legitimation] has been our theme from the beginning." "[There was an] early recognition of the issue as how to become legitimate." "Legitimation is a key area [..]."
High relevance of more rigorous research methods	"[Research results lead to legitimation in the eyes of business school colleagues, however] it's not the problems we're studying as much as the process." "In the really early days much of what we did was largely descriptive. So [we] tried to bring more rigorous methods and criteria into the field. [..] I think that helped legitimate it very much." "In a number of places, professors worked very hard to be legitimate, which meant that they worked very hard to have their work be rigorous and perhaps not relevant. And management schools in the United States were doing exactly the same thing. They were trying to develop their academic credentials."
High relevance of importing theories from other disciplines	"[..] We really had to downplay anything that had to do with building technology or describing technology as a foundational activity and we had to start emphasizing theory and that's when the field started importing theories mainly from Psychology and to a lesser extent from other areas and then eventually a lot from Economics as a way of giving the field legitimacy." "We had to start emphasizing theory [and] importing theories [..] from other areas [..] as a way of giving the field legitimacy".
High relevance of respected publication outlets	"[..] it became apparent that we needed journals that have legitimacy." "[The ICIS conference with a good review process and refereed journals, such as MIS Quarterly have lead to] a more acceptable discipline in the academy." "I think the major [effort for legitimation] was improving the rigor of the research and improving the perceived quality of the journals."
High relevance of student demand	"Yes [demand and interest by students is important], because that gets the recognition of deans and administrators." "What influences my impacts in the business school is the fact that there's a demand for our students [..]." "To some extent the field was legitimate informally by the fact that there were large student numbers. Business schools needed faculty to teach these things [..] In the US [..] students migrated to IS because they saw this is a place where they certainly could get jobs."
Early importance of external grants	"Another way that some programs have been able to legitimize the discipline is through their ability to attract external grants, which really commands a lot of attention and legitimacy." "SIM helped to start ICIS. They were the original executive sponsor of ICIS. [..] When ICIS was formed, SIM sponsored the doctoral consortium for several years, and for several years [..] they provided the insurance." "IBM gave 20 grants for Information Systems. This was big money that changed a lot of schools. [..] this was considered to be really seed money to build better academic programs and build better research. The IBM grants were very important in that time. And it brought people together because we had meetings of the IBM schools."

Table 7: Role of legitimation efforts (efforts with relatively high relevance).

Legitimation efforts	Quotations
Ambiguous importance of AIS and ICIS	"ICIS and AIS have had no impact upon [..] legitimizing IS with [..] colleagues in the business school" "Legitimation came initially from ICIS because it was our first conference in the US and it allowed people to come together on a once-a-year basis and form a collective or a quasi-collective. But it wasn't until AIS was founded in 1994 that it became formalized within a professional society." "AIS, in a sense the idea of having a professional society, has also I think been an important component at least in recent years in helping to legitimize the profession."
Minor role of acceptance of research results	"I don't think there was any sort of grand equation or the great truth that nobody knew until we revealed it" "Research results adopted by industry are in many cases not leading to more acceptance and credibility in the broader academy." "The results and the research [..] are not having the impact, or they're not being perceived as this leading edge." "It was in part the success of research results. It was in part recognition of that success by people out in the field. It was, in part, recognition of that success by others in the academy."
Other issues (E-commerce boom, PC,)	"Another factor in our legitimation as a field is general societal acceptance of the importance of IT as a result of the e-commerce boom (and bust). Perhaps a few leading researchers at individual schools have been able to turn around their colleagues' negative impressions of the field. I don't think our research corpus as a whole or demand from practitioners (other than hiring our students or donating money for chairs) has had much to do with it." "[The PC] legitimized us [..] Because all of a sudden computing was something that everybody could do."

Table 8: Role of legitimation efforts (efforts with minor relevance).

4 Profile

Motivation
A scientific discipline can be characterized by its main subject of research (domain), objectives of research and a certain more or less fixed set of research methods. The latter are applied in order to achieve the research objectives in the respective domain.

4.1 Main subject of research

"The traditional focus has been on intra-organizational use of IT" (M. Lynne Markus)

Motivation
While there is no official statement of the AIS characterising the main subject of research, a more or less common subject of research can be derived from literature. In 1980 Keen described the discipline's subject as "the effective design, delivery and use of information systems in organizations" ([Keen80], p. 12). Ives et al. suggest a short definition of MIS research including its main subjects of research: "MIS research is the systematic investigation of the development, operation, use and/or impact of an information (sub)system in an organizational environment." ([IHD80], p. 910). Another similar definition can be found in [ASB99]: "The field of information systems (IS) studies phenomena associated with the utilisation of information and communication technologies, primarily in the context of business organizations." (p. 136). King and Lyytinen state that "the IS field [..] has an identity gathered from the consistency of its focus on the systematic processing of information in human enterprise" ([KiLy04] p. 541).

Research questions
Our research question is aimed at characterizing the main subject of research in IS.

Hypothesis
Based on the literature review we developed the hypothesis that information systems in businesses and organizations are the main subject of research in IS (H4.1.1.).

Results: terminology
Four interviewees assumed the term 'subject of research' to be equal to topics of research.

Results: answers to research questions
Asked for the main subject of research in IS, four interviewees were uneasy to give a decisive answer (see Table 9). They argue that "diversity has characterized the field" which is why not a single main topic can be named as dominant for the IS field. The main subject of research as described by the four other interviewees focuses on information and communication technologies in organizations, the design of processes and activities applying the technologies and taking into account societal and human factors.

Results: hypothesis evaluation
The interview answers support our hypothesis, that information systems in business organizations are considered the main subject of research with emphasis on the support of organizational activities and processes (H4.1.1.).

Results: additional issues

In two interviews it was pointed out that the view point taken onto the major research subject is the view of the Chief Information Officer: "IS as an academic discipline is within the organizational context. There is a function that plans, builds, justifies, works in a joint strategy effort with the organization to decide how this technology should be used, what investment should be made." One interviewee criticized the "CIO mindset" as "extremely limiting to the field".

There is no main subject of research (topic)	Definition of a main subject of research
"I don't like the idea of an IT artifact or of homing in on a particular subject or model or artifact. I think diversity has characterized the field because of the multiple disciplinary backgrounds and I think that's a good thing; not a bad thing." "We're still arguing that. I don't think one can easily answer that." "I don't think there's been one main subject. There are several themes." "I don't think there's a single answer to that. I really don't."	"The traditional focus has been on intra organizational use of IT" "The main subject is how to support or enhance organizational activities [..] through the design of systems of human activity that are enabled through information systems." "[The main subject of research] is information and communications technology systems in organizations to support organizational processes." "[major topics of IS research relate to] the human factors [and the] societal embeddedness of IS and IT"

Table 9: Subject of research in IS.

4.1.1 Changes over time

Research question

Information technology has developed on a fast pace for the last 40 years. We intend to more precisely describe the subject(s) of research in IS by investigating possible changes over time.

Results: answers to research questions

The general assessment regarding changes of the subject or topics of research, respectively, relates to an enlarging area of topics covered over time (see Table 10). One interviewee describes the larger context of social and organizational systems that are investigated in today's IS research. It is explained, that the emphasis has changed in terms of the functional areas covered: in earlier days the emphasis was on the support for management; other functional areas (e.g. marketing, finance) did not receive as much interest as they do today in IS research. Another one pointed out, that topics have emerged because of new technologies.

Results: additional issues

One researcher argued that the IS discipline has studied emerging technologies relatively late compared to their respective adoptions in industry: "There are the usual shifts where essentially IS as a discipline has lagged what's out there in industry by five to ten years".

Results: normative valuation

The "drift away from technology" is pointed out by one interviewee as a drawback of current IS research "we wind up talking about IS rather than doing IS".

Another statement reflects the negative valuation of "just" looking at technology in the early days: "The very early research really just looked at the technology. And increasingly over time, people have been broadening it up [..]".

Changes over time	Quotations
Enlarging context	"The increasing acceptance by people within Information Systems of the importance of the enlarging context within which information systems are situated. The very early research really just looked at the technology. And increasingly over time, people have been broadening it up to the various social systems, organizational systems, the context within those activities are taking place."
New technologies	"There certainly were changes as new technologies came on-stream. Topics emerged in the field to be studied and then they dropped out as the technologies dropped out."
More functional areas	"The emphasis has changed somewhat. The early emphasis was on support for management and not so much on clerical processes. Functional areas such as marketing or finance did not receive nearly as much interest, except in their management issues."

Table 10: Changes w.r.t the subject of research over time.

4.1.2 Role of re-occurring topics or fads

> "We worry about our doctoral students choosing to do research on faddish topics which will disappear and so we try to get them to [..] work on areas which are stable and are likely to withstand the test of time." (Rudy Hirschheim)

Motivation

Fast technological changes have led to quick developments in the software industry and these developments are further pushed by consulting firms. The dot-com boom and bust was a prominent example of a technological hype that was lead by corresponding industries in order to push new markets. Other topical areas have been coined by the IT industry or consultancy firms; examples are terms such as 'customer relationship management', 'business intelligence' or 'pervasive computing'.

Research question

With a closely related industry to a large extent being determined by 'fads' we are interested in knowing if re-occurring topics or 'fads' have also played a particular role in the IS discipline.

Results: terminology

The term 'fad' has been characterised in the course of the different interviews in several ways:

- as one *phase of a life cycle* of a topic, "when we get excessively excited about something"
- as a re-emerging, *perennial topic* that is given a different name in order to differentiate it from similar or related concepts or topics that have been looked at previously: "One of my particular frustrations is that when a topic re-emerges we forget that anything was ever written about it before."
- as a technological *innovation* ("latest fad in IT")
- as a *fundamental topic*, because it keeps reoccurring.

Results: answers to research question

The interviewees agree that fads and reoccurring topics have played a major role in IS research (see Table 11). However, positive and negative aspects have to be differentiated. Fads are as-

sessed positively in terms of the relationship to practice, because they "legitimize the field in the eyes of practice" in the way that researchers – from the view point of practitioners – understand the current problems relevant in practice. Fads also open new research areas and frequently push new funding opportunities.

However, from an academic view point, fads are assessed to have clear disadvantages. Research topics are selected according to "what's the latest fad", which has lead to opportunistic research strategies. It is difficult for doctoral students to select appropriate research topics that are "likely to withstand the test of time". The IS discipline itself has suffered from overdrawn emphasis on the e-commerce fad, which lead to a significant increase in student demand; after the dot-com bust, student numbers are dropping (see section 6 on teaching in IS).

Results: normative valuation

One interviewee sees a large time lag between fads in industry and research on the fad in IS and emphasises the importance of staying ahead: "What you see is we get into a fad two or three years after it's over and takes us a year to do it and three years to publish at which time, who cares? [..] The industry we try to study moves and we never stay ahead."

Positive side of fads	Negative side of fads
"It's a normal phase when we get excessively excited about something and then finally we pull out the things that are really useful and we integrate them." "But it has also greatly legitimized the field in the eyes of practice, in the sense that if you understand [..] the same fads that are hitting practice, you can at least talk and sound to practice like you are one of them and you are doing relevant things." "A fad has often meant that there was interest, income, budget support and opportunities to do research."	"One of my particular frustrations is that when a topic re-emerges we forget that anything was ever written about it before." "We worry about our doctoral students choosing to do research on faddish topics which will disappear and so we try to get them to use or work on areas which are stable and are likely to withstand the test of time." "I think academically, in the long run, it's probably not been a good thing." "The consultants grab onto some of these [fads] and push it more than [..] it ought to be pushed."

Table 11: Positive and negative sides of fads in IS research.

4.2 Fundamental objective(s) of research

"[..] from an academic perspective the objective of research in the US is to get published" (Rudy Hirschheim)

Motivation:

A goal or objective of research can be described on varying levels of abstractions: as a general objective of knowledge or achievement for the entire discipline (e.g. "put a man on the moon") or as an abstract objective of a particular research project. The introductory quote shows that there are other, more pragmatic objectives in research.

Research question

Our research question intends to identify the major objectives of research in IS. Asking for the fundamental objectives of research in IS we did not define the kind of research objectives but left it open for the interviewees to discuss.

Results: answers to research question

A range of answers was given, each taking on a different perspective (see Table 12). One answer relates to the epistemological objectives of research: "[..] the fundamental research objective is to better understand how organizations can design themselves to make effective use of technology". Other interviewees took on a particularly pragmatic perspective. They suggest that the objective is to get published and "to get people tenure". These statements are complemented by the experience of one researcher, who describes that "for a lot of research the objective is essentially incremental improvement".

It is argued by one that the discipline does not have a general goal of research. Referring to the Meta level of research, one researcher replied that the discipline aims at research methods that support relevancy to practice as well as rigor.

Results: normative valuations

Two interviewees referred to the application orientation of the field and stated that the major objectives of the field should be to make use and develop new theories in order to "solve practical problems" and produce research results, which "managers find useful for them".

Perspective	Objectives
Epistemological	"understanding [..] how organizations can make effective use of technology" "provide better solutions to practice"
Pragmatic	"to get published" "to get people tenure" "incremental improvement"
General	"I don't think as a field we have a mission statement like put a man on the moon"
Meta	"The objectives are the methods [..]. I think we have those joint objectives of relevancy on the one hand and rigor on the other hand"

Table 12: Perspectives on research objectives.

4.2.1 Role of description, explanation, construction/design

> "In the hierarchy of epistemology explanation usually is given the highest credibility." (Richard Mason)

Motivation

From an epistemological view point the kind of knowledge aspired through scientific research can relate to insightful descriptions of real-world phenomenon and their explanation through theoretical models. Information systems themselves represent constructions that can influence the real-world environment and processes they support. Therefore, constructs or artefacts which help to improve the process of information systems development or implementation can be seen as another type of IS research objectives.

