European Research Consortium
for Informatics and Mathematics

ERCIM

www.ercim.org

Annual Report 2001

Contents

Foreword from the President

Gerard van Oortmerssen, Director of CWI and President of ERCIM.

In the 12 years of its existence ERCIM, the European Research Consortium in Informatics and Mathematics, has developed into a strong network in ICT research in Europe The activities reported here bear evidence of this fact. ERCIM maintains a dozen Working Groups on research themes of paramount importance for Europe, and participates in an equal number of EU projects. Its Fellowship Programme is very successful: in 2001 the record number of 19 fellows, coming from all over the world, started a fellowship in ERCIM institutes. ERCIM has launched a series of strategic research workshops under the joint auspices of the EU and the NSF (USA). The subjects of 2001 were: Bio-inspired Information Technologies, Future Information Processing Technologies, and the Semantic Web.

ERCIM's quarterly newsletter ERCIM News enjoys increasing popularity, and has established itself as a leading publication on research in ICT and related fields in Europe. The 2001 issues focused on Grids, Human Computer Interaction, Ambient Intelligence, and e-government. Finally, ERCIM welcomed as its 14th member AARIT, the Austrian Association for Research in Information Technology. At present ERCIM encompasses 14 countries and over 9000 researchers and engineers.

Now, ERCIM is coming into a new phase, and during 2001 its Board of Directors has set out a strategy for the coming years, of which the main points are:

- increase research co-operation among the ERCIM members, by creating a virtual laboratory in ICT research
- provide a comprehensive overview of ongoing projects and research competencies available in Europe on ERCIM's web site
- stimulate mobility of researchers among European countries and enhance ERCIM's fellowship programme to attract more researchers from outside Europe
- enhance technology transfer by stimulating entrepreneurship, and by organising summer schools for industry
- enhanced involvement of researchers from non-member organisations
- forge links between ERCIM and other organisations, for instance ESF, NSF and W3C.

European Commissioner Busquin recently developed the concept of the European Research Area as the basis for the new EU Framework Programme. ERCIM is a good example of the 'networks of centers of excellence' which have to constitute this European Research Area. ERCIM strongly supports the ideas behind the European Research Area and is geared up to fully participate in the plans for the new Framework Programme, thus contributing to the emergence of a stronger Europe.

Gerard van Oortmerssen

ERCIM — the European Research Consortium for Informatics and Mathematics — aims to foster collaborative work within the European research community and to increase cooperation with European industry. Leading research establishments from fourteen European countries are members of ERCIM. Representing over 9000 researchers and engineers, ERCIM is able to undertake consultancy, development or educational projects on any subject related to its field of activity. ERCIM was founded in 1989 and is a European Economic Interest Grouping (EEIG).

ERCIM's aim is to contribute significantly to innovation in the areas of Information Technology and Applied Mathematics in Europe. In particular:

- to contribute to the development of a strategy for European research in Information Technology
- to make industry aware of strategic research results and ensure these lead to timely European products
- to make advanced research in academia applicable to industrial scale problems
- to foster international activities relevant to European research.

Technology Transfer

The transfer of research results is one of the ERCIM institutes' main assignments today in addition to basic and applied research in Computer Science and Mathematics. Over the last years, ERCIM members have played a pioneering role in creating small and medium high-tech companies, an effective way of achieving such transfer. ERCIM members have spawned over 100 companies. In addition, ERCIM members have a long track record of cooperation with European industry in R&D projects, generally within the framework of European programmes. As a network, ERCIM facilitates industrial partners to locate the best scientific teams in Europe for the relevant domains.

International Cooperation

ERCIM considers it as a high priority to develop cooperation with scientists all over the world. ERCIM participates for example in international consortia like the World Wide Web Consortium and in EU activities with non-European countries (Latin America, USA, etc). ERCIM administers European research projects involving also partners from China, Africa and South America.

Organizational structure of ERCIM.

