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International Federation for Information Processing

fifth anniversary issue

Editor:
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ORGANIZATIONAL DECISION SUPPORT SYSTEMS

Decision Support Systems (DSSs) were originally conceived to provide analytic, computer support to senior decision makers. In recent years, attention has turned to providing such support to groups of workers. In order to advance research in this direction, IFIP's Working Group on DSSs (WG8.3) held a conference on Organisational Decision Support Systems 20-22 June 1988 in Como, Italy. One hundred researchers participated.

The Conference concentrated on the support of non-repeated organizational decisions. These decisions, rather than being made by individual managers, are typically made either by groups or, after intensive consultation, among different organizational units. The organizational context is often crucial but underemphasized in the DSS design and implementation phases.

Prof. Andrew McCosh (GB), chairman of the International Program Committee, described the current focus of DSSs in the preface to the Conference proceedings: *

> In a sense, the study of DSS has come full circle. In 1988, much of the interesting work in the DSS area is once again affecting many organizational

* © IFIP

continued on page 10

This is the fifth anniversary issue of the ***IFIP** Newsletter.* An article about the *Newsletter,* which was planned for this edition, has been deferred to the next issue because of the large amount of material of higher priority printed in this issue.

GENERAL ASSEMBLY MEETS IN DELHI

Sendov New President-Elect

IFIP's General Assembly (GA), Council, and several of its committees met in New Delhi 5-9 September 1988 for a productive session. In addition to electing officers, discussing the evolution of existing technical activities and plans for new ones, casting a critical eye on how finances are managed, planning assistance for developing countries, furthering plans for IFIP Congresses, establishing awards, improving the management of IFIP's technical publications, and handling administrative matters, the GA spent a considerable amount of time discussing the goals of IFIP.

Two new bodies, the Activity Management Board and the Technical Assembly, which replaced the Activity Development Board, met during the first two days of the week. An article on page 5 describes the mission of these groups.

At the start of the GA, Mr. *K.P.P. Nambiar,* secretary to the Government of India, Department of Electronics, delivered an address to the Assembly entitled *Information Technology The Indian Scenario,* in which he described the importance of information technology to developing countries like India, as well as current activities and future plans for the application, development, and manufacture of computer hardware and software in India.

New Officers

One important matter of GA business was the election of officers. *Acad. Blagovest* Sendov (BG) was chosen president-elect, to assume the office of president after the 1989 GA. Elected as vice-presidents were *Mr.* James *Finch (CDN),* elected to a 3-year term, and Prof. *Asbjørn Rolstadås* (N), elected to a 2-year term. Trustees elected, all to 3-year terms, were *Prof. Angel Alvarez-Rodriguez (E),* Prof. *Alex Verrijn-Stuart* (NL) [re-elected], and Mr. *Masanori Ozeki (J).*

A significant amount of attention was devoted to IFIP's most important events—the World Computer Congresses. An article on page 7 gives news of IFIP Congresses '89, '92, and '94.

New technical initiatives of IFIP are advancing well. In some cases, they have developed to the point that new Working Groups (WGs) were approved by the GAt: WG3.3 on Research on Edu-

1. Particulars will be printed in the next issue of the ***IFIP** Newsletter.*

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Kindly submit material for the *Newsletter* three months before the publication date.

Please send the following **IFIP** information directly to the Secretariat: announcements of conferences, workshops, and other meetings; calls for papers; appointments to committees and other positions; and changes of address. The Secretariat is the clearinghouse for all such information; it will forward it to the *Newsletter.*

ECCE '88

*by Ute Brauer (D) **

The Technical Committee for Education (TC3) of **IFIP** held its first European Conference on Computers in Education (ECCE '88) in Lausanne, Switzerland from July 25 to 29, 1988. Since the more than 600 participants came from 44 countries, this European CCE was essentially a world conference. *Bernard Levrat (CH)* did an excellent job as chairman of the International Program Committee.

The great interest of the United Nations Economic, Scientific and Cultural Organization (Unesco) in the work of TC3 became obvious by the fact that the Deputy Director-General of Unesco, *M. de Bonnecorse,* gave an address at the opening ceremony and that in the closing session the director of the Division of Education of Unesco, *E. Brunswic,* delivered an invited lecture.

The keynote address by *J. Hebenstreit (F), Computers and Education: An Encounter of the Third Kind,* had as its main message that much more fundamental research in cognitive psychology is needed before we will know how, when, where and how much the use of computers can improve education.

Consensus

There was a broad consensus that computers and their software will drastically change not only the individual way of teaching and learning but also the whole educational system. However it is not yet clear in which direction and towards which goals policymakers and teachers should drive the development. Significant discussions asked:

- Is it necessary to teach informatics or only the use of hardware and software?
- How much knowledge of informatics is needed to make good use of hardware and software tools?
- Is the ability to program a prerequisite to learning basic concepts of informatics?
- How can we use the computer as a teaching and learning aid?
- To what extent does informatics change other disciplines: their contents and the methods of teaching and learning them?
- How can we produce courseware on a large scale?
- What amount of formal education is needed?

These discussions were particularly stimulated by the way the conference program was organized: a large amount of time was reserved for panel and round-table discussions and for a number of social events—in particular, the evening gala cruise on the lake of Geneva. This gave ample opportunities for personal discussion.

Most of the 10 panels were prepared by the Working Groups (WGs) of TC3 and had a twofold goal: to present the activities and plans of the WGs and to get input to them. Also, TC3 held the formal meetings of TC3, all its WGs and the program committee for WCCE '90 before, during and after ECCE '88.

Apart from the planning of a number of future conferences (e.g., ECCE '92 in Madrid in conjunction with the 12th World Computer Congress of **IFIP,** and WCCE '95), the most important decision of TC3 was to propose the creation of a new WG on Research on Educational Applications of Information Technologies, WG3.3.

Lausanne and ECCE '88 were an excellent framework for the celebration of TC3's 25th anniversary.t One special session, chaired by the current TC3 chairman *W. Brauer (D),* was devoted to lectures on particular achievements of TC3. A festive dinner united many former and current members and friends of TC3 and its WGs.

ECCE '88 was also enriched by EURIT '88—a biennial European Conference on Information Technology in Education—and the ECCE '88 exhibition, which was an attractive and multifaceted international presentation of tools for the teacher and the learner, from special purpose terminals, PCs and workstations to educational software and books.

The ECCE '88 Organizing Committee was chaired by *Marc-Henri Cuendet (CH).*

The proceedings, *Computers in Education,* were edited with great care by F. *Lovis (UK)* and *E. D. Tagg (UK),* and they are available from Elsevier/ North-Holland. At the opening of ECCE '88, members of TC3 learned, with sorrow, of the death of *Donovan Tagg.* He had made major contributions to the work of TC3.

*** *IFIP Newsletter*** correspondent for TC3

t An article about the TC3 anthology appeared on page 4 of the September 1988 ***IFIP Newsletter.***

DR. E.D. TAGG

An obituary of Donovan Tagg, who died last summer, will be printed in the next issue of the ***IFIP Newsletter.***

IFIP AWARDS

Three Awards Discussed by GA

The IFIP Outstanding Service Award' was conferred upon the following contributors to IFIP activities by the 1988 IFIP General Assembly (GA).

TC5: J.L. Burbidge (GB)
TC8 C. Rolland (F)
P. Lockemann (D)
G. Sol (NL)
C.H.P. Brookes (AUS)
N. Bjørn-Andersen (DK)
TC9: J.Berleur (B)
D. Millin (IL)
F. van Rijn (NL)
K.Tijdens (NL)

The Award is granted for services rendered to IFIP by Technical Committee (TC) and Working Group members. We congratulate and are grateful to these people for their service to IFIP. It should be noted that some TCs are opposed to the concept of the Award and thus have not nominated potential recipients.

IFIP Award

The External Awards Committee reported to the GA that its plans are complete for the IFIP Award for contributions in information processing.$ IFIP president *Mr. Ashley* Goldsworthy *(A* US) appointed a committee to raise an endowment fund for the Award. According to present plans, the first two Awards will be conferred at IFIP Congress '92 in Madrid.

TC6 Award

Dr. Ronald Uhlig (USA), chairman of the TC on Data Communication (TC6), announced plans for an award for excellence in Digital Data Communication to the General Assembly in New Delhi. The first TC6 Award may be presented at the TC6 event COMNET '90 in Budapest.

In addition to honoring technical contributors to the area of interest of TC6, the Award is expected to result in increased international awareness of TC6 and its work.

It is planned for the award to be granted once every two years. At most, two awards will be made at one time. ▬

t Details of the Outstanding Service Award are given in an article on page 6 of the December 1987 ***IFIP*** *Newsletter.*

$ An article on page 1 of the March 1988 ***IFIP*** *Newsletter* describes the **IFIP** Award.

The Role of Artificial Intelligence (AI) in Databases and Information Systems was the title of a Working Conference held in Guangzhou, China 4-8 July 1988. It was sponsored by IFIP's Working Groups on Database (WG2.6) and Design and Evaluation of Information Systems (WG8.1). Approximately 150 attended, some 90 from P.R. China and the remainder from other parts of the world. Of the 30 papers presented, nearly one third were by Chinese authors.

Prof. *Dr. Arne Sølvberg* (N), WG8.1 chairman, was General Conference Chairperson. Chairpersons of the International Program Committee were Prof. *Dr. Robert Meersman (NL)* and Prof. *Kung Chen-Ho (USA). Xu Kongshi (PRC)* was chairperson of the Organizing Committee, assisted by *Prof. Shi Zongzhi* (PRC), who also prepared the participant's edition of the proceedings.

