EDITORIAL

ERCIM's Joint Action Programme is taking shape

We three partners – GMD, INRIA and CWI – have adopted a name for our cooperative initiative: ERCIM (European Research Consortium for Informatics and Mathematics). The name expresses the European character of this cooperation, as well as our objective of extension to a larger group of institutions.

This comes at a time when our joint initiative is really taking shape. The directors of the institutes first met to consider cooperation in the Spring of 1988, when they drew up a list of possible actions. Essentially all of these actions, which were formalized a year later, have now become a reality:

The Newsletter, of which this is the third number, is distributed world-wide. The first call for application to our Joint Fellowship Programme has been sent out (see also this issue). And other actions, such as an Advanced Training Programme for researchers in computer science and mathematics, are well under way.

The heart of our cooperative activities are the workshops on research themes of common interest. These themes are expected to play an important role in the Europe of the 1990's and to require a joint venture of the type our institutes are uniquely suited to make. At the last workshop, in December 1989 near Paris, attention focussed on data protection and security, software for parallel systems and VLSI design. Short reports on the sessions open this issue, but here I would like to briefly touch on their themes.

Cryptography dates back at least as far as Julius Caesar, who used it for protecting military messages delivered by runners. Two thousand years later, military and other national interest in secrecy of message content continues. But with expanding computerization in so many areas, there is of course also a great need for improved means of protecting other kinds of information systems, such as with banking, databases of personal information and all kinds of Electronic Data Interchange (EDI). And in today's systems, listening in on transmitted messages is only the simplest of abuses that cryptography and modern data protection techniques can prevent. The contributions of the ERCIM partners have a well balanced complementarity for addressing these important problems: whereas CWI concentrates on cryptography and acts as prime contractor in the European programme RIPE and GMD is strong in computer software security, INRIA has some of both to offer, with quite some expertise in the related theory of coding.

With the physical limits of semiconductor-based computers in sight and other technologies such as superconducting or optical computing devices still far from the stage of practical realization, the only real gain in computing power is to be derived from a different organization of the computing process. This has led to a considerable interest in the study of parallel systems. These are much more complicated than the classical sequential systems, and the same holds for the accompanying software. Developing this software requires close international cooperation, in order to avoid the situation - as actually occurred in the fifties - that for every new machine special, non-portable software is developed. Therefore the subject of software for parallel systems is pre-eminently fit for ERCIM cooperation. In this area, CWI concentrates on the design of new algorithms, whereas at GMD and INRIA the emphasis is on vectorizing, parallelizing and optimizing algorithms.

One of the most important modern technologies is the construction of integrated circuits (chips). The ever increasing requirements have made modern chip design a highly complex affair. The design of Very Large Scale Integrated Circuits (VLSI) is truly multidisciplinary, where questions arise concerning computer architecture, automatic translation of specifications to concrete layout, and design of the chip itself. In this field the three ERCIM partners' skills complement each other: GMD can offer an integrated environment for experimental chip design, at INRIA various classes of specialized chip processors have been studied, and CWI possesses fundamental knowledge of optimizing layout and energy consumption, as well as experience with concrete chip design. The possibilities of an application for participation in the European JESSI programme are presently explored.

The above elements represent a sample of what we can achieve through cooperation. Step by step the European Scientific Community in information technology will become a reality. Its construction is our main objective.

Cor Baayen

Contents

ERCIM meeting in Rocquencourt — reports on workshops

The third ERCIM meeting took place at INRIA's headquarters in Rocquencourt, near Paris, on the 7th and 8th of December, 1989. Three workshops were organized on different themes. Here each of these workshops is briefly reported on.

Data Protection and Security

Fifteen lectures on this theme were presented, divided into two sessions. The first session dealt with Data Protection. Research in this field is mainly conducted by CWI and INRIA. The topics considered were very diverse: certifying primes, speeding up exponentiation in RSA, breaking hash functions, random mapping statistics (closely connected with cryptanalysis), and electronic payment (signature in payment systems, identification with undeniable signatures, correcting codes with a very noisy channel). The session on Security covered a lot of projects being done essentially at GMD. Considerable effort has been spent in the past and is cur-rently put in many aspects of this field, starting from an analysis of the risks, deficiencies and threats in computer systems and networks, and by trying to provide new solutions to those problems. Several subjects were covered, such as the use of smart cards as a personal security device in several applications, applying advanced VLSI technology which enables the production of powerful chips, even if today the power is not yet sufficient for the use of very complex cryptosystems. Other topics were related to the introduction of security services in message systems according to current standards, protection based on an object oriented approach and new techniques for increasing the security of distributed systems at different functional levels.

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Software for parallel systems

The subjects of the fifteen lectures presented in this workshop were divided into three main themes: (1) parallel numerical algorithms, (2) parallel non-numerical algorithms, and (3) software

**Director's Meeting at INRIA's headquarters in Rocquencourt: (from left) Prof. Gerhard Seegmüller (GMD), Prof. Alain Bensoussan (INRIA), Prof. Cor Baayen (CWI)
Photo by Rames (Studio 9)**

tools for high performance processors. Although some contributions were not restricted to just one of these themes, the lectures of the participants may be grouped as follows:

Theme	(1)	(2)	(3)
CWI	3	1	1
GMD	2	-	3
INRIA	2	2	1

The subjects of the first theme on Parallel Numerical Algorithms ranged from the construction and analysis of new algorithms for general parallel systems to vectorization and parallelization of current methods for specific parallel architectures. The problem classes considered dealt with initial-value problems for ordinary differential equations (stiff equations arising in circuit analysis and control engineering) and (initial-) boundary-value problems for partial differential equations (incompressible and compressible Navier-Stokes equations).