Research question

At this point, we want to investigate in further detail, which role the objectives of description, explanation and construction play in IS research.

Hypothesis

The results of prior literature analyses (see e.g. [EvKa97], [AWK04]) indicate that explanation in terms of identifying causal relationships to explain a phenomenon plays an important role in IS research (H4.2.1). At the same time, prior research shows, that construction or design is very rare in IS research journals. Therefore, we propose that construction or design research plays a minor role in IS (H4.2.2).

Results: answers to research questions

Answers were given in varying detail. Nevertheless, the roles of the different objectives are described relatively clear and have obviously changed over time (see Table 13). The objective of description was more important in the early days, and is not valued as an appropriate research objective today. The general process of understanding was then extended by applying more rigorous methods and the objective of explanation is now given the highest credibility. The objective of construction or design has, since recently, not been valued very much in the field and is slowly gaining more importance in IS research.

Objective: role	Quotations
Description: has early been important, not valued today	"In the early days, description and to some degree explanation were 'all' that we did." "Description [..] has never been valued in our field."
Understanding: the general objective (not in the sense of 'Verstehen' from philosophy of science)	"As new phenomena emerged, we tried to understand the new phenomenon and [..] to formulate it in some way that more rigor can be applied to it." "I think [description, explanation and construction design] are equally important, and it really depends upon where you are in the stage of understanding with regard to the particular phenomenon you're studying."
Explanation: highest credibility	"in the hierarchy of epistemology explanation usually is given the highest credibility."
Construction design: recently more important	"[the design approach] has emerged in Europe and has had fairly significant impact here." "Until recently construction design were only valued in some marginal areas like group decisions and support systems" "I'd say the percentage of design science, designing and building something, is rising, I think. But slowly."

Table 13: Objectives of research in IS.

Results: hypotheses evaluation

H4.2.1 can be supported: explanation is the most important research objective in IS, while description used to be more important and construction/design is gaining importance in IS research. So, H3.2.2 can indirectly be supported, since it was stated that design has "fairly significant impact" in American IS research, and was only "valued in some marginal areas".

Results: normative valuations

One interviewee expressed his opinion that design and construction research are important from a normative view point: "The engineering view, in the software area and [..] in applications type things, just the very fact that you can construct and design and get it to work is a real intellectual achievement [..]. So that's an important kind."

Potential bias/conflicts

The statement that "description [..] has never been valued in our field" was given by a researcher, who has not been in the field from its beginning. This way the apparent contradiction to other recollections, such as "In the early days, description [..] [was] all that we did" can be explained.

4.2.2 Role of problems in business practice

Motivation

The general subject of research in IS, i.e. information systems in organizations, is per se closely related to business practice. The actual practice orientation of a discipline can be measured according to the relevance of actual problems in business practice for determining research objectives (more aspects considering relationships to practice are discussed in section 7).

Research question

Hence, our research question focuses on the role of problems in business practice for formulating research objectives.

Results: answers to research question

In the discussions on the role of problems in business practice for research objectives it became apparent that the experiences concerning the role of business problems are ambiguous. On the one hand, problems in business practice are the source for many research ideas, or research projects are motivated in relation to current problems in industry. However, the role seems to be restricted to being a source for ideas.

In order to get tenure researchers often "contribute to the discipline rather than to real problems", i.e. the success of a research project is not measured in terms of contributions to practice. This is – according to one interviewee – leading to the fact that "a lot of research is refining footnotes", so that many conference papers would not be really relevant for providing solutions to business problems.

This indicates, that problems in business practice are used as "source for ideas" or to "motivate" a research project. However, the actual objectives aim at providing only very limited problem solutions: the objective is to contribute to the discipline in terms of publications and personal promotion "rather than [to] contribute to real world problems".

Results: normative valuations

One interviewee stated that he thinks that IS "is an application oriented field", therefore "business situations and problems [should] drive the field". Another one points out that according to his opinion, "the real advances come when there are problems in industry and problems in real life".

Role of problems in business practice	Quotation
Source for ideas	"As a research community, we are constantly trying to [..] understand these problems [of business practice]. And it's those deep, recurring complex problems which are the fundamental sources where you get your ideas for research." "Most of the dissertation work where I've supervised or where I've been involved with, is motivated by a business problem. It's a problem by practitioners; that they have trouble doing something." "I think ideas are often generated by at least some idea of a real-world problem." "There are many people who are problem driven."
Not primary objective (but increasingly relevant)	"A major part of the research in our field is still done to get tenure, which means that you look at the small things that contribute to the discipline, rather than contribute to real problems. [..] But I think increasingly we see much more effort aimed at real problems." "[..] there are particularly people who have come into the field from either the economic tradition or [..] from a psychological tradition. They're more theory driven than problem driven"

Table 14: Roles of problems in business practice for research objectives.

4.3 Research methods

"Quantitative, rigorous research has always been the gold standard." (Jack Rockart)

Motivation

Previous literature reviews and analyses (see e.g. [OrBa91], [AWK04]) indicate that there is only a particular set of research methods, which is most commonly applied in research projects, whose results are presented in prominent IS journals. Additionally, the results so far have highlighted the important role of 'appropriate' research methods for legitimating IS in schools of business. At this point we want to look more closely at accepted or common research methods in IS.

We start with discussing the existence of a set of accepted research methods and its possible changes over time. Subsequently we report on the relevancy of particular research methods.

4.3.1 Set of accepted research methods

Research question

On the one hand we are interested in knowing, if there is a set of accepted research methods in IS. On the other hand we intend to find out, if there have been any changes w.r.t. the set of accepted research methods over time.

Hypothesis

Based on the results of prior literature analyses we propose, that positivist, behaviourist (quantitative) research methods determine the set of accepted research methods in IS (H4.3.1)

Results: additional issues

During the course of the interviews we received not only information on their *perceptions* but, additionally, it was commented on *reasons* for certain research methods being or not being dominant

and proofs or *indicators* showing that there is or is not a set of accepted research methods. We will integrate the respective answers in the discussion of results.

Results: answers to research questions

Table 15 gives an overview of the respective citations. All but two interviewees think that there is a set of accepted or dominant research methods in IS and describe it as positivist, quantitative, empirical research. One additionally mentions case study as part of the set of accepted research methods.

Four different reasons were given to support the existence of a set of accepted research methods: (1) IS faculty being part of business schools apply very much the same methods as other management disciplines. (2) It is 'easier' to publish, because there are 'templates' that tell you how to write an article. (3) Most researchers are "biased to use the research method that their PhD-advisor used". Additionally, publication analyses of major IS journals indicating a relatively close set of accepted research methods were mentioned to support this opinion.

Two researchers do not see a set of research methods being dominant in IS research; one argues that – due to fast technological developments – the field changes very quickly, so those, who come to the field are self selected to be tolerant of new approaches. The Manchester IFIP 8.2 conference in 1984 is mentioned to indicate that methodological issues were discussed even in the early days of the discipline, indicating the attitude, that "the world is more than just positivism".

Most interviewees agree (all but the two who do not see a fixed set of dominant research methods) that there have been changes in the set of accepted or dominant research methods. The "field has broadened" and has become more open to various research methods, such as action research and interpretive studies. Two have perceived the change in the set of accepted research methods as negative: one argues that researchers would only 'pay lip service' w.r.t the acceptance of more qualitative research methods; another one argues that the range of accepted research methods was narrowed down over time as indicated by the publishing policies of the MIS Quarterly. Other interviewees argue, that changed journal publishing policies indicate a broadened set of accepted research methods.

Results: hypothesis evaluation

The hypothesis that positivist, behaviourist (quantitative) research methods determine the set of accepted research methods in IS was supported by the statements of six interviewees (H4.3.1).

Results: derived hypothesis

The apparently ambiguous statements concerning the changes in the set of accepted research methods can be resolved with the following assumption: In the early days descriptive, less rigorous and more ad-hoc research methods were applied. In order to establish legitimacy, the journals restricted their publication policies to only a limited set of accepted research methods (example: Applications section in MISQ). Recently, journals have started to change their policies – at least as reflected in their editorial statements – to include a broader set of research methods, for example more qualitative research methods as well. This is supported by the current call for papers on Design Science by MIS Quarterly.

Potential bias

One interviewee, who mentioned that there is not a fixed set of accepted research methods, worked in the IS field on different continents (Rudy Hirschheim). Furthermore, the conference he mentions to support his assessment did include US American as well as English (M)IS researchers.

	Is there a set of accepted research methods?	**Have there been changes in the set of accepted research methods?**
Assessment	No: • "the field has been very receptive to different paradigms and different research methods" • "we are more pluralistic than many other areas in the business school" Yes: • "the dominant methods have been quantitative [methods] and case studies" • "quantitative, rigorous research has always been the gold standard"	Yes, broadened: • "action research [..] is accepted now" • "interpretive studies made a pretty good jump recently" • "the field has broadened and has become more open to alternative methodologies" • yes, but only "lip service" w.r.t the acceptance of qualitative and interpretive approaches Yes, more narrow: • yes, it has become more restrictive No: • does not apply, because there has never been a fixed set
Reasons	No: • the field changes every day, so "people in the field are self selected to be pretty tolerant of new ideas and new approaches" Yes: • IS is situated in business schools: acceptable approaches are "more or less equivalent" to other management disciplines • Influenced by career considerations, it is 'easier' to publish, because there are "templates" that tell you how to write an article • Most researchers are "biased to use the research method that their PhD-advisor used"	-
Indicators/ proofs	No: • it was shown in early workshops on research methods that "the world is more than just positivism" (refers to Manchester IFIP 8.2 conference in 1984) Yes: • it can be seen in publication analyses of major IS journals, • "journals specialize in what they publish and [..] have standard ways [..] of doing research"	Yes, broadened: • "new journals were founded to break the molds of traditional journals" • Journal policies have changed over time Yes, more narrow: • MISQ used to be a problem oriented journal in its early days, it has narrowed down since then.

Table 15: Selection of answers regarding a set of accepted research methods.

4.3.2 Relevance of particular research methods

Research question

We intend to determine the role and relevance of the following research methods for IS research:

- Quantitative empirical research
- Interpretative studies (qualitative research, e.g., interpretive case studies)
- Action research
- Design oriented research ("design science", research by development)

Results: answers to research question

The answers given complement the picture drawn by the previous discussions (see Table 16). Quantitative empirical research is the most prominent research method: "the gold standard" in IS research. Interpretative studies are commonly applied as well, while it is still hard to get them published in top journals. It was indicated that the usefulness of interpretative vs. quantitative methods depends on the stage in the process of research: "In a sense the interpretive studies are essentially at the beginning of the process [to give you some ideas]. The quantitative empirical research is doable once you [..] understand where it is you are going.".

Action research and design oriented research have not been discussed in detail and do not seem to be of high relevance in IS research, while particularly action research has gained more acceptance in the IS community.

Research Method	Quotations
Quantitative empirical research	„I think that the dominant methods have been quantitative and then case studies“ "Quantitative, rigorous research has always been the gold standard."
Interpretative studies	"interpretive studies made a pretty important jump recently" "We do interpretative research." "Qualitative methods are under appreciated. It's very difficult to get them published in MIS Quarterly."
Action research	"Action research in the United States has never been a strong method. It's accepted now.“ "I have not seen much of it"
Design oriented research	"I think that that [i.e. design oriented research] is the future"

Table 16: Relevance of particular research methods.

4.4 Diversity

"I think the result of those debates is that diversity has won, that there is an acceptance of diversity. I think it's clear, that there's an acceptance of a broad range of methods and that was not true, for example, in the 1960's, in the United States [..]." (Gordon B. Davis)

Motivation

Discussions on diversity in IS research have related to the variety of research topics covered, and research methods applied. A recent literature analysis has shown that research published in different journals reflects different degrees of diversity [VRG02]. Robey argues for a disciplined diversity ("disciplined methodological pluralism" [Robe96]). Benbasat and Weber view a diversity of theories and concepts in IS as a danger for the disciplines unity: "If theories keep proliferating, each with its own measures, terms, concepts, and research paradigms, at some point in time there will be nothing holding the IS discipline together" ([BeWe96], p. 394). We want to complement the discussion on common research subjects and methods in IS by explicitly investigating the diversity in the field.

4.4.1 Debates

Research question

We focus on diversity as reflected in debates on research topics and appropriate methods in the IS field. Here, we want to gain further insights into how these debates have been conducted and if they had any affect on the discipline.

Results: answers to research question

The different issues covered in the discussion are summarized in Table 17, they describe *if* there have been debates or not, *how* the debates have taken place, and what their *influence* has been on actual research practice.

Except for one researcher, the interviewees agree that there have been extensive debates concerning research topics as well as research methods. These debates have been published in journal articles and have lead to some changes, regarding the "awareness" of the researchers in the discipline and have broadened the set of accepted research methods.

One interviewee emphasises that diversity has won as a result of these debates. The interviewees' assessments of the usefulness of debates in general was overall positive – they "improved the discipline", "created awareness", and "enriched the field" – but also critical: one states that the debates were "overdrawn". It is argued that the impact of the debates on research practice has been limited because people involved in the discussions are different from those researchers still focussed on a single research method.

Results: normative (personal) assessment of the value of diversity in the field

Some interviewees described their personal valuation of 'diversity' in the field. The following positive assessments are given:

- "what is very good about the field is it is pretty diverse in terms of the topics that we look at"
- "I think that we are much more advanced than many other disciplines in that [there are] many outlets within the IS domain within the US which allow you to promote this diversity both in terms of method and topic. [But] the diversity is probably far less so in places like JMIS, ISR, and MISQ."

