Preface

Introduction

The International Federation for Information Processing (IFIP) is a non-profit umbrella organization for national societies working in the field of information processing. It was founded in 1960 under the auspices of UNESCO. It is organized into several technical committees. This book represents the proceedings of the 2008 conference of technical committee 8 (TC8), which covers the field of information systems. TC8 aims to promote and encourage the advancement of research and practice of concepts, methods, techniques and issues related to information systems in organisations. TC8 has established eight working groups covering the following areas: design and evaluation of information systems; the interaction of information systems and the organization; decision support systems; e-business information systems: multi-disciplinary research and practice; information systems in public administration; smart cards, technology, applications and methods; and enterprise information systems. Further details of the technical committee and its working groups can be found on our website (ifiptc8.dsi.uminho.pt).

This conference was part of IFIP's World Computer Congress in Milan, Italy which took place 7-10 September 2008. The occasion celebrated the 32nd anniversary of IFIP TC8. The call for papers invited researchers, educators, and practitioners to submit papers and panel proposals that advance concepts, methods, techniques, tools, issues, education, and practice of information systems in organizations. Thirty one submissions were received. All submissions were rigorously refereed by at least three reviewers and following the review and resubmission process, less than half of the submissions were accepted. The current proceedings reflect not only the breadth and depth of the work of TC8, but also the international nature of the group - the authors come from 10 countries and 5 continents.

The Information Systems discipline has often reflected about the issues addressed in this conference. This has been most noticeably undertaken by TC8's WG8.2 – for example, at its 2000 Working Conference on Organizational and Social Perspectives on Information Technology, and, more recently, in 2004 at its 20th year retrospective, Relevant Theory and Informed Practice. This is, however, is the first time that TC8 as a whole is addressing issues of research, education, and practice, and therefore, a milestone in its own right. It is the hope of the organizers that this conference responds to the call of Hirschheim and Klein in their 2000 paper on "Information Systems at the Crossroads: External versus Internal Views," where they pointed out that "the current publication culture of narrowly focused, highly specialized papers is one of the major impediments to making our research more relevant to practitioners. We simply must attempt the difficult, but invaluable, syntheses that pull together research results from the various sub-communities into broader analyses of potential interest to practitioner communities."

The 15 papers in this volume cover a broad spectrum, and in order to provide a structure for the presentation of the papers at the conference itself, we made an attempt to classify the papers, and we followed this classification in this volume. We realise that it is never straightforward to classify a set of papers. Any classification imposes a certain mental compartmentalisation of the material at hand, and (potentially) destroys the relationships between the component parts of the whole. We ask the reader to discover the integrated whole of the proceedings as an exercise in hermeneutical analysis! Our classification of the papers is as follows: Information systems education; New perspectives on information systems development; Defining, modelling and diffusing information systems projects; Knowledge management and business intelligence; and Applications and emerging technologies.

Before introducing the papers in the proceedings, we would like recognize our two very special keynote speakers. Both look at our conference theme with the overall umbrella of professionalism. Information systems is no longer 'the new kid on the block,' and we no longer have the luxury of "beginner's errors." We must attain

professional standards in our research, education, and practice commensurate with societies' dependence on the systems we build. Bill Olle exemplifies this professionalism and indeed he has every right to be seen as the 'organizational knowledge' of TC8 as he was an early pioneer in our field as well as being a consistent contributor to the group's work over the years. His keynote paper is entitled *reflections on 50 years of computing: impact of professionalism on teaching, practice and research* and these reflections form an ideal base on which to build our conference.

Our second keynote speaker turns our attention to the future with his vision of tomorrow's IS professional. As chair of the IFIP International professional practice partnership, Charles Hughes is leading an effort to build a global standard of IT knowledge, experience, competency, and integrity. His talk is entitled *The IFIP International professional practice partnership: Transforming and informing IT professional practice.*

Information Systems Education

Our first group of three papers have been categorized as IS education, though the papers can be seen also as covering the discipline of information systems as a whole as they discuss the links between teaching, research, and practice. The first paper by Jorma Riihijärvi and Juhani Iivari is entitled *the practical relevance of IT education: skill requirements and education expectations of practitioners.* This paper suggests two interpretations of the practical relevance of IT education at the university level: the congruence between skill requirements of IT experts and the skills provided by the education on the one hand and the practitioners' expectations concerning these skills on the other. A questionnaire study shows significant differences between what is provided compared to what is expected.