The second theme on Non-Numerical Algorithms varied from algorithms on distributed memory parallel systems (such as hypercubes and transputer-based systems) to parallel number crunching for attacking famous problems in number theory (Riemann Hypothesis, Conjectures of Goldbach and Mertens, etc.).

The third main theme: Software Tools for High Performance Processors, covered software for various advanced parallel systems such as a communication library for the Suprenum, load-balancing software for the Hypercluster, optimization of vector loops and linear algebra codes on (parallel) vector computers (Cray-2, Alliant).

The diversity of the topics discussed indicated the liveliness of this field of research. Most participants felt however that future workshops should be more restrictive in their choice of topics. Because of this diversity, the possibility of publishing proceedings of this workshop was — after serious consideration — discarded.

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VLSI-design

The topics presented in 12 papers covered a wide range of activities. These were computer architecture, IC design, CAD tools, basic algorithms for CAD tools and also IC technology.

The following diagram shows the main research interest of the participating organizations:

- IC Technology:
INRIA
- Computer Architecture:
CWI, GMD, INRIA
- IC Design:
CWI, GMD, INRIA
- CAD tools:
GMD
- Basic Algorithms for CAD tools:
CWI, GMD

The diagram indicates that computer architecture and IC design are of common interest for all participants and therefore should be topics for further discussions.

Although technology and tools are not current research topics within all organisations it is necessary to keep knowledge and experience in these areas. So the three partners can very well complement one another.

During final discussion it was stated that exchange of information has been very useful and should be continued, e.g. using an electronic conference system.

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RESEARCH ACTIVITIES

BABYLON — the European initiative in knowledge processing

GMD — BABYLON, the tool system for expert systems, is to be further developed and professionally marketed as a software product tailored to industry. This is the aim of a cooperation agreement signed by GMD and the Volkswagen Company for Technical Data Processing Systems (VW-GEDAS) in Wolfsburg. BABYLON was developed by GMD's Expert Systems research group within the framework of WEREX, a joint project sponsored by the Federal Ministry for Research and Technology. This new link between research and application is intended to open up an even wider market for BABYLON.

The costs of developing BABYLON will now be borne by GMD and VW-GEDAS jointly, without additional funding from the Federal Research Ministry. VW-GEDAS will be responsible for marketing and sales.

This cooperation agreement enables the results of top-level research to be ideally combined with industrial, application-oriented know-how. Technology transfer will thus ensure that the latest research findings are rapidly translated into practical forms. Through Volkswagen AG, the principal

3

shareholder of VW-GEDAS, user requirements will be directly incorporated into the project.

With its BABYLON research project, GMD has developed the foundations of a revolutionary tool for expert systems and a software prototype. It is the aim of joint cooperation to further develop BABYLON into an open, portable, expert systems tool which is oriented to user needs and which can be employed within a wide hardware spectrum ranging from personal to main frame computers.

A new book on BABYLON is just published by Addison-Wesley. The 400-page book "Die KI-Werkbank BABYLON" (BABYLON — an open development environment for expert systems and their implementation), edited by Thomas Christaller, Franco di Primio and Angi Voss, and prepared by the Expert Systems research group, describes for the first time how a hybrid tool can be designed and implemented. BABYLON Version 2.1 has been issued to accompany the book; it can be obtained in the Macintosh version from Addison-Wesley. Compared to Version 2.0, the 2.1 version offers increased portability and greater modularity and efficiency. BABYLON can be used, identically source-coded, on more than ten different computer systems and six different LISP systems. The Macintosh surface has been greatly improved and supports the knowledge engineer in the construction and testing of knowledge bases. BABYLON's functional scope can also be deliberately reduced according to application environment. It is also possible to compile BABYLON knowledge bases.

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EPIDAURE — a new medical computer science project

INRIA — The team conducted by Nicholas Ayache at Rocquencourt decided some months ago to create a new research activity on medical computer science. This activity has just been adopted by the "Evaluation Commission" at INRIA.

Several techniques produce internal images of the human body: magnetic resonance images (MRI), X-ray tomography (scanner), ultrasound echography, scintigraphy, etc. These images produce both morphological and functional information, and the diagnostic usually requires both their quantitative and qualitative three-dimensional analysis. Then, the therapy often asks for a very precise medical gesture guided by the image analysis. The aim of the project is to solve fundamental problems as artificial vision and advanced robotics problems in order to build systems which assist the diagnostic from medical images and also the realization of medical gestures. Our research is currently focussing on the following topics:

• three-dimensional (3D) image segmentation
• complex 3D shape modeling
• motion and deformation analysis
• multimodality image comparison
• building of a computerized atlas of the human body
• planification and control of trajectories
• hardware integration.
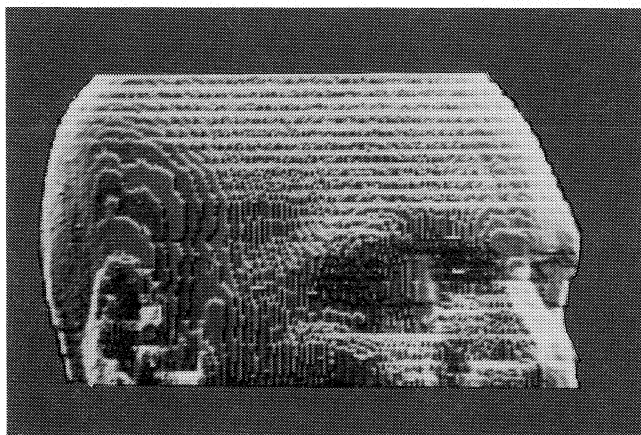
3D representation of a human head, reconstructed from Nuclear Magnetic Resonance sections
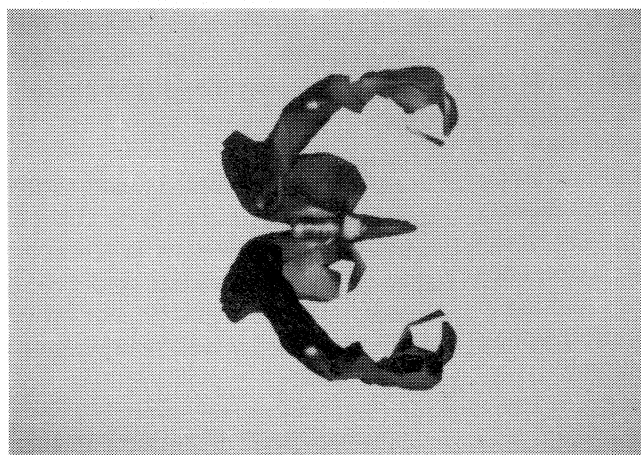
Surface of the brain ventricles, reconstructed from the Talairach Atlas