The Conference had a twofold scientific goal: Since information system design, implementation and operation is a complex problem-solving task, where expert knowledge is needed, papers concerning AI techniques for information system design were solicited. In addition, the Conference explored new database formalisms and technologies for use in (large) AI applications.

Three eminent experts were invited speakers: Prof. *John McCarthy (USA), Mr. John* Sowa (USA), and Prof. *Raymond Reiter (CDN).*

We quote here from Mr. *Sowa's* paper, the only invited address available at press time. Its discussion of the problems of integrating natural language, database, and expert system specifications contains material of interest to nonspecialists. The paper, *Knowledge Representation in Databases, Information Systems and Natural Language,* began as follows: *

Incompatibilities

> Natural language processors, expert systems, and database systems all represent knowledge in some way, but they typically represent it in incompatible ways. Language talks about things in the world; knowledge systems reason about things; and databases store information about things. A common taxonomy is a prerequisite for interaction between the three.
>
> The search for common features of knowledge becomes most important when different kinds of systems are interconnected: when a program calls an expert system, when an expert system accesses a database, or when a natural language system interacts with any of them, either by queries, commands, or declarations.

The main part of the paper was devoted to demonstrating that *Mr.* Sowa's "conceptual graphs" can serve as a tool to unite the three components. He then summarized his arguments as follows:

A Uniform Approach Needed

> A uniform approach to semantics would be an important step towards simplifying the interfaces between databases, knowledge bases, and natural language. It would help to support the query language, the reasoning strategy, and the database design. In particular, the knowledge acquisition problem, which is the major bottleneck in expert system development, would be facilitated by a single semantic language that could represent natural language semantics as well as logic and database design.
>
> Unfortunately, languages that are strong in one area are not necessarily the best for the other two. Notations for defining database structure are difficult to extend to handle all of logic. Grammar rules that are suitable for defining language syntax may not be the best for defining semantics. And languages that are best for logical structure may not be ideal for database structure or linguistic syntax. Each area should have a language or notation suitable for its needs, but there should be clearly defined mappings for relating them at the intersections.
>
> In the future, new notations may be defined that integrate the needs of the three areas as well or better than conceptual graphs. But it is important to recognize that each area has its own characteristics that are quite different from the other two. A language that is ideal for one area is unlikely to be ideal for either of the others. However, the languages designed for each area should be designed to accommodate and adapt to the requirements of the others.

The proceedings of the Conference, to be published by Elsevier/North-Holland in March 1989, are being edited by *Meersman, Kung,* and *Shi.* ▬

* IFIP

GEN. ASSEMBLY cont. from page 1

cational Applications of Information Technologies, WG8.5 on Information Systems in Public Administration, WG9.3 on Home-Oriented Informatics and Telematics (HOIT), and WG11.7 on Computer Security-Related Legislation. Another new field of activity is a proposed **IFIP** code of ethics.f

In other areas, plans for new conferences and workshops were heard, as well as reports on several successful events held recently. A slightly different type of activity has taken place in WG6.6 on Network Management for Communication Networks. One of its working parties, dealing with user requirements for network management, developed a position paper that received wide distribution by the Corporation for Open Systems (COS), an industry association involved with North American communication standards. WG6.6 has established a good working relation with COS as well as extensive interaction with the International Standards Organization.

IMIA Matures

It is satisfying to see an area of **IFIP's** work begin as a small activity and grow to become a major field. This has happened to medical informatics. In 1967, **IFIP** created TC4 on Health Care and Biomedical Research. By 1978, TC4 had grown and matured to the point that it seemed appropriate to grant it semi-autonomous status as a Special Interest Group; therefore, it became the International Medical Informatics Association of **IFIP** (IMIA). Now, IMIA is working independently of, but cooperating with, **IFIP.** As a result, the 1988 GA took steps to change IMIA's status to that of an Affiliate Member. Subsequently, IMIA approved the move and created a committee to implement the transition.

Four categories of **IFIP** awards were handled by the GA. They are covered in an article on page 3.

IFIP's Developing Countries Support Committee (DCSC) proposed two measures to encourage developing countries to join **IFIP** as full Members. The first, approved by the GA, is to halve the membership fee of a new Member from a developing country for the first three years of its participation. The second part of the proposal is that the DCSC will endeavor to arrange for an **IFIP** technical event, typically sponsored by a TC, to be held in the new Member's country.

Bl. Sendov listens as K. P. P. Nabier welcomes General Assembly.

The DCSC has been encouraging the formation of regional computer confederations in Africa. This came to fruition when the 1988 GA voted to admit the West Africa Regional Computer Society (WARCS) as a Full Member of **IFIP.t**

Plans for the two TC2 State-of-the-Art programming seminars in developing countriest are progressing. The correct venues are given in the Calendar of Events on page 16.

Publications

Publications received a good share of attention by the GA. The new contract with Elsevier/North-Holland was discussed. The major new provisions are (1) Elsevier is to be the sole publisher of proceedings of **IFIP** conferences, workshops, Congresses, and other major events (by mutual agreement, proceedings may be published elsewhere), **(2) IFIP** Member societies receive a 50% discount on all **IFIP** Elsevier publications, and individual members of Members receive a 40% discount, (3) Members and individual members of Members receive a 25% discount on all other Elsevier publications, (4) Elsevier will increase its marketing efforts, and (5) Elsevier will undertake two experiments to increase sales. Means by which **IFIP** might increase its royalty income were also discussed. Among the more helpful steps were to reduce the time between a conference and the submission of the proceedings to the publisher, and to reduce the number of small publications.

Closely related to publications is the matter of marketing **IFIP's** resources. **IFIP** has entered into an agreement with International Organizations Services, by which the latter will market an **IFIP** International Calendar of Events in Information Processing, an **IFIP** Database of Information Processing Journalists, and an **IFIP** Database of Addresses of Leaders in Information Processing. This is an experimental program, to determine whether there is interest in these **IFIP** resources. Experiments for improving the sale of **IFIP** publications were also discussed. Possible use of the ***IFIP*** *Newsletter* to promote **IFIP** more extensively and to raise revenues was also considered. Marketing Committee chairman *Mr. Hennie Leroux (ZA)* also announced that the next edition of the **IFIP** Bulletin will be produced early in 1989.

Finances

There is good news and bad news with regard to IFIP's financial situation.§ The good news is the forecast by Vice-President for Internal Affairs *Mr. Aage* Me*/bye (DK)* that the net operating outcome for 1988 will not result in a loss. This outcome, better than expected, is due in part to currency exchange gains, which reversed, in the first 6 months of 1988, approximately 2/3 of the exchange losses incurred in 1987. The bad news is that because of an auditor's error, **IFIP's** assets at the end of 1987 were previously reported to be approximately 100 000 Sfr. greater than their actual value.

Although the revised 1988 budget shows an operating loss of 36 000 Sfr., it appears that the actual loss will be almost nil. When the amount of 49 000 Sfr. set aside for the **IFIP** Contingency Fund is added (no further additions have been budgeted for 1988 for the **IFIP** Development Fund or the DCSC Development Fund), the final result is an estimated loss of 49 000 Sfr.

For 1989, the proposed budget originally showed an operating loss of 63 000 Sfr. No provisions were made for additions to the Contingency Fund or the two Development Funds. The GA then voted to increase Members' dues for 1989 by 10%, which should increase income by approximately 22 000 Sfr. and thus reduce the operating loss to 41 000 Sfr. Because a further, substantial dues increase may be necessary, the Finance Committee (FC) was instructed to recommend a new dues structure.

f Particulars will be printed in the next issue of the ***IFIP*** *Newsletter.*

$ See the article on page 1 of the September 1988 ***IFIP*** *Newsletter.*

§ A disoussion of IFIP's financial situation can be found on page 1 of the June 1988 ***IFIP*** *Newsletter.*

The FC proposed a more conservative investment policy and an improved procedure for controlling the accounting and disbursement of loans and grants and repayment of the former; these measures were approved by the GA. The FC chairman, ***Prof. Alex Verrijn-Stuart*** (NL), noted that the net cash flow from TCs (proceeds from conferences plus royalties less expenses) is positive; whereas, IFIP's other expenses are responsible for the net negative cash flow.

The most unusual aspect of this GA was the period set aside on the final morning for discussion of the mission of IFIP. The GA representatives and other IFIP officials present were divided into four groups for round-table discussions about the "why" of IFIP. Following two hours of discussion, the GA convened to hear brief reports from the groups. It was noted that IFIP is a multinational, multi-disciplinary organization with 28 years of experience. Among the reasons put forward for the importance of the existence of IFIP were

- to promote international cooperation
- to advance the state of the art
- to publish technical literature
- to provide advice to international organizations
- to help developing countries
- to provide an international forum
- to contribute to world stability

Vice-president Mr. Graham *Morris* (GB) will prepare a draft "mission statement" based on the groups' reports.

Before adjourning the meeting, IFIP president Mr. ***Ashley*** Goldsworthy *(A* US) presented Mr. George Glaser, representative of the U.S.A., vice-president, and chairman of the Activity Management Board, with a gift in recognition of his many years of valuable service to IFIP. Mr. Glaser's second term as vice-president ended at this GA. President ***Goldsworthy*** then closed the meeting with many thanks to the members of the Computer Society of India and others for the magnificent way in which they had served as hosts for the meeting.

