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## The German Information Systems Perspective

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# The German Information Systems Perspective

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## ABSTRACT

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*This paper provides an overview of the development of the Information Systems (IS) discipline in German universities for French readers. First, we briefly introduce particularities of the German university system which influence the IS discipline. Then we sketch the historic development of the IS discipline in Germany and describe the discipline's actual associations and most important institutions. After deliberating prevailing research topics we give a survey of the course syllabus. Finally we briefly assess the future of the German IS discipline.*

**Key-words:** IS community, Germany.

## RÉSUMÉ

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*Cet article retrace le développement de la spécialité systèmes d'information dans les universités allemandes. Nous décrivons d'abord les particularités du système universitaire allemand qui l'influence. Puis nous donnons une vision schématique du développement historique de la discipline et décrivons les associations et institutions les plus importantes. Nous exposons les principaux thèmes de recherche et le cursus suivi par les étudiants. Enfin l'article aborde la question du futur de la spécialité.*

**Mots-clés :** Communauté SI, Allemagne.

## **I. PARTICULARITIES INFLUENCING THE IS DISCIPLINE IN GERMANY**

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Four particularities of the German university system seem to be interesting concerning a better understanding of the development of the IS discipline in Germany:

First, for 30 years all major political parties have agreed to "keep the German universities open" which means that every German with Abitur (Baccalaureat) has the right to enroll in a university, without substantial tuition. Thus, as the national education policy strived to increase the numbers of Abitur-graduates, the number of students significantly went up whereas personal capacity in universities – because of costs – was enlarged only to a much smaller amount, resulting in a continuously increasing teaching overload in the universities. Especially the Business Administration discipline, in Germany regarded one of the "mothers" of IS, was and still is bothered with these problems. In the 90s, education officials talked about a limited overload which soon would diminish because of dropping birth rates and which had to be "tunneled" by overtime for a few years (... and the majority of Business Administration professors agreed to this view). Now we know that this relaxation did not occur and there is no indication that the student numbers in Business Administration and IS will decrease. Aside from this development, the enrollments in Computer Science increased dramatically in the last years, too, as Germany tries to be better positioned in the information and communication field. But at the university

level the underlying political goals are still valid (limited resources in the university, but open access to it), and so are centralized administrative instruments to channel the flows of students nation-wide, rather than, e. g., having given the right to the universities to select their students individually.

Concerning IS this means that the discipline – although having been inaugurated already in the late 60s, always had to fight hard for resources and has faced for many years a substantial educational overload, in particular in view of the fact that IS education in Germany is characterized by intensive hands-on exercises (programming-oriented IS culture with prototypical system developments, in contrast to the field survey oriented IS culture in Anglo-American nations). Another effect of the "education for free" culture is that cost-liable post-graduate programs do very hard in general, also in the IS field.

Second, the diploma type of course program is still prevailing in Germany (although the number of universities offering the Anglo-American system of independent Bachelor and Master programs is quickly increasing). This requires students to enroll in a comprehensive course program being combined by both undergraduate and graduate programs. Law requires a minimum of four years, but in practice the completion of a diploma program regularly takes five to six years (in some cases even longer). Several disadvantages stem for German students (and professors) herefrom. Students enroll and either succeed in the comprehensive program (on the graduate level) or fail completely as up to now there is no

substantial public recognition of an undergraduate degree. In the diploma culture we have no easy exchange of student bodies between undergraduate and graduate programs. And, what influences IS mostly: Forcing students in a combined undergraduate and graduate program – reflecting all the necessities to successfully run an undergraduate program – results in incentives to reduce diversity on the graduate level. So the inauguration of autonomous courses of study in IS was particularly hampered in Germany (but nevertheless occurred often), in reverse promoting IS as an elective (mainly of Business Administration). Being – still in a lot of cases – integrated as an elective in Business Administration courses of study resulted in severe dependencies on different local educational priorities. Thus a variety of course configurations in IS emerged and is still observable. And on top of that we now face new courses of study according to the Bachelor and Master schema.