Members
ERCIM has one member institute per country. In 2001, fourteen countries were represented in ERCIM. A member institute must be a leading research establishment in its country with excellent links to both national and international research community. All ERCIM members are national centres of excellence, independent of specific commercial ties. They have a strong involvement in the research programmes of the European Union and joint projects with both small and medium size enterprises and large industrial companies.

Publications
ERCIM publishes 'ERCIM News', a quarterly newsletter, workshop proceedings and policy documents.

Research Projects
In addition to many projects involving a few ERCIM institutes, ERCIM is itself participating in several European Commission related activities and projects as coordinator or associated partner. In these projects several member institutes carry out the research while the ERCIM office takes care of administrative tasks. In 2001, ERCIM has been involed in nine projects supported by the European Commission.

Consultancy
ERCIM also undertakes studies, evaluations and offers consultancy services. ERCIM has carried out a number of studies for the European Commission. ERCIM is currently organizing joint European-American strategic workshops under the auspices of the European Commission and the US National Science Foundation.

Working Groups
Working Groups are specialist networks that have been set up by researchers, where the ERCIM partners arrange regular workshops with invited external participation to study a specific topic and prepare international research projects. These Working Groups are also the focus of the ERCIM fellowship programme. Working Groups have been created in areas such as Constraints, Control and System Theory, Database Research Group, E-Learning, Electronic Commerce, Environmental Modelling, Formal Methods for Industrial Critical Systems, Health and Information Technology, User Interfaces for All, Matrix Computations and Statistics, and Applications of Numerical Mathematics in Science.

Institute	Board of Directors	Executive Committee
AARIT (Austria)	Günter Koch	Hans-Peter Axmann
CLRC (UK)	Keith Jeffery	Ken Robinson
CNR (Italy)	Franco Denoth	Costantino Thanos
CWI (The Netherlands)	Gerard van Oortmerssen	Barry Koren
CRCIM (Czech Republic)	Jiri Wiederman	Lubos Brim
FORTH (Greece)	Stelios Orphanoudakis	Constantine Stephanidis
FhG (Germany)	Ulrich Trottenberg	Eckart Bierdümpel
INRIA (France)	Bernard Larrouturou	Georges Nissen
SARIT (Switzerland)	Kurt Bauknecht	Christine Vanoirbeek
SICS (Sweden)	Gunnar Bjurel	Janusz Launberg
SRCIM (Slovakia)	Branislav Rovan	Ladislav Hluchy
SZTAKI (Hungary)	Péter Inzelt	László Monostori
TCD (Ireland)	Jane Grimson	Pádraig Cunningham
VTT (Finland)	Pekka Silvennoinen	Seppo Linnainmaa

ERCIM representatives.

The purpose of an ERCIM working group is to build and maintain a network of ERCIM researchers in a particular scientific field. The working groups are open to any researcher in the specific scientific field.

The activities of a working group can be subdivided into three areas:
- workshops
- project proposals
- mobility and fellows.

A working group receives support in the form of initial seed money, on application to the ERCIM Executive Commmittee, to set up a first workshop.

Travel support is given to ERCIM researchers by their institutes to participate in the workshops organized by the working group. It is expected that each working group organizes at least one annual workshop.

A major activity of any ERCIM working group is to search actively for project funding that crosses national borders.

A working group is also the focus of internal mobility within ERCIM. ERCIM institutes have reserved resources to stimulate mobility, enabling work on collaborative research projects at other institutes for periods from one to six months. Working Groups will also be invited to identify topics of interest to be included in the half-year calls published for the ERCIM Fellowship Programme, and as a consequence can participate in this programme by hosting a fellow.

Current Working Groups

- **Applications of Numerical Mathematics in Science**
  Coordinator: Mario Arioli, CLRC (mario.arioli@ercim.org).

