Annual Report 2003

Information Systems and Database Technology

Staff

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  Prof. Dr. Thomas Berlage
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  Sebastian Brandt (since 1.10.2003)
  Oliver Fritzen (until 30.9.2003)
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  Dr. Ralf Klamma
  Dr. Roland Klemenke
  Frank Köhne (since 1.7.2003)
  Jörg Köller (until 31.3.2003)
  Thomas List
  Dominik Lübbers
  Michael Miatidis
  Dr. Hans Wilhelm Nissen (since 4.3.2003)
  Christoph Quix
Researchers continued:

Dr. Lemonia Ragia (since 1.4.2003)
Moez ur Rehman
Marcus Schlüter (15.01.2003 - 30.9.2003)
Dominik Schmitz (since 2.5.2003)
Priv.-Doz. Mareike Schoop, Ph.D.
Stefan Sklorz
Marc Spaniol
Dirk Staskiewicz (since 1.5.2003)

Visiting Lecturers:

Dr. Andreas Becks, Fraunhofer FIT
Dr. Wolfgang Broll, Fraunhofer FIT
Dr. Kurt E. Fendt, MIT

Technical Staff:

Tatiana Liberzon
Reinhard Linde
Jörg Mathieu (since 1.9.2003)

Student Researchers:

Overview

Informatik V represents the field of databases and information systems at RWTH Aachen. A major focus is the formal analysis, prototypical development, and practical application of metadata systems. Specific research areas include Internet Information Systems and Knowledge Management, Electronic Business Negotiations, Database and Repository Technologies, and Requirements Engineering.

Informatik V cooperates closely with the Fraunhofer Institute for Applied Information Technology FIT of which Prof. Jarke is Executive Director. Two FIT area managers hold cross appointments as Professors of Cooperative Systems (Wolfgang Prinz) and Life Science Informatics (Thomas Berlage). A third joint appointment is planned in the context of building up B-IT, the Bonn-Aachen International Center for Information Technology. Under the direction of Prof. Jarke as one of the B-IT Founding Directors and assistant director Dr. Hans Nissen, Informatik V engaged heavily in B-IT, student selection, financial organization and administration, and faculty selection. Other joint activities between Informatik V and FIT include the joint semantic web EU project SEWASIE and a start-up project in eLearning. A Dagstuhl seminar on e-Accessibility, the challenges and opportunities of Universal Access to IT for an increasingly diverse and aging population in Europe was also organized jointly. Our cooperation with Microsoft Research was further strengthened by a two-month research visit of new team member Dr. Lemonia Ragia in Redmond to investigate the interaction of metadata management and geographical information systems.

2003 was characterized by a lot of personnel fluctuation. Dr. Mareike Schoop, leader of the electronic business negotiation group, not only started a Young Researcher Group Award in the prestigious DFG Action Plan Informatics with two new Ph.D. student Dirk Staskiewicz and Frank Köhne, but also successfully defended her habilitation thesis in the spring of 2003. During much of the year, she was on leave as substitute full professor at the University of Münster. Also, she organized an international e-Contracting conference in Aachen. In December 2003, Christoph Quix defended his doctoral thesis before also starting a research visit at Microsoft.

Dr. Ralf Klamma’s Internet Information Systems and Knowledge Management team continued their successful activities in SFB 427 and was instrumental in acquiring, once again jointly with Fraunhofer FIT, the new European Network of Excellence in Professional Technology-Enhanced Learning (ProLearn) which is coordinated by former Informatik V colleague Wolfgang Nejdl (TU Hannover). After the successful review of SFB 476, our team in the field of chemical engineering informatics also changed with departure of Jörg Köller into the chemical industry and of Oliver Fritzen to another university, and arrival of Dr. Marcus Schlüter and Sebastian Brandt as new team members. In the graduate college 'Software for Communication Systems', Valerie Bures left for Sweden and Dominik Schmitz, having just received one of the best paper awards of CAiSE 03 for a paper from his diploma thesis, joined as new doctoral student.
Research Projects

Metadata and Cooperative Knowledge Management

M. Jarke, R. Klamma, A. Becks, C. Quix, T. List, S. Sklorz, C. Seeling
M. Jeusfeld (Uni Tilburg, NL), R. Linde, R. Klemke, A. Schlosser, T. Schöneberg