- From the viewpoint of one interviewee diversity in IS research "works very well" at his department (MIT), where there are people from "technology" to "soft science" including "organizational behavioralists", economists and "problem oriented" researchers.

One interviewee emphasises that diversity has a negative side: "So the early days of the field saw this tremendous diversity [and] research in the field was suspect to say the least." Which was because "people [..] weren't trained in IS but were teaching IS courses"

	Debates on research topics	**Debates on research methods**
Have there been debates?	No (1) • "I don't think there have been a lot of attempts to identify things as being inappropriate." Yes (4) • Ongoing debates: "There are always debates about what is in and what is out. [There are] people arguing that our scope was too broad and they figure that if we could narrow our scope [..] then we would be closer to a discipline." • "There certainly have been debates" • "there is some lack of comfort when people cross sort of an invisible boundary" (referring to the 'IT artefact' discussion)	Yes (5) • "There have been whole articles written on why qualitative research is an acceptable research methodology in IS." • "There have been a lot of debates about research methods."
How have the debates taken place?	• In publications "still widely cited" (2)	• In published articles
What was their influence on research practice?	No influence: • "Fortunately people ignore all of that" Some influence: • "to some extent the debates have improved the discipline because it creates awareness and [..] interest"	Limited influence: • "We need people doing both (research and debates on research). The problem is we tend to have a group of people who only want to debate, and another group of people who only want to do research with a single methodology and so you don't end up with as much progress as you would like to have." Lead to changes: • The interpretivist "have enriched the field" in showing the "positivists [..] that there are other useful approaches" • "I think the result of those debates is that diversity has won, that there is an acceptance of diversity."

Table 17: Answers on the assessment of debates concerning diversity.

4.4.2 Communities

Research question

Diversity in a discipline or field of research is also represented by different sub-fields or communities as part of the discipline. Hence, we complement our discussion on diversity by investigating if there are different communities in the field and how these communities perceive each other.

Results: answers to research questions

All interviewees agree that there is a number of (sub-) communities in the IS field. To support this impression they listed some examples of communities. Table 18 displays these statements structured according to more management oriented groups and more technical or Computer Science oriented communities.

Management oriented groups	Technical / design oriented groups
• "management of information systems group" • "group around organizational issues and impacts" • "the economic crowd", "There's the economics of IS community. ", "the economists" • "There's the more management science, analytical modeling people." • "There's the behavioral IS community", "organization behaviorists" • "those interested in technology acceptance"	• "a very heavy tech crowd which is a little bit different from the system building crowd", "technologists" • "WITS" (Workshop on Information Technology and Systems) • "There are really Computer Science oriented types of communities. There are people who do really modeling. And the Computer Science people are more the semantic modeling people. " • "There's the design science community."

Table 18: Statements to communities in IS.

Two interviewees argue that the different meetings at the ICIS conference represent these sub-communities: "The groups that are attached to ICIS shows this diversity."

In this context the issue of the identity of the IS field is discussed by two interviewees. They state, that IS cannot be called a 'discipline' because it exists only of loosely coupled communities of interests:

- "I'm not sure that the IS field has a common identity."
- "I personally don't view that there is a single [IS] discipline. There are a bunch of sub-disciplines; it's a very loose confederation. "

The relationships between the different groups or communities in the IS field are described covering issues of the integration or exchange between different communities as well as their mutual appreciation (see Table 19). Those that commented on the level of integration and exchange between the different groups agreed that, while international conferences do serve as meeting points, there is the need for better integration of the different groups. It is suggested to improve this by making sure that IS journals are open to publish research from the different communities. The mutual appreciation between the sub-communities in the field is described as a "live and let live" attitude with a certain level of indifference. Only one researcher uses the word tolerance to describe the relationship between different groups in IS, while all agree that there is no hostility.

Mutual integration and exchange
International conferences as meeting points: "[It is] part of the role of the national meetings and the HICSS meetings, to get these people [from different communities] together." Need for better integration: "Few of them read outside their own literatures. [From a research perspective – not from a curriculum perspective – their relationships are] very tenuous." How to achieve better integration: "I think, we have to take the basic journals, which purport to define what IS is, and make sure that they're always open to those somewhat specialized kinds of research."
Mutual appreciation
Indifference: "There's always some level of indifference. We all tend to be fascinated with our own area and not so fascinated with others." No hostility, "live and let live": "[The attitude is:] I'm not particularly interested in the area, but that's a legitimate area and we're quite happy to let it be. So I don't think there is that hostility." "There seems to be a feeling that we are part of a small community that is part of a larger community. We just have our own subfield (birds of a feather and special interests) within the broad domain. There doesn't seem to be any hostility." "IS as a field has not been that hostile, in my view, as some of the other disciplines with respect to the splinter groups. I wouldn't call it indifference, quite, either because there is a certain element of live and let live." Tolerance: "I think it's been a very tolerant community, [we're] very welcoming and very open." "[The relationship between them can be described as] benign tolerance" "[The different communities] tolerate each other: you're doing IS but that's not what I do in IS, [..] so, we all get along very nicely with each other [..]."

Table 19: Descriptions of the relationships between sub-communities.

5 Political and Institutional Context

Most IS researchers are integrated in business schools. In order to describe the discipline's development, we complement the core properties (research subject, object and method) by investigating the support and influence of related research institutions (e.g. business school or university officials and administrators) and other public institutions, such as funding organizations and governmental institutions.

5.1 Support by universities, motives for providing support

> "I still don't think [..] that the majority of business school administrators and the majority of faculty outside of Information Systems really know what Information Systems faculty do." (Robert Zmud)

Research question

We start with investigating the support by universities. We look at the motives of university institutions for providing or not providing support for the development of the IS field.

Result: answers to research question

From the answers given it can be derived that the support by university institutions has been rather limited: All (but one, who considered it completely negative) had the impression that the support had been positive at some places and "very bad" at others (see Table 20). One of the main motives for providing support is financial gain (see Table 21): support by universities depends on the student numbers that can be generated, which is directly related to the financial gain for the school. Recognition of the general (future) importance of IT is another factor, indirectly supporting the important role of the financial dimension.

Few places provided limited support
"There are isolated incidents of schools that have said, well this is not really a discipline and we're not going to put many resources into it, [..] but they are very few"
Little support in the early days
"Earlier it was a struggle" "In the early sixties, there was very little support for the field. But there wasn't active non-support; it just hadn't emerged [yet]." "When it came to then tenuring people, or even taking their research and evaluating their research, it wasn't quite as supportive. [It] was often not viewed as legitimate as the economist or the mathematician, where they've had a tradition of that. That was a battle that had to be fought, and literally fought in the university. "
Today still bad / recently less support
"There are still deans and associate deans that really would rather we never existed and would take anything [to] get rid of us. I've been in several schools, or been in or near schools where IS has been systematically destroyed. [mentions examples: UCLA, USC, NYU, Stanford, Irvine]" "The interesting phenomenon is what's happening now that the student enrollments are down and we see a number of deans becoming uneasy about IS" "I think certainly within business schools we sort of had no respect, won the respect, and now are losing." One interviewee gives examples of schools who "have been on the map" and now are "off the map" in IS, such as NYU and Harvard Business School.

Table 20: Limited support for the disciplines development by universities.

Financial gain
"IS has traditionally been one of the cash-cows of the business schools and it's been that way up until relatively recently. So deans have been more than willing to support IS as long as the student numbers were there."
"Because IS faculty have stakeholders in terms of the companies who want to recruit their graduates, they have students who want to go in these careers, and they can bring in external research funds, there is support by university/academic institutions."
"It generally relies on money. If you bring money in the university, they're quite happy with you. So if you have the student numbers, you do what you want."
"[We] generate a lot of money for the university [by high student numbers]".
Importance of IT
"I think that most university administrators have come to recognize the obvious fact of the importance of technology and have tended to be extremely supportive."
"As it emerged as field in the seventies, you not only got a support, you have had deans lined up trying to hire people, and places don't have time to get the things to go. So the university initially looked at it as a very positive thing."

Table 21: Motives for providing support.

Three, partly interrelated reasons were given to explain that IS has been supported in some schools more than in others (see Table 22): support by and background of deans and faculty members, understanding of the discipline by business school administrators, and entrepreneurial leadership by IS faculty.

Support by and background of deans and faculty members
"It depends upon who the key faculty members are, including the dean, in each different place. At MIT we are hugely supported [..] And then I've watched universities that really had great IT departments, and then all of a sudden they got a dean who was an economist, didn't believe in any of this softer stuff, didn't believe in the tech."
Understanding of the discipline by business school administrators
"I still don't think [..] that the majority of business school administrators, and the majority of faculty outside of Information Systems, really know what Information Systems faculty do. So in that sense, there's not the support which constantly creates a problem. [..] The fragmentation [of the IS field] is not enabling the administrative structure to understand what Information Systems is."
"Most faculty members grew up without understanding information systems in organizations, and they don't understand it. [Hence, it is necessary to] have someone who really gets this message [that we can make a difference with a new field of IS] across to the faculty."
"There are essentially visionaries at the managerial levels of universities who say information is part of the future [..]. So you may find that the Schools of Information may be much more potent in pushing the discipline and for people to understand what it is we do."
Entrepreneurial leadership by IS faculty
"One reason was individual leadership and entrepreneurial leadership at the top saying we can make a difference by developing a new field."
"Institutional support comes when you have an entrepreneur. Somebody who says, hey this is my thing. When you have something to offer, when you start developing a reputation for the place, they'll jump and do it because they want your reputation. If you don't have anything, they're not going to support it. But if you've got something that they can tell a story and they can go out to their donor community, then things happen."

Table 22: Reasons for varying support.

Additional issues

IS faculty have not brought in significant amounts of funding from external sources: "We generally don't generate that much in terms of NSF or large-scale research grants". But it is stated, that IS researchers "made up for that" by high student numbers (until recently) and in this way "generate a lot of money for the university". On the other hand, it is argued, that IS faculty are relatively expensive: "we cost the university a lot of money because our salaries are higher than other professors."

5.2 Picture of the discipline as seen by closely related disciplines

"I think, other disciplines are happy to allow IS to survive." (Rudy Hirschheim)

"[Other disciplines think that] these people [from IS] know about things we don't know about but those are not important things to know." (Paul Gray)

Research question

The overall picture of the support by Universities in general can be complemented by a discussion about the assessment of IS by closely related disciplines. We want to investigate how the IS field and its representatives have been perceived by other related disciplines at business schools, such as business administration and management, as well as by Computer Science.

Results: answers to research question

The picture of the IS field as seen by other disciplines is generally characterized by indifference and a lack of understanding concerning the field's relevance and importance (see Table 23).

Most interviewees reported, that, according to their experiences, in business schools there is a high lack of understanding regarding the role and importance of the IS discipline and its distinctive research subject. Two vivid examples were given to explain that other disciplines at business schools do not understand why a separate discipline of IS exists:

> "I still remember a conversation [..] with a marketing professor. He said: I don't understand why you're not studying marketing databases. I think, that's the only thing you ought to be studying, and the man was dead serious. He said, there's nothing else."

One interviewee supports his impression, that most people do not understand what IS researchers do, by reporting on his experience with a dean who was Economist in Finance:

> "What was interesting was he thought that he understood Information Systems, because he used spreadsheets. And so he reasoned there was no value in having a group doing research and teaching in IS".

The picture as seen by Computer Science and other disciplines outside business schools is characterized as largely indifferent.

Additional issues: recent developments

Two interviewees referred to recent developments, which – from their view point – further challenge the identity of the IS discipline:

> "There's this process going on of integration of IS into everything else. So in a sense we've won the battle and lost the war, because we're converting everybody else to become Information Systems people, or to integrate IS into their own field and that means that there's less left over for us. So, in a sense we're victims of our own success."

Another researcher expressed his view that other disciplines are taking over topics that used to be part of IS, such as "introducing people to PCs" (e.g. spreadsheets) in the early days or researchers from Organizational Behaviour who perform studies related to technology:

> "A lot of people who study in other fields have a technology orientation to it. They then think: well, what do we need these guys for, because we know it?"

Lack of understanding of the discipline's importance
"[other business school disciplines] view the discipline as business administration and management"
"[even researchers from business administration] still don't understand what we do and what our role is"
"[other disciplines think that] these people [from IS] know about things we don't know about but those are not important things to know"
"Computer Science people think they are purer than we are. Management people said that you don't understand management."
Indifference
"In Computer Science, as long as they had student numbers, I don't think they particularly cared; they were quite happy to do what they wanted. I think the game is changing a little bit now."
"So I think other disciplines are happy to allow IS to survive as long as they perceive, we're bringing in money and we're not taking revenue for them."

Table 23: Perceptions by closely related disciplines.

5.3 Influence of research associations

> "AIS can provide a meeting place for people to get together, talk and learn. However, legitimacy with academia and business comes more from the effectiveness of the research that we do than from an organization." (Jack Rockart)

Motivation

Research associations may help to improve a discipline's perception by funding organizations, governmental institutions, other disciplines and university officials. The Association of Information Systems (AIS, http://www.aisnet.org) was founded in 1994.

Research question

We intend to clarify the influence the AIS and other research associations for IS have had on the development of the discipline.

Results: answers to research question

From the answers we can derive the following central roles of AIS: to bring people together, to be a representative for external organisations, and to foster international recognition and internationalization (see Table 24). Other roles of research associations mentioned in this context include to "assemble resources" and to "sponsor conferences".

The discussions do not provide a common picture concerning the contribution of AIS for legitimizing IS as a discipline. One interviewee states that "The association provides a lobbying group" and according to his impression, a lot of schools say that AIS "gives us legitimacy". He stresses his point by pointing out the important role of AIS in recent efforts to get "IS back into the required group" at AACSB: "Blake Ives put 40 signatures together to go to AACSB and got IS back into the required

group which in the business schools is terribly important. He did this because he had an association behind him."