The second paper by Juhani Iivari, Rudy Hirschheim and Heinz K. Klein is entitled *challenges of professionalization: bridging research and practice through a body of knowledge for IT specialists.* This paper suggests that the interpretation and development of IT occupations as knowledge work might provide a more realistic avenue to

proceed towards more professional practice in the IT field than the ambition of trying to establish them as true professions. The idea of knowledge work leads the authors to focus on a distinct body of knowledge for IS professionals. The paper discusses how the gap between research and practice could be bridged by making IT research more sensitive to practice.

The final paper in this category is *mapping research questions to research methods* by Pertti Järvinen. In information systems there is a wide range of research methods available. Yet selection of a research method appropriate to the research question remains a problem. The author supplements the well-accepted IS research methods with some important amendments like mathematical approaches, theoretical studies and the dissensus and consensus views, and he presents instructions on how to select a suitable research approach given a research question.

New Perspectives on Information Systems Development

Our second category of papers, that of new perspectives on IS development has sometimes been seen as the core of the discipline and has been a main concern of two of TC 8's most well-established working groups, on the design and evaluation of information systems (WG 1), and the interaction of information systems and the organization (WG 2).

The paper of Jan Pries-Heje, Linda Levine, Richard Baskerville and Bala Ramesh entitled *advances in information systems development: from discipline and predictability to agility and improvisation* discusses how the process of IS development has changed over the years. When information systems development (ISD) was coined as a term and evolved into a research area we lived in a largely industrial economy. This traditional universe placed high value on discipline and predictability for its own sake. In the 1990s several new trends began to question and challenge the traditional view. Specifically, Internet marketplaces created a new environment for information systems development, and novel approaches such as

agile methods emerged. In their paper, these authors present an analysis of empirical findings showing how new principles and practices have come to exist in a parallel economic universe with increased emphasis on agility and improvisation.

The paper by Jens-Magnus Arndt, Thomas Kude and Jens Dibbern, *the emergence of partnership networks in the enterprise application development industry: a global corporation perspective*, points out that within the IS development industry, incumbent system developers (hubs) are increasingly embracing partnerships with less well established companies acting in specific niches (spokes). This paper seeks to develop a better understanding of the motives for this strategy. Relying on existing work on strategic alliance formation, three categories of capabilities are identified and analyzed through a single-case study. The case represents a market leader in the global IS development industry, which fosters a network of smaller partner firms. The study reveals that temporal dynamics between the identified factors exist in these networks. A cyclical partnership model is developed that attempts to explain the life cycle of partnerships within such a network.

In the paper by Tuure Tuunanen, Michael Myers and Harold Cassab entitled *challenges of consumer information systems development: the case of interactive television services*, the authors suggest that a new type of information system appears to be increasing in importance, that of consumer information systems. Compared with traditional information systems development approaches, where the focus is on improving the efficiency and effectiveness of organizational processes, the design of consumer information systems focuses more on the enjoyment, pleasure and purchases of the consumer. The authors argue that the shift in focus from users to consumers in consumer information systems calls for a significant re-appraisal of our current information systems development methods. Hence, this paper proposes a new research agenda for IS researchers using design science research and enabling a more holistic evaluation of consumer information systems.

Defining, Modelling and Diffusing IS Projects

Ronell Alberts and Vreda Pieterse assert that diffusion of information technology in a developing world context is difficult due to the fact that most of the targeted communities are in market neglect environments. In their paper, *improving diffusion of Information Technology in communities in a developing world context,* they characterize market neglect environments as those that fail to make a economic market and have an economic impact because the prospect for immediate or even intermediate return on investment is low given that the client base is small or with little economic power. Software development for market neglect areas face a number of unique challenges while at the same time needing (perhaps more than in developed economies) to produce products of high quality, on budget and on time. In their paper, the authors' aim to identify the unique problems experienced when developing for market neglect environments and to identify tools and methods needed in for software development methodology to address these problems in order to improve the diffusion of information technology in market neglect economies.