TECHNICAL ASSEMBLY INAUGURATED

The IFIP Technical Assembly (TA) met for the first time immediately preceding the General Assembly **(GA)** last September in New Delhi. The TA, whose membership comprises the chairmen of all **IFIP** Technical Committees (TCs), Special Interest Groups, and Specialist Groups and all Affiliate Member (AM) representatives, was created for the purpose of formulating long-term plans for IFIP's technical activities and facilitating and promoting cooperation among IFIP's TCs and AMs. It is also envisioned that the TA will be the means by which **IFIP** may serve as an "umbrella" organization for all societies related to information processing. The concept of a TA was endorsed by the 1987 GA in Budapest.i'

The reorganization endorsed by the 1987 GA also called for an Activity Management Board (AMB), whose responsibilities are to handle the more routine aspects of **IFIP's** technical activities, such as approving loans and grants and authorizing technical meetings. The TA and AMB replace the Activity Development Board (ADB). The AMB's membership of six consisted of GA representatives, some TC chairmen, and an AM representative. It was widely felt in New Delhi that since the presence of TC chairmen at AMB meetings was essential, they should be members. However, because that might make the AMB unwieldy, no change to the AMB membership has been made.

The details of the operation of the TA and AMB have not been formally approved by any GA, and the bodies are not yet described in the **IFIP** Statutes and Bylaws. Nevertheless, there is such flexibility in the power of the **IFIP** president to appoint committees that the president, Mr. ***Ashley Goldsworthy (AUS),*** was able to proceed with the 1987 GA's wishes and call for these bodies to meet prior to the New Delhi GA. He appointed ***Acad. Blagovest Sendov*** **(BG), who** was then the vice-president for technology and is now president-elect, chairman of the **TA. *Mr.*** **George *Glaser (USA),*** who was then a vice-president and is now conference officer, served as chairman of the AMB. Newly elected vice-president Mr. James ***Finch (CON) is*** the new AMB chairman.

t An article on page 8 of the December 1987 ***IFIP*** *Newsletter* describes the motivation for forming the TA and the structure of the body.

The GA approved the charter of the TA:

1. to stimulate action to develop new initiatives with regard to (a) the overall nature and scope of IFIP's technical activities, (b) the level of participation, and (c) the general need to ensure that IFIP constantly improves its relevance and value to its target audiences

2. to constantly review the aims, structure and thrust of IFIP technical activities, with the aim of recommending to the General Assembly changes, as appropriate, to improve the continuing relevance of IFIP

3. to review proposals for IFIP participation in new areas of activity, with a view to recommending to the relevant authority appropriate action to be taken, including the establishment of new TCs and WGs

Acad. ***Blagovest*** Sendov, president-elect of **IFIP,** was elected president of the Bulgarian Academy of Sciences in July 1988. Details will be printed in the next issue of the ***IFIP*** *Newsletter.*

4. to promote the effective interfacing of Affiliate Members' and other relevant organizations' activities, where this contributes to the advancement of information processing to the benefit of such bodies and IFIP, as well as of the community at large

5. to initiate TC/SIG Review Committees; to receive their reports, if necessary adding comments and recommendations; and to distribute them to Council members and members of the reviewed TCs or SIGs

The AMB's charter consists, essentially, of those items of the former ADB charter not assumed by the TA. The fundamental division of responsibility for technical activity is

TA: new activities and long-range plans
AMB: current status of technical activities and loans and grants
GA: formal approvals, relationship with Members, and global issues

An important aspect of the reorganization was an attempt to integrate the work of **IFIP** more closely with that of its AMs and to make **IFIP** more of an

Deliberating at General Assembly: P. Kovacs, A. Melbye, G. Morris, J. Fourot, and A. Goldsworthy

continued on page 6

HARDWARE DESIGN VERIFICATION

The Fusion of Hardware Design and Verification was the title of an international Working Conference held 4-6 July 1988 by IFIP's Working Group on Digital Systems Descriptions and Design Tools (WG10.2).f Meeting in Glasgow, the 67 participants, including most of the leaders in this field, discussed 23 papers on applying formal techniques to the verification of VLSI circuits.

Dr. George Milne (GB) served as Conference chairman. Proceedings of the Conference have been published by Elsevier/North-Holland.

A good summary of the state of the art of hardware verification is found in the paper *NODEN: An Engineering Approach to Hardware Verification* by *Dr. Clive Pygott (GB).* Excerpts from the initial sections of that paper are quoted here: *

> Hardware verification is a process by which a circuit designed to implement some specification is shown to be correct under all circumstances. Formal hardware verification involves the use of mathematical tools to manipulate the descriptions of the circuit and of the requirement, to show whether or not they agree under all circumstances. This is a far more complex process than that involved in normal circuit testing and is still the subject of much research. At present, formal verification has only been used on a handful of circuit designs. Currently, the justification for using such methods has been that the circuits being verified are to be used in safety-critical applications, and so no design errors, however obscure, can be tolerated. However, as the complexity of integrated circuits increases, the use of formal methods is likely to become more relevant to all digital circuit designers.

Real - Life Practice

> Verification methodology should be contrasted with what happens in practice during the fabrication of most circuits. Usually there is no formal statement of what the circuit is to do, the requirement being expressed in a natural language form (with its inherent ambiguities). A level of confidence in the correctness of the circuit is gained by simulating its response to a selected set of stimuli. This set of stimuli has to be designed to exercise as much of the circuit as possible, but all this method can ever show is that for those tests performed, the circuit behaves as expected. For example, a comparatively simple 8-bit microprocessor is capable of 2^{221} different state transitions. Even if a transition could be simulated every microsecond, it would take 10^{53} years to examine all the possible changes (this is far longer than the age of the universe).
>
> The argument usually made to justify this approach is that it is known from the specification that there is no logical connection between different parts of the circuit. This leads to problems when rarely used parts of the processor interact in unanticipated ways. A number of microprocessors have gone on the market which have later been shown to behave erroneously under unusual circumstances (such as an interrupt occurring in the middle of a block move instruction).
>
> Research into hardware verification is typified by programmes that lead to formal verification of an implementation. However, this proof of correctness involves a great deal of human interaction with the proving tools. Furthermore, the current state of the proving tools is such that a high degree of mathematical ability is required to use them. A secondary problem is that they have been developed within an academic environment, as stand-alone tools with little or no consideration given to the way they would interact with existing CAD systems.
>
> In particular, the programmes typically assume that the circuit will be described in the language used by the proving tool. In practice, the circuit is likely to be designed using a schematic capture process on a work station, with the graphical representation being translated into a textual hardware description language. Whilst it would be possible to write a translator, this is not the whole solution to the problem. The steering of the tools by the person performing the proof is such that the person must have a good understanding of the structure of the information being manipulated. Automatic translation of a graphic representation of the circuit, followed by further translation into the proving language, is likely to lead to a poorly structured description that will be very difficult for the prover to interpret.
>
> In addition to the translation problem, there is also a requirement to test the chips once they have been fabricated. This means that some quite detailed simulation of the device is still needed to provide test waveforms and expected results. This simulation cannot be performed at the top level of specification, as details of the circuit interface and timing may not be visible in the abstract high-level description.

Future Trends

> Given the above problems with formal verification, it may be wondered if it will ever replace testing for any but the most safety-critical circuits. Eventually, as improvements in the man-machine interface of the proving tools are made, the human effort required to prove a circuit will be reduced until verification is as attractive as testing. More importantly, it would appear that the amount of effort required to perform verification rises only slightly faster than linearly with the complexity of the circuit under investigation. This should be contrasted with the effort required to test a circuit to the level of confidence required before it can be manufactured, which appears to increase as at least the cube of complexity, if not exponentially. This means that as circuits become more complex, there must come a time when it is cheaper to perform a verification than to test the circuit to the currently accepted level of confidence.

The author then proceeded to describe a system in which the method of proof was designed to alleviate some of the problems associated with the verification process.

* © IFIP

An article on page 4 of the March 1988 ***IFIP*** *Newsletter* also discussed this Conference.

TECH. ASSEMBLY cont. from p. 5

umbrella organization. Some second thoughts on this aspect of the plan were voiced in New Delhi. Only one AM (IAPR) was represented by a delegate not representing other activities. In fact, the closeness of the ties between IFIP and its AMs seems to be directly related to the degree to which the AM representatives have participated in other IFIP activities. *Acad. Sendov* expressed his reservations with regard to the goal of IFIP serving as an umbrella organization.

The inaugural meetings of the TA and AMB went extremely smoothly. The division of labor was handled surprisingly well. Unfortunately, however, there was not time for a TC Chairmen's Forum during the week of the 1988 GA, although the TC chairmen had requested this of the 1987 GA.

To one observer, the actions and discussions of the TA and AMB seemed very similar to those that used to take place in the ADB. Since it was formally created only one month before the GA, the New Delhi TA did not assume the role of a long-range planning body. This observer feels, however, that in time the TA and AMB will fulfill their desired goals and provide the leadership and management for which they were chartered.

THE IFIP PROTOCOL MEETINGS

*by Dr. Harry Rudin (CH) **

Computer-communication protocols, the rules which specify how processing entities communicate with one another, form the glue which holds modern information-handling machinery together. The eighth meeting on protocols organized by IFIP's Working Group on Architecture and Protocols for Computer Networks (WG6.1) was held June 1988 in Atlantic City, under the careful guidance of ***Drs. Sudhir Aggarwal (USA)*** and *Krishan Sabnani (USA).*

The complete title of the series is *Protocol Specification, Testing and Verification.* "Specification" reflects the currently common belief that some kind of formal or semiformal technique for defining protocols is required; otherwise, their implementations will have little chance of working together harmoniously. Plain text is ambiguous and no longer adequate. "Verification" refers to a growing body of techniques which can be used to remove errors from early versions of protocol specifications, hopefully before they are implemented in hardware and software. "Testing" is required to make sure that different implementations of the same protocol specification conform to their architectural definition and that implementations by different parties will function with one another as intended.

* chairman of WG6.1 and keynote speaker at the 1988 WG6.1 Protocol Symposium

Growing Importance

Because of the growing importance of protocols, interest in techniques for designing and implementing protocols has also grown—both in academia, because there are many intellectually challenging problems, and in industry, because of the necessity to guarantee high availability of information-handling systems. Our meetings have an attractive mixture of industry and university researchers.