In the project, called EPIDAU-RE, four INRIA researchers, two external researchers and five fellows preparing their thesis on a related subject, participate. The research is performed in relation with industrial companies and research laboratories in France, other European countries and the USA; cooperation is achieved through the CEA-EEC project AIM and the ESPRIT project Depth and Motion Analysis.

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OSF sponsors Amoeba distribution

CWI — The Amoeba project, a joint project of groups at CWI and the Vrije Universiteit Amsterdam, is currently working on the final stages of the first official release of the Amoeba Distributed Operating System. The Research Institute of the Open Software Foundation (OSF), with locations in Cambridge (Mass.) and Grenoble, has shown interest in Amoeba by sponsoring four programmers for one year to work on the preparation of the distribution tape. The Amoeba distribution, which is expected in March, will contain Amoeba kernels for VAX station and SUN3, a distributed name server, a file server, the X-window system and over 150 UNIX-like utilities. The code does not contain any AT&T-licenced code. Kernels for MIPS and Intel 80386 architectures are expected later this year. The Amoeba licence allows the use of the Amoeba software for research and teaching purposes. The distribution is available at media costs. Commercial licences can be negotiated with the developers.

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REFLECT — reflective expertise in knowledge-based systems

GMD — The overall goal of the ESPRIT project REFLECT is to lay foundations for the construction of second-generation expert systems which are knowledgeable of the limits of their competence and are more flexible in the ways in which they can employ their knowledge.

The fundamental premise underlying this project is that such more advanced knowledge-based systems can only be realized by creating a reflective system. Reflective reasoning is to be understood in the context of this project as the capability of a system to reason about its object-domain models, previously solved cases and associated problem-solving strategies in a particular task context. This will allow for a much wider range of intellectual functions than current knowledge-based systems have. In this project a novel approach is taken to reflective systems, which takes as its basis the KADS modeling methodology, current insights about reflective reasoning, advanced AI techniques of systems like BABY-LON, FOL or KRS, and experience from real-life applications of knowledge-based systems. The novelty of this approach lies in its emphasis on integration of these developments in AI research and its application to knowledge-based systems.

The first objective of the REFLECT project is to develop a conceptual framework for the knowledge-level modeling of reflective reasoning, whereby the focus is on the design of systems that realize reflective functions based on competence assessment. Second, aided by this framework specification concepts and a skeleton architecture for a class of reflective systems are to be devel-

oped. The third objective of the project is to show the viability of the developed approach by producing demonstration systems that perform particular reflective functions in a domain and integrate these.

The REFLECT project aims at realizing its objectives through the following steps:

• formalization of object-level knowledge
• conceptualization of the knowledge for reflection
• architecture for reflective reasoning
• experimental reflective modules
• integrated demonstrator.

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Support for software developers — an ergonomic user interface for UNIX

GMD — Software developers all over the world view the UNIX operating system as a suitable basis for production. The wide-ranging functions offered by UNIX remain largely unexploited, however, due chiefly to shortcomings in the user interface currently available.

GMD has developed a new extension to the UNIX user interface which overcomes some of the most fundamental problems. The prototype, produced in the GMD Institute for Systems Technology, is called ERGO-Shell; its ergonomic and technical advantages enable software developers to employ methods and tools with greater efficiency.

Software developers profit from these improvements chiefly during work preparation. Work preparation and planning are vital aspects of a methodical approach to soft-

ware development. The development of ERGO-Shell is designed to support planning strategy, a method of working which — according to empirical findings — brings greater efficiency with less stress.

ERGO-Shell enables individual work preparation and execution to be efficiently coordinated. This guarantees the technical integration of the components of the user interface.

ERGO-Shell is an open system. The development of further components is based on the practical needs of software developers. All parts of the new UNIX user interface are developed with the X-Window System.

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Participation in Eureka programme

INRIA — INRIA participates in three Eureka projects: ESF, PROMETHEUS and ELSY.

ESF (Eureka Software Factory)

The aim of the project ESF is the conception of a software factory and the promotion of modularity and reusable programs. The partners of INRIA are AEG, CAP SESA, ICL, MATRA, Nixdorf, Norskdata, Semagroup, SI, Softlab, Dortmund University and Telelogic. INRIA received financial support from the French Ministry of Industry for more than 14 millions francs, including support for the realization of the industrial structured documents editor based on GRIF, developed by GIPSI SA.

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PROMETHEUS

The aim of PROMETHEUS is to assure an improvement of the security and the fluidity of road traffic. Initially proposed by Daimler Benz, this project joins INRIA, CNRS and the major European car manufacturers. Three projects of INRIA are involved in the subproject PROART with respect to the artificial vision aspects. INRIA is also participating in the subproject PRONET for the study of communication protocols between cars.