The next paper in this category is entitled *'Driving' IS projects* by Marta Fernández-Diego and Julián Marcelo-Cocho. This paper begins with a discussion of complexity and uncertainty as determinants of IS project success and the relation to 'right' and 'left' brain notions of problem solving. The authors then review different auto racing circuits as methaphors for 'driving' an IS project to completion and dealing with the accompanying complexity and uncertainty. For example, drivers on an oval track have a very different support structure and exposure to risk and complexity than do drivers on off-road rallies. These metaphors provide interesting perspectives for IS project development and management.

The paper by Viera Rozinajova, Marek Braun, Pavol Navrat and Maria Bielikova, *bridging the gap between service-oriented and object-oriented architectures in information systems development,* is the last paper in this grouping. Service-oriented architecture is

currently one of the most promising technologies in the area of information systems development, whereas the most popular development methodology of the last decade was object-oriented. The goal of this paper is to investigate the possibility of enhancing object-oriented methodology with service-oriented architecture.

Knowledge Management and Business Intelligence

During the last few years much emphasis in organisations has been given to the capture and retention of knowledge and business intelligence, and this forms the fourth of our conference themes. Our first paper in this grouping is *requirements elicitation in data mining for business intelligence projects* by Paola Britos, Oscar Dieste and Ramon Garcia-Martinez. The authors argue that there are no suitable data mining methodologies for business intelligence. They argue that the classical software engineering approach is not completely suitable for data mining for business intelligence because it neglects the requirements specification aspects of the project. The authors propose a data mining business intelligence elicitation process and show how requirements can be educed by their proposal.

William Dixon argues that little is known about how people, contexts, and tools impact decisions to use a Knowledge Management System (KMS) in his paper *social networks and knowledge management systems use in US IT services.* The purpose of his study is to understand information retrieval better when solving difficult problems. Key research questions focus on social structure, interpersonal relationships, and the nature of the KMS. In this sequential exploratory study, semi-structured interviews were conducted and questionnaires distributed in a large accounting firm. Social structure analysis showed fewer structural holes within networks among routine KMS users. Contrary to social resource theory, information was rarely sought from supervisors. Reciprocal information exchange accompanied asking for help, but not when information was retrieved from the KMS. The KMS facilitated the distribution of information and enabled learning, but was not uniformly adopted. Recommendations for practice include the strategic

designation of experts and refinement of mechanisms available for information retrieval.

Business Intelligence (BI) remains one of the top priority issues for CIOs and investment in BI technologies continues to grow. Derek Smith and Maria Crossland in their paper *realizing the value of business intelligence* attempt to understand how an organization can realize and measures the business value derived from their investment in BI. A single, in-depth case study was undertaken in a major South African financial services organization. The study found that the realization of business value from BI is highly dependent on activities that occur in all stages of the process model – from the alignment of the BI and organizational strategy to the way the business measures the benefits of BI.

Applications and Emerging Technologies

Information systems is about how the new technology fits in with people, organizations and society, and it is fitting that our last theme looks at emerging technologies that will impact us in the next few years. Lisa Seymour, Emma Lambert-Porter and Lars Willuweit discuss one such technology in their paper *towards an RFID adoption framework: a container supply chain analysis.* While the benefits of RFID (radio frequency identification) in supply chains have had extensive press, there are few publicised cases showing poor returns on investment. This qualitative study in the South African port community refines and extends an RFID adoption framework and provides insight into the factors potentially affecting the adoption of this new technology as well as the probability of adoption in that community. Four new factors not previously mentioned in research were identified: related initiatives; the integrated structure of the industry; organisational dominance with the supply chain and the supply chain culture. The research reveals that cost, the absence of a universally-adopted standard and the supply chain culture are currently the major impediments to RFID adoption in the South African port community.