The series of WG6.1 meetings began in workshop format in 1971 in the U.K. In 1987, in Zurich, we shed our workshop format for that of an open symposium. The open symposium tradition continued at the Atlantic City meeting, where the 28 papers presented were selected from a record of 74 submitted papers. We had some 160 attendees from 14 countries.

Except for the first meeting, proceedings have been printed by Elsevier/North-Holland. It is our goal that these proceedings be the premier reference in the field.

The Atlantic City meeting began with a one-day tutorial dealing with the application of formal methods to Open System Interconnection (OSI) Protocols, which will, some day, become a kind of Esperanto for computers. Most of the presentations will become available in a special issue of *Computer Networks and ISDN Systems.*

The site of the Symposium alternates between one side of the Atlantic and the other. The 1989 meeting will be held in The Netherlands, June 6 to 9; the Tenth IFIP Protocol Meeting will be held in Ottawa, probably in early June, 1990. ■

IFIP PLANS THREE CONGRESSES

Plans for three IFIP Congresss were aired at the IFIP General Assembly (GA) in New Delhi last September.

Congress '89

The 11th World Computer Congress, to be held in San Francisco 28 August-1 September 1989, was discussed by International Program Committee chairman Dr. Nerve Gallaire ***(D)*** and Organizing Committee chairman Prof. ***Stephen Yau (USA).*** The preliminary programf is now available, and IFIP Member societies are reminded of the importance of distributing them to their members. For more information, contact

11th World Computer Congress
Convention Service Center, Inc.
P.O. Box 18-P
Denver CO 80218, U.S.A.
tel. 1 (303) 831-6338
telex: 168184SVCCTR UT

IFIP Member society presidents will be invited to a special seminar during the Congress, at which issues of interest to them will be presented.

Congress '92

IFIP president ***Mr.*** Ashley Goldsworthy *(A* US) announced the appointment of *Ms. Rosa* Alonso ***(E)*** as chairman of the Organizing Committee for the 12th World Computer Congress, which will take place at the Madrid Palace of Congresses 31 August-4 September 1992. A biography of Ms. Alonso will appear in a future issue of the ***IFIP*** *Newsletter.*

During discussion at the GA in September, IFIP's Technical Committee on Education (TC3) expressed interest in holding its European Conference on Computers in Education '92 as part of IFIP Congress '92. Other TCs are also interested in having the Congress organized as a group of individual TC conferences, with some plenary sessions of interest to all participants. The representative of an Affiliate Member, ***Prof. Herbert Freeman*** (USA) of the International Association for Pattern Recognition, told the GA that its 10th Conference is being organized as an assembly of 4 or 5 specialty conferences. Participants will be able to register for any or all of the conferences. The proceedings will be in separate volumes, obtainable singly or as a complete set.

Congress '94

The Site Evaluation Committee informed the GA that Finland and Germany had expressed interest in holding Congress '94 in their countries. IFIP Members are reminded that the deadline for submitting formal proposals for Congress '94 is 1 February 1989. For further details, see the article on page 10 of the June 1988 ***IFIP*** *Newsletter.*

¦ An article on page 1 of the September 1988 ***IFIP*** *Newsletter* gave details of the program. A list of panel sessions will be printed in a future issue.

IFIP's Technical Committee on Security and Protection in Information Processing Systems (TC 11) held SEC '88, its fifth International Conference and Exhibition, 19-21 May 1988 in Gold Coast, Queensland, Australia. Over 400 participants registered for this very successful meeting. The newly appointed chairman of TC11, *Dr. William Caelli (AUS),* served as chairman of both the International Program Committee and the Organizing Committee. The Conference was opened by the attorney general of the State of Queensland.

The term "trusted computer systems," which may be new to many of us, was highlighted in a keynote address by Dr. *Willis Ware (USA),* vice-chairman of TC 11. In the talk, he characterized *trust* in these words: *

> Initially "trust" was a concept to describe a computer system that (1) would include security safeguards and (2) could enforce control over access to the resources within it. More precisely, the term *trust* meant a system that could enforce a security policy with extremely high confidence. One must immediately note that a *security policy* is the set of rules governing who may access what information, and what each may do with it, and who may access processes and system resources. The prevailing notion throughout has been, however, that control of access would be central to any security policy.
>
> *High confidence* relates to the certainty with which a system owner and the accreditor hold a conviction that the security features function as expected, and are themselves protected against inadvertent or deliberate modification. There is a collateral implication that the security features do indeed implement the intended security policy—the access control rules.
>
> Finally, there is also the notion of *integrity,* which in this context relates to the ongoing assurance that the protection features continue to be what they are expected to be.
>
> Today the common usage of trust is in the context of system software or major components of it. Trust is little used for hardware; it is sometimes used for systems, but even then it conveys a software connotation.
>
> Trust is a very useful concept, but it should not be confined to software. It properly can and should be applied to hardware/software combinations; to communication networks; to overall systems; to application programs; to individual components of a system; to information processes, whether automated, manual, or both; to procedures, whether automated or manual; and, particularly, it should be applied to people.

No Need to Wait

His views about trusted systems are these:

> Trusted systems can be implemented now. There is no need to wait for systems certified by some federal authority. Maybe the level of trustedness will not be ideal, especially the assurance measures may not be all that would be desired, but a significant level of trusted behavior can be achieved using what we now know how to do and installing the security safeguards that we now understand and can implement. An organization can certainly get started right away on the part only it can do. An organization can build its own security safeguards into application programs; or if a large enough organization, can even make limited modifications to an operating system.
>
> In some, perhaps many, cases, we will be pleasantly surprised to find that certified and evaluated systems or system components may not even be essential in private sector systems.
>
> It must be understood that a certified system is not a magic bullet that, of itself, will be the answer to all security problems. It is one facet of a complex matter.
>
> As systems with some level of trust come into being, threat against them will mature and become more sophisticated; it will shift. Hence, the cat-and-mouse game must continue; security and trustedness will not be static attributes. On the contrary, both are likely to be rather dynamic.

Conclusions

Dr. Ware concluded with the following points:

> We are reasonably well convinced that we know how to do the security job in one community—defense. We have the vendor commitment to provide the necessary products. The vendor community has responded quite well "to the drummer" in the defense world.
>
> The private sector has yet to nominate or even find its drummer, and it is time that it does so. We have not yet learned very much about threat or appropriate safeguards against it in the various communities of the private sector.
>
> There is homework to be done by the private sector, but it generally relates to a careful exposition of the threat, often by communities of common interest such as the savings bank industry or the retail department store industry, plus mutual agreement about the kinds and nature of safeguards that any one industry will need.
>
> In the near future, the commercial, private sector can do much for the security of its computer systems with present systems and present products. Certified evaluated systems will be important in the commercial community as the threat matures and becomes more sophisticated, and as the ssfeguards essential to counter that threat become technically more complex.

Proceedings of the Conference will be published by Elsevier/North-Holland early in 1989.

* © IFIP

FIACC MEETING

*by Mr. Jacques Fourot (F) **

[This article is taken from the Secretary's report to the 1988 General Assembly.]

I attended the 19th meeting of the Five International Associations Coordinating Committee (FIACC) on July 16 in Paris. Following are the major points discussed.

Co-sponsorship: Our four partners stress the importance of joint events and co-sponsorship. A statistic for the activities planned for 1988, 1989, and 1990 has been established:

	CO-SPONSORED Leader	OTHER Not Leader	TOTAL EVENTS		FRACTION CO-SPONSORED
IFAC	15	8	11	34	.67
IFIP	10	11	111	132	.16
IFORS	6	12	10	28	.67
IMACS	5	7	6	18	.67
IMEKO	3	4	20	27	.26

I pointed out that the low percentage shown for IFIP is not altogether abnormal, since our scope is considerably wider and our activity much higher than any other FIACC Federation.

FIACC Secretary Dr. *Gy. Striker (H)* retires this year, and it was decided that it was not necessary to appoint a successor, since *Ms. Havrilla* could easily fill the position. Ms. *Havrilla* was attending the meeting, and she immediately accepted this appointment.

Next FIACC meeting: week of June 5, 1989 in Paris. ■

*** IFIP** secretary and GA representative of France

HARDWARE AND SOFTWARE FOR REAL TIME PROCESS CONTROL

*by Dr. Janusz Zalewski (PL) **

A Working Conference on Hardware and Software for Real Time Process Control was convened 30 May-1 June 1988 in Warsaw by IFIP's Working Group on Computerized Process Control (WG5.4). From the very beginning, it received co-sponsoring support from the International Federation of Automatic Control (IFAC) and the European Workshop on Industrial Computer Systems (EWICS).

Mr. Wolfgang Ehrenberger (D), chairman of WG5.4, was chairman of the International Program Committee. *Dr. Janusz Zalewski (PL),* of the Polish Committee on Computer Automated Measurement and Control of the Association of Polish Electrical Engineers, served as chairman of the National Organizing Committee. This was the latest in a series of local conferences held biennially; however, it was expanded for the international community.

The aim of the Conference was to present and discuss recent developments and trends in real time computerized control. The emphasis was on the fundamental issues in hardware and software rather than on control aspects.

Of the 55 papers presented, 30 were by invitation and the other 25 were selected from 36 contributions received. The authors, originating from 16 different countries, came from universities (26 papers), government institutions, (21), and industry (8). The total participation was 155 registrants from 20 countries, including 79 participants from Poland.