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ELSY (European Lisp System)

Here the purpose is the conception and realization of a programming environment for a Lisp system based on the version 1.6 of LE-LISP. The partners are GMD, CRIL, BULL, ILOG and INRIA.

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Computational theory of natural languages

CWI — A typical natural language engine accepts keyboard input in natural language (let us say English), and produces a set of parse trees with for each tree a finite number of unambiguous logical representations. It also contains mechanisms to select one reading from this set of possibilities, possibly after negotiation with the user. The selected representation is then used as input to solicit an answer or action from an application. Possible applications include databases, expert systems and process simulations.

The Natural Language research effort at CWI does not directly aim

at building such engines, but explores their theoretical background by investigating various new parsing and interpretation techniques for natural language. On the syntactic side, the focus is on categorial grammar formalisms, which are studied from the perspective of the "parsing as natural deduction" approach advocated by Joachim Lambek. The starting point on the semantic side is "partial and dynamic Montague grammar", where dynamic interpretation can account for those anaphora links that cannot be captured by simple variable-binding techniques, and evaluation in partial models provides the fine grained account of logical consequence needed to handle the semantics of propositional attitude contexts and perception verbs. Partial models are also useful for interpreting natural language fragments containing a truth predicate.

There is a close cooperation in the area of computational linguistics between CWI and the Institute for Speech and Language Technology (OTS) at Utrecht University. Also, links exist with the Institute for Language, Logic and Information (ITLI) at the University of Amsterdam, and with the Rosetta project for machine translation based on Montague grammar at Philips Research Laboratories in Eindhoven.

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VLSI design — the next step

CWI/GMD/INRIA — Following the ERCIM workshop session on VLSI design in Rocquencourt, participants discovered that the research programmes in this field at the various institutions are complementary in a quite natural way. As a result they decided to investigate the options for concrete cooperation. INRIA

would then primarily contribute in specific knowledge of certain classes of processors such as systolic array arrangements, CWI would contribute to mathematical foundations for new algorithms as well as to certain energy models that are helpful in maximizing density, and GMD would contribute to a complete design environment and the tools that can adapt these methods. Possibilities are presently investigated to turn this into a JESSI proposal.

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EVADIS manual helps evaluate computer systems

GMD — What is popularly dismissed as a purely cosmetic flaw frequently reveals itself to be one of the central weaknesses of program systems: how easy is the access they offer the user to their often high functionality? Developers frequently concentrate upon optimizing technical program abilities and neglect user comfort. Their ambition is to design a sophisticated racing car rather than a sturdier, safer and more comfortable limousine — however high its performance. But for the occasional user in particular, easy operating elements and aids — like an automatic gearbox in a car — are more important than outstanding performance data. It is a fact that, in the immediate future, the number of these occasional computer users will be growing considerably faster than the number of expert users. Furthermore, the development of user-friendly programs represents an exciting technical challenge.

The operating comfort of a computer system depends on two factors:

• The "application part" is determined by the convenience of a program's features, like a car's auto-

matic gearbox: can a text program reorganize all kinds of passages, print automatic customized letters, etc.?
• The "interface part" includes the entire visual appearance of the system and its form of dialogue with the user.

The Man-Machine Communication research group at the GMD Institute for Applied Information Technology is concerned above all with this second factor. The EVADIS (Evaluation of Dialogue Systems) manual represents a first means of evaluating the quality of the user interface. Laboratory work and field tests are studying how specific interface characteristics affect the user, her performance, job satisfaction and personality development.

The EVADIS manual, specially developed for the office environment, is primarily concerned with programs for word processing, databases, spreadsheets, graphics and communication. It should be possible to analyze the characteristics of these programs in both a qualitative and detailed and comprehensive manner. If necessary, developers should also be able to use EVADIS to improve their systems, while it will offer users a selection guide.

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Graphical Kernel System in Russian

GMD — "Computer Graphics Programming", the book on the Graphical Kernel System written by Günter Enderle, Klaus Kansy and Günther Pfaff and first published in 1983 by the Heidelberg Springer Verlag, has just been published in Russian by the Moscow Radio and Telecommunications Publishers (Radio i Svjaz'). The Graphical Kernel System (GKS) is

the first international standard in the field of computer graphics. GKS specifies the structure and functionality of a Graphical Kernel System for two-dimensional graphics. Designed by German standardization experts and supported by European neighbours (including CWI and INRIA), GKS was able to defeat American competition and establish itself as the international standard. The book is an in-depth commentary of the GKS standard. The rather impenetrable language employed in the text of the standard document is didactically dissected and illustrated by means of examples. The aims and ideas underlying the standard are discussed and the background to the most important design decisions is explained. The book's authors themselves edited the text of the standard document and were thus directly involved in the development of GKS, giving them first-hand experience of their subject. The first edition of the book appeared in 1983, barely two years after the official standard document. The second edition in 1987 was revised to include additional work on the standardization of three-dimensional graphics. The book is internationally recognized as standard reading for graphics system users and students of computer graphics.

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Computer systems support group communication

GMD — Computer-supported group communication is the subject of a book edited by GMD scientist Uta Pankoke-Babatz and recently published by Ellis Horwood, Chichester. This book presents research work carried out by the AMIGO group (Advanced Messaging in Group

Organizations). Its aim is to further the understanding and development of technical support for group communication processes. In different chapters, authors Thore Danielsen, Uta Pankoke-Babatz, Ahmed Patel, Paul-André Pays, Wolfgang Prinz and Rolf Speth examine different aspects of group work and in particular discuss the problems of human communication using distributed computer systems.