It is pointed out explicitly by three interviewees that they do not see any contribution of AIS to the actual legitimacy of the field and no influence on research directions (see Table 25). It is considered a meeting place, while legitimacy comes from the actual work of the researchers.

Hence, we can conclude, that AIS has had some positive influence on the disciplines development. However its influence is mostly related to shaping the community or creating external legitimacy as perceived other organizations rather than in terms of influencing research directions and legitimizing research in IS.

Potential bias

The interviewee who expressed that AIS is considered a lobbying group and is perceived by many schools as providing legitimacy is according to his own words "heavily involved in association work". Consequently, on the one hand, he might be biased to consider the association's activities more important than they really are, and on the other hand, he does have more insights into the association works, which could allow him a better understanding of the association's actual influence.

To bring people together
"Before AIS there was a need for some organization that could [..] try to make sure that these isolated pockets of IS people at different universities had something in common beyond just interest in computers."
"I think [research associations] are very important. [..] They bring people together to share ideas."
"AIS can provide a meeting place for people to get together, talk and learn."
To foster international recognition and internationalization
"I really do think it has contributed to some internationalization of the field and has brought more people under the IS umbrella."
To be a representative for external organisations
"The idea of having this single association is valuable, because it at least gives the appearance of solidarity to other stakeholder and institutional groups, whether it's university administrators or whether it's accrediting agencies or whether it's governments, or funding agencies."
"AIS has been a body which allows people to hang their hat on; they say 'I'm a member of AIS' and that gives us sort of support and legitimation behind it."
"We need to be able to say there is an organization, so the AACSB, for example, the accrediting body for business schools, has an organization to communicate with. [..] If some issue comes up, it's helpful to have someone who is president of the Association for Information Systems to respond to a criticism. So that's important."

Table 24: Roles and influences of the AIS.

Existence of AIS does not influence individuals' opinions
"I think people that are disposed against the field would not consider whether or not there's an association to be a defining characteristic. Similarly, people that are favorably disposed wouldn't see it as relevant."
AIS has no significant impact on research directions
"[I do not see AIS to play a big role] in terms of actual research and research directions, because in IS [..] diversity has been accepted and in fact, valued [..] from the very beginning".
AIS is a meeting place, legitimacy comes from actual research
"AIS can provide a meeting place for people to get together, talk and learn. However, legitimacy with academia and business comes more from the effectiveness of the research that we do than from an organization."

Table 25: AIS as a meeting place with no direct contribution to legitimizing the field.

5.4 Influence of political institutions

Research question

Most IS researchers are integrated in public institutions; we, therefore, want to investigate the influence of political institutions for the development of the discipline, for example the bureaus of educational affairs and the National Institute of Standards and Technology.

Results: answers to research questions

All interviewees agree that political institutions had very limited influence on the development of the discipline (see Table 26). The diversity in the field and its small size compared to Computer Science are mentioned as reasons for the minimal influence of political institutions on the discipline's development.

Additional issues

Despite the general minor influence of political institutions, two interviewees stated that they view recent laws and public issues as having a major impact on the discipline: "Recently, we've had a major impact of the Sarbanes-Oxley law, which has great impact on IT organizations and IT departments, as well as other aspects of business. I think that's been a relatively unique thing that has impacted the field." Referring to the privacy area, one interviewee states that "Government is having an enormous impact on our field" and continues to have an impact.

Very limited influence of political institutions on the field
"I think, in the U.S. [the influence of political or governmental institutions on the field] has been relatively minor"
"I honestly don't think there have been very many [influences from political institutions] at all."
"[In the US] we haven't had any political institutions that have been important [for the IS field]."
"We have not engaged in political lobbying of any kind."
Reasons for limited support/influence
"I think, the fact that the IS discipline has presented these different faces, and has been housed in business schools, has resulted in it having some difficulty in gaining the support of the existing political institutions, at least in the US."
"I think, they had interest in shaping Computer Science. I think we've got to understand that IS is too small for them to notice. We've got 5000 members [in AIS] worldwide and we probably have at least half the people teach IS on a full-time basis. ACM is 80,000. On the scale of things, we're not noticed."

Table 26: Influence of political institutions on the field's development.

5.5 Influence of funding organizations

"You can't do these [..] large research projects without some source of funding."
(Richard Mason)

Research questions

To complete the discussion on the influence of public organizations on the discipline's development, we want to investigate to which extent public funding organizations (e.g. National Science Foundation) have influenced the field.

Results: answers to research question

It is pointed out by two researchers that the actual influence of NSF has been relatively limited (see Table 27). Nevertheless, four interviewees describe the influence of the National Science Foundation for the discipline as important, while they do not describe explicitly in which way or to which extent.

One interviewee reports, that NSF has recently started to give the IS field more attention. He explains the minor influence of NSF so far with "IS [being] buried in the business schools" with no need to apply for public grants. Some interviewees mentioned past major grants by IBM and SIM, which apparently had a significant influence on the discipline's development in the early days.

Important (general)
"I think NSF has been important providing funding. [..] It's not been as important for us as a field as it has, for example, for Computer Science but it still has helped increase the legitimacy of what we're doing."
"I ran a program for several years with the National Science Foundation, [..] You can't do these [..] large research projects, without some source of funding. So the funders in some sense kind of helped determine what's important and what's not."
"The National Science Foundation funding, since you can get grants for information systems research, has been important. [..] I've been on one NSF panel that recommended giving money and observed that NSF sets high standards."
"Funding has come from [the National Science Foundation]. Funding has come from ARPA and other places. That's been important."
Little influence
"I think [the influence of NSF was] relatively little in IS per se. [Only in technical areas, such as ARPANET]"
"[the fact that the IS discipline is so fragemented has been] a big handicap [with NSF]. In the NSF network [..] most people are not MIS people [..] since in parts of NSF where MIS would fit into they are either computer scientists, sociologist or psychologists."
Recently gained importance
"NSF is just now, in the last five years, discovering that IS is there at all. Part of the problem in that is that IS is buried in the business schools. IS has never had to sit on its own bottom. Business schools do not have a history or an ethos that says you go out and get government money."
Important commercial grants in the early days
"The IBM grants were very important."
"this field would have not gotten started without IBM funding" (deliberate exaggeration)
"The SIM grants turned out to be a major push towards research and part of it was they were very smart in who they hired."

Table 27: Influence of funding organizations.

6 Development of Teaching

Motivation

The status of an academic discipline is characterized not only by its research characteristics but also by its teaching activities. These can be described through official curriculum developments, actual teaching contents and the attractiveness of the corresponding degrees in practice.

6.1 Development of the IS curriculum

> "We've had a long and very rich tradition of curriculum development, largely started by ACM."
> (Rudy Hirschheim)

Motivation

The literature provides a detailed overview of the history of model curricula in IS (see e.g. [TFG+03]). A listing of the curricula history in IS is provided in Appendix B.

Research question

We want the interviewees to sketch the process of IS curriculum development and to describe the factors that influenced this process. In this way we intend to find out, which role the curriculum efforts have played for the discipline members and the actual influence it had on IS teaching.

Results: answers to research question

The following history reconstructs the important dates in the chronology of curriculum development as derived from the discussions (see Table 28):

- 1969: first IS curriculum, largely started by ACM
- 1972: curriculum chaired by Ashenhurst
- 1974: IS curriculum sponsored by ACM and NSF
- 1982: IS curriculum, sponsored by ACM, initiated by Jay Nunamaker
- 1990s: further curriculum efforts by Gordon B. Davis, John Gorgone, Paul Gray and others

ACM, DPMA/AITP and AIS are mentioned as organisations involved in curriculum efforts. Today ACM and AIS are the organisations mainly involved in defining the IS curriculum. In addition to the participating organisations the discussions provided insights into the role of curriculum efforts, objectives, drivers and influence in teaching practice.

From the multitude of answers received we derive that curriculum efforts have played a major role throughout the field's development. One interviewee makes this explicit: "We've had a long and very rich tradition of curriculum development, largely started by ACM. [..] The role of [..] the development of curricula, has been very, very strong and there have been people who have kind of spent their whole life working on [..] curricula matters within IS."

One objective or purpose of early curriculum efforts was to gain the recognition of the importance of IS for management students: "In the old days it was the attempt to get some recognition that teaching the minimal skills in computer programming to business students was a good idea."

Qualification requirements from industry are seen as a major driver for the curriculum development processes: "[the curriculum developed] from the bottom up. [..] It has really been driven by what the companies hiring the students have wanted the students to be able to do. And so it sort of followed the evolution of the IS profession in practice." Another states, that "ultimately it was a desire to

make sure that the students when they graduated had appropriate skills sets for organizations who would be hiring them."

At least some influence in teaching practice can be derived from the following experience. One interviewee describes how adopting the ACM 82 curriculum helped to legitimize their degree programs following this curriculum: "That curriculum served us for the masters program. When potential students came in, the first question they asked was 'what's your curriculum?' It allowed us to say, we follow the ACM '82 curriculum. It gave us legitimacy."

Results: additional issues

Several additional issues have been raised and discussed in the context of the IS curriculum development: (1) the challenge of adapting and evolving the curriculum to respond to changes in technology along with the impression that IS faculty is not "current with technology", (2) the role of textbooks and their influence on curricula, and (3) the coherence of the discipline in terms of teaching vs. research.

(1) Being current with technology: It became apparent in the discussions, that curriculum efforts in IS are ongoing due to the rapid changes in technology and application scenarios in organizations: "the curriculum continues to evolve and change because the subject matter changes so much". However, it was critically pointed out, that – as opposed to Computer Scientists who are expected to be current with technology – "IS faculty, for the most part, are not current with technology and IS curriculum are not current with technology". One argues, that taking on a certain higher level of abstraction allows more independence from fast technological changes: "For both the teaching and research that I did, a good understanding of current technology was not necessary. I taught managerial aspects of IT [..] and found that I could learn whatever new technology was necessary when I found it to be necessary – but this did not happen often."

(2) Role of textbooks: One interviewee emphasizes the central role of the early textbook by Gordon Davis in some way defining the discipline – in analogy to the OR textbook by Hillier and Liebermann. The relationship of curricula and textbooks is described as "chicken and egg culture": "You can't get a publisher to publish something until there's a course. You can't get a course unless there's a textbook." So, the curriculum has also been influenced by textbooks.

(3) Coherence of research and teaching: One interviewer indicates that contents taught in IS classes and subjects of research differ considerably. "There is an IS discipline in terms of teaching. But I think in the research area, the research perspective, there is really a group, a loose collection of sub-disciplines." This statement by one interviewee has led us to ask the other interviewees to comment on it in a feedback cycle. Three explicitly answered this question and agreed that they have a similar impression: "Our research efforts are more fragmented than our teaching curriculum." Another one sees a "coherence problem in what we teach and what we do research about". One interviewee reported on his experience that most IS faculty refer to more practice related sources in class than they do in their research because of student demand: "It's interesting as I talk to a number of faculty members, in terms of what they teach in class, as opposed to what they research. What they teach in class, the materials they use, are articles from the Harvard Business Review, articles from the Sloan Management Review, increasingly today articles from MISQ Executive. And they also use their own consulting experience. [..] And yes, some very disciplinary, very intellectual, very state of the art stuff is taught. But I think at least from the universities that I know in the United States, the teaching comes from the journals I noted above – not from our most abstract journals."

Organizations involved in curriculum efforts
"The two organizations were really ACM and, let's say, DPMA, that kind of said here are the things we think that someone who graduates ought to have, and supported a lot of work which academics took and created standard curriculum. But the curriculum continues to evolve and change because the subject matter changes so much."
"For the current curriculum efforts ACM is one sponsor. AIS is another. And AITP, which used to be called DPMA is another sponsor. But it's mainly ACM and AIS."
Chronology of the development of official IS curricula
"When you go back to ACM, in 1969, I think they came up with the first curriculum in IS and so we've had a long and very rich tradition of curriculum development, largely started by ACM."
"Early curriculum efforts sponsored by NSF and ACM, with first publication in 1974, and ACM continued to be a sponsor."
"I think there was a '72 curriculum chaired by Ashenhurst of some kind; I'm not sure. Around 1982 Jay Nunamaker convened what became the '82 [ACM] curriculum and then had a very strong influence."
"By the time the '90's rolled around – it was a long time since 1982 – John Gorgone and I at the first AMCIS meeting in Pittsburgh had a meeting on the masters curriculum. [..]Then essentially a series of these curricular things coming along and that's how this thing preceded."

Table 28: Organizations involved in and chronology of curriculum efforts.

6.2 Role of Computer Science in IS classes

Motivation

IS research and practice can be located at the intersection of Computer Science and Business Management research. Computer Science has been characterized as enabler of IS while diverse Business Management disciplines have 'provided' researchers in the early days of the field (see section 2.2). In order to characterize the distinct IS teaching characteristics, it seems appropriate to investigate the role of, on the one hand, Computer Science and, on the other hand, Business Management concepts in IS classes.

Research question

First, we intend to find out more about the role and importance of Computer Science concepts in IS classes.

Results: answers to research question

The discussions puts together a picture of changing relevance of Computer Science and Computer Science related concepts in IS classes (see Table 29). The expression "the foot in the door really was programming" describes the fundamental role of Computer Science related teaching contents in the early days. The role of Computer Science in IS classes today, however, is minimal. Today's students are expected to already have the basic computer knowledge and skills, for example through introductory courses, so that no additional Computer Science courses are required for business school students.