ConceptBase is a multi-user deductive object manager mainly intended for conceptual modelling, metadata management and model management. The system implements the knowledge representation language Telos which amalgamates properties of deductive and object-oriented languages. ConceptBase is used for research and teaching in more than 200 institutions worldwide. An interesting cooperation was begun with Microsoft Research in the field of model management, and development of a Windows version was started. In 2003, the implementation of the internal object storage has been optimized using C++ standard technologies. The user interface has been improved and stabilized. Several issues in the programming interfaces have been resolved. The team improved also the documentation of the whole system.

The bureau42 Entrepreneurship project has been extended for another year. Purpose of this project is to support the re-design of two FIT research results – the Brokers Lounge and the Adaptive Learning Environment – for commercial exploitation. In addition, the course HighTechEntrepreneurship and New Media was organized in order to sensitize and prepare students from several disciplines for entrepreneurship, to tighten cooperation and exchange knowledge between start-ups and the university, and to network the regional entrepreneurship community.

Internet-based community support

R. Klamma, T. List, J. Mathieu, R. Linde, H. Janßen, S. Steinfels

Sun SITE http://sunsite.informatik.rwth-aachen.de/ (Sun Information and Technology Exchange) is a programme sponsored by Sun Microsystems established at about 50 universities all over the world. Sun SITE’s aim is to use the Internet to distribute free software, to provide Sun-related information, and to research, develop, and introduce novel Internet applications. Informatik V has been managing Sun SITE Central Europe since 1995, focusing on the support of scientific communities. In addition, Sun SITE offers active hosting support for virtual communities in science, culture, and education, e.g. in the shape of a BSCW server providing shared workspaces.
The software archive of the SunSITE contains around 1 TB of open source software and is one of the biggest of its kind in Germany. Typically, the Sun SITE enjoys several million accesses per month.

As part of the federal WIS programme which aims at reducing the shortage of IT specialists in Germany, the four-year project **WWBIT** (Continuing Education Portal NRW) aims at organizing a portal and (virtual) communities for high-level university-based continuing education in computer science and information systems for the state of Nordrhein-Westfalen. In 2003 our work concentrates on the implementation of community support tools for three different kind of continuing education communities: a network of educational service provider, a network of human resource managers, and networks of actual learning communities. The technological basis of such support tools is the BSCW system.

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**SFB 427: Media and Cultural Communication**

*Networked multimedia information systems in cultural science communities*

R. Klamma, M. Spaniol, M. Jarke, D. Denev, H. Janßen M. Pienkos, D. Renzel
Z. Afzal, S. Conrad, C. Maas, D. Mihaylov, A. Falaleev, P. Stojadinovic

In Germany’s first Cultural Science Research College (SFB 427), our project is studying the ‘Impact of multimedia information systems on communication and knowledge organisation in cultural science projects’. Together with our colleagues from the culture sciences we are studying the influence of media specific aspects on knowledge creation and knowledge organization based on the theory of transcription, localization, and (re-) addressing. Informatik V has strengthened its interdisciplinary cooperations by developing cultural science applications. In 2003, we presented our research results at major events such as CAiSE, WWW, ICALT, ICWL, and the E-Learning exhibitions in Karlsruhe and Bangkok. In parallel, a new cooperation project with electroacoustic music scientists has been launched by designing a multi-channel music analysis and representation software (MARS). The MPEG-7 based software is intended to bring together researchers of the electroacoustic music science communities in Cologne and Paris. In cooperation with Fraunhofer FIT the SWAP-it tool has been applied for the comprehensive investigation of cultural science communities by analyzing more than 30,000 mails from over 3,000 individuals. Altogether, the systems fit into our cultural science community portal MAVIS, offering an in depth analysis and simulation of cultural science projects, mailing-lists, and web-sites. The year was concluded by the guest professorship of Kurt Fendt from the MIT, Cambridge, in December.
Dr. Klamma presents e-learning software to her Royal Highness Crown Princess Maha Chakri Sirindhorn of Thailand at the E-learning Expo 2003 in Bangkok

DFG Young Researcher Group: Electronic Negotiation Support in Business-to-Business Electronic Commerce