Of major interest are the difficulties which result from the lack of direct contact and spontaneous communication between discussion partners. The usual means of communication at a round-table discussion, with participants facing each other, must be replaced by other alternatives when group communication is taking plàce via distributed computer systems. For this reason, the technical support and effects of such alternative technology formed an important object of investigation.

The book introduces the "AMIGO Activity Model", which allows the necessary coordination of group activities to be analyzed and described. This model has been initially evaluated through comparison with other models and systems and through its application for special tasks. Finally, the new book includes a suggestion for an architectural model, which offers possible means of incorporating technical support for group communication into distributed systems based on electronic mail services. It also discusses strategies for the use of the AMIGO Activity Model.

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German computer program manufacturers not ready for Europe — GMD software market study

GMD — Seen from the point of view of production methods and sales strategies, West German computer program manufacturers are seriously under-prepared for the future single European market and the greater internationalization it will mean for the — still rapidly expanding — software market. The predominantly regionally-operating software vendors of today will have to cope with profound structural changes if they are to compete successfully at an international level. If all goes well, these structural changes will result in a small number of large, state-of-the-art software companies; the pioneering days of the small company and one-man business will be over.

These are the most important results to emerge from a study, recently published by GMD, entitled "The software market in the Federal Republic of Germany". This study, which ties up with earlier investigations by GMD from 1975, 1979 and 1983, is based on a survey of 420 vendors and 973 users of computer programs. The survey was carried out partly in the form of standardized interviews and partly through in-depth personal discussions. The study investigated vendor structure, product range and procurement behaviour, organization of data processing in companies, and vendor and user software production conditions. At the same time as the software market study, a joint study was made of the information and communication technology industry; "software statistics" were collected which provided significant data on the market as a whole.

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Networking at CWI

CWI — One of the most important uses of computers in a work environment is as a communications tool to facilitate interactions among people who work on different schedules or at different sites. In this respect, CWI has provided an important service to the European community for the last seven years as one of the central nodes, and the European-US transfer point, for EUnet: the European network of UNIX-based computing systems. MCSUN , the name of CWI's networking node, is one of the best known networking addresses in Europe; it replaces MCVAX which for seven years served the European UNIX community. Currently MCSUN is a SUN-4/280 which provides backbone services for nineteen sites, serving approximately 1,500 user systems throughout Europe.

Communication with the various national backbone hosts proceeds via either X.25 connections or via dedicated, high-speed lines. Dedicated lines are currently in place between CWI and the KTH in Stockholm, INRIA in France, the University of Kent in the United Kingdom, and CERN in Switzerland. In addition, a 64Kbps line with the United States provides a direct link with UUnet, the American network of UNIX computers.

At present, MCSUN acts as a transfer agent for between 25,000 and 28,000 mail messages daily, as well as approximately 1,750 UNIX news articles daily. (NEWS is an electronic billboarding and conferencing system.) Approximately 100,000 UNIX users throughout Europe make use of MCSUN as an intermediary in sending mail to others either inside Europe or in the United States and around the world. In this respect, EUnet in

general, and MCSUN in particular, provides a truly open network, with interconnection services through national UNIX networks to universities, research institutes, the government sector, and to companies (all at affordable rates), using UNIX-based networking protocols.

In addition to mail and news services to the European community, MCSUN also provides direct Internet access to computers across the United States. This, in turn, provides file transfer and remote login facilities to over one thousand nodes across both continents. We expect that the networking infrastructure that has grown around MCSUN will be able to provide European Internet service to users throughout this decade.

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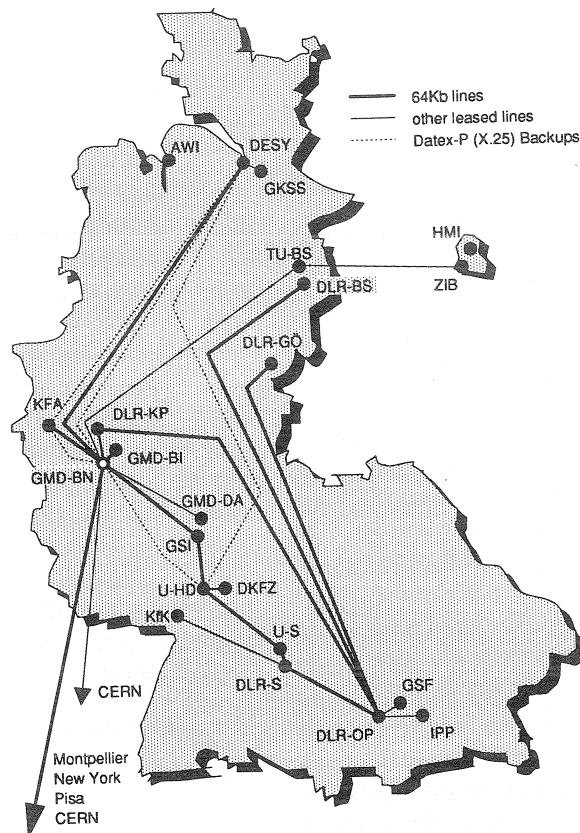
The AGF network

Computer link-up for the Association of Major Research Centres

GMD — The communication infrastructure of the German national research centres has been improved through the introduction of a high-performance computer network, the result of an initiative by the Association of National Research Centres (AGF). During the first stage, lines with a capacity of 64 kilobits per second were used to link up the networks of the Jülich Nuclear Research Centre, the German Electron Synchrotron, the German Aeronautical Research Institute, the Society for Heavy Ion Research, GMD and the German Cancer Research Centre as well as the Konrad Zuse Centre for Information Technology in Berlin via Heidelberg University. Some of these networks are also linked to others; thus the Society for Heavy Ion Research is connected with the European Space Operations Centre

in Darmstadt, and Heidelberg University to other universities in southern Germany (Stuttgart, Tübingen, Konstanz) GMD is linked to the universities in North Rhine-Westphalia via the Regional University Computer Centre in Bonn.