Other reasons explaining why Computer Science is relatively unimportant in today's IS classes are centred on the argument that such contents are not required for business students, because of changes in demand from practice; the availability of packaged software does not require graduates to know basic Computer Science. Another argument relies on changes in the discipline of Computer Science: it is said to have become "esoteric" from an IS perspective; so that there is little relationship with IS research and teaching. One interviewee mentions that in recent discussions in his school the role of Computer Science in IS classes has been (again) debated.

Results: additional issue

An additional issue is brought up by one interviewee, who describes the reluctance of Computer Scientists to teach courses for IS students: "There's not a ready acceptance of having Computer Science teach a basic couple [of courses] that will give everyone these technical underpinnings. And that reluctance persists even if we could agree on the content of that underpinning. [..] Computer Science has tended to not do it very well, because they don't want to do that."

Early days: importance of programming
"In the old days it was the attempt to get some recognition that teaching the minimal skills in computer programming to business students was a good idea. [..] Then, very quickly, we began to expand into non-technical, non-programming kinds of things trying to develop this business-technology interface and the idea that good quality students, particularly at the MBA level, would need to have understanding of business as well as an understanding of technology."
Today: minimal role of Computer Science in IS classes (*extracts*)
"relatively modest", "less and less", "by and large, minimal", "zero" "We water it down; we don't do Computer Science."
Today: you expect IS students to have basic computer knowledge
"I think most business schools, at least in IS, think that you had to have the rudimentary understanding of Computer Science or the computer concepts, and in that sense you would start out the same way." "You sort of assume that students understand from introductory courses about operating systems, data communications, and databases."
Today: in depths Computer Science knowledge is not required, because of…
…changes in demand from practice "I think [the role of Computer Science] is relatively modest with the preponderance of packaged software that is used by business and used in IS classes. I don't think there's really much involvement, or need for Computer Science." "The students who go into jobs out of an IS program, at least from a business school perspective, have to know less and less about fundamental Computer Science. [..] more and more of the fundamental operation of computer technology is being hidden from the people that use it in practice." …changes in Computer Science: "Much of Computer Science is, shall we say from the IS perspective, esoteric." "Computer science has gone off to be so very abstract that it has little relationship to what we do."
Recently: new debates
"Up until recently we didn't use much Computer Science in our teaching. [..] There was discussion about what subject matters that would be, computing type topics that should be taught within the IS courses and there was obviously much discussion and also a lot of disagreement."

Table 29: Changing role of Computer Science in IS classes.

6.3 Role of business and management concepts in IS classes

Research question:

We intend to draw a picture of the relevance of business and management concepts in IS classes, particularly in relationship to the – minor – role of Computer Science in IS teaching.

Results: answers to research question

All interviewees agreed that business management concepts are central for IS classes (see Table 30). (One even states that they might be too important, however without giving further reasons.) Teaching business management concepts and teaching students to understand information systems within the organizational context is considered a competitive advantage of the IS discipline, also distinguishing it from Computer Science. Additionally, IS faculty being integrated in business schools, see the emphasis of business management concepts in their classes as a factor for improved legitimacy within business schools – because in this way they speak the 'same language'.

Results: additional issues

One argues that – as with research topics – certain topics that used to be covered in IS classes have been taken out and are now taught by other disciplines or fields, such as strategic dimensions of information systems for example: "When we started teaching kind of the strategic dimensions of information systems, initially no one seemed to care outside of IS, but all of sudden the strategy people started to realize, hey that's important, [..], and so they would say wait, and then they developed research, and they had the sources and so forth to teach in."

High importance
"I think it extremely important."
"Business and management concepts, on the other hand, I think have been pretty central and have continued to be."
[business management concepts are] "dominant", "critical"
"Maybe even more important than it should be [..]"
Central characteristic and competitive advantage
"I think it extremely important. Everybody in IS and IT, particularly those who come from business schools, get well grounded in business and management principles and ideas."
"[the emphasis is specifically] on business analysis and having an understanding of how the technology operates from [..] a mid-level view, [..] and understanding where the technology is going, and having enough ability to constantly adapt to new technologies."
"The fundamental comparative advantage of information systems is that we should understand about systems within the context of organizations."
"One [reason] is that that's what distinguishes us from Computer Science."
Source of legitimation in business schools
"[one reason for emphasising business management concepts in IS classes] is a search for legitimacy. I think we are now legitimate. When we started we were essentially an alien implant and we were getting hard rejections in business schools because we didn't talk their lingo. So there's that lovely word, acculturation that took place."

Table 30: Role of business management concepts in IS classes.

6.4 Attractiveness of IS degree

"I think the attractiveness is declining and I know it's declining in the number of students. However this may be significantly reversed if we ca adjust to business' needs in an era of overseas outsourcing." (Jack Rockart)

Motivation

It was shown earlier that demand from practice for graduates has been an important factor for improving the legitimacy of the field and getting support from universities (see section 5.1).

Research question

At this point we want to investigate in further detail how the attractiveness of the IS degree developed.

Hypothesis

We propose that demand from industry for graduates has significantly determined the attractiveness of the IS degree (H6.4.1).

Results: terminology

Using the general term 'IS degree' we indicated that we mean specialized Bachelor and Master degrees in (Management) Information Systems. However, it is likely that the answers given do not only relate to these specialized degrees but to other degrees as well, e.g. MBA degrees with a major in IS.

Results: answers to research question

The job market, i.e. demand for IS graduates from practice, is seen as the central factor for the attractiveness of the IS degree (see Table 31). The field being exciting due to its "blend of business and management and technology" is another, but apparently minor, factor for the degree's attractiveness. The recent decline in student numbers[1] is attributed to the burst of the dot-com bubble and the IT-offshoring debate with adopted forecasts for the job market.

Results: hypothesis testing

The hypothesis (H6.4.1) of practice demand being a major factor for the attractiveness of the IS degree can be supported by the statements given.

[1] There are no official statistics on changes in student enrolment numbers in IS since the dot-com bust. However an informal survey on the isworld-list showed that since the peak (in 2001) undergraduate enrolments for IS majors have gone down up to 80 % (East coast). (Study results published by Pete Mykytyn on October 3rd, 2005 on the IS-World list, available at: http://www.cba.siu.edu/faculty/mykytyn/mis_undergraduate_enrollment.htm

Practice demand
"There is an external demand for people to have these kinds of skills and capabilities. As that demand increases, the degree becomes more attractive. Demand decreases, it becomes less attractive."
"[Businesses] needed people to work in IS functions and they were not happy with Computer Science because they didn't have the skill sets in management and business, so that led to the direct growth of these MIS programs."
"students follow the job market"
"As organizations were ramping up their IS departments and trying to find people: these were places where people could get jobs. [So, the attractiveness increased]"
Exciting area
"In the beginning (late 1960s) it was attractive because people saw that there were interesting things going on [..] It was exciting to get into a field that was changing and growing."
"I think that having a blend of business and management and technology understanding is the thing that is very attractive and I think generally that has manifested itself in several ways."
Recent changes in practice demand: dot-com boom and bust, IT offshoring
"Up until the last few years [the attractiveness had increased] The last couple of years have seen a pretty dramatic shift here. But the nature of offshore has kind of changed the game in a pretty dramatic way."
"I think the attractiveness is declining and I know it's declining in the number of students. However this may be significantly reversed if we ca adjust to business' needs in an era of overseas outsourcing."
"We had a flashback from our electronic business [..]. It turned out not to be what people said it was going to be. Although e-business is happening today [..]. But the fad hurt a little bit."

Table 31: Factors influencing the attractiveness of the IS degree.

7 Relationship to Practice

Motivation

The debate on relevance of IS research has been documented in multiple publications. ([Keen91], [Lee99], [West99], [BeZm99] and other articles in MIS Quarterly 23/1 1999, [KGH+02]). One dimension of relevance in IS research is reflected by the relationships to industry practice.

First, we derive a classification of possible types of cooperation with practitioners; then we look at the current status of cooperation. The third issue in this section is the IS/IT professionals' perceptions of IS research. We finalize this discussion by looking at the importance of relevance for the profile of the IS discipline.

7.1 Role and types of cooperation with practitioners

Motivation

Cooperating with practitioners in terms of common research projects, consulting or funding is a typical type of relationship between researchers and industry.

Research question

We intend to determine the role of cooperation with practitioners and companies for IS research. (Initially, we put this issue in the context of the discussion on the subject of research.)

Results: answer to research question

The discussions on IS researchers' cooperation with practice gave insights into the possible roles of cooperating industry partners and practitioners. Possible roles of industry partners for cooperation are as follows (see Table 32):

- Enabler of research: companies serve as field of study allowing access to real-world data, for example by observation, through surveys or participatory research.
- Provider of access to "what's going on": in depth cooperation with practitioners allows not only access to data, but also increased sensitivity to actual problems in business practice that can serve as driver for research. This is closely related to the role of industry practice to serve as source for research topics and ideas as discussed in section 4.2.2.
- Provider of funding: another role of industry partners is to fund research, which is – apparently – restricted to "applied research". The concept of IS research centers is a prominent (and successful) example in this context (see below).
- Buyers/user of products developed: an apparently minor role of industry partners is to serve as buyers or (test) users of artefacts developed in IS research.

Other, generally non-funded, types of cooperation with practitioners include exchanging expertise and inviting practitioners to report on their experience in class.

The research centre concept was mentioned by three interviewees as a successful approach to cooperate with practice through funded research. Using the example of MIT CISR (Center for Information Systems Research) the concept is described as follows:

> "[The cooperating companies] pay per year. They pay to support our research. We get them involved in determining what that research should be. The five major companies that we call *patrons* are all companies that are as vendors in the field. They are Microsoft, and others. Our *sponsors* are users of research. Our patrons have a major say in what we will research, but so do our sponsors. We ask our patrons to pick a project that they are most interested in."

It is emphasised that certain prerequisites have to be fulfilled in order to successfully cooperate with practice in that way:

> "One of the reasons that CISR has done well throughout the years is not only have we worked with our faculty, but we have had full time research people doing research. Faculty have many other things that they want to do and are sometimes influenced by their particular discipline. But our full-time research people can work on problems as they arise, and try to cross disciplines."

Industry as …	**.. enabler of research** (field of study)
	"studies in companies or organizations need at least the acceptance to come in" "Another group of researchers feel it's important to interact with practice in order to actually do their research." "[cooperation with practice allows us to] get access to good data" "[cooperation can be] asking industry personnel if you can come in and observe unobtrusively (be a fly on the wall) on your project. Another way would be as a participant observer and do action research."
	.. provider of access to "what's going on" (i.e. actual problems in business practice)
	"I'd say that perhaps 75 percent of IS research has some direct connection to industry practice, either studying it or modeling it, [..] or getting data, [..] or working with [..] case studies [..], so that you finally end up with a strong tie to what's going on." "Because of tenure, most people have to start on a disciplinary view. But many of the current leaders in our field have said, if I'm going to do something that's important, I've got to get out there and really understand what the problems are. I've got to work for solutions to problems, which cut across disciplines." "Cooperation with practitioners is extremely important [because] as management schools, we ought to be serving managers."
	.. provider of funding
	"the applied research simply couldn't have been done without that kind of support [i.e. funding support from industry practice]." "There have always been centers of IS research that have been funded by outside companies [..] CISR for example at MIT"
	.. buyers/user of products developed
	"[cooperation with industry] is extremely important [for] those IS researchers actually building systems [..] which are then exercised within practice" "But we don't make products of our research, typically. It's the consultants that do that, if anybody does it."
Other types	**Mutual exchange**
	"expertise exchange" "develop relationships with people in the industry, previous graduates, companies, working with them"
	Support in teaching
	"you can bring people into your classroom who are doing the problem that you are talking about"

Table 32: Types of cooperation with business practice.

7.2 Status of cooperation with practitioners

"I'd say that perhaps 75 percent of IS research has some direct connection to industry practice" (Gordon B. Davis)

"Except for a chosen few, I don't think that there is a lot of cooperation." (M. Lynne Markus)

Research question

Various possible types of relationships to practice have been mentioned in the previous section. At this point we want to focus on the current status of cooperation with practitioners.

Results: answers to research question

The picture derived on the assessment of the current status of cooperation with practice can be distinguished in a descriptive and a normative perspective (see Table 33). Positive and negative statements w.r.t. the current status and potential of cooperation are given. On the one hand, cooperation with practitioners to get access to data is assessed as generally possible and most researchers are said to have some connection to industry practice, which makes the IS field "better than most" in terms of the ability to cooperate and work with practitioners. On the other hand, actual cooperation with practice is relatively rare and close connections are "the exceptions, rather than the rules". This ambiguity can be explained by possibly differing expectations as to the type and strength of cooperation.

In the normative perspective we see, that cooperation with practitioners is assessed as useful and important, but is not valued by many IS researchers and – from the view point of three researchers – has a lot of potential for improvement.

A number of reasons are identified to explain the shortage of IS researchers cooperating with industry (see Table 34). Two reasons relate to the typical academic career path and correspondingly missing incentives. When you do a Ph.D. in the US you usually do not go to industry, but plan an academic career. This might be a reason for less interest in connecting to business practice. Additionally, the requirements for an academic career do not consider relevance as a criterion for good research, so a direct financial or career incentive for cooperating with practice is missing.

The difficulty of cooperating with industry is explained by differing view points and language on the one hand and, on the other hand, by a downturn in practice demand, which is why businesses are more reluctant to allow access to their organizations.