M. Schoop, F. Köhne, D. Staskiewicz, Y. Cao, J. Huster, J. Terwey

The research group (DFG-Nachwuchsgruppe) is funded by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) in their "Aktionsplan Informatik". The group is led by Priv.-Doz. Dr. Mareike Schoop. Frank Köhne and Dirk Staskiewicz are the two PhD students working in the group. In addition, there are several student assistants. The main goal of the research is to develop comprehensive empirical and formal foundations for supporting human users in electronic commerce negotiations. The three prominent negotiation models (namely negotiation support, auctions, and negotiation agents) will be assessed and compared. The aim is to develop a decision support module that suggests the most appropriate model or combination of models in a given business context. Selected systems implementing one of the negotiation models will be combined into an integrated negotiation module that enables negotiations according to the suggestions of the decision support module. The approach will be
validated through the development of a significant prototype system of electronic negotiation with decision support and its evaluation in cooperation with industrial partners in regional networks of small and medium-sized enterprises. In 2003, the negotiation support system Negoisst developed in former projects has been extended by means of the development of a decision support module based on a hybrid conjoint approach. Negotiators can specify preferences which will then be used to compute utility functions. The decision support can be done in real-time, i.e. during the negotiation. Each negotiation step is assessed and the rating is shown to the negotiator. The approach can also deal with partly-specified offers which is a common phenomenon in electronic negotiations. Negoisst has taken part in the second annual negotiation tournament. Several hundred students from the USA, Canada, Germany, Russia, The Netherlands, Taiwan, Great Britain, and Austria negotiated in teams based on a specified scenario (negotiation between a union and a school management) using different negotiation systems such as Negoisst, Inspire, SmartSettle, WebNS, and SimpleNS. The team performance was rated. At the same time, the systems themselves competed. Negoisst won the tournament on the management side.

**SEWASIE: Semantic Webs and AgentS in Integrated Economies**

*M. Jarke, M. Schoop, A. Jertila, C. Quix, M. Rehman, Y. Cao, K. Papadimitropoulos, M. Schnitzler, A. Becks (Fraunhofer FIT), C. Seeling (Fraunhofer FIT), D. Frese*

SEWASIE is a European project with partners from Germany (RWTH Aachen, Informatik V; Fraunhofer Institute for Applied Information Technology (FIT); Thinking Networks AG) and Italy (Università di Modena; Università di Roma "La Sapienza"; Università di Bolzona; CNA Servizi Modena; IBM Italia) funded from 2002-2005 within the Semantic Web initiative. The overall goal of the project is to design and implement an advanced search engine enabling intelligent access to heterogeneous data sources on the web via semantic enrichment to provide the basis of structured secure web-based communication. Informatik V closely cooperates with Fraunhofer-FIT in SEWASIE.

Informatik V develops a communication tool that will support electronic negotiations in business-to-business electronic commerce in two ways. Firstly, ontology-based contract negotiations are enabled that allow human negotiators to use the ontological context of semantic search for structured web-based negotiations. Secondly, ontology negotiations enable negotiators to negotiate about ontologies, the normative and terminological basis of their contract negotiations. FIT develops a monitoring agent on top of the query engine to observe information according to long-term interests of users. Graphical methods to explore these personalised information spaces, developed at Informatik V, will be included. FIT also provides functionalities to link observed information into decision support environments based on OLAP.
Inter-organizational networks of people, information and communication systems are often described by the interplay between individual goals and actions and the strategic dependencies among individuals and subgroups. The TROPOS project started in the context of the DFG Focussed Research Programme on Socionics, jointly conducted with the KBS group of Prof. Lakemeyer and the network sociology group of Dr. Funken. It aims at improving requirements engineering for such networks by not just representing their goals and dependencies statically, but also by studying the dynamic interactions between both via agent-based simulation through our SNet prototype environment. A key feature of SNet is the automatic translation of extended i* models into the process modeling environment ConGolog (via ConceptBase). This year’s work extended previous versions e.g. in that the resulting agents are not purely reactive any more but make use of a decision-theoretic planning component. The project is expanded in the context of the DFG-funded Graduate School 643 ”Software for mobile communication systems”, with the goal to interlink agent-based simulation and execution environments in applications for mobile production engineering.
Process-Integrated Modelling Environments (PRIME)
M. Jarke, T. List, K. Pohl (Uni Essen)

This DFG-funded project develops architectures and object-oriented frameworks for the process integration of modeling tools in engineering environments. In this manner, formal process definitions can directly influence the behavior of tools in a situation-specific manner. In addition, the environment automatically traces development processes across tools for reuse of process experiences.