The deliberations of our working group on information systems in public administration (WG8.5) is well represented in the two papers on e-government. Ilse Baumgartner and Peter Green report on a case study which focuses on the question: what are the critical factors that influence IT professionals' intention to adopt the Service Oriented Computing (SOC) paradigm? Their paper, *adoption of service oriented computing from the IT professionals' perspective: an e-Government case study,* examines the e-Government initiative in a middle-sized European city. It uses an initial SOC adoption model developed through a proceeding interview-based exploratory study. The current study has two principle aims. The first aim is to "shed some light" on the IT professionals' acceptance of such complex technological approaches as Service-Oriented Computing in the e-Government sector and to report key learning factors that emerge from the case study. Their case study also aims to bring further credibility to their first study and to validate its assertions. As such, some of the major findings of the study are the replacement of the complexity variable by the variable of maintainability, and the replacement of the trust and dependency variables (both of inter-personal rather than of technical nature) by the variable of external involvement. The results of the study also suggest the introduction of the "champion" of the approach variable.

John Krogstie looks at the reasons why the introduction of the Internet Marketplace – eHandel.no – has thus far failed to be a success in the County Municipality of Sør-Trøndelag, as compared to the original ambitions regarding usage volume for this channel. In his paper, *introduction of a public sector e-procurement solution: lessons learned from disappointing adoption,* he uses various acceptance theories to analyze why users fail to accept eHandel.no. The theories were utilized prior to the interviews in order to formulate interview questions. Afterwards the same theories were used to analyze the results. The results indicate that good product catalogues, motivated users, compulsory use of the system, and renegotiation of contracts with the suppliers are some of the most important prerequisites in order to achieve success using eHandel.no.

Further Reflections

In organizing an international conference many people put in a great deal of time and effort in ensuring its success. We first wish to recognize two colleagues, Bill Olle and A. Min Tjoa, members of IFIP Technical Committee 8 who helped us greatly in the early stages and we are very grateful for this support. The Chairs and Committee Members of the various working groups within IFIP TC8 acted as associate editors and we would particularly like to mention the help of this group and the following individuals. Neither this conference nor the proceedings can happen without the commitment of these individuals to the profession.

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A Min Tjoa
(Vienna University of Technology, AT)

David Wastell
(Nottingham University, GB)

CHALLENGES OF PROFESSIONALIZATION: BRIDGING RESEARCH AND PRACTICE THROUGH A BODY OF KNOWLEDGE FOR IT SPECIALISTS

Juhani Iivari[1], **Rudy Hirschheim**[2] **and H.K. Klein**[3]

1 Department of Information Processing Science, University of Oulu, P.O. Box 3000, FIN-90014 Oulun yliopisto, FI

2 E. J. Ourso College of Business, Louisiana State University, Baton Rouge, LA 70803, US

3 School of Management, SUNY-Binghamton, Binghamton, NY 13902, US

Abstract: This paper suggests that the interpretation and development of IT occupations as knowledge work might provide a more realistic avenue to proceed towards more professional practice in the IT field rather than the ambition of trying to establish them as true professions. The idea of knowledge work leads us to focus on the body of knowledge possessed by it specialists, which is the hallmark of all professions. The on-going debate about the practical relevance of IT research suggests that there is a significant gap between research and practice in the IT field. The paper discusses how the gap could be bridged by making IT research more sensitive to practice.

1. INTRODUCTION

A joint project of the ACM and IEEE Computer Society to define Software Engineering (SE) as a profession is perhaps the most serious attempt to professionalize an IT occupation.[1] The project proposed a guide for the SE body of

[1] There is no standard definition of IT occupations (Kaarst-Brown and Guzman 2004). Without any formal definition IT occupations are exemplified by jobs such as programmer, telecommunication specialist, database specialist, software engineer, human-computer specialist, systems designer, systems analysts, systems support, help desk, (IT) team leader,

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knowledge (SWEBOK 2004) as well as a code of ethics and professional practices (SWECOE 2000). More recently, IFIP has also started a program to promote professionalization. The IFIP Professional Practice Task Force recommends that IFIP should initiate a vigorous activity to promote professionalism worldwide (IFIP 2007). The Task Force also emphasizes that the voice of the IT practitioner should be clearly and powerfully expressed alongside other competing groups.