The bulk of the papers was carefully divided into 3 separate but mutually dependent tracks. The hardware track included separate sessions on Bus Systems (Multibus II and VMEbus developments), Multiprocessor Systems, and Local Area Networks. The software track had separate sessions on Programming Languages (7 papers on Ada, with others on Modula 2, C, and Forth), Software Specification, Software Development, Expert Systems, Operating Systems, and Distributed Systems (shared with the hardware track). The integration track started with 2 sessions on Reliability and Safety, and ended with separate sessions on Standardization and Licensing and Real Time Applications. Oral presentations were complemented by poster sessions for shorter communications.

Considering the scientific level, the number of contributions and the attendance, and stressing that it was the first IFIP/IFAC event organized in Poland in the eighties, may I express my personal view that the conference was a success.

Proceedings are to be published in December 1988 by Elsevier/North-Holland. ■

* chairman of the National Organizing Committee

WG9.2 HOLDS CONFERENCE IN BELGIUM

*by Mr. Richard Sizer (GB) **

"Landscapes in an Information Society" was the title of a Working Conference held by IFIP's Working Group on Social Accountability (WG9.2) at Namur University (Belgium) June 6-8 1988. The Conference had its origins in one held in January 1985 with the title "Can Information Technology Result in Benevolent Bureaucracy?" A conclusion then was that evaluation of the impact of technology on social and human aspects of society is largely reactive and seldom beneficial. WG9.2 decided that normative or proactive evaluation would be more productive. Further analysis of the findings of the 1985 conference had shown that an holistic approach is essential where social aspects are concerned and that, consequently, there had to be an integration of such specialist fields as informatics and law, education, economics, politics and religions. These fields were adopted as conference themes, and the term "landscapes" came naturally to mind. WG9.2 also decided that the publication of a Reader would be a useful way of helping people to become aware of the issues at stake in the future uses of information technology.

Once the the themes were determined, planning of "Landscapes" occupied WG9.2 for the next two years. The Reader had, itself, to be holistic yet not so generalized in content as to lose its potential impact. Much thought went into determining the depths to which each theme should be taken, and the selection of authors, on an international basis, who could each specialise in one of the themes. A novel feature of the Conference was to be that the authors would form the bulk of attendees and would have the express task of subjecting their own and others' contributions to critical review. Material was to be distributed prior to the Conference so that, in effect, each attendee had in his/her possession a draft version of the Reader.

The local activity, handling the material, and hosting the delegates, were tasks ably undertaken by *Jacques Berleur (B),* vice-chairman of WG9.2 and Recteur of the University.

The Conference was chaired by *Richard Sizer (GB),* chairman of WG9.2. The opening session was attended by *Ricardo Petrella* (I) of the Commission of the European Communities and a contributor to the Reader. *Harold Sackman* (USA), chairman of IFIP's Technical Committee on the Relationship between Computers and Society (TC9), was also present on the first day as were *Subash Bhatnagar (IND), Perlti Jarvinen (SF), Silvin* Lescovar (YU) and Peter Pirow *(ZA),* all members of TC9.

At the opening session, five members of WG9.2—Felix *van Rijn (NL), Herbert Burkert (D), Bart de* Greet (NL), *Diane Whitehouse* (GB) and *Richard Sizer—each* acted as rapporteur for a group of chapters, highlighting strengths, weaknesses, and provocative aspects of the various authors' contributions. Thereafter, the rapporteurs' comments formed the agendas for working groups, where membership had been chosen to reflect the holistic nature of the Conference.

At the final plenary session, attendees commented freely on the scope of the proposed Reader in the light of the three days of intensive discussion and analysis. The editors—Jacques *Berleur, Richard Sizer, Diane Whitehouse* and *Andrew* Clement (CDN)—now have the task of producing the Reader in form and content worthy of the fine efforts of all those who contributed to, and attended, the Landscapes Conference. ■

* chairman of WG9.2

DECISION SUPPORT continued from page 1

> units and is addressing major corporate problems of potential interest to the top levels of management. The mission of the DSS of 1988 is quite similar to that of its ancestor of twenty years ago or more. The focus, once again, is on decisions involving many people, to help them reach a view about an issue which affects them all.

One of the papers we found fascinating was devoted to the potential contributions of quantitative analysis to negotiation and mediation. The authors, ***Prof. Jeryl Mumpower, Mr. Sandor Schuman,*** and ***Mr. Anthony Zumbolo*** (all from the U.S.A.), put forth the viewpoint that systematic analyses, even simple ones, can frequently help negotiators or mediators identify efficient agreements that should be mutually satisfactory to the parties involved. We quote here parts of this paper, *Analytical Mediation: An Application in Collective Bargaining: **

Analytical Mediation

> The analytical mediation approach consists of three fundamental elements:
>
> Step 1. Develop *models of the negotiation problem* that explicitly identify and define each issue under dispute, describe current bargaining positions, and identify any potential points of compromise on issues;
>
> Step 2. Develop *value models* for each negotiatior, using computer-supported judgement analysis techniques; and
>
> Step 3. Attempt to identify potential agreements that simultaneously maximize both equity and mutual satisfaction, using *computer-supported quantitative analyses.*

The specific case study was then described:

> Negotiations involved the Board of Education and a local union of school administrators in a small, upstate New York school district. A detailed model of the negotiation problem was developed in the first session of the mediation process. Both negotiation teams were brought together in joint, then separate, meetings to clarify the nature and extent of their disagreements. The mediation team elicited descriptions of 13 major unresolved issues, the positions of negotiators with respect to each issue, and, wherever possible, intermediate positions on each issue.
>
> The next step in the process involved development of value models for each party. Each negotiation team met separately to review a series of 40 hypothetical settlements put forward by the mediation team: proposed packages in which each issue was settled either in favor of a proposed position of one of the parties or at one of the intermediate positions. The two teams rank-ordered all 40 hypothetical settlements, then rated them on a scale ranging from 1 (for a completely unacceptable settlement) to 100 (for a completely acceptable one). Each team carried out this exercise in closed session. Next, in discussions with the mediation team, each team rank-ordered and then rated the issues in terms of their relative importance.

The paper proceeded to describe the analytic techniques used to mathematically model each side's judgements. Then they described how a proposed settlement was chosen.

> Analyses were conducted to combine the two sides' models in an attempt to achieve simultaneous resolution of all disputed issues. To do so, one searches for settlements in which interests are satisfied by tradeoffs involving combinations of issues. In simplest terms, one looks for trades where one party concedes, wholly or partially, on an issue less important to them and more important to the other party in return for concessions on some other issue more important to them and less important to the other party. Although the strategy is simple, implementing it is not, and it is usually impractical to find such settlements intuitively or heuristically when more than a few issues are involved. Fortunately, techniques of linear programming and modern computing technology make it possible to solve such problems of constrained optimization quickly. Integer goal programming, a variant of linear programming, was used.
>
> The identified solution represented the best estimate of a potentially satisfactory compromise settlement offering maximum levels of mutual utility.

The paper then told how the two sides came close to accepting the proposed solution but eventually decided to call for a fact-finder, who, after four months of review, made a recommendation quite similar to the final proposal generated by analytical mediation. The parties eventually agreed to the terms of the fact-finder's report.

Focusing on Primary Issues

The paper concluded with an evaluation of the analytical mediation process:

> Analytical mediation forced discussion to focus on primary issues, eliminated extraneous ones, defused personal and emotional conflicts, explicitly identified priorities, and clearly established differences between parties. A number of interviewees commented that "I don't think we would have gotten the settlement without you."
>
> In conventional mediation, teams typically discuss one issue, or one package at a time, attempting to resolve issues, or sets of issues, sequentially and incrementally. In contrast, early in the analytical mediation process, teams systematically evaluate large numbers of hypothetical settlements that involve simultaneous settlements on multiple issues. This shifts the orientation from single issues, packages, or rules (e.g., "We won't consider any salary proposal over $40,000.") to multiple issues and tradeoffs.
>
> In conclusion, analytical mediation is not a substitute for conventional mediation. It will not prove helpful or cost-effective in every case. It constitutes, however, a useful addition to the set of techniques and tools available to mediators.

This paper can be found in the proceedings of the Conference, which were edited by Prof. McCosh, ***Prof. Ronald*** Lee (USA), and Prof. Piero ***Migliarese*** (I) and published in May by Elsevier/North-Holland. ***Prof. Migliarese*** was also Conference Chairman. ■

IFIP

PUBLICATIONS AVAILABLE

New **IFIP** workers should be aware of the availability of the following **IFIP** publications from the **IFIP** Secretariat:

- Information Bulletin
- Statutes and Bylaws
- Standing Orders
- *What Is **IFIP?***
- 6-Year Plan (list of planned **IFIP** events)

National Abbreviations Used in Newsletter

A	Austria	GR	Greece	PRC	China
AUS	Australia	H	Hungary	RA	Argentina
B	Belgium	I	Italy	S	Sweden
BG	Bulgaria	**IL**	Israel	SEARCC	South East Asia Regional Computer Confederation
BR	Brazil	**IND**	India	SF	Finland
CDN	Canada	**IRL**	Ireland	SU	U.S.S.R.
CH	Switzerland	IQ	Iraq	USA	U.S.A.
CS	Czechoslovakia	J	Japan	WRN	Nigeria
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Proceedings of the 2nd IFIP WG10.5 Workshop, Egham, Surrey, UK, September 1987
edited by **R.M. Lea**

1988 x + 250 pages Price: US $65.75/Dfl. 125.00
ISBN 0-444-70535-X

Fault-tolerant VLSI chip design, the imminence of ULSI and the prospect of WSI are stimulating research and development projects throughout the world. Freedom from traditional constraints on chip area creates a real opportunity for the integration of Systems-on-Silicon. The objective of this second workshop was to bring together system designers, fault-tolerant VLSI/ULSI/WSI device designers and technologists in order to gauge progress and discuss WSI prospects.
The book consists of 2 keynote addresses, which provide a comprehensive tutorial introduction to this new subject, and 18 selected papers carefully selected to represent the state of progress in the main research areas of architecture, fault-tolerant design theory and practice, electrical and physical design issues and technology. As such, the volume will be a valuable reference for the growing number of workers concerned with state-of-the-art microelectronics.
Contents: WSI Architecture. Fault-Tolerant WSI Design: Theory. Fault-Tolerant WSI Design: Practice. Electrical and Physical WSI Design Issues. WSI Technology.