SFB 476 IMPROVE
Information Technology Support For Collaborative and Distributed Design Processes in Chemical Engineering
M. Jarke, M. Miatidis, O. Fritzen, S. Brandt, M. Schlüter, M. Schoop, T. List
A. Passen, B. Zaman, J. Renner

The collaborative research center SFB 476 IMPROVE is funded since August 1997 by the Deutsche Forschungsgemeinschaft (DFG), and aims at improving the processes in chemical and plastics engineering.

In May 2003, the CRC underwent a successful review by the DFG, and received a project continuation for the third phase (till summer 2006). The new phase, centering on the aspect of synergetic interleaving, was started in mid-year. In this context, Informatik V works on two projects.

"Experience-Based Development Processes" aims at models, methods and tools to support the cooperative design of chemical processes at a direct and fine-grained level based on prior experience. A novel flowsheet editor has been developed to support the central role of flowsheets as design documents in chemical engineering and to capture and enable reuse of best-practices during design. This flowsheet editor tool is supported by our process integration environment PRIME that provides fine grained method guidance and process tracing to the engineering processes. In the next period, we are going to focus on the cooperation aspect by providing support to multiple users and address the challenge of providing a mechanism for continuous quality improvement by analysis and reuse of the process enactment experience.

"Goal-Driven Information Flow Management" aims at the improvement of information flows during chemical process design. To efficiently support the manifold information flows in a chemical process design from heterogeneous information sources a Process Data Warehouse (PDW) is developed, which collects and transforms selectively and incrementally required information from the engineering process. After
transfering the charge of the project from O. Fritzen to S. Brandt (a former student worker of the same project), the research focussed on the design of ontology-based recording of product and process traces, to be used among other as the infrastructure for product-based cooperation support and analysis.

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<th>GCO-Support (Next Generation Computer Aided Process Engineering Open Simulation Environment)</th>
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This EU-funded project aimed at the uptake of the international CAPE-OPEN-Standard for open simulation environments in chemical engineering. We contributed several chapters on the CAPE-OPEN book summarizing the results of the earlier projects, and developed the website, quality assurance tools, and cooperation environment for members of the GCO support community. The project was successfully completed in March 2003.

Other Activities

Service

Prof. Jarke’s major administrative and service activities in 2003 included:

- Executive Director, Fraunhofer FIT, Birlingenhoven
- Founding Director, Bonn-Aachen International Center for Information Technology (B-IT)
- Vice President and Treasurer, GI German Informatics Society
- member, extended management board of FIR Forschungsinstitut für Rationalisierung an der RWTH Aachen
- member Curatory Board and International Scientific Advisory Board, IBFI, Schloss Dagstuhl
- DFG elected reviewer for practical computer science
- member, evaluation board Information Sciences for the state of Baden-Württemberg
- BMBF steering committee for research program IT-2006
- responsible for room management, CS department RWTH Aachen
- chaired two faculty search committees at RWTH Aachen

Dr. Klamma served as study advisor of the master program Software Systems Engineering. Dr. Schoop co-organized ‘Girls Day’ and the ‘Schnupperstudium’ in 2003.
Editorial Boards
Together with D. Shasha (New York University) M. Jarke is Editor-in-Chief of Information Systems, the oldest European database journal (SCI Impact Factor: 3.0); R. Klamma served as Assistant Editor. M. Jarke also served on other editorial boards:
• Decision Support Systems
• (electronic) Journal of the AIS
• Requirements Engineering Journal
• Organizational Computing and Electronic Commerce
• Intelligent Information Systems
• Group Decision and Negotiation

Prof. Prinz is Chair of ACMSIGGROUP and Editor of SIGGROUP Bulletins. He is also editor of the i-com magazine and associate speaker of GI-department CSCW (5.14). Besides he is Editorial Collective member of the CSCW Computer Supported Cooperative Work International Journal by Kluwer.