Descriptive evaluation Cooperation is…		**Normative evaluation** Cooperation is…
Positive	… generally possible: "I don't know of any person who has wanted to develop better and closer relationships and get access but could not. Of course, it takes time and effort." (Gordon B. Davis) … done by most: "I'd say that perhaps 75 percent of IS research has some direct connection to industry practice, either studying it or modeling it or perceptions, or getting data, or working with either case studies [..], so that you finally end up with a strong tie to what's going on. IS research has not, at least not very much, ignored what organizations are doing." (Gordon B. Davis) "I think this field is better than most in terms of its ability to work with its practitioners." (Richard Mason)	… useful and important: "In many contexts it's been very useful." (William R. King) "for major segments of IS research [has been] extremely important to move the field" (Bob Zmud) … not valued by many researchers: "It's really sad to say, I think, that many of those in the IS discipline (as evidenced through their actions) do not view this as a very important issue." (Bob Zmud) … not sufficient: "We are in a professional school, i.e., a business school, just like law, like medicine, and so on and as a professional school we should be working with practitioners." (Rudy Hirschheim) "Never as good [..] as we would like it to be", (William King) "Not what I would like to see." (Jack Rockart)
Negative	… is rare: "Except for a chosen few, I don't think that there is a lot of cooperation." (M. Lynne Markus) "there are some touch points [for cooperation with practice] where it is good. And pretty strong. But those are the exceptions, rather than the rules." (Bob Zmud) "It's heavily dependent upon individuals. Some individuals are able to develop these relationships [and] get good access to industry." (Gordon B. Davis)	

Table 33: Assessment of the status of cooperation with practice.

Academic career path and requirements – missing incentives
"When you do a PhD in the US you don't go to industry [as opposed to Germany for example; so there is less] ability to form relationships between industry and academia"
"Cooperation with industry fits with incentives to be a better teacher, and to be a better researcher. [But] there is no financial incentive. [..] There's nothing which requires that [i.e. cooperation with practice] to happen."
Differing view points and languages – difficulties in understanding
"I don't think both parties speak the same language. I think it works, but not without a lot of effort, and they certainly know a lot of shortfalls for every major hit."
"They [i.e. industry practice] have been willing to serve as test beds [and] have shovelled money at us" there is no cooperation in terms of actual research, because industry is taking a completely different view point."
Downturn in practice demand – recently increased difficulty
"[cooperation with practice used to be better] because the companies needed our students and they had to agree to these things. [..] Now, our students are not getting access because these companies are not hiring and they're saying sorry, we don't have the time to give you."

Table 34: Approaches to explain the relatively low level of cooperation with practice.

7.3 Perception by IS/IT professionals

"A large number of them don't care much about our research" (Richard Mason)

Motivation

Cooperation between research and practice can additionally be characterized by the way IS research and IS researchers are perceived by IS/IT professionals in industry.

Research question

We aim at identifying the picture of the perception of the discipline and its members by IS/IT-professionals in industry, e.g. Chief Information Officers and IT managers.

Results: answers to research question

The answers range from relatively positive statements, such as "I think [the IS discipline is perceived] generally positively" and "by comparison we have a fairly strong bond with practitioners" to completely pessimistic statements, such as "I don't think they know we're there."

This mismatch of answers can partly be resolved by taking into account the different contexts the interviewees had referred to. The perception of the IS discipline can be differentiated into the perception of the educational program, the research activities and the research results (see Table 35).

Apparently, practitioners think highly of the educational program in IS. The perception of IS research, however, is not as positive. One expresses his concern that IS researchers and professionals do not have common interests and researchers are "too academic". Another points out, that a large number of practitioners does not care about IS research. But there were also more positive answers regarding the perception of IS research. While most practitioners are skeptical, there are some individual researchers that are perceived positively by practitioners. Another interviewee comments on his experience with SIM, where at least some interaction between researchers and professionals takes place.

The perception of research results id assessed quite negatively: on the one hand research results are not presented in a way appropriate for IT professionals and, on the other hand, the limited number of research results that has disseminated into practice is – by practitioners – not perceived as stemming from IS research. It is argued that practitioners do have access to research results; however they do not appreciate them, because results are usually not presented in a way suitable for practitioners' needs. The few research results that do permeate into industry are introduced by former students, so that research results are not perceived as such by professionals.

Educational IS program
"They have a very positive perception of programs that turn out people with a combined business and technology expertise and interest." "In terms of our educational program, they think normally pretty highly of it."
IS research
Negative perceptions: • "a large number of them don't care much about our research" • "I think the practitioners in IS/IT, don't like what we're doing because we're too academic. We [..] don't address the kind of problems that they need to solve. We don't go to the same conferences. We don't share their problems. Too many of our academics [..] have never spent any time out in industry with IS organizations." Depends: • "Obviously there are differences. The practitioners that deal with the Jack Rockarts and the John Hendersons and the Peter Wiles and so forth, I'm sure they think that academia is fine, but most practitioners are tolerant to skeptical." Positive: • "About 15 percent of [SIM members] are academics, which means that in general, the CIO's want to work with academics wherever they can. So I think in general, the reception is very positive."
IS research results
"Typically they don't appreciate them [i.e. the research results, because] most of the research is not written in that mold" "Very little of what we have done individually has permeated into industry. I think some things cumulatively have [permeated into industry] and [..] Human Computer Interaction is an example. [..] Young people had seen this idea in the university and took it with them. Then they didn't know where it came from."

Table 35: Perception of the educational program, IS research, and IS research results.

7.4 Value of relevance for profile

"[IS] has always been an application oriented and driven field. If relevance isn't a primary concern, I don't think it has a reason for its existence." (William R. King)

Research questions

The previous questions and discussion to a certain extent contained an assessment of the importance of relevance to practice for the profile of the discipline. At this point we aim at explicitly discussing and identifying the value of practice relevance, i.e. alignment with practice demand, for the profile of the IS discipline. Additionally, we look at possible changes of the importance of relevance over time.

Results: answers to research questions

The answers given in this section are in parts ambiguous, probably due to the differing backgrounds and interests of the interviewees. While all agree that some degree of relevance is important for the discipline, one group views it as fundamentally important and another group as (only) relatively important for the discipline (see Table 36). The first group views relevance as a critical and fundamental characteristic and requirement of research in IS. The second group considers it appropriate to keep or establish a certain level of relevance in research, while aligning the curriculum with student demands is attributed higher priority.

Two interviewees note that there have been – and still are – debates concerning practice relevance. Frequently, these discussions are led together with 'rigor' as apparently opposing requirement for 'good' research in IS (see also e.g. [Keen91], [BeZm99], [KGH+02], [Fran03]).

Three of the answers emphasized that the role of relevance has indeed changed during the discipline's development (see Table 37). Based on the answers given three phases can be distinguished, in which relevance to practice was given different priority in IS research and related discussions, the temporal annotation directly refers to the terminology used by the respective interviewees:

The early days: The early days of the disciplines were characterized by close alignment with practice, because "industry was ahead" and relevance was needed to attract financial support.

Up until recently: During the discipline's development relevance started to be dominated by rigor, exemplified through the research requirements set by top tier journals. Additionally, rigor was necessary to improve institutional legitimacy at business schools.

Today: Nowadays practice relevance is more tolerated in IS research, because people recognized that they have "gone too far" in emphasizing rigor over relevance. Furthermore, the problem of institutional legitimacy has been largely resolved. Topics such as RFID and off shoring are given as examples for research areas, in which IS researchers are "ahead of industry".

Critical importance of relevance
"[IS] has always been an application oriented and driven field. If relevance isn't a primary concern, I don't think it has a reason for its existence."
"To me it's fundamentally a phenomenon based field; it's problem centered from the very beginning. So I would say that only [..], maybe 10, 15 percent of our portfolio ought to be more or less basic and that most of it should be applied [or] maybe degrees of applied."
"In my view [relevance] is extremely valuable."
Relative importance of relevance
"The relevance of the curriculum [is] more important than the relevance of the research. [Because] the curriculum [..] has a larger amount of practitioners who might be concerned."
"Since we're supplying students and also our opportunities for interaction with the practice that we're teaching and studying, the alignment needs to be reasonably good. It doesn't have to be perfect."
"I don't think relevance is terribly important." (also pointing out that a debate has been necessary to give students "a sense that they ought to be relevant" to a certain extent)

Table 36: Value of relevance of the profile.

Long run debates
"These debates come up again and again. I think that the importance of relevance remains constant. I think the field's tolerance for it changes." "I think we've had this debate between relevance and rigor since I can remember."
Changes over time
The early days: • Need for relevance: "When we started, we were very sensitive to relevance, because industry was ahead of us, every step of the way for the first few years." • High importance of relevance: "I think very early in the MIS discipline, when there wasn't much rigor, relevance was real important, because without any rigor the only way that one could attract any support by stakeholders was through relevance." • Too relevant: "In the early days, in some sense we were too relevant because we were simply describing the things that businesses were doing with computer systems." *Up until recently:* • Relevance dominated by rigor: "I'm somewhat concerned that the top journals have gone to the extreme and required such rigor that relevance may be minimized. Throughout the whole field, all of the journals, it probably isn't a problem, but in the top journals rigor clearly dominates relevance." • Less relevance for institutional legitimacy: "When the IS discipline needed to legitimize itself and its institutions, it moved to emphasizing rigor over relevance because the target there was institutional legitimacy as opposed to external legitimacy. " *Today:* • More tolerance of practice relevance: "I think, that within the relatively recent past that's become better recognized, that maybe we went too far [in emphasizing rigor over relevance]. I think the situation is better now than it was five years ago, but we probably had gone too far." • More importance of practice relevance: "I think now that the rigor has resolved many of the institutional problems, relevancy has again become very important." • More actual practice relevance: "we're looking at RFID ahead of when the companies are looking [..] at some of the issues. Off shoring, we're approximately there. In other words, we were looking at it as it happened. We will probably have data before the industry has, not in the survey sense but in analytical analysis of the data."

Table 37: Changes in the value of relevance over time.

8 General Assessment

"The strength of the discipline [..] is, we have established our scholarly legitimacy and we have established the fact that there is a demand for our students [and] Information Systems [..] does serve a valid presence in a business school." (Robert Zmud)

"The weakness is largely that we have neglected the practitioner community and we've done so at our peril." (Rudy Hirschheim)

Motivation

The interview discussions close with the general evaluation of the discipline, including strengths and weaknesses as well as a forecast for future developments and recommendations for the future.

8.1 Central strengths and weaknesses

Research question

We intend to give an overview and discuss the central strengths and weaknesses given in the interview discussions as summary of the current status of the discipline.

Results: answers to research question

From the different strengths and weaknesses mentioned, diversity is the only issue that is mentioned as strength and weakness alike (see Table 38). Diversity per se, i.e. the willingness to accept new ideas and to apply new approaches, is – by two researchers – viewed as a central strength of the discipline. Furthermore, it is argued that openness to new ideas is a strength, because it allows attending to the changing phenomena in a rapidly changing technological environment. On the other hand, diversity represents a weakness of the discipline, because lack of interest, "attention", "true understanding" and "trust" between sub-fields has lead to a fragmented research community.

Further strengths relate to the fact, that IS has now established legitimacy on different levels (see Table 39). In the business school context the IS discipline has established a "scholarly legitimacy", and demand for students; additionally, IS is accepted as a vital business function and the technology orientation allows differentiation from other disciplines at business schools. In the broader academy the size and acceptance of the IS field is a strength; focus on academic work and highly regarded academic journals represent further strengths in the academy.

In addition to the problem of dealing with diversity in the research community, various weaknesses are mentioned, including the following (see Table 40):

- Research lacking relevance to practice: having "neglected" the practitioners' community now impedes getting access to corporations for empirical studies.
- Too long publication cycles: it takes up to three years to publish a journal paper, so that published papers are frequently out of date and "we publish history".
- Inadequate perception of the discipline's identity from the outside: the content, subject and objectives of the research field of IS are still not communicated (or perceived) adequately to (by) university institutions and students.

Diversity and openness as a strength per se
"I think a simple strength is this notion of change and acceptance of change, and the willingness to accept new ideas and apply open systems ideas to the field, not just to technological systems. [..] And people who are more flexible, more willing to adapt to change, more willing to tolerate ambiguity, more willing to accommodate new ideas, I think are self-selecting to IS. I think, that's a very great strength in the field."
"The central strength, I think, is diversity and benign tolerance. So I think, the strengths we have is we allow many flowers to bloom. [..] We've actually supported a multiplicity of research styles, research topics, different groups and that's a core strength of the group."
Diversity as a strength because it allows attending to constantly changing phenomenon
"I think that we're a phenomenon based field, and that's [..] what makes our field exciting, because the phenomenon is constantly changing. [..] I think, that we're a diverse and inter-disciplinarian area of interest. I think, that's a strength because, again, there is so much you can draw and [..] as a field we're more open to affording new ideas than other fields, in my opinion."
Diversity as a weakness
"[the different communities'] inabilities to truly understand each other and through a collective understanding be able to communicate as a group who they are and what they do is a weakness."
"I think, [that we're a diverse and inter-disciplinarian area of interest] is also a weakness because there are so many of these areas that people can go off and just do their own little thing without paying any attention."
"I think, another weakness is the fact that we represent a very diverse and at times fragmentary community to outside people as well as inside the discipline itself, in the sense that there is mistrust across the different sub-disciplines of IS."

Table 38: Diversity as strength and weakness.