The Fusion of Hardware Design and Verification

Proceedings of the IFIP WG 10.2 Working Conference, Glasgow, Scotland, UK, July 1988
edited by **G.J. Milne**

1988 xii + 502 pages Price: US $110.50/Dfl. 210.00
ISBN 0-444-70532-5

The ever-increasing complexity of integrated circuits, coupled with the need to quickly and accurately produce new designs, has caused a surge of interest in mathematically-based design and validation techniques. The fusion of verification with VLSI design appears to be a promising methodology for the future, where the ultimate goal is the inclusion of formal verification within CAD systems.
This book is the result of an international working conference which explored issues relating to the integration of design and verification.
Topics covered include:
- design and verification languages
- design and verification methodologies
- formal verification and simulation
- verification within CAD systems
- behavioural models for hardware
- behaviourally correct architectural synthesis.

Protocol Specification, Testing and Verification VIII

Proceedings of the IFIP Eighth WG6.1 International Conference,
Atlantic City, NJ, USA, June 1988
edited by **S. Aggarwal** *and* **K. Sabnani**

1988 xii + 422 pages Price: US $102.75/Dfl. 195.00
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Smart Card 2000

Proceedings of the First IFIP WG11.6 International Conference on The Future of IC Cards, Laxenburg, Austria, October 1987
edited by **D. Chaum** and **I. Schaumüller-Bichl**

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Parallel Processing

Proceedings of the IFIP WG10.3 Working Conference, Pisa, Italy, April 1988
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Proceedings of the IFIP TC6 International Conference, Ronneby Brunn, Sweden, May 1986
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Knowledge and Data (DS-2)

Proceedings of Second IFIP TC2 WG2.6 Working Conference on Database Semantics, Albufeira, Portugal, November 1986
edited by **R.A. Meersman** *and* **A.C. Sernadas**

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Women, Work and Computerization

Forming New Alliances
Proceedings of the IFIP TC9 WG9.1 International Conference,
Amsterdam, The Netherlands, April 1988
edited by **K. Tijdens, M. Jennings, I. Wagner** *and* **M. Weggelar**

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Hardware and Software for Real Time Process Control

Proceedings of the IFIP WG5.4/IFAC/EWICS Working Conference,
Warsaw, Poland, May/June 1988
edited by **J. Zalewski** *and* **W. Ehrenberger**

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H. Zemanek (A), Chairman

IFIP-Unesco Liaison Officer: J. Fourot (F)

The following committees have been disbanded:
Long Range Planning Committee
WG11.6: Multiparty Transaction Security

NEW APPOINTMENTS

GA MEMBER

Representative for Cuba: Eng. R. Franco Perellada
Institute of Cybernetics, Math. and Physics
Habana 2, Rep. of Cuba
(succeeding Mr. 0. Olivera)

WG OFFICERS

WG3.6 Chairman: Mr. G. Kovács
John von Neumann Society for Computer Science
P.O. Box 240, H-1368 Budapest 5, Hungary
tel. 36 (1) 329 390 / 353 132
telex: 225369 mtesz

WG7.3 Chairman: Dr. M. Reiser
IBM Zurich Research Lab.
Saumerstrasse 4
CH-8803 Ruschlikon, Switzerland
tel. 41 (1) 724 8288
(succeeding K.C. Sevcik)

WG7.3 Vice-Chairman: Dr. S.S. Lavenberg
IBM Research Center, P.O. Box 704
Yorktown Heights, NY 10598, U.S.A.
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WG7.3 Secretary: Dr. O.J. Boxma
Centre for Maths. and Comp. Sciences
Kruislaan 413
NL-1098 Si Amsterdam, The Netherlands

WG8.3 Chairman: Prof. Dr. H.G. Sol
Faculty of Mathematics and Informatics
P.O. Box 356
NL-2600 Al Delft, The Netherlands
tel. 31 (15) 784 412 (office)
31 (15) 177 549 (home)
fax. 31 (15) 787 022
e-mail: WINFSOL @ HDETUD1
(succeeding Prof. L.B. Methlie)

WG9.3 Chairman: Drs. F. van Rijn
Ruysdaelkade t.o. 225
NL-1072 BA Amsterdam, The Netherlands

WG9.3 Vice-Chairperson: Mr. K. Bjerg
Copenhagen Univ., Psychological Lab.
88, Njalsgade, DK-2300 Copenhagen, Denmark

WG9.3 Secretary: Mr. J. Fokkema
Stichting Grote Broer, Kinkerstraat 17 II
NL-1053 DC Amsterdam, The Netherlands

ORGANIZING COMMITTEE, CONGRESS '92

Chairperson: Mrs. Rosa Alonso
Technology Development Dept.
Alcatel Standard Eléctrica, S.A.
Ramirez de Prado, 5, E-28045 Madrid, Spain
tel. 34 (91) 467 30 00, fax. 34 (91) 228 61 22
telex: 27461

AFFILIATE MEMBER

Representative for FACE: Dr. Alan Bridges
ABACUS
Dept. of Architecture and Building Science
University of Strathclyde
131 Rottenrow, Glasgow G4 ONG, U.K.
(succeeding I. Harvey)

TC AND WG MEMBERS

TC2: **Dr.** B. Ford (GB)
(succeeding Prof. J.N. Buxton)
TC3: Prof. S. Otsuki (J)
(succeeding Prof. Nishimura)
TC10: Dr. Vladimir Lazarov (BG)
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Mr. V.N. Garusov (SU) Mr. G. Philokyprou (GR)
FHD Gastkemper (NL) Mr. A. Rohonyi (H)
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Mr. T. Matsuda (J) Mr. R. Swetter (NL)
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Mr. F. Mulder (NL) Mr. S.-A. Wichit (SEARCC)
Mr. F. Netta (D)

WG5.3:
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Mr. M. Maentylae (SF) Mr. N. Toderov (BG)
R.C. Michelini (I) Mr. M. Vernon (F)
V.R. Milacic (YU) Mr. D. Zigiong (PRC)

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Mrs. J. Cameron (AUS) Mr. B. Lutterbeck (D)
Mrs. S. Cook (USA) Mr. Mumford (GB)
Mrs. S. Gensoir (D) Mr. S. Radhakrishna (IND)
Mr. C.C. Gotlieb (CDN)Mr. M. Toda (J)
Mr. R. Kling (USA)

WG9.3:
Mr. A.G. Arnold (NL) Mr. K. Monse (D)
Mrs. A.-J Berg (N) Mr. G. Noltes (NL)
Mr. L.A. de Garrido-Talavera (E)
Mr. N. van Gelder (NL) Mr. T. Ohlin (S)
Mr. R. Gobits (NL) Mr. C. Presvelou **(NL)**
Mr. E. Hagelskjaer (N) Mr. D. Rijkers (NL)
Mr. M. Hepworth (GB) Mr. K. Robins (GB)
Mr. P. vanHoogstraten(NL)Mr. H.H. deVries (NL)
Mr. J. Jankowski (NL) Mr. Th. Weijers (NL)
Mr. H. Kubicek (D) Mr. R. Williams (GB)

WG10.2:
Mr. A. Aas (N) Mr. N. Kawato (D)
Mr. D.G. Agnew (CDN) Mr. F.R. Wagner **(BR)**
Mr. P. Bakowski (F) Mr. R. Waxman (USA)
Mr. L. Claesen (B)

ADDRESS AND OTHER CHANGES

MEMBER SOCIETIES

Gesellschaft fuer Informatik e.V. (GI)
Godesberger Alice 99
D-5300 Bonn 2, **Federal Rep. of Germany**

SVI/FSI
P.O. Box 71, CH-8037 Zurich, Switzerland

Hong Kong Computer Society
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Causeway Bay, Hong Kong
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TC AND WG OFFICERS

TC2 and WG2.7 Secretary:
Dr. Rosalie Zobel-Pocock, Esprit Project
Commission of the European Communities
25, rue Archimède , B-1049 Brussels, Belgium

TC3 Secretary: Prof. G. Wiechers
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TC6 Chairman: Dr. R.P. Uhlig
Northern Telecom. Inc., 885 E. Collins Blvd.
Richardson, TX 75081, U.S.A.
tel. 1 (214) 301-7287, fax. 1 (214) 997-4199
telex: 650250-1777 mci uw

WG7.5 Chairman: Prof. P. Thoft-Christensen
telex: 69523
fax. 45 (8) 14 82 43, tel. 45 (8) 14 23 33

WG8.1 Chairman: Prof. A. Solvberg
(until July 89)
Dept. of Comp. Science
52, Naval Postgraduate School
Monterey, CA 93943, U.S.A.

continued on page 14

WG 10.5 3rd Workshop on Wafer Scale Integration
6-8 Jun 89, Como, Italy
abstracts due: 1 Dec 88
contact: Prof. Mariagiovanna Sami
Dip.to di Elettronica, Politecnico di Milano
P.za Leonardo da Vinci 32, 1-20133 Milano, Italy
tel. 39(2)23993516 fax. 39(2)23993587
telex: 333467 POLIMI-I

Fourteenth IFIP Conf. on System Modelling and Optimization
3-7 Jul 89, Leipzig, G.D.R.
abstracts due: 15 Dec 88
contact: Dr. K. Tammer
Leipzig Univ. of Technology
Dept. of Math. and Informatics, PF 66
Leipzig, 7030, G.D.R.