- **Constraints**
  Coordinator: Krzysztof Apt, CWI (krzysztof.apt@ercim.org)
  Workshop: Sixth Annual Workshop of the ERCIM Working Group on Constraints: constraint solving techniques and modelling real-life problems, Prague, Czech Republic, 18-20 June 2001
  Fellows: The working group hosted two fellows: Jan Smaus (INRIA and CWI) and Frederique Goualard (CWI and SARIT).

- **Control and System Theory**
  Coordinator: Jan van Schuppen, CWI (jan.van.schuppen@ercim.org)
  Project: Five teams of the Working Group are participating in the European TMR project “System Identification”
  Fellows: Laurie Ricker (CWI)
  ERCIM internal molibity: Bernard Hanzon (CWI) has visited INRIA Sophia Antipolis to cooperate with Dr. M. Olivi.
  Andrea Gombani (CNR-ISB, Padova) visited the INRIA Sophia Antipolis team.

- **Database Research Group**
  Coordinator: Fausto Rabitti, CNR-CNUCE (fausto.rabitti@ercim.org).

- **E-learning**
  Coordinator: Sepideh Chakaveh, FhG (sepideh.chakaveh@ercim.org).

- **Electronic Commerce**
  Coordinator: Hans-Dieter.Zimmermann, SARIT
  Workshops: ‘The Role of Trust in e-Business', Zurich, Switzerland, 3 October 2001
  E-Commerce Business Model', held in conjunction with SOFSEM2001, Piestany, Slovak Republic, 26 October 2001.

- **Environmental Modelling**
  Coordinator: Achim Sydow, FhG (achim.sydow@ercim.org)
  Workshop: Advanced Environmental Information Technology, Stockholm, 29-30 May 2001
  Project: The Working Group has set up the EC-funded joint ERCIM project ‘DECAIR’.

- **Formal Methods for Industrial Critical Systems**
  Coordinator: Hubert Garavel, INRIA (hubert.garavel@ercim.org)
  Workshop: 6th International ERCIM Workshop on Formal Methods for Industrial Critical Systems, Paris, 16-17 July 2001.

- **Health and Information Technology**
  Coordinator: Jane Grimson, TCD (jane.grimson@ercim.org).

- **Matrix Computations and Statistics**
  Coordinator: Bernard Philippe, INRIA (bernard.philippe@ercim.org)
  Workshop: First Matrix Computations and Statistics Workshop, Geneva, 4-5 May, 2001.

- **User Interfaces for All**
  Coordinator: Constantine Stephanidis, FORTH (Constantine.Stephanidis@ercim.org)
  Conference: The Working Group has contributed to the establishment of the International Conference on Universal Access in Human-Computer Interaction (UAHCI). The first such event, UAHCI 2001 (http://uahci.ics.forth.gr/), took place in New Orleans, Louisiana, USA, 5-10 August 2001, in cooperation with HCI International 2001.
  Journal: The work of the ERCIM WG UI4ALL has also contributed to the establishment of the international, interdisciplinary refereed journal "Universal Access in the Information Society" (UAIS), with the first issue published in June 2001 by Springer (http://link.springer.de/journals/uais/).
  Award: The Working Group received the ERCIM Working Group Award 2001.

http://www.ercim.org/activity/workgroup.html

User Interfaces for All

The vision of User Interfaces for All advocates the proactive realisation of the 'design for all' principle in the field of Human-Computer Interaction (HCI), and involves the development of user interfaces to interactive applications and telematic services, which provide universal access and usability to potentially all users. The Working Group 'User Interfaces for All' is the winner of the 2001 Working Group Award.

The vision of User Interfaces for All advocates the proactive realisation of the 'design for all' principle in the field of Human-Computer Interaction (HCI), and involves the development of user interfaces to interactive applications and telematic services, which provide universal access and usability to potentially all users.