Third, in contrast to the situation in the US and the UK, the basic research and teaching unit in German universities is a chair (“Lehrstuhl”) where a full professor and – in the IS case – at average almost four research assistants work in teams. Actually, in Germany there are (2002) 140 chairs – 140 full professors – with roundabout 500 research assistants. A meaningful translation of this situation would result in a figure that on top of 140 IS chair holders about 100 assistants with a Ph.-D. degree in fact have the rank of assistant professors. Complementary, about 400 Ph.-D. students are working in universities and closely related research institutes. Probably another 80 Ph.-D. students have to be counted

as people preparing a dissertation but not being employed at a university. Back to the research assistants: We estimate 200 of them teaching IS courses (in addition to the professors). And a substantial amount of the research assistants in universities are financed via contracted work for enterprises (we estimate a share of about 20%) which on the one hand helps concerning an appropriate perception and compilation of actual challenges in the field but at the same time to some extent redirects attention from basic research.

Fourth, we enjoy a long-term and moderate increase of IS chairs in Germany based – in view of overall limited resources – on the necessity to convert chairs, step-by-step. However, reflecting the ongoing non-saturated demands of IS graduates, on top of this basic trend we encounter additional “thrusts” which seem to appear every ten years. In the beginning of the 90s we experienced such a burst, reflecting German unification. And recently, the number of chairs increased from 1999 to 2002 by 29 (= 26%), as politicians more and more realized the role of IS as a key industry. The long-term and continuing non-saturated demands as well as the thrusts resulted in a number of newly appointed IS professors not having been educated in IS but rather with a background in, e. g., Operations Research, Operations Management, Physics, and Chemistry.

## II. DEVELOPMENT OF THE IS DISCIPLINE IN GERMANY

Computer Science, the second “mother” of IS, was introduced in Germany in the mid 60s, and for a rather long

time to come Computer Science colleagues strived for a "hard-core" discipline where for example advanced mathematics and complexity theory played an important role and applications and technology transfer were considered of limited value.

The IS discipline was inaugurated in Germany in 1970. The German name is "Wirtschaftsinformatik", literally translated: Business Informatics.

After the first decade saw database systems and production scheduling as most important teaching topics, the second decade of IS development in Germany was triggered by an ever-increasing demand – and in the years to come: supply – of business process support in, e. g., production management, inventory control, procurement, human resources, sales, distribution, and controlling. In the 80s, SAP's R/2 – the host-based integrated enterprise resource planning system – captured a new market. In parallel, a variety of host-based communication solutions for distributed IS came step-by-step in use.

And in academia, in the 80s the first comparatively large IS units were formed in Berlin, Cologne, Frankfurt a. M., Hamburg, Mannheim, Münster, Nuremberg, and Saarbrücken. An increasing number of other universities enjoyed at least one IS chair. IS teaching is now also focused on Information Management, organisational impacts and strategic IS questions, moreover Software Engineering Management, and in a countermovement contents with close proximity to hardware and systems software were gradually rejected.

The next decade, the 90s, was characterized by Artificial Intelligence, the

Internet, and the widespread use of PCs and smart devices. These developments brought for example media into the IS arena and added personal and home computing to the scope. Computer- and network-based information production (e. g., in credit agencies and consulting companies) gained momentum. Client-server architectures prevailed (see for example R/3).

The long-term trend to step-by-step omit teaching units too closely related to core information technology coincided with the emergence of basic research questions like workflow management, collaborative work, and the integration of different dimensions of networking. Actually, the long-term objective of IS, namely the integration of system components, is of ever-increasing importance. Moreover, during the 90s we saw the broad deployment of independent IS courses of study (no longer only being integrated in Business Administration programs as an elective) and also, slowly, an increasing number of IS units being an element of computer science departments.

In this time span the coverage of IS in both west and east German universities was further completed. In the wake of German unification (1990), the university staff in the area of the former German Democratic Republic (GDR) were evaluated according to western criteria (e. g., looking for research productivity and eliminating people who snitched for the state security services in the past). In general, IS people were regarded as less socially burdened. The GDR already had universities with IS chairs and after the evaluation IS chairs were installed

in eleven universities, with Dresden and Ilmenau being the first comparatively large IS units.

The recent decade of IS development actually started before the millennium with supply chain management, customer relationship management, electronic marketplaces, e-auctions, agent-based services, web services, e-payment systems, and mobile business / mobile commerce. Peer-to-peer technologies gain momentum and increasingly security questions are raised.