Sixth IFAC/IFIP/IFORS/IMACS Symposium on Information Control Problems in Manufacturing Technology
29 Sep-1 Oct 89, Madrid
draft papers due: 15 Dec 88
contact: INCOM'89
E.T.S. Ingenieros Industriales
Po. Castellana, 80, 28006 Madrid, Spain
tel. (1)-261.69.89 telex: 46854 LCOE
fax: (1)-261.86.18

TC5/WG5.3 Working Conf. on **Computer-Integrated Quality Systems in CIM** Systems
20-23 Jun 89, Beograd, Yugoslavia
abstracts due: 15 Dec 88
contact: Mr. Vidosav Majstorovic
Mechanical Eng. Faculty
Lab. for Production Metrology and Quality Assurance
27 mart 80, 11000 Beograd, Yugoslavia
tel. (011) 322-125 or (011) 328-651, ext. 210
telex: 1276 or 12090

IFAC/IFIP/IMACS Symposium on **Skill-Based Automated Production**
15-17 Nov 89, Vienna
abstracts due: 15 Dec 88
contact: Austrian Center for Productivity and Efficiency (OEPWZ)
Ing. W. Karner
Rockhgasse 6, A-1014 Vienna, Austria
tel. 0222/638636/54DW telex: 115718 oepwz

TC2/WG2.7 Working Conf. on Engineering for **Human-Computer Interaction**
21-25 Aug 89, Napa Valley, CA, U.S.A.
papers **due:** 9 Jan 89
contact: Leonard J. Bass
Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213, U.S.A.
or
Claus Unger
Praktische Informatik II, University of Hagen
Feithstr. 140, D-5800 Hagen, F.R.G.

CHANGES continued from page 13

TC11 Chairman: Dr. W.J. Caelli
Information Security Res. Centre
Queensland Institute of Technology
P.O. Box 2434, Brisbane, Qld. 4001, Australia
tel. 61 (7) 223 2752 (office)
61 (75) 58 2255 (home)
fax. 61 (7) 229 1510, telex: AA 44699
(ERACOM Pty. Ltd.)
tel. 61 (75) 934 911 (office)
fax. 61 (75) 934 388, telex: AA 43943

HONORARY MEMBER

Prof. P.A. Bobillier: fax. 41 (22) 91 52 00 ■

Sixth World Cong. on Medical Informatics-**MEDINFO 89**
16-20 Oct 89, Beijing
papers due: 10 Jan 89
contact: Phil. R. Manning, M.D.
Chairman, Sci. Prog. Comm. MEDINFO 89
USC School of Medicine
1975 Zonal Ave., KAM 317
Los Angeles, CA 90033, U.S.A.
tel. 1 (213) 342-9370, Bitnet: Manning at USCVM

TC10/WG10.2 Working Conf. on CAD Systems Using AI Techniques
6-7 Jun 89, Sanjo-Kaikan, Tokyo
abstracts due: 10 Jan 89
contact: Prof. Gotaro Odawara
c/o Business Center for Academic Societies Japan
3-23-1 Hongo, Bunkyo-ku, Tokyo 113, Jap.
tel. +81-3-817-5831 fax. +81-3-817-5836
telex: 02722268 BCJSP J

TC10/WG10.5 International Conf. on **Very Large Scale Integration-VLSI 89**
16-18 Aug 89, Munich
papers **due:** 15 Jan 89
contact: (for Europe and Africa)
Prof. G. Musgrave
Brunel University
Uxbridge, Middx UB8 3PH, United Kingdom
or (for The Americas)
Prof. Carlo H. Sequin
Dept. of Elec. Eng. and Computer Sciences
Univ. of Calif., Berkeley, CA 94720, U.S.A.

Third **Pan Pacific Computer Conference**
16-19 Aug 89, Beijing
papers due: 15 Jan 89
contact: PPCC-3 Secretariat, Ms. Xiao Lianhua
c/o Institute of Software, Academia Sinica
P.O. Box 8718, Beijing, China
telex: 222655 ISCAS CN

TC9 Working Conf. on Opportunities and Risks **in Artificial Intelligence** Systems-ORAIS **89**
17-20 Jul 89, Hamburg
position papers due: 31 Jan 89
contact: K. Brunnstein
Fachbereich Informatik, Hamburg Univ.
Schluterstrasse 70, 2000 Hamburg, F.R.G.
tel. +49.40.4123-4158/-4162
fax: +49.40.4123-2449

WG8.1 Working Conf. on Information System Concepts: **An In-depth Analysis**
18-20 Oct 89, Namur, Belgium
papers due: 17 Feb 89
contact: Prof. Dr. Eckhard D. Falkenberg
Univ. of Nijmegen, Dept. of Information Systems
Toernooiveld
NL-6525 ED Nijmegen, The Netherlands
tel. +31-80-612229/3465
fax. +31-80-553450
Email (usenet) !mcvax!kunivvl!kunivv5!ef ■

FUTURE IFIP MEETINGS

GENERAL ASSEMBLY AND COUNCIL (and related meetings)

Council		27 Feb-3 Mar 89	Geneva
27 Feb	a.m.	Executive Board, Developing Countries Support Committee (DCSC)	
	all day	Publications Committee	
28 Feb	a.m.	Marketing Committee	
	all day	Technical Assembly	
1 Mar	a.m.	Activity Management Board	
	p.m.	Council	
2 Mar	a.m.	Council	
3 Mar	all day	Council	
GA		1-5 Sep 89 **(Friday-Tuesday)**	San Francisco
1 Sep	a.m.	Executive Board, DCSC, Publications Committee	
	p.m.	Technical Assembly, Publications Committee	
2 Sep	a.m.	Technical Assembly, Marketing Committee	
	p.m.	Activity Management Board	
3-5 Sep	all day	GA	
Council		early Mar 90	Jerusalem
GA		first week of Sep 90	Buenos Aires

TECHNICAL COMMITTEE AND WORKING GROUP MEETINGS*

TC2	Jan 89	Grenoble
WG2.1	9-13 Jan 89	Grenoble
	21-26 Aug 89	Palo Alto
WG2.2	1st quarter 89	San Francisco
WG2.4	16-20 Jan 89	Boston
WG2.7	1st quarter 89	U.K.
	Sep 89	Napa Valley, CA, U.S.A.
TC3	25-27 Jun 89	Reykjavik
WG3.4	30 Jul 89	Helsinki
WG3.5	16-19 May 89	Sofia
TC5	9 May 89	Barcelona
	1 Oct 89	Tokyo
TC6	Mar 89	Belgium, Israel, or F.R.G.
	Sep 89	U.S.A.
	May 90	Budapest
	Sep 90	Spain
TC8	end of Aug 89	San Francisco
TC9	15-16 Jul 89	Hamburg
WG10.2	23 Jan 89	Darmstadt, F.R.G.
WG10.5	28 Feb 89	London
TC11	week prior to Congress '89	Vancouver or California

• Some meetings are scheduled in conjunction with Working Conferences, for which the conference dates are listed.

CALENDAR OF EVENTS

(continued from page 16)