Whilst these goals are laudable, IFIP is somewhat silent on how to effect such professionalization, in particular when it is still an open question if the aforementioned ACM/ IEEE project will manage to establish SE as a profession with associated accreditation, certification and licensing practices.

This paper takes a positive position to "professionalization" of IT occupations as far as the enhancement of ethical principles, knowledge and expertise is concerned. However, we are much more circumspect with the enforcement aspects of professionalization, i.e. certification and licensing which would establish SE and IS as true professions. Instead, we propose that IT occupations may be developed in a professional direction by viewing themselves as knowledge work and by strengthening their underlying bodies of knowledge (BoK).

The literature on professionalization (e.g. Abbott 1988) suggests that a scientifically grounded body of knowledge is a necessary, but not sufficient condition for any profession. There should also be demand for that knowledge in practice (Collins 1990). The present paper especially focuses on the question of demand for the knowledge produced by IT research institutions. The gap between research and practice in the IT field (e.g. Osterweil, 1996; Benbasat and Zmud 1999) implies that the demand is not self-evident. So, while we encourage the IT communities to take active steps towards creating such professional bodies of knowledge, we also see it as important that the knowledge will be made more relevant for practice. Therefore our special focus is in how to bridge research and practice when specifying bodies of knowledge for IT specialists.

(IT) project manager, CIO, etc. These are often referred to as 'IT specialists'. We also assume that IT specialists earned at least an undergraduate degree in a relevant subject.

2. PROFESSIONS AND PROFESSIONALIZATION

Professions and professionalization are widely discussed in sociology. Sociologists have been particularly interested in how certain occupational groups have managed to persuade society to grant them a privileged position as a profession. Following Abbott (1988) one can identify three major traditions in the literature on professions, strands which are clearly relevant in the current efforts to professionalize IT. The first tradition refers to the early literature on professions dominated by traits of professions such as a service ideal, professional culture and associations, and what the profession stands for. The second tradition focuses on the professionalization process as a sequence of events such as establishing formal education, licensing, founding a national association, developing a code of ethics and school accreditation (Wilensky 1964). The third tradition centers on power (Larson 1977), looking at how a profession is able to achieve its privileged position and maintain it.

But what is a profession? Although there is no consensus on the necessary traits of professions, a system of characteristics such as a unique BoK, code of ethics, lengthy education, control of the entry to the profession, and high autonomy are often associated with professions. Among these the BoK is central (e.g. Abbott 1988; Macdonald, 1995).

There are a few attempts to analyze IT occupations as possible professions. Ensmenger (2000) shows that professional efforts in the computer fields have a long history, starting already in the 1950's and 1960's. Orlikowski and Baroudi (1989) claim that IS specialists (including operators, programmers, analysts and various technical specialists) cannot be considered professions. Ford and Gibbs (1996) conclude that SE as an occupation does not fulfill the traits of a profession.

It is clear that the SE professionalization project has insufficiently discussed the project from the power perspective. It is widely accepted that professionalization efforts have an ideological and political aspect of increasing the status of the occupation in question. Abbott (1988) interprets professionalization as competition between different occupational groups for jurisdiction. Professional

autonomy, emphasized by Freidson (1988), includes the right to serve as the best experts on affairs related the BoK and to decide about it, to control the education and accreditation of new entrants, and autonomy over the practical aspects of their work (Freidson 1994). Accordingly, professionalization means building 'exclusionary shelters in the market' and providing a market monopoly (Freidsonn 1988; Collins 1990; Macdonald 1995).

Professionalization as standardization of skills provides companies with one coordination mechanism (Minzberg 1983). The rise of outsourcing and especially offshore software development may also play an important role in professionalization, although at this point it is not clear whether it would be pro or con (*cf.* Sahay et al. 2003). Yet, it is questionable if companies employing IT experts are ready to support professionalization, since the exclusionary shelters may influence the labor market in a way that is not beneficial to employing companies.