The AGF network became international in June 1988, when the GMD computer centre in Bonn was linked up to the network of the Centre National Universitaire Sud de Calcul in Montpellier. This connection allows access to various universities in France and to the City University in New York.

All IBM systems with access to the above networks can be contacted both in dialogue and via file transfer and batch processing.

The IBM systems in the AGF network are linked up using SNI technology (SNA Network

Interconnection). SNI is used to divide up large networks for reasons of network management or to connect autonomous systems such as those in the AGF network. Connection takes place via gateways, which convert the internal addressing of one network into network addresses of another network.

In the second phase, which partially overlapped the first, the packet switching protocol X.25 (level 3 to ISO/OSI, Open Systems Interconnection of the International Organization for Standardization) was introduced into the AGF network. The lines of the AGF network can thus be employed both for linking IBM systems via SNI and for using OSI and/or German Research Network protocols and applications, Internet protocols (TCP/IP) and the communication protocols of other manufacturers (SAG, DEC, etc.). It

will also be possible to transfer all AGF network applications to the German Research Network's X.25 knowledge network when this becomes available in 1990.

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RODEO — high speed and open networks

INRIA — The project RODEO, conducted by Christian Huitema, has been officially launched in December 1989. The objective of the project is the definition of communication protocols for very high speed networks at one Gigabits or more, and experimenting with them. This includes the study of high speed transmission control protocols, their parametrization and their insertion in the operating systems, together with the study of synchronization functions and the management of data transparency between heterogeneous systems.

Within these activities, high speed application like multimedia messaging and conferencing are developed. They are conducted in cooperation with industrial partners (XEROX, BULL, SITA). These activities are also conducted through the ESPRIT project THORN and in relation with the evolution of communication standards. Six persons are working full-time on this project.

The first realization of the project was the system MAILWAY, a software interface between electronic mail on UNIX and mail delivery conforming to CCITT X400 recommendations. This prototype has been industrialized and distributed by French companies. INRIA also distributes MAILWAY to universities and public research centres.

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SIMULOG commercializes INRIA products

INRIA — SIMULOG, the subsidiary of INRIA, concerned with CAD and system evaluation, will announce the availability of:

• GHS3D, a mesh generation system which preserves the nodes of a domain boundary,
• SPHINX, a protocol simulator which has been used to evaluate many protocols, such as 802.3D, HSDB, and GAMT103.

Both products come from research performed at INRIA Rocquencourt.

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SIMULONDE — a consortium for the solution of wave equations

INRIA — For the first time, INRIA and its subsidiary SIMULOG created a consortium with industrial companies for the conception and realization of a simulation code for wave equations. This project, called SIMULONDE, is based on the financial participation of future users in industrial companies and research laboratories. SIMULOG will ensure the industrial support and will integrate recent developments in the software code. This project will be launched in the first quarter of 1990. More than ten companies and organizations already showed their interest.

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Agreement with IBM renewed

CWI — In the fall of 1986, a three-years agreement was signed between IBM on the one hand, and the two Amsterdam Universities and CWI on the other. Ever since some dozens of projects were carried out with material and personal support by IBM (for a total amount of about 15 million guilders), mainly in the field of the humanities and the social sciences. CWI participated with three projects. Last October the agreement was renewed for another three years. IBM offers amongst others possibilities for exchange of lecturers and experts, trainee positions, postdoctoral fellowships, joint research projects, and advice and knowledge transfer concerning numerically intensive computing and other large-scale computing activities. IBM's partners make available their potential in expertise and computing facilities.

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New Computer Centre in Nicaragua

GMD — The Federal Republic of Germany and Spain have officially presented Nicaragua's supreme electoral council with a computer centre. In the computer centre, which is operated by the Department of Computer Science at the Universidad Nacional de Ingeneria in Managua, technical preparations for the elections on 25 February 1990 were carried out. The Computer Science Department is headed by Cornelius Hopmann, currently on leave from his duties at the GMD Institute for System

Technology. The West German government has contributed DM 3.2 million to the computer centre, whose first task was to draw up a national electoral roll. The computers will subsequently be used by the university.

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EVENTS

European Conference on Hypertext — ECHT '90

GMD/INRIA — INRIA and GMD are organizing the first European Conference on Hypertext — ECHT '90 — in Paris, November 27–30, 1990. The purpose of this conference is to set up a wide ranging scientific European event where researchers, developers, and users can meet around the theme of hypertext and hypermedia. ECHT '90 will establish a series of European conferences organized as a complement to and alternating with the biannually US-based and ACM-sponsored Hypertext conferences in recent years.

By its very nature, hypertext is at the intersection of many fields, especially of computer science, cognitive science and different applications domains. This conference will therefore be of interest to a broad spectrum of professionals ranging from pure theoreticians studying hypergraphs and graph grammars to end-users of all hypertext applications such as medical information systems and computer aided design. Topics include:

• models of hypertext
• hypertext interchange formats
• hypertext and knowledge representation
• DBMS support for hypertext systems
• hypertext abstract machines
• authoring systems
• browsing and navigation support
• information retrieval
• multimedia documents
• support for collaborative work
• cognitive aspects
• social issues
• legal issues
• standardization issues
• application for computer aided software engineering
• on-line help and documentation
• electronic publishing
• office information systems.

Deadline for full papers (not exceeding 4000 words), panel or demonstration proposals: April 2, 1990.