Conference Organization
M. Jarke co-chaired the Dagstuhl Symposium ’e-Accessibility: new devices, new technologies, and new challenges in the information society’ (Nov. 24-27, 2003) with A. Kobsa, K. Miesenberger, and C. Velasco. He also served as Technology Track Program Chair of the 24th International Conference on Information Systems, Seattle, Dec. 14-17, and as senior research advisor for its associated Junior Faculty Workshop and IS Theory Research Workshops. He co-chaired the Symposium on Conceptual Modeling, held in conjunction with CAiSE 03 in Velden/Austria in honor of the 60th birthday of John Mylopoulos (June 17, 2003), and the FIT Symposium on the 25th anniversary of CSCW research (Nov. 21, 2003). In addition, he was program committee member of the following conferences: Intl. Conf. Advanced Information Systems Engineering (CAiSE 03), Velden/Austria, 18.-20.6.2003; Data Mining and Data Warehouses (DMDW ’03), Berlin, 8.9.2003; Intl. IEEE Conf. Requirements Engineering RE 03, Monterey, Ca, 8.-12.9.2003; Intl. Conf. Information Quality ICIQ 03, MIT Cambridge, Mass., 7.-9.11.2003; Workshop on Information Technologies and Systems WITS 2003, 13.-14.12.2003, Seattle.

Prof. Prinz was a member of the following program committees: Computer Human Interaction (CHI 2003), Fort Lauderdale Communities and Technologies (C&T 2003), Amsterdam 9th Intl. Workshop on Groupware (CRIWG03), Grenoble Language Action Perspective (LAP2003), CAiSE Workshop on Ubiquitous Mobile Information and Collaboration Systems (UMICS 2003).

Priv.-Doz. Dr. Schoop was chair of the Conference ”E-Contracting”, Aachen, 26 June 2003. She was also co-chair of the 10th International Workshop on Knowledge Representation Meets Databases (KRDB 2003). Furthermore she was a member of the following program committees: 11th European Conference on Information Systems (ECIS 2003, 2nd International Semantic Web Conference (ISWC 2003), Workshop
XML Technologien für Middleware - Middleware für XML-Anwendungen (XMDIX 2003), 5th International Conference on Enterprise Information Systems (ICEIS 2003), 8th International Workshop on the Language-Action Perspective on Communication Modelling (LAP 2003), Action in Language, Organisations, and Information Systems (ALOIS 2003). She was also a discussant at the International Conference on Information Systems (ICIS 2003), Seattle.


Marc Spaniol was peer reviewer of ICWL 2003.

Software Demonstrations

- SFB 476 Review, Aachen, April 3.
- SOCRATES end-user workshop, Cologne, June 11 and September 9.
- CESE and VEL: Demonstration; E-Learning 2003 Expo, Bangkok, September 4-7.
- VEL presentation, b-it Wirtschaftsforum, Siegburg, September 16.

Talks and Publications

Talks


M. Jarke: Ambient Intelligence - Big Brother zu Hause, am Arbeitsplatz, überall?, Ringvorlesung Technikgestaltung für morgen - Chancen und Risiken’, RWTH Aachen, January 7.

M. Jarke: Hightech Entrepreneurship and New Media, Opening Statement, public final B-IT project course presentation, RWTH Aachen, February 10.

M. Jarke: Metadata and cooperative knowledge management, Colloquium, IIT Kanpur, February 19.


M. Jarke: Semantic web: Going beyond searching - SEWASIE value-added services, Review, EU project SEWASIE, Luxembourg, July 1.

M. Jarke: Quality-oriented design of data warehouses, Colloquium, SAP-BW Group, Walldorf, July 7.


D. Lübbers: Systematic Development of Data Mining-Based Data Quality Tools, 29th International Conference on Very Large Data Bases (VLDB 2003), Berlin, Germany, September 10.


W. Prinz: Virtual Communities: Cooperation and Awareness Support, Workshop on Computational Visualistics, Media Informatics, and Virtual Communities, Magdeburg.