Event	Date	Location	Organized by
Sixth Symp. on *Information Control Problems in Manufacturing Technology*	29 Sep-1 Oct 89	Madrid	IFAC/IFIP/IFORS/IMACS
Work. Conf. on *Human Factors in CAD*	Sep 89 ?	Laxenburg, Austria	WG5.2
Conf. on *Computer Arithmetic—Arith 9*	Sep 89	Santa Monica	TC2/WG2.5/IEEE
Third Intl. Conf. on *Comp. Applications in Production and Engineering—CAPE'89*	2-5 Oct 89	Tokyo	TC5/IPSJ/JSPE/IFAC
Sixth World Congress on *Medical Informatics—MEDINFO 89*	16-20 Oct 89	Beijing	IMIA/CMIA
Work. Conf. on *An In-Depth Analysis of Information System Concepts*	18-20 Oct 89	Namur, Belgium	TC8/WG8.1 /FRISCO
Intl. Workshop on *Industrial Computer Systems*	30 Oct-2 Nov 89	W. Lafayette, IN, U.S.A.	Purdue/TC5/WG5.4
Work. Conf. on *The Next Decade in Information Systems Development Environments*	Oct 89 ?	Israel	TC8/WG8.1
Open Conf. on *Information Systems*	Oct 89	Ljubljana	TC8/A.E.S.
Work. Conf. on *Modeling and Simulation for Optimization of Manufacturing Systems Design and Application*	8-10 Nov 89	Tempe, AZ, U.S.A.	TC5/WG5.3
Intl. Symp. on *Skill-Based Automated Production*	15-17 Nov 89	Vienna	IFAC/IFIP/IMACS
Work. Conf. on *Strategic Information Management*	89 ?	?	WG8.3
Seventeenth Workshop on *Reliable Computing and Fault Tolerance*	Feb 90	?	TC10/WG10.4
Workshop on *Knowledge-Based System Design Tools*	Mar 90	Amsterdam	TC10/WG10.2
Work. Conf. on *Programming Concepts and Methodology*	Mar 90	Israel	TC2/WG2.2 & 2.3
Intl. Workshop on *Industrial Computer Systems*	23-26 Apr 90	W. Lafayette, IN, U.S.A.	Purdue/TC5/WG5.4
Intl. Conf. *COMNET '90: Forward into the Second Quarter-Century in Networking*	8-10 May 90	Budapest	TC6/J.v.Neumann
Seventh Intl. Conf. on *Computer Security—IFIP/Sec'90*	23-25 May 90	Helsinki	TC11
Work. Conf. *on Social Communication and Information Systems*	Jun 90	Finland	TC8
Eighteenth Workshop on *Reliable Computing and Fault Tolerance*	Jun 90	Newcastle	TC10/WG10.4
Tenth Work. Conf. on *Protocol Specification, Testing and Verification*	Jun 90	Ottawa	TC6/WG6.1
Fifth World Conf. on *Computers and Education—WCCE 90*	Jul 90	Sydney, Australia	TC3
Fourth Intl. Conf. on *Advances in Production Management Systems—APMS'90*	20-22 Aug 90	Helsinki	TC5/WG5.7
Symp. on *International Computer Message Systems*	Aug 90	Venice	TC6/WG6.5
Conf. *IBERICOM-90*	Sep 90	Spain	TC6/FESI
Intl. Conf. on *Harmonization of Technology with Society: "Toward the Advanced Information Society"*	1 Oct 90	Tokyo	**IFIP/IPSJ/IPSC** IEEE/AC
Intl. Workshop on *Industrial Computer Systems*	8-11 Oct 90	W. Lafayette, IN, U.S.A.	Purdue/TC5/WG5.4
Work. Conf. on *Formal Product Information*	Oct 90	Amsterdam	TC5/WG5.2
Work. Conf. on *Design Methodology in Manufac. Systems and the Human Role*	90 ?	C.S.S.R.	TC5/WG5.3
Fourth Conf. on *Human Choice and Computers*	90 ?	Dublin	TC9
Work. Conf. on *Women, Work and Computerization*	90	Scandinavia	TC9/WG9.1
Workshop on *CAD/CAM Interfaces in Mechanical Engineering*	90	Darmstadt, F.R.G.	TC5/WG5.2/5.3
Intl. Workshop on *Industrial Computer Systems*	15-18 Apr 91	W. Lafayette, IN, U.S.A.	Purdue/TC5/WG5.4
Tenth Intl. Symp. on *Computer Hardware Description Languages and Their Applications—CHDL 91*	Apr 91	Europe	TC10/WG10.2.
Work. Conf. on *Collaborative Work, Social Communication and Information Systems Theories, Methods, Tools and Impacts*	Jun 91	Finland	TC8/FIPA
Work. Conf. on *Impacts of Informatics on the Organization of Education*	Jul/Aug 91	Santa Barbara	WG3.1
Work. Conf. *VLSI 91*	Aug 91	Edinburgh	TC10/WG10.5
Intl. Workshop on *Industrial Computer Systems*	Oct 91 ?	W. Lafayette, IN, U.S.A.	Purdue/TC5/WG5.4
Intl. Conf. on *Computing in the 21st Century*	91	London	**IEEE/IFIP**
Fourth Intl. Conf. *CAPE 9I—Computer Applications in Production and Engineering*	91	Bordeaux	TC5 et al.
Intl. Workshop on *Industrial Computer Systems*	6-9 Apr 92	W. Lafayette, IN, U.S.A.	Purdue/TC5/WG5.4
IFIP Congress '92-12th World Computer Congress	**31 Aug-4 Sep 92**	**Madrid**	**IFIP**
Eighth Conf. on *Software for Discrete Manufacturing—PROLAMAT 92*	92	Japan	TC5/WG5.3/IFAC
Work. Conf. *VLSI 93*	Aug 93		TC 10/WG 10.5

Please see page 14 for schedule of **IFIP** administrative meetings.

The **IFIP** Secretariat can furnish details of most of the events listed.

CALENDAR OF EVENTS

Event	Date	Location	Organized by
Intl. Conf. on *Information Systems (ICIS)*	4-6 Dec 88	Boston	TC8
State-of-the-Art Seminar on *Database Principles and Practice*	Dec 88	Pune, India	TC2/WG2.6
Work. Conf. on *Data Semantics—DS-3*	88 ?	Beijing	WG2.6
Second Intl. Workshop on *Artificial Intelligence in Economics and Management*	9-13 Jan 89	Singapore	IFIP/IFAC/IFORS
Fifteenth Workshop on *Reliable Computing and Fault Tolerance*	Feb 89		TC10/WG10.4
Conf. on *Data Communication*	Mar 89	Israel	TC6
Work. Conf. on *Visual Database Systems*	3-7 Apr 89	Tokyo	TC2/WG2.6
Intl. Workshop on *Industrial Computer Systems*	17-20 Apr 89	W. Lafayette, IN, U.S.A.	Purdue/TC5/WG5.4
State-of-the-Art Seminar on *Formal Description of Programming Concepts*	18-27 Apr 89	Rio de Janeiro ?	TC2/WG2.2/DCSC
Intl. Conf. on *Integrated Services Digital Networks—ISDN'89*	25-27 Apr 89	The Hague	TC6/ICCC
Work. Conf. on *Distributed Computing*	Apr 89		TC10/WG10.3
Work. Conf. on *Medical Informatics: Educational Issues and Trends*	Apr 89	Victoria, Canada	IMIA
Work. Conf. on *Shaping Organisations, Shaping Technology__SOST'89*	3-5 May 89	Sydney	TC9/ACS
Work. Conf. on *Design, Implementation and Opn. of Databases for Production Mgt.*	10-12 May 89	Barcelona	TC5/WG5.7
Intl. Symp. on *Integrated Network Management*	14-17 May 89	Boston	TC6/WG6.6
Sixteenth Workshop on *Real-Time Programming*	16-19 May 89	Berlin, G.D.R.	IFAC/IFIP
Workshop *What Should be Done with a Single Computer in an Elementary School?*	16-19 May 89	Sofia	WG3.5
Tenth *Tunisian-French Seminar of Computer Science*	23-25 May 89	Tunis, Tunisia	ENSI/TC2
Intl. Symp. on *Urban Data Management*	May 89	Lisbon	UDMS/TC8
Workshop on *Advances in Geometric Modelling*	May/June 89	Berlin, F.R.G.	TC5/WG5.2
Work. Conf. on *Desktop Information Technology*	2-4 Jun 89	Ithaca, NY, U.S.A.	TC8/WG8.2
Work. Conf. on *CAD Systems Using* ***A.I.Techniques***	6-7 Jun 89	Tokyo	TC10/WG10.2
Third Workshop on *Wafer Scale Integration*	6-8 Jun 89	Como, Italy	WG10.5
Ninth Intl. Symp. on *Protocol Specification, Testing and Verification*	6-9 Jun 89	Enschede, Netherlands	TC6/WG6.1
Work. Conf. on *Educational Software at Secondary Level to be Used in and out of School*	18-22 Jun 89	Reykjavik	TC3/WG3.1
Ninth Intl. Symp. on *Computer Hardware Description Languages and Their Applications—CHDL 89*	19-21 Jun 89	Washington	TC10/WG10.2
Work. Conf. on *Computer-Integrated Quality Systems in CIM Systems*	20-23 Jun 89	Beograd, *Yugoslavia*	TC5/WG5.3
Fifth Symp. on *Control of Distributed Parameter Systems*	26-29 Jun 89	Perpignan, France	IFAC/IFIP/IMACS/INRIA
Sixth Symp. on *Dynamic Modelling and Control of National Economies*	27-29 Jun 89	Edinburgh	IFAC/IFIP/IFORS/IEEE
Sixteenth Workshop on *Reliable Computing and Fault Tolerance*	Jun 89	Urbana, IL, U.S.A.	TC10/WG10.4
Fourteenth General Conf. on *System Modelling and Optimization*	3-7 Jul 89	Leipzig, G.D.R.	TC7/IFAC/IFORS
Open Conf. on *Information Systems, Work and Organizational Design*	10-13 Jul 89	Berlin, G.D.R.	TC9/WG9.1
Work. Conf. on *Opportunities and Risks of A.I. Systems—ORAIS'89*	17-20 Jul 89	Hamburg	TC9/TGAI/GIS
Work. Conf. on *Methodologies of Training Data Processing Professionals and Advanced End Users*	31 Jul-4 Aug 89	Helsinki	WG3.4/DPAF/ATKI
Fifth Intl. Conf. on *Stochastic Programming*	13-18 Aug 89	Ann Arbor, MI, U.S.A.	TC7/WG7.1
Third Intl. Congress *Pan Pacific Computer Conference—PPCC'89*	15-19 Aug 89	Beijing	CCF/IFIP/NSF/CIE-CEAS
Conf. *VLSI 89*	16-18 Aug 89	Munich	TC10/WG10.5
Work. Conf. on *Engineering for Human-Computer Interaction*	21-25 Aug 89	Napa Valley,CA, U.S.A.	TC2/WG2.7
Work. Conf. on *Dependable Computing for Critical Applications*	23-25 Aug 89	Santa Barbara	WG10.4/IEEE/EWICS
IFIP Congress '89-11th World Computer Congress	28 Aug-1 Sep 89	San Francisco	**IFIP**
Work. Conf. on *Concepts and Characteristics of Fifth Generation Computers*	Aug 89		TC10/WG10.1
Fourth Intl. Conf. on *Man-Machine Systems (MMS'89) Analysis, Design and Eval.*	12-14 Sep 89	Xian, P.R.C.	IFAC/IFIP/IEA/IFORS
Workshop on *Decisional Structures in Automated Manufacturing*	18-21 Sep 89	Genoa	IFAC/IFIP
Symp. on *Control, Computers and Communication in Transportation*	19-21 Sep 89	Paris	IFAC/IFIP/AFCET

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IFIP Congress '89-11th World Computer Congress	28 Aug-1 Sep 89	San Francisco	**IFIP**
IFIP Congress '92-12th World Computer Congress	31 Aug-4 Sep 92	Madrid	**IFIP**

Please see page 14 for schedule of **IFIP** administrative meetings.

The **IFIP** Secretariat can furnish details of most of the events listed.