German "Wirtschaftsinformatik" has considerably influenced the development of the SAP systems from the very beginnings. Because of the market share and SAP's impact on IT applications in large firms all over the world we might pretend that German business administration and IS procedures contribute to the functions and processes in companies worldwide. Vice versa SAP traditionally cooperates with German universities and thus has an impact on IS education and research. In many universities there are courses on SAP systems which, however, require considerable investments in hardware, software, manpower, and specialized know-how of the faculties.

Nowadays, only on rare occasions may one find a university in Germany without an IS chair.

The most important IS associations in Germany are:

- The "Science Commission IS" (in German: Wissenschaftliche Kommission Wirtschaftsinformatik) which is an element of the national association of Business Administration professors (<http://pbwi2www.uni->

[paderborn.de/WWW/TEMP/VHB/NEW/VHB.NSF/L2CTG/ECC4C0E0C1C8C681C1256B0A00033447?OpenDocument](http://paderborn.de/WWW/TEMP/VHB/NEW/VHB.NSF/L2CTG/ECC4C0E0C1C8C681C1256B0A00033447?OpenDocument)).

- The department 5 "IS" of the national association of informatics (in German: Gesellschaft für Informatik) (<http://www.gi-ev.de/wissenschaft/fachbereiche/fachbereich-5.shtml>) – going along with a reduced-price personal subscription to the journal WIRTSCHAFTSINFORMATIK (see below) and other journals. The majority of its members are practitioners.

The most important IS journal in German speaking countries and the only internationally recognized German A journal in the field is WIRTSCHAFTSINFORMATIK ([www.wirtschaftsinformatik.de](http://www.wirtschaftsinformatik.de)) which appears bimonthly and comes with 600 pages per volume (some articles are written in English and some contributions stem from international researchers).

The locally most important IS conference is the biannual international Wirtschaftsinformatik convention which for six years regularly has drawn more than 1.000 participants, being almost equally split into academics, practitioners and students. Aside from this large conference, both the Science Commission IS and the IS department of the national association of informatics regularly offer Ph.-D. consortia. Moreover a large amount of smaller conferences and workshops continuously takes place. The participation of German IS experts in international conventions is somewhat limited. One reason might be that there are enough opportunities in German speaking countries being run in

the native tongue. Another reason seems to be the different IS culture in Germany (predominantly prototypical developments of application systems) compared to the, e. g., Anglo-American point of view (predominantly oriented on field surveys).

### **III. PREVAILING IS RESEARCH TOPICS IN GERMANY**

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Mertens and Barbian (2002) collected the following data from 140 IS chairs in 2002 (67 universities, multi-fold nominations per university were possible) (in brackets: difference to the 1999 survey):

- Methodological focus: 110 (-7%)
- Application Systems: 111 (+20%)
- Communication systems and office systems: 20 (-5%)
- Software engineering, modeling, and object oriented approaches: 48 (+4%)
- Information Management: 59 (-23%)
- Data base management: 36 (+38%)
- Knowledge management: 28 (+1300%)

Breaking-up the 110 methodological answers results in:

- Management Information Systems / Decision Support Systems: 21 (-12%)
- Artificial Intelligence / Agents: 16 (-16%)
- Workflow Management / Workgroup Computing / Document Management: 24 (-40%)
- Operations Research: 21 (-12%)
- Computer-supported education: 28 (+154%)

Workflow issues lose momentum whereas computer-supported education gains substantially.

Breaking-up the 111 answers concerning applications results in:

- Industrial applications / Computer Integrated Manufacturing / Production management: 19 (+46%)
- Accounting / Controlling / Finance: 20 (+11%)
- Logistics and Trade: 20 (+122%)
- Electronic Commerce / Electronic Markets / Electronic Business: 26 (+73%)
- Service Industries: 7 (+40%)
- Marketing: 2 (-50%)

Production management, industrial applications, and computer integrated manufacturing are still considered very important. Of interest is moreover the substantial increase of electronic commerce, electronic markets, and electronic business.

German IS research is quite varied with particular emphasis on constructive prototypical work, but also some survey-oriented projects.