In this paper, however, we do not wish to discuss the political side of professionalization of the IT occupations nor do we wish to become strong advocates for professionalization. Instead we focus on analyzing IS as knowledge work, suggesting that this is a more realistic avenue to enhance the expertise of IT specialists and thereby their "professionalism". The advantage of a knowledge work perspective is that it focuses attention on the BoK of IT specialists and the gaps between research and practice without getting involved in the political battle of professionalization, which is considered to lie beyond the scope of this paper.

3. IT OCCUPATIONS AS KNOWLEDGE WORK

One possibility for avoiding the political battle of professionalization is to have a more modest goal: to have the IT occupations recognized as knowledge work. This would have the effect of directing attention to the bodies of knowledge of IT specialists. As discussed above a scientifically grounded BoK is a necessary, but not sufficient condition for any profession.

3.1 Knowledge work

Knowledge work (KW) is difficult to define precisely because all work requires knowledge to some extent (Beyerlein et al. 1995, Pyöriä 2005) and because the concept of knowledge is ambiguous (Schultze 2000). Despite the difficulty to define KW there are a number of attempts (see Kelloway and Barling 2000). We propose four criteria to characterize KW (Iivari and Linger 1999):

(i) KW is based on a demonstrable body of knowledge (BoK),
(ii) entails working on representations (data) of the objects of work,
(iii) stipulates a deep, theoretical understanding of the objects of work, and
(iv) KW produces results, which entail knowledge as their essential ingredient.

The first characteristic emphasizes the significance of a BoK, often codified, as a resource in KW. This is consistent with Stehr's (1992) emphasis of the relational structures of knowledge-based occupations, i.e. their relation to socially constructed forms and stocks of knowledge. This underscores that knowledge workers "are not isolated individuals but derive and defend their expertise by virtue of their memberships and standing in communities of" knowledge workers.

The second characteristic emphasizes the abstract and detached nature of KW. Working indirectly through the representation of the object of work requires intellective skills (Zuboff 1988), in contrast to action-centered skills.

The third characteristic, a deep, theoretical understanding of the object of work, means that knowledge work typically requires several years' training, usually through formal high-level education. This theoretical understanding may help the knowledge worker to deal with new and exceptional cases, but in particular to adapt to changes in the objects of work, to accommodate changes in the BoK, and to adopt technologies allowing new representations of the object of work.

The fourth characteristic does not stipulate that the output of KW is perceived primarily as knowledge but that the output includes knowledge as an essential ingredient. Overall, our conception of KW views it primarily as knowledge applying work rather than as creative, knowledge producing work (Machlup 1962; Schultze 2000). Note, however, that much of the creative knowledge producing work is also knowledge applying work, and that our interpretation does not deny

that knowledge workers and even their employer organizations are learning through their work. In that sense, KW is producing knowledge, but it is not necessarily the primary purpose of the work.

Referring to the topic of the present paper, it is apparent that software and information systems development satisfies characteristics (ii) and (iv) above. The question is whether IS development is based on a systematic BoK and whether the development requires any deep, theoretical understanding of software/information systems as the objects of that work.

3.2 Bodies of Knowledge for IT specialists

A body of knowledge is knowledge of the relevant phenomena associated with KW as an activity. To our knowledge, the Software Engineering Body of Knowledge (SWEBOK) is the most ambitious attempt to define a BoK for one IT occupation. SWEBOK (2004) identifies ten knowledge areas: software requirements, software design, software construction, software testing, software maintenance, software configuration management, software engineering management, software engineering process, software engineering tools and methods, software quality.

To broaden our vision of the required potential scope of the BoK to be considered as relevant for IT specialists, we note the following recent computer curricula which have specified bodies of knowledge for five 'computing disciplines': Computer Engineering, Computer Science, Software Engineering, Information Systems, and Information Technology (Computing Curricula 2005).