W. Prinz: Awareness in Cooperative Work, Invited talk, University of Münster, June.


D. Schmitz: Deliberation in a Modeling and Simulation Environment for Inter-Organizational Networks, Fifteenth Conference on Advanced Information Systems Engineering (CAiSE 2003), Klagenfurt/Velden, Austria, June 19.

D. Schmitz: Eine Simulationsumgebung für Agenten-Netzwerke, Tag der Informatik, RWTH Aachen, December 5.

M. Schoop: Towards a Standardization Process for Component-Based Architectures, 10th International Conference on Concurrent Engineering, Madeira, 30 July.

M. Schoop: Practices and Standards in Electronic Negotiations, 10th International Conference on Concurrent Engineering, Madeira, 30 July.


Publications

Books and Edited Volumes


**Journal Articles**


C. Loebbecke, D. Feeny, P. Weiill, M. Jarke, A. Kambil, E. Filos: *Different IS research communities: are they competitors, complements, or ignoring each other?*, Communications of the AIS, volume 11, article 29, April 2003.


**Conference and Book Contributions**


W. Prinz: *Virtual Communities: Cooperation and Awareness Support*, In J. Schneider (ed.): Computational Visualistics, Media Informatics, and Virtual Communities, 2003, pp. 25-35.


Rectors Burkhard Rauhut (RWTH Aachen) and Klaus Borchard (Uni Bonn) with Minister Hannelore Kraft at the signature ceremony for the B-IT Universities Institute

B-IT is a joint institute of RWTH Aachen and University of Bonn in cooperation with the Fraunhofer Institute Center Birlinghoven Castle and the FH Bonn-Rhein-Sieg in Sankt Augustin, aiming at the acceleration and internationalization of studies in applied computer science. Supported by the B-IT Foundation and complementary federal and state resources, B-IT offers highly selective English-language international Master Programmes in Media Informatics, Life Science Informatics, and Autonomous Systems. Moreover, B-IT offers summer and winter schools for qualified undergraduate computer science university students from RWTH Aachen, University of Bonn, and in the future other universities. The B-IT programmes are distinguished by their international orientation and a deep integration of research and teaching through close cooperation with the participating Fraunhofer Institutes of Applied IT (FIT), Autonomous Intelligent Systems (AIS), Media Communications (IMK), and Scientific Computing and Algorithms (SCAI). Curricula are fully integrated in the European ECTS system.
Founding Directors Cremers, Jarke, and Witt discuss with Landrat Frithjof Kühn and MWF representative Burkhart Reith at the first B-IT Business Forum

After funding for B-IT was approved in October 2002 and Professors Armin Cremers (Bonn), Matthias Jarke (RWTH Aachen), and Kurt-Ulrich Witt (FH Bonn-Rhein-Sieg) were appointed as Founding Directors, several milestones in the build-up of B-IT were achieved in 2003:

- In July, the founding treaty for the B-IT Universities Institute was signed by the Rectors of both universities in the presence of NRW Minister of Research, Hannelore Kraft. The fact that this is the first joint institute of two universities in NRW marks the legal complexity that had to be addressed to get this done.

- Joint study commissions were set up for both university master degrees to define curricula and actual teaching schedules. The commission on Media Informatics is chaired by Professor Otto Spaniol (RWTH Aachen), the commission on Life Science Informatics by Professor Rainer Manthey (University of Bonn).

- In spring and summer, the first batch of B-IT Master students was selected from a large number of applicants. Finally, almost seventy students from 15 countries were selected, more than half of them in the Media Informatics programme coordinated by RWTH Aachen. Several mutual visits with top international university organizations and ministries, most importantly in India and China, were conducted to improve even further the quality of future applicants.

- In October, the first B-IT-funded faculty positions were filled with Professors Jan Borchers (C4 Media Informatics, formerly Stanford and ETH Zurich) and Stefan Kowalewski (C4 Software for Embedded Systems, formerly Bosch Research); the selection processes for the other seven endowed faculty positions, three of them joint appointments with Fraunhofer Institutes, were also largely completed. As a consequence, an almost complete course program could be offered in B-IT from the beginning, including several innovative methods of teaching such as project lectures.
An international Science and Business Advisory Council for B-IT was defined to ensure long-term alignment with employer needs and international standards, and Professor Gerhard Barth, former Management Board member of Dresdner Bank and former GI President, was elected as its Founding President.