Legitimacy at business schools	**Legitimacy in the broader academy**
Scholarly legitimacy and practice/student demand: "The strength of the discipline, I think, is we have established our scholarly legitimacy and we have established the fact that there is a demand for our students, both by the students and by companies. [..] And we've established, in many cases, that Information Systems, particularly understanding and being able to exploit the enabling role by IT, does serve a valid presence within a business school."	Size and acceptance in the academic community: "I think the strength is that we have now reached a critical mass. There are enough people who do this that we're no longer oddballs. [..] Within the academic community we are accepted as part of the furniture."
Differentiation from other business school disciplines through technology orientation: "the central strength, at least politically is, that we've always been able to address problems from the standpoint of the knowledge of the technology. And that has been my view of what we bring when we study topics or when we teach, that typically the other disciplines don't."	Highly regarded journals: "I think the fact that we have at least a couple of journals that are highly regarded, whether they should be or not is a different issue, is important and that those journals have a cumulative tradition."
IS as a vital business function: "I think the strength in this context is that it is connected to and serves a vital business function."	Focus on academic work: "I think we're starting to see a large number of academics tending to their knitting. That is, they're spending their time being in academia and they're not spending their time on the road as consultants. I think that creates strength."

Table 39: Strengths of the IS discipline.

Lack of relevance to practice
"The weakness is largely that we have neglected the practitioner community and we've done so at our peril. And I think, it's only now starting to hit home of just what this means. We're not able to get access to corporations any more and this is a problem that's been affecting us the last couple of years; a bunch of doctoral students can't get access. By neglecting the practitioner community, we've now hurt ourselves in terms of our own research."
Too long publication cycles
"I think that one of the worst weaknesses as a field is that it takes us so [..] long to publish. [..] We are in a field in which the field changes faster than our publication cycle. That being the case, our publication cycle is out of whack with the field and that's why we lose relevance. [..] Their turn-around time for revision is slow [..]. And the next thing we know is that we publish history. So I think this is a major weakness, that we're publishing too much history, not enough relevance." (giving the example of ISR taking 3 years to publish and CAIS taking only 4 months)
Inadequate perception of the discipline…
… by institutions: "The weaknesses are that we still haven't communicated well enough to our institutions what exactly IS is." … by business schools: "I think the major weakness is, at least in schools of management, that we're not perceived as a single discipline, that our research runs across multiple disciplines." … by students and colleagues: "The weaknesses are in defining the content of the field in such a way that students understand, that they need to understand it well to be successful as accountants, as marketing personnel, etc. and to define the course content in such a way that it becomes very relevant and meaningful. Our weakness is essentially at the entry level, our interaction with the other students and the other professors."

Table 40: Weaknesses of the IS discipline.

8.2 Future developments and recommendations

"We may not be educating as many programmers. But there will still be a strong need for faculty in this area." (Jack Rockart)

8.2.1 Forecasts

Research question

The IS field investigates a rapidly changing subject of research. Against this background and the status of the field as discussed in the previous sections, we want to discuss possible forecasts of future developments.

Results: answers to research questions

The answers cover aspects of the external environment as well as forecasted changes of the discipline itself (see Table 41). The following discipline internal aspects are mentioned:

- It is predicted, that the field is moving outside of business schools, e.g. to "schools of information". Another forecast states that some of the issues currently discussed in the field will get diffused into other disciplines.
- It is suggested that problems could arise from IS faculty being of similar age, so that a large group of IS researchers will "retire at the same time"
- On interviewee argues that the IS function will not be outsourced completely due to its complex relationships with other business function, hence student numbers in IS will still be high and there will still be a need for faculty in the IS area.

Several developments are forecasted for the environment that possibly affect the IS discipline:

- Rapid technological advances.
- An increase in governmental regulations that impact (business) usage of IT.
- The field of IS will become more international, especially with input from Asia, so that the U.S. might lose its prominent role in shaping the field.
- The offshoring movement will pose new challenges on the IS field. But it is argued, that the IT/IS management function will still be vital for businesses.

Internal aspects	External aspects
"the field seems to be moving outside of schools of business" "[parts of IS are] getting diffused into different disciplines [but] we will have this intellectual discipline in schools of management, [..] we'll still be there." "So many of us are of a certain age and we're all going to retire at the same time and I think that could actually be more of a problem in our field than in others." "I think we will still be educating a lot of students. Even if, as it will happen, a lot of the work is outsourced to India and China, there will still need to be a core understanding in the companies about what IT is all about. How it can improve management in a company. [..] We may not be educating as many programmers. But there will still be a strong need for faculty in this area."	"rapid advances in technology" "more government regulations [will] impact IT more severely in the future than it has in the past in the States" "I think the United States primarily was the main force in creating this field, and certainly with creative work done in Europe especially, but will we continue that? I don't know. There are indications that there's heavy [competition]. Singapore is going to have the emphasis on it. India I guess, a great emphasis on this field [and maybe] China. We've already seen what Japan was able to do in a short period of time. We may not be in this long term good shape, as a nation, as the US." "[Offshoring is] a pretty significant movement [..] many in the IS academic community are ignorant of [those] real challenges that exist in the community for its long-term survival" "The IS function manages a lot of resources [..] we'll offshore some things, but any company that off shores too much is going to go into bankruptcy"

Table 41: Forecasts concerning the discipline and its environment.

8.2.2 Recommendations

Research question

Throughout the interviews a number of issues that the interviewees attributed potential for improvement have been mentioned. We want to finalize the interview discussion, by pointing out the explicit recommendations given for the future development of the IS field.

Results: answers to research question

The recommendations relate to teaching, research, and institutional politics in the IS context (see Table 42). It is suggested by several interviewees, that efforts are necessary to re-new the curriculum, partly as a way to cope with the offshore challenge. The discipline's ability to adapt to change is emphasised as strength, which we should focus on in the future. Another one expresses his view point that it is essential for IS faculty to "keep up with technology". Also relating to the difficulty of fast changing technology, one researcher points out that it is necessary to significantly reduce cycle times for publications. Another interviewee suggests not to focus too much on technology, but to consider "management of information" as the root of the field.

It is recommended that the IS discipline should "turn around the [fallacious] perception" that IT doesn't add value as stated in the HBR article by Nicholas Carr [Carr03]. This would require to "get practice involved", but is necessary, because otherwise the discipline will become irrelevant.

Because of his concern that IS faculty are not politically embedded within the University institutions one interviewee demands more involvement in academic institutions; he recommends more senior IS faculty to engage politically in the Universities, by becoming deans for example.

Other recommendations include better linking with other business functions ("I think we need to link, as we have, to other parts of the organization") and the general recommendation to do "good research".

Teaching – new curriculum
"New skill sets are necessary [such as outsourcing, and customization of vendor-supplied systems.]"
"The traditional ways of teaching students IS have not well prepared them to deal in this new environment with lots of functions that were traditionally run internally being outsourced. We need to manage that and to retain one's technological understanding even though you have outsourced the functions that used to provide that technological understanding."
"We would really benefit from a clean sheet curriculum" (also suggesting to take into account requirements of different groups, specialists and companies, e.g. Accenture and GM)
"[We need to] keep up with technology [..] We can't just dust off last year's notes and go into the class."
Research
"We have been very good at adapting to change. We need to continue to make that a hallmark."
"Keep up with technology"
"[We need to] get out of the social science model because time is relevant [we cannot – as we used to – assume] that the current technology is technology forevermore."
"[We should] go back to our roots: [..] the management of information, [because] technology is necessary but not sufficient to complete the field."
"Turn around the [fallacious] perception [that IT doesn't add value] [..] Because if we don't succeed in turning that perception around, then we really are irrelevant; we really are going to have a real problem."
Institution politics
"We really have not embedded ourselves politically within the institutions on which we depend on. [..] There are very few deans who have an IS background, as an example. Why aren't IS people attracted to those roles?"

Table 42: Recommendations.

8.3 Summary: assessment by discipline members

Table 43 provides an overview of the assessment of the current status of the discipline described in the previous subsections. The recommendations reflect the concerns and currently perceived needs for improvement in the discipline. While diversity is seen as strength and weakness alike, it is recommended to maintain a topical diversity reflecting the rapid technological changes in the future. Having achieved legitimacy in business schools is seen as a major strength, but the forecasts related to possible future institutional changes support the recommendation to engage more politically at one's school and to keep the technology-orientation as a unique feature of IS in business schools. Legitimacy in the broader academy is seen as strength of the discipline, but at the same time improper perceptions by other disciplines create the need for improvement of the picture of IS as seen

by other disciplines. Too long publication cycles are assessed as drawback of IS publishing policies, because of rapid technological advances; therefore, it is suggested to decrease publication cycle times. The importance of student demand is reiterated by the consensus that the IS curriculum has to be revised; this is further supported by the forecasts concerning the external environment, including rapid technological development, outsourcing and offshoring movement as well as an increasing number of government regulations in the IS/IT area. The identified weakness of lacking relevance to practice is – surprisingly – not directly reflected in any recommendation.

Strengths	Weaknesses	Forecasts	Recommendations
Diversity as strength	(current dealing with) diversity as weakness	Rapid technological development	Adapt to change / keep up with technology (topical diversity)
Legitimacy in business schools (student demand, technology orientation, IT valid business function)		Moving outside business schools IS getting diffused in other disciplines	More political engagement at schools, Adapt to change / keep up with technology
Legitimacy in broader academy (size, journals, academic work)	Inadequate perception by other disciplines		Improve perception by other disciplines
	Too long publication cycles	Rapid technological development	Faster publication cycles
Student demand		Rapid technological development Global competition, Outsourcing, offshoring More government regulations	New curriculum Focus on management of information
	Lack of relevance to practice		

Table 43: Overview of strengths, weaknesses, forecasts, and recommendations.

9 Summary and Conclusions

The interview interpretation presented covers a wide range of issues concerning the development and status of the IS discipline. All hypotheses that had been developed in advance could be supported (for an overview see Table 44 on page 61). To summarize the results of our work, we start by looking at what we call the research culture in IS. A research culture can be understood as representing values and norms that influence or determine the behaviour and actions of the researchers in a discipline or in a sub-community of the field.

It is obvious, that publications play a major role in the research culture of IS; this is vividly described in the statement: our research objective is "to get published." This "publish or perish" attitude, however, can be observed in other disciplines as well. It is, therefore, important to identify what defines valuable research in the field. The general stakeholders in IS, who (could) define criteria for valuable research are: businesses, tenure committees, university administrators, and other business school faculty.

Dependence from business schools

We have seen that there is a high dependence on the requirements set by business schools, which is limiting the self-reliance of the IS field and IS faculty in setting research standards. The need for justification of – or defending – the field of IS towards other business school faculty and administrators is underlined by the low esteem in the eyes of related disciplines, even until today (see section 5.2). This dependence has led to a focus on scientific rigor in IS research in order to fulfil business school standards of research. Consequently, valuable research in IS is characterized as follows: Quantitative empirical research methods are the "gold standard" (see section 4.3). Scientific rigor is emphasized following the natural science model of research (see section 3). Relevance to practice is considered less important (see section 4.2.2). Having followed these expectations, the establishment of IS in the business school context is considered a major strength of the discipline today (see section 8.1).

Little self-confidence

A certain level of self confidence and academic credibility of IS is based on rigorous research published in respected journals; additionally, high student numbers have improved support from business school administrators and deans (see section 3 and 8.1). However, different aspects indicate that the actual self confidence of IS is rather limited: As reported by one interviewee, few IS faculty are willing to serve as deans at their schools (see section 8.2.2). There is no significant number of IS researchers involved at NSF (see section 5.5). Particularly recently, there is the concern of IS being diffused into other disciplines (see section 8.2.1). Frequent and ongoing debates on research methods and subjects of research underline the discipline's concern for more acceptance and academic credibility (see section 4.4). Furthermore, IS not being understood and being wrongly perceived by other disciplines, is (still) considered one of the major weaknesses of IS (see section 8.1).

Close cooperation with practice in earlier days

Business enterprises are particular stakeholders of the IS discipline. The history of alignment with practice has started with intensive cooperation and exchange with practice. Because industry was "ahead", IS researchers had to be relevant to create acceptance for their research. From today's perspective it is even stated that: "we were too relevant" in the early days (see section 7.4). Major grants by IBM seem to have influenced IS research in the early days, additionally SIM helped to get ICIS started in the 1980s (see section 3). Furthermore, the professionals association DPMA/AITP has been involved in the curriculum development processes since the 1980s. These are further indicators for close relationships to practice in the beginning of the field.

Practice alignment lost reputation

The growing up discipline is characterized by less cooperation and alignment with practice demand. Relevance has been dominated by rigor in order to fulfil the expectations on good research as set by business schools[1] (see section 7.4). Statements on the current status of the field indicate that demand for graduates has been the primary incentive for companies to cooperate in terms of providing access to real-world data for empirical studies. Hence, recently declining demand for graduates has increased the difficulty of getting access for research projects (see section 8.1).

Alignment with practice not only entails cooperation with practice, but also producing research results that are "useful" for practitioners, as Keen put it: the IS field "is intended to influence action in some domain" ([Keen91] p. 27). Our study results indicate that there are no research results that have had a significant impact on business practice (see section 3). This is supported by various authors who point out, that positivist and empirical research in IS has not led to any research results that impacted practice (see articles in MISQ Vol. 23 No1, 1999).

While alignment with practice is said to have improved recently, the general assessment of the discipline (still) includes lack of relevance to practice as a major weakness of the field (see section 8.1). However, none of the interviewees explicitly included improving alignment with practice as one of their recommendations for the discipline's future development (see section 8.3).

Research centers: a different research culture?

Research centers, to a large extent or completely funded by corporations, have the opportunity to develop a different research culture: funding firms are the major stakeholders, thus enabling more independence from business school requirements. This independence might lead to more self-confidence regarding the value of one's research in general, because of its alignment with requirements for corporate stakeholders. But still, in order to proceed in an academic career you have to confirm to the criteria set by tenure and promotion committees typically consisting of business school faculty. Such contrasting expectations often lead to opportunistic behaviour as described by one interviewee:

> "A lot of faculty members view that, well I'm going to have to put my nose to the grindstone and do these little trivial things, and do ten of them, so I get tenure, and then I can work on the really interesting stuff. I think our system encourages it, if not demands it."