Iivari et al. (2004) suggests five broad knowledge areas for IS specialists: technology knowledge, application domain knowledge, organizational knowledge, IS application knowledge, and systems development process knowledge. *Technology knowledge* refers to knowledge associated with understanding the types of hardware and software available and how and where they might be applied. *Application domain knowledge* refers to knowledge about the application domain for which an IS is built. For example, in the case of accounting information systems, the application domain knowledge relates to accounting concepts and principles. *Organizational knowledge* is knowledge "about the social and economic processes

in the organizational contexts in which the IS is to be developed and used" (Jones and Walsham, 1992). *IS application knowledge* is the knowledge about typical IS applications, their structure, functionality, behavior and use, in a given application domain. It includes the knowledge of possibilities to support activities in the intra- and inter-organizational context by IS applications in a specific application domain. *Systems development process knowledge* refers to the tools, techniques, methods, approaches and principles used in systems development.

Iivari et al. (2004) go on to describe how these five knowledge areas form a nascent BoK for IS development. In this paper, we now wish to take these five knowledge areas and see how they differ from the perspective of research and practice. In particular, we see knowledge generated through research to be more general in nature, while the knowledge used in practice is more contextual. It is apparent that there exists gaps between the general and contextual knowledge; and it is in these gaps that a more professional BoK could be of help.

4. THE RELATIONSHIP BETWEEN RESEARCH AND PRACTICE

The on-going debate about the practical relevance of IS research (see Schauer 2007 for a review) suggests that there is a significant gap between research and practice in the IS field. The SE community has also suffered a similar dilemma (e.g. Osterweil 1996).

Often the assumption in the debate is that academic knowledge does not sufficiently influence practice. This section reverses the view and looks at how practice could better influence research, contending that we in academia should pay more attention and give more respect to the experience-based knowledge of practitioners when attempting to specify a BoK for IT specialists. Indeed, Klein and Hirschheim (2008) offer a number of change strategies for academia to better take into account the knowledge possessed by practitioners. Yet, if one considers the continued problems and failures of information systems and software development, it is obvious that we cannot accept the current practice and its underlying

knowledge uncritically. To this end, we offer a framework for thinking about a BoK which embraces the knowledge generated from both research ('general' or 'theoretical' knowledge) and practice ('contextual' or 'experiential' knowledge).

4.1 Academic and practical knowledge

One of the reasons for the chasm between academia and practice is the different nature of knowledge on which they focus. Classical Greek epistemology illustrates the difference by distinguishing *episteme*, *techne*, *phronesis*, and *metis* (Baumard 1999). *Episteme* is abstract and general theoretical knowledge, while *techne* describes the practical knowledge in craft and art covering techniques and artifacts which provide methods and means to accomplish tasks.

The practice of developing and applying IT normally takes place in an organizational or inter-organizational context. *Phronesis* refers to social knowledge required in our everyday interaction with other people. Hirschheim and Klein (2003) characterize *phronesis* (or applicative knowledge as they call it) as closely related to a person's identity, emotions and interests, and rooted in one's lived experience and especially the tradition into which someone is born and into which he/she has chosen to integrate. They also point out how critical applicative knowledge is for achieving mutual understanding and consensus when developing information systems.

The practice of developing and applying IT also takes place in a dynamic context. Every situation is potentially new and unique. To address these new and unique situations successfully one needs knowledge that ancient Greeks called *metis*. Baumard (1999) translates it into "conjectural knowledge" and Spender (1996) characterizes it as cunning and shrewdness. *Metis* can be interpreted to include improvisation as situated performance where thinking and action emerge simultaneously at the spur of the moment (Ciborra 1999).

While theoretical knowledge (*episteme*) is considered the most valuable knowledge produced by research, practitioners presumably are more interested in *techne*, i.e. effective means to achieve their goals, than *episteme* as abstract theories do not inform them about effective action. Yet, to apply technology suc-

cessfully, practitioners need *phronesis* and *metis*. One should note, however, that *phronesis* and *metis* are highly situated and therefore difficult to separate from the concrete context in which they are rooted and where they emerged.

4.2. How to bridge the gap between research and practice?

We believe the challenge for the IT field is to develop a BoK which embraces both research-originated and practice-originated IT knowledge and bridges the gaps between the two. Referring to the contextuality of practice-originated knowledge (*phronesis* and *metis*) we do not see any short-term solutions to bridge the two, as it requires profound changes on both sides that can only be addressed with a long time perspective.