The planning of the reconstruction work for the B-IT building, the beautiful former NRW Representation in Bonn, was also completed; for financial and administrative reasons, the actual reconstruction can take place only in 2004. Together with the complexity of cross-organizational studies and the special needs of international students, this caused some novel problems of administration and student assistance which were detected and overcome in a highly cooperative manner when the first full class of international master students arrived in the fall of 2003. Further major plans for 2004 include the completion of B-IT research and student labs in the participating organizations, and the further strengthening of the international cooperation networks.
The mission of the Fraunhofer FIT Institute of Applied Information Technology in Birlinghoven Castle near Bonn is to support human-centered computing in the context of organizational processes. Researchers in FIT study lifecycle-wide methods for the design and evolution of adaptive, user-oriented information and cooperation systems in the interplay of human work practice with organizational processes. With a research staff of about 100 (more than 30 of them have a doctoral degree), FIT pursues this mission in three major research areas:

- **FIT.CSCW** (Cooperation Systems, area leader: Prof. Wolfgang Prinz, Ph.D.)
  BSCW, our web based groupware platform has been significantly enhanced the in 2003. Novel features include distributed task management, user-definable workflows and improved community support. Its web service interface makes BSCW well-suited as an open middleware for cooperation systems. This new service is also used in several student projects.

Three EU-funded projects were completed successfully:
In the ITCOLE project we developed Synergeia, a platform for collaborative learning on top of BSCW. After extensive field-tests in schools in several European countries, more than 1,000 teachers and a large number of students now use the Synergeia service that we provide over the Internet. The CYCLADES project prototyped a communityware for interdisciplinary e-paper archives. A study on Future Workspaces worked out a roadmap of research for collaborative design and engineering environments.

Two books on knowledge management were published based on BMBF-funded
project. One discusses organizational learning and knowledge sharing in virtual organizations while the other looks at knowledge management concepts and systems deployed in various organizational settings from a user perspective.

- **FIT.LIFE** (Life Science Informatics, area leader: Prof. Dr. rer nat Thomas Berlage) investigates system analysis and solutions for diagnostic and interventional image processing / visualization in medicine, especially minimally invasive and robot-assisted surgery, in pharmaceutical research and biotechnology, but also in the compensation of individual health challenges. In 2003, first elements of an architecture to support image-based high-throughput experiments in drug discovery were evaluated in an industrial setting. The quality control workflow for a Proteomics project could be successfully supported in a visually interactive application. A second group of projects concerned image-based iterative navigation in minimally-invasive surgery. In this area, the prototype of an iterative navigation system using ultrasound as the intraoperative imaging modality was developed in the SUPPORT project supported by the German Ministry of Research. The prototype was evaluated with clinical partners in Kiel and Leipzig. Finally, an automatic checker (Imergo) to analyze barrier-free properties of large web sites was developed together with media providers for several public sites.

- **FIT.ICON** (Information in Context, area leader: Prof. Dr. Reinhard Oppermann) develops and evaluates context-adaptive information systems for eLearning, mobile work contexts, planning and decision support. The eLearning platform ALE supports learning on demand and case-based learning with strong personalization of learning goals. Within the EU-funded SEWASIE project (see research report Informatik V) a patent-pending method for semantically integrating text information with business reporting and planning data was developed. Other important research results include location-based services and models of user situational context. FIT.ICON’s decision support group provides the German federal government and parliament with microsimulation results by impact analyses for virtually all laws in the social sector, e.g. pension reforms, student loan reforms, and tax reforms. Major new projects in this area include the EU Network of Excellence ProLearn where FIT and i5 closely cooperate in e-learning research and development.

Across the domains of these three areas, FIT has set up two Competence Centers in its kernel methodological domains of expertise: The **Competence Center for User-Oriented Software Engineering**, part of the German Federal Virtual Software Engineering Research Center ViSEK, specializes in Requirements Engineering, Participative Design, Rapid Media-Assisted Prototyping, and Usability Engineering, whereas the **Competence Center for Internet Accessibility** develops adaptive compensatory solutions which help people with physical or mental disabilities access and exploit the possibilities opened up by internet services for community-building, business, government and entertainment.