It is obvious that scientific (or research) processes and results require criteria that allow discrimination against non-scientific work. Multiple authors in philosophy of science have discussed these difficulties and suggested approaches and criteria that allow discrimination. Hence, IS claiming to be an academic research discipline cannot just follow the requirements of practice, because then IS might not be discernable from private companies, such as consulting firms, and would lose its distinguished scientific assignment.

IS discipline: distinguishing characteristics

If IS as an academic discipline has a distinguished scientific assignment, we should be able to identify or determine

- its unique subject of research differentiating IS from other disciplines,
- criteria for determining the quality of research, which allow IS research results to be called scientific (in a broader sense), and
- its contribution to practice, since IS is an applied science.

[1] The general shortcomings of business schools alignment with practice, in particularly faculties' lack of experience with real world businesses, has been discussed in a recent article by Bennis and O'Toole [BeO'T05].

While the institutional circumstances of IS faculty will not change as quickly, with answers to all of the three issues IS researchers can be more self-confident, knowing that their research discipline has (at least intrinsic) academic legitimacy.

Our results show that information systems in businesses and organizations are the main subject of research in IS. While this is a very broad definition, its main characteristic is clear: the application of information systems and information technology in business organizations. Because today information systems and technology penetrates nearly every business process and activity, it is likely that other business management disciplines take into account influences of information technologies as well (see section 8.2.1). Therefore, in order to distinguish the IS subject of research from other disciplines, we suggest to make the combination of IS/IT characteristics and the organizational or business context the unique feature of IS research topics (cf. discussion on the IT-artifact in [Orla01]).

We have seen that, currently, the primary criteria for differentiating IS research from non-scientific work are based on the assumptions of positivist empirical quantitative research approaches. While these approaches are well accepted in the natural sciences, their adequacy for the social sciences is frequently questioned. We do not aim at providing a solution for this problem, but to point out additional approaches, which have also been discussed previously in literature. Discussions on hermeneutic or interpretative research (qualitative approaches) have already been led in IS (see section 4.4.1). Klein and Myers, for example, suggest criteria for assessing interpretive field studies in IS [KlMy99]. Because information systems are a vital part of the research subject of IS – themselves exemplifying constructions, which to a certain extend shape reality – it is reasonable to consider construction oriented research approaches as well. In section 4.4.1 we describe that 'design'-oriented approaches are currently not accepted as research methods in IS but are – at least by some interviewees – viewed as the "future" of IS research. Discussions on the value of design oriented research for IS can also be found in the literature (see [MaSm95], [Lee00], [HMP04]).

It was shown that IS research results have not directly impacted practice (see section 7.3). One option for research results to diffuse into and possibly impact practice is through graduates going into industry. This requires that research results are integrated in curricula and teaching. The interview results indicate, however, that research and teaching are quite separate areas, and that in IS there is a "coherence problem in what we teach and what we do research about" (see section 6.1.). Different journals used for publications and for reference in teaching are indicators of the missing coherence in research and teaching (see section 6.1.). Another option for research results to impact practice is to cooperate with practitioners in terms of research projects or through other ways of exchanging ideas, with the aim to solve particular practice problems. While it is important to confirm to some standard of scientific research – allowing differentiation from consultancies – the current status of cooperation is not satisfying: problems in business practice are used to generate ideas for research projects, but these projects do not aim at producing results for practitioners (see section 4.2.2).

Future work

As introduced in [Lang05b] another set of interviews has been performed with renowned researchers in the German IS community (*Wirtschaftsinformatik*). Future work includes the interpretation of these interview transcripts and the comparative evaluation of the respective research results. The reconstruction of the development and status of the IS discipline is augmented by a publication analysis [Lang05a], which is expected to give further insights on the subjects and objectives of research as well as the actual research methods applied.

Area	Hypothesis	Explanation
Foundations	IS has several root disciplines contributing to its development (H2.2.1)	When interpreting 'root disciplines' as the disciplinary background of early IS researchers, it was shown that there is the consensus that there is more than one root. Interestingly, the root disciplines mentioned can all be considered social sciences and organizational management sciences, but Computer Science is considered as "enabler".
	The early discipline had been perceived with little value by related disciplines (H2.3.1)	On a general basis, the hypothesis could be supported: IS was considered: not a discipline itself, too soft in its methods and not interesting by related disciplines. However, it should be noted, that on an individual basis, there are IS researchers who are particularly well respected by researchers of other disciplines.
Legitimacy	Efforts for increasing legitimacy have been discussed in the discipline on a broad scale, indicating a prominent role of legitimation efforts in the disciplines development (H3.1).	Supported.
	Demand by practitioners for graduates, and in this way by students has largely contributed to the disciplines legitimacy (H3.2).	It was stated quite clearly that student demand was important for increasing legitimacy, in particular, at business schools. However, additionally, the results show that improving the quality ('rigor') of research methods and establishing highly respected research results has been attributed very high relevancy for contributing to the discipline's legitimacy as well.
Profile	Information systems in businesses and organizations are the main subject of research in IS (H4.1.1.)	Information systems in business organizations are considered the main subject of research with emphasis on the support of organizational activities and processes.
	Explanation in terms of identifying causal relationships to explain a phenomenon plays an important role in IS research (H4.2.1).	Explanation is the most important research objective in IS, while description used to be more important and construction/design is gaining importance in IS research.
	Construction or design research plays a minor role in IS (H4.2.2).	This hypothesis can indirectly be supported, since it was stated that design has "fairly significant impact" in American IS research, and was only "valued in some marginal areas".
	Positivist, behaviourist (quantitative) research methods determine the set of accepted research methods in IS (H4.3.1)	Supported.
Teaching	Demand from industry for graduates has significantly determined the attractiveness of the IS degree. (H6.4.1)	Supported.

Table 44: Overview of evaluated hypotheses.

10 References

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Appendix A: Interviewees

Interviewee (Source)	Educational background	Current employment
Gordon B. Davis	Ph.D. in business administration from Stanford University, 1959	Professor of Management Information Systems, Carlson School of Management, University of Minnesota
Paul Gray	Ph.D. in Operations Research from Stanford University, 1969	Professor Emeritus and Founding Chair of Information Science at Claremont Graduate University. (retired in May 2001)
Rudy Hirschheim	Ph.D is in Information Systems from the University of London, 1985	Professor of Information Systems at the Information Systems and Decision Sciences Department of the E. J. Ourso College of Business Administration at Louisiana State University
William R. King	PhD in Operations Research, Case Institute of Technology (now Case Western Reserve University), 1964	University Professor of Business Administration at the Joseph M. Katz Graduate School of Business, University of Pittsburgh
M. Lynne Markus	PhD in Organizational Behavior from Case Western Reserve University, 1979	John W. Poduska, Sr. Professor of Information Management at Bentley
Richard O. Mason	Ph.D. in business administration from the University of California, Berkeley, 1968.	Professor of Management Information Sciences at the Edwin L. Cox School of Business at Southern Methodist University.
John F. Rockart	Ph.D., Massachusetts Institute of Technology, Sloan School of Management 1968	Senior Lecturer of Information Technology, Emeritus at MIT Sloan School of Management
Robert W. Zmud	Ph.D. from College of Business and Public Administration, University of Arizona (major: management, minor: quantitative methods; Computer Science) , 1974	Professor and Chair in MIS at the Michael F. Price College of Business, University of Oklahoma

Table 45: Educational background and affiliation of interviewed IS researchers.

Sources (access on Dec. 6th 2005)**:**

Gordon B. Davis: http://misrc.umn.edu/faculty/

Paul Gray: http://www.cgu.edu/pages/2237.asp

Rudy Hirschheim: http://projects.bus.lsu.edu/faculty/rudy

William R. King: http://www.katz.pitt.edu/fac_pages/King.htm

M. Lynne Markus: http://web.bentley.edu/empl/m/lmarkus/

Richard O. Mason: http://faculty.smu.edu/rmason/Mresume.html

John F. Rockart: http://web.mit.edu/afs/athena.mit.edu/org/c/cisr/www/html/rockart.html

Robert W. Zmud: http://faculty-staff.ou.edu/Z/Robert.W.Zmud-1/

Appendix B: History of model curricula in IS

Year	Level	Organization(s)	Source
1972	Graduate	ACM	Ashenhurst, R. L. (Ed.) 1972. "A Report of the ACM Curriculum Committee on Computer Education for Management: Curriculum Recommendations for Graduate Professional Programs in Information Systems." Association for Computing Machinery, Inc., 1972.
1973	Undergraduate	ACM	Couger, J. (Ed.) 1973. "Curriculum Recommendations for Undergraduate Programs in Information Systems," Communications of the ACM, Volume 16, Number 12, December 1973, pp. 727-749.
1981	Undergraduate	DPMA	DPMA. 1981. DPMA Model Curriculum, 1981. Park Ridge, Illinois: Data Processing Management Association. (original source not available, information from the [TFG+03] appendix.)
1983	Graduate/ Undergraduate	ACM	Nunamaker, Jay F., J. Daniel Couger, and Gordon B. Davis. 1982. "Information Systems Curriculum Recommendations for the 80s: Undergraduate and Graduate Programs," Communications of the ACM, Volume 25, Number 11, November 1982, pp. 781-805.
1984/ 85	Undergraduate	DPMA	Different curriculum recommendations (no original source available, information from the [TFG+03] appendix).
1990	Undergraduate	DPMA	Herbert E., Jr., and David L. Feinstein (Eds.) 1991. IS'90: The DPMA Model Curriculum for Information Systems for 4 Year Undergraduates. Park Ridge, Illinois: Data Processing Management Association.
1990	Undergraduate	ACM, IEEE	ACM/IEEE Computing Curriculum for Computer Science for Undergraduates (no original source available, information from the [TFG+03] appendix.)
1995	Undergraduate	ACM, DPMA, AIS	Longenecker, Herbert E., David L. Feinstein, and John T. Gorgone 1994. "Development and Review of IS'95 — A Joint Curriculum of DPMA, ICIS/AIS, and ACM for Four Year Information Systems Programs." Proceedings of the International Academy for Information Management, 1994, p. 1 (not available), Progress Report in: John T. Gorgone, J. Daniel Couger, David Feinstein, George Kasper, Herbert E. Longenecker: "Information systems '95 curriculum model: a collaborative effort", ACM SIGMIS Database, Volume 25 Issue 4, November 1994.
1997	Undergraduate	ACM, AIS, AITP	Couger, J. Daniel; Davis, Gordon B.; Gorgone, John T.; Feinstein, David L.; Longenecker, Herbert E.: IS '97: model curriculum and guidelines for undergraduate degree programs in information systems, The DATA BASE for Advances in Information Systems, Volume 28, No. 1 (1997), pp. 101 - 194
2000	Graduate	ACM, AIS	Gorgone, John; Gray, Paul: MSIS 2000: model curriculum and guidelines for graduate degree programs in information systems, Communications of the Association for Information Systems, Volume 3, No. 1 (2000)
2002	Undergraduate	ACM, AIS, AITP	[TFG+03] Topi, Heikki; Feinstein, David L.; Gorgone, John; Davis, Gordon B.; Valacich, Joseph S.; Longenecker, Herbert E.: IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems, Communications of the Association for Information Systems, Volume 11, No. 1 (2003), see also http://192.245.222.212:8009/IS2002Doc/Main_Frame.htm
current	Undergraduate	ACM, AIS, IEEE	Draft, see http://www.acm.org/education/curricula.html

Table 46: History of model curricula in IS

The Institute for Computer Science and Business Information Systems (ICB), located at the Essen Campus, is dedicated to research and teaching in Applied Computer Science, Information Systems as well as Information Management. The ICB research groups cover a wide range of expertise:

Research Group	Core Research Topics
Prof. Dr. H. H. Adelsberger Information Systems for Production and Operations Management	E-Learning, Knowledge Management, Skill-Management, Simulation, Artificial Intelligence
Prof. Dr. F.-D. Dorloff Procurement, Logistics and Information Management	E-Business, E-Procurement, E-Government
Prof. Dr. K. Echtle Dependability of Computing Systems	Dependability of Computing Systems
Prof. Dr. S. Eicker Information Systems and Software Engineering	Process Models, Software-Architectures
Prof. Dr. Ulrich Frank Information Systems and Enterprise Modelling	Enterprise Modelling, Enterprise Application Integration, IT Management, Knowledge Management
Prof. Dr. M. Goedicke Specification of Software Systems	Distributed Systems, Software Components, CSCW
Prof. Dr. T. Kollmann E-Business and E-Entrepreneurship	E-Business and Information Management,E-Entrepreneurship/ E-Venture, Virtual Marketplaces and Mobile Commerce, Online-Marketing
Prof. Dr. B. Müller-Clostermann Systems Modelling	Performance Evaluation, Modelling and Simulation, SAP Capacity Planning for R/3 and mySAP.com, Tools for Queueing Network Analysis and Capacity Planning, Communication Protocols and Distributed Systems, Mobile Systems
Prof. Dr. K. Pohl Software Systems Engineering	Requirements Engineering, Software Quality Assurance, Software-Architectures, Evaluation of COTS/Open Source-Components
Prof. Dr.-Ing. E. Rathgeb Computer Networking Technology	Computer Networking Technology
Prof. Dr. R. Unland Data Management Systems and Knowledge Representation	Data Management, Artificial Intelligence, Software Engineering, Internet Based Teaching
Prof. Dr. Stephan Zelewski Institute of Production and Industrial Information Mangement	Industrial Business Processes, Innovation Management, Information Management, Economic Analyses

For more information visit us on the Web: **http://www.icb.uni-due.de**

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