Schauer (2007) analyzes the relevance vs. rigor debate in IS and distills a number of recommendations from that literature. Table 1 is a partial summary of the recommendations from her work, but extends them in many ways. We note that many of the recommendations in Table 1 are not particularly novel, and that different communities as well as different regional areas and countries differ in the degree and extent to which they already follow the recommendations. The point of Table 1 is that one should be as comprehensive and systematic in the measures to bridge research and practice as possible.

5. CONCLUSIONS

Several authors have recommended that IT should emulate established professions to bridge the gap between research and practice (*cf.* Davenport and Markus 1999). While we agree that the analogy between IT and more established professions such as engineering or medicine and law is informative, one must also be conscious of essential differences between these professions and the IT field. One must keep in mind that, although medicine has become ever more dependent on technology it is ultimately concerned with the human body which has remained essentially the same for hundreds of thousands of years. The IT field on the con-

trary deals with a constantly evolving artificial world of IT artifacts, which are developed and applied in the artificial worlds of organizations and societies. Law is also concerned with a socially constructed artificial world, but the law profession is lucky in the sense that it actively constructs the artificial world called "law", i.e. the system of legal procedures, codes and precedents (Collins 1990). In the IT field, the IT experts cannot control which IT artifacts are developed and how they are applied. In fact, the IT field probably resembles engineering more than anything else. If so, it is worthwhile realizing that engineering has been much less successful in its professionalization than medicine and law (Collins 1990).

The case of engineers illustrates that the existence of a BoK and the demand for that knowledge in practice is not enough for professionalization. It requires the capability to monopolize that knowledge. The gap between research and practice in the IT field led us to wonder if there is real demand for the knowledge that the discipline provides. Therefore, in our view it is not sufficient that we specify a BoK for the IT disciplines but that knowledge should also have practical relevance. In this paper, we have specifically focused on the issue of how to bridge the gap between research and practice by making research more sensitive to practice. In conclusion, while the professionalization model might inform us on how to bridge the gap between research and practice in the IT field, the very same gap also hinders all professionalization efforts in our field.

Although we support stronger sensitivity to practice, one should not interpret this to imply that the current practice should have the right to decide research directions. From the standpoint of practice and society, research needs to have autonomy for at least two reasons. One is to play its intellectual role of fundamental criticism as defined by Etzioni (1968) and discussed in more detail in Klein and Myers (2007). The other is that research as an institution needs to develop its ideas freely so that it can be a productive contributor to the global marketplace of ideas. Yet, we believe that researchers should also always seriously assess if their research projects have any chance of producing knowledge that could affect practice. Therefore, it is extremely important that we do not bring in rigidities that jeo-

pardize the freedom of research and its potential innovativeness when attempting to develop the IT field towards more professionalization.

Table 1: Recommendations for how to bridge research and practice

Category	Recommendations
Improve conditions for relevant IT research	Promote mobility between academia and industry - recruit more faculty with industry experience in universities - provide university faculty with opportunities to have sabbaticals at business organizations - have more IT PhDs working in industry
	Change doctoral education to address better industry interests - recruit doctoral students from industry - create special doctoral programs for practitioners interested in doctoral studies - provide funding for doctoral students from industry
	Foster joint university and industry research projects - provide special funding for joint projects - simplify the bureaucracy with funding
	Encourage responsible consulting by faculty members
Conduct more relevant IT research	Strive for relevant research questions and results - joint university and industry research projects - make sure that the joint projects also have high scientific ambitions - integrate joint projects with a research program that has a longer time frame - focus on applied theory research, evaluation research, policy research and design science research
	Apply research methods that support industry participation and enable the capitalization of practical experience of researchers - emphasis on qualitative research methods - action research and constructive (design science) research
	Produce better consumable research articles - publish in both academic publication forums and practitioner-oriented outlets - write in a way that is more targeted to practitioners - organize the results in a way that is action-oriented
Increase the academic acceptance of relevant research	Reward publications in practitioner outlets Establish new publication outlets Change academic journal policies Broaden acceptable dissertation research

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