### **IV. OVERVIEW OF THE IS COURSE SYLLABUS IN GERMANY**

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2002 sees 140 IS chairs in 67 German universities (additional information for German speaking countries: 15 IS chairs in 6 Austrian universities, 21 IS chairs in 6 Swiss universities) (Mertens and Barbian, 2002). The number of IS chairs increased from 1999 to 2002 by 26%.

In this time span the number of universities offering autonomous courses

of IS study has increased from 23 to 26 and the maximum capacity went up from 2.100 to 2.700 students. Regularly, 180 contact semester hours (a semester hour being defined as 13 (weeks) \* 45 minutes) are required (eight semesters plus an examination semester with a six month master thesis).

Moreover Mertens and Barbian (2002) reported that 53 universities offer IS as an elective in Business Administration courses of study. In less than 5 universities IS is an elective of a Computer Science program. The number of contact semester hours varies from 4 to 22.

Since 1984, the science commission IS and the department IS of the German association of informatics (see chapter 3) has developed joint guidelines to set-up and run IS programs in universities. In 1992 these two institutions published recommendations for autonomous courses of IS study (Kurbel, 2002) requiring that each of the following areas constitutes roughly a third of the contact hours:

- Business Administration;
- Computer Science;
- IS.

Actually the guidelines advocate that autonomous IS courses of study may only be installed in universities with both powerful Business Administration and Computer Science departments. Substantial hands-on exercises are required. Moreover, attention has to be paid concerning a variety of enterprises within reach in order to incorporate these as partners in project seminars, for example. In 1999, a federal commission fixed the number of contact semester hours to 180, nation-

wide. These guidelines proved very helpful in the "heydays" of the 90s to brand Wirtschaftsinformatik graduates as experts being capable of understanding both the Business Administration and Computer Science languages and on top of that bringing in IS methodology and hands-on experience and of course new ideas which made them (and still make them) very valuable in organisations.

In 2002 a recommendation framework for the university IS education was composed reflecting different types of courses of study (autonomous IS diploma program, IS as an elective of a Business Administration diploma program, IS as an elective of a Computer Science diploma program, IS Bachelor program, IS integrated in a Business Administration or Computer Science Bachelor program, IS Master program, IS integrated in a Business Administration or Computer Science Master program) as well as different educational formats (presence learning, e-learning, full time, part time). The recommendations differentiate the following topics:

- Information and communication technology;
- Information management, information products;
- Development of integrated application systems;
- Data and knowledge;
- Decision support and cognitive science;
- Enterprise application systems, inter-organisational application systems, electronic business;
- Legal framework.

In comparison to IS curricula in Anglo-American countries the basic education in "Wirtschaftsinformatik" focusses the predominant integration tasks – including the necessary infrastructure – and

in particular accentuates integrated application systems. The following table shows the content of a widespread textbook for the first term at the university level (Mertens et al., 2001):

<i>Content items</i>	<i>% of pages</i>
1. Object of IS	5
2. Computers and Networks	18
3. Data and their integration	11
4. Goals, types and tools of integrated IS	7
5. Integrated application systems	
5.1. Manufacturing, industry	16
5.2. Service industry (Banking, Insurance, Commerce...)	16
6. Planning and implementing integrated application systems	13
7. Information management	13

**Table 1**

Some of the newly founded Bachelor and Master programs have been accredited.

The post-graduate IS education is in the very beginnings (for example in Augsburg and Münster).

**V. THE FUTURE OF THE IS DISCIPLINE IN GERMANY**

Being the third-largest economy in the world which is characterized by intensive international competition, Germany needs a continuous improvement of value chains by better applying modern information and communication technologies. There is no indication that this process of further automation, better integration, better end-user support, and better exploitation of resources is halted or that other researchers gain substantial advantage over the IS people to support this ongoing transition. So we expect

in the next years for example still increasing demand for IS skills and research results as well as further increases of student enrollments.

In the international arena an interesting question gets more and more attention. As there are first Anglo-American comments that the there-prevailing IS culture of designing and executing surveys – seeing only rigour but often failing to produce relevance – may not be sufficiently future-proof: To what extent will Anglo-American researchers adopt the prototypical IS approach being cultivated in Germany and to what extent will German IS research better adapt to the survey-oriented Anglo-American research culture? Assessing on the one hand the slow pace of changes in German universities and on the other hand the frequent problems of solitary researchers in the Anglo-American university culture we expect no quick approximation.

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