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Program chair: Norbert Streitz (GMD)
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ECCV 90

INRIA — For the first time in Europe an international conference will be dedicated to computer vision. Topics include:

• colour
• texture
• stereo
• motion
• motion-stereo cooperation
• active vision
• shape
• object identification
• hardware architectures
• neural nets (as applied to vision).

Moreover, a separate workshop will be organized by the Commission of the European Communities drawing together common elements of computer vision research in the ESPRIT projects.

The events, organized and coordinated by INRIA-Sophia-Antipolis, will take place at Antibes (France), April 23–27, 1990 .

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JELIA 1990 — European Workshop on Logics in Artificial Intelligence

CWI — JELIA 1990 (Journées Européennes sur la Logique en Intelligence Artificielle) is a European workshop on logics in artificial intelligence. The workshop will be held in The Netherlands, September 10–14, 1990 and is organized by CWI. It intends to bring together researchers involved in developing logical tools for artificial intelligence. Main themes of the conference are:

• logic programming and automated theorem proving
• computational semantics for natural language
• applications of non-classical logics
• partial and dynamic logics (sponsored by the ESPRIT project DYANA).

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FOOL — Foundations of Object-Oriented Languages

CWI — Foundations of object-oriented languages will be the subject of a school/workshop, to be organized by CWI in Noordwijkerhout (The Netherlands), May 28–June 1, 1990. It is an activity of the project REX (Research and Education in Concurrent Systems), in which

REX — part of a Dutch computer science programme

CWI participates with the Universities of Leiden and Eindhoven. REX is part of a national computer science programme. The school/workshop receives in addition support from ESPRIT project TROPICS (TRansparent Object-oriented Parallel Information Computing System) and is organized under auspices of the European Association for Theoretical Computer Science.

Tutorials cover the following subjects:

• actor systems (G. Agha, University of Illinois)
• semantics of a parallel object-oriented language (P.H.M. America, Philips Eindhoven, and J.J.M.M. Rutten, CWI)
• net-based description of parallel object-based systems (J. Engelfriet, Leiden University)
• sheaf-theoretic semantics for concurrent object-oriented programming (J. Goguen, Oxford University)
• graph grammar based description of object-based systems (D.

Janssens, Free University Brussels).

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CONCUR'90 — theories of concurrency: unification and extension

CWI — CONCUR 90 is the first in a series of conferences that will be organized by the ESPRIT project CONCUR. The conference is organized by CWI and will be held in Amsterdam, August 27–30, 1990. Its main topics are:

• formal methods in software engineering
• distributed algorithms and protocols
• formal specification languages and their semantics
• verification methods
• tools for the verification and design of concurrent systems.

The programme committee includes three ERCIM-members: Gerard Berry (INRIA), Eike Best (GMD) and Jan Willem Klop (CWI, chairman).

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Eurographics workshop on object-oriented graphics

GMD/CWI — A Eurographics workshop on object-oriented graphics will take place in Königswinter (FRG), June 6–8, 1990. It is organized by GMD and CWI, and promoted by Eurographics, in cooperation with the German Society for Informatics. Object-oriented methods are proving to be particularly applicable to computer graphics —

in formulating new graphics standards and in dynamic graphics and human computer interaction. The specific computer graphics problems have also resulted in a critique of the object-oriented paradigm. Areas to be covered in the workshop include:

• standardization and object-oriented graphics languages
• complex objects
• dynamic type creation
• automatic classification of dynamically created objects
• issues in 3-D animation and robotics
• artificial intelligence and knowledge representation in object-oriented graphical systems
• direct manipulation and object-oriented user interfaces.

Co-chairmen of the workshop are: Peter Wisskirchen (GMD) and Edwin Blake (CWI).

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Eurographics workshop on Intelligent CAD systems

CWI — The fourth Eurographics workshop on Intelligent CAD-systems (ICAD) will take place near Paris, April 24–27, 1990. The workshop is organized by the University of Compiègne and promoted by the Eurographics Working Group ICAD (chairperson Paul ten Hagen, CWI). Application of knowledge engineering to CAD has become a major research area. Transferring this research to existing CAD environments requires specific design process control and design artifact representation. The scope of the workshop includes the following subjects, to be understood in the context of ICAD systems:

• experiments with intelligent CAD systems

- toolkits on top of problem servers
- integration of advanced subsystems
- knowledge representations
- the object paradigm
- user interface management systems
- integration of application software (e.g. finite elements, databases).

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9th Benelux Meeting on Systems & Control

CWI — Researchers in Systems and Control in Belgium, The Netherlands and Luxemburg meet annually to promote research activities and cooperation. The 9th meeting took place in Veldhoven, The Netherlands, March 14–16, 1990. Invited speakers included G. Picci (Italy) on modeling by stochastic systems, P. Welch (UK) on transputers, and J. van Amerongen and A.W.P. Bakkers (The Netherlands) on application of transputers in control engineering.

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Symposia on parallel scientific computing

CWI — Five one-day symposia on parallel scientific computing are organized at CWI in collaboration with the Technical University Delft, the University of Amsterdam and the International Association for Mathematics and Computers in Simulation (IMACS). Dates are: February 2, April 6, June 8, September 7 and November 2, 1990. Attention will focus on new developments in numerical algorithms for parallel computing systems, on software tools for parallel computing (including libraries) and on applications in science and technology (e.g., fluid dynamics, mechanics, chemistry). A special issue of the IMACS Journal "Applied Numerical Mathematics" will be devoted to the proceedings of the symposia.

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Computer Algebra symposium

CWI — The expertise centre CAN (Computer Algebra Nederland) was established last September at CWI. Its official opening took place on December 18, 1989, with a symposium attended by some 100 participants.

The programme opened with two specialist contributions: H. Melenk (Konrad Zuse Zentrum für Informationstechnik, Berlin) focussed on the expertise in Groebner basis technology at the Konrad Zuse Zentrum in relation to CA research, and J. Smit (University Twente, Enschede) discussed performance issues of CA-systems related to VLSI design.

In the afternoon two excellent reviews were given by well-known experts in the field: G.H. Gonnet (University of Waterloo, Ontario) discussed the advantages of the present generation of CA-systems, such as his own Maple system, and the promises of future generations. A.C. Hearn (Rand Corporation, Santa Monica), inventor of REDUCE — one of the oldest computer algebra packages — described the current status and perspectives of computer algebra on the basis of the report "Future Directions for Research in Symbolic Computation" to the American National Science Foundation (1989). In this report funding agencies are recommended to "establish mini-centers for symbolic and algebraic computation". The expertise centre CAN is one of the first centres of this kind.

Demonstrations of several current packages (REDUCE, MAPLE, Mathematica, Form and LiE) gave a good impression of the state-of-the-art in computer algebra.

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History of Computing colloquia

CWI — Continuing interest within CWI in historical issues is presently focussing on the history of computing. In cooperation with the national working group on history and social function of mathematics, a series of colloquia on this theme started last fall. Attention is paid to technology as well as mathematics. Topics covered thus far were:

- Müller-, Babbage- and Scheutz-difference engines (Michael Lindgren, Stockholm)
- Culmann and graphical statics (Erhard Scholtz, Wuppertal)
- numerical mathematics under the influence of computing technology 1925–1960 (Lothar Collatz, Hamburg)
- the roots of software engineering (Michael Mahoney, Princeton)
- tidal calculations in The Netherlands, 1920–1960 (Jan van den Ende, Delft).

Coming contributions include:

- Hermann Weyl's work and integral equation (Skúli Sigurdsson, Harvard University, March 21)

13

• computing in the mechanical age (J.A. Zonneveld, retired from Philips Eindhoven, May 30)
• Howard Aiken and the beginnings of computer science (I. Bernard Cohen, Harvard University, June 27).

LIFE IN THE INSTITUTES

INRIA has a showroom at Infomart in Paris

INRIA — Infomart is the first European and permanent exhibition for advanced communication and computers. Infomart is open since the last quarter of 1989. INRIA has a showroom together with CNET, CNRS, and ANL where demonstrations of research activities are presented.

Lectures Prof. Lions

CWI — "Problèmes mathématiques liés à l'environnement". Under this title professor Jacques-Louis Lions, Collège de France, lectured at CWI on January 23 and 25 for a very interested public of some 50 Dutch mathematicians on mathematical models and their control for large-scale (global) physical, chemical and biological phenomena. Lions is professor of the Collège de France and was invited as such by Maison Descartes in Amsterdam (an institution to promote French culture). He was president of INRIA in the period 1980–1984, after which he became president of the administrative board of CNES (Centre National d'Etudes Spatiales).

Symposium "Computational Engines"

CWI — Managing director Jan Nuis celebrated in September his 25-years affiliation with CWI. Being a mathematician from origin, with a considerable interest in historical matters, a symposium was organized on this occasion devoted to the (pre)history of electronic computing. Speakers included Dr. H. Petzold (FRG) about technological changes in German computers before the 1960's, Prof. B. Randell (UK) about the making of the Colossus, and Prof. G.A. Blaauw — one of the first staff members of CWI in the late 1940's — about the persistence of classical computer architecture.

GMD — **Dr. Eckart Raubold**, acting head of the GMD Institute for Systems Technology, has been awarded the 1989 Research Prize for Technical Communications given by the SEL Foundation. The Foundation's board of trustees wished to pay tribute to Dr. Raubold's outstanding contribution to research in the field of open and protected communication systems. The prize, worth DM 35,000, was presented during a ceremony at the Neues Schloss in Stuttgart. Dr. Raubold has developed technical solutions regarding the security of transported and stored information within the framework of communications and cooperation between private individuals, companies and authorities via computer-based and other communication systems.

INRIA — The teams of scientific computing of INRIA Rocquencourt, represented by **Frédéric Hecht, Paul Louis George, Ardi Golgolab and Eric Saltel**, received the Prize of Excellence IBM for intensive numerical computation. This prize rewards their work on grid mesh generation. The software developed by the INRIA teams transforms a domain into a mesh of triangles and tetrahedrons. In particular, the software package GHS3D based on the techniques of VORONOI, allows to get a mesh which preserves the nodes of a domain boundary.

INRIA — **Bernard Lang** has been invited to Japan by the P&T to give a lecture during a symposium on automatic interpretation of telephone information.

INRIA/CWI — **Gérard Huet**, research director at INRIA, has been appointed editor for the new review "International Journal of Foundations of Computer Science". Jean Vuillemin, former research director at INRIA and presently at DEC PRL, is the other French representative in the Editorial Board. There is also a Dutch board member: Jan Karel Lenstra (Technical University Eindhoven/CWI).

INRIA — **Christophe Lecluse**, researcher at GIP ALTAIR, received the IBM prize for young scientists.

CALL FOR APPLICANTS

The European Research Consortium
for Informatics and Mathematics (ERCIM)

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GMD   CWI
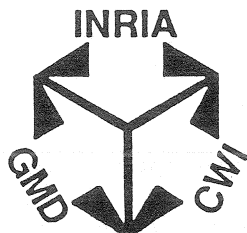
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Deadline : April 1st 1990
Duration of fellowship : 18 months (6 months in each institution)
Requirements : Have a Ph. D. or equivalent, be resident of one of the European
countries. Employees of the ERCIM members are not entitled to apply.

INFORMATION

Application forms and further information may be requested from the
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