The requirement for Universal Access stems from the growing impact of the fusion of the emerging technologies, and from the different dimensions of diversity that are intrinsic to the Information Society. These dimensions become evident when considering the broad range of user characteristics, the changing nature of human activities, the variety of contexts of use, the increasing availability and diversification of information, knowledge sources and services, the proliferation of technological platforms, etc. In this context, Universal Access refers to the accessibility, usability and, ultimately, acceptability of Information Society Technologies by anyone, anywhere, anytime, thus enabling equitable access and active participation of potentially all citizens in existing and emerging computer-mediated human activities. The user population includes people with different cultural, educational, training and employment background, novice and experienced computer users, the very young and the elderly, and people with different types of disabilities, in various interaction contexts and scenarios of use. As people experience technology through their contact with the user interface of interactive products, applications and services, the field of HCI has a critical and catalytic role to play towards a universally accessible, usable and acceptable Information Society.

On the European scene, ERCIM appears as a key actor in the this field, with many collaborative activities being conducted in several member institutions. The ERCIM Working Group "User Interfaces for All" (http://ui4all.ics.forth.gr/), which was the recipient of the ERCIM Working Group Award for the year 2000, has systematically promoted the proactive realisation of the Design for All principles in HCI.

Since its establishment in 1995, the ERCIM Working Group "User Interfaces for All" (UI4ALL) has organised annual workshops, that have brought together researchers and teams working in the different ERCIM organisations (but also organisations beyond ERCIM or the European boundaries), who share common interests and aspirations, and contribute to the endeavours towards making the emerging Information Society equally accessible to all.

The prolific and dedicated work of the growing UI4ALL community also led to the establishment of the new International Conference on Universal Access in Human-Computer Interaction (UAHCI). The first such event, UAHCI 2001 (http://uahci.ics.forth.gr/), took place in New Orleans, Louisiana, USA, 5-10 August 2001, in cooperation with HCI International 2001, the Symposium on Human Interface (Japan) 2001 and the 4th International Conference on Engineering Psychology and Cognitive Ergonomics 2001. A total of 228 papers were accepted for presentation covering a wide variety of topics in this area. Several members of ERCIM WG UI4ALL participated in the organisation of the Conference and presented papers that were published in the Proceedings.

From the year 2001 onwards, the UI4ALL Workshop is planned to be bi-annual instead of annual (as it were between 1995 and 2000), in order to alternate with the UAHCI Conference series (also to be held every two years), hence no ERCIM WG UI4ALL Workshop was held this year. The 7th ERCIM WG UI4ALL Workshop will be organised on 23-25 October 2002, in Chantilly, France (with Noelle Carbonell as local organiser), while the 2nd International Conference on Universal Access in Human-Computer Interaction will take place on 22-27 June 2003, in Crete, Greece.

The work of the ERCIM WG UI4ALL has also contributed to the establishment of an international, interdisciplinary refereed journal "Universal Access in the Information Society" (UAIS), with the first issue published in June 2001 by Springer (http://link.springer.de/journals/uais/). The journal solicits original research contributions addressing the accessibility, usability, and, ultimately, acceptability of Information Society Technologies by anyone, anywhere, at anytime, through any medium and device. In addition, the Chair of the ERCIM WG UI4ALL, Constantine Stephanidis, was coordinator for the ERCIM News issue No. 46, with a special theme on 'Human-Computer Interaction', which

attracted a very high number of submissions and considerable interest worldwide. 'User Interfaces for All' is also the title of an edited book dedicated to the issues of Universal Design and Universal Access in HCI, published by Lawrence Erlbaum Associates (ISBN 0-8058-2967-9, 760 pages).

Furthermore, the work of the ERCIM Working Group UI4ALL has contributed to the establishment of the International Scientific Forum "Towards an Information Society for All" ISF-IS4ALL (1997-2000), an international ad hoc group of experts which first recognised the need for a global approach towards an Information Society for All (http://ui4all.ics.forth.gr/isf_is4all). Two White Papers have been published and submitted to the European Commission, reporting on an evolving international R&D agenda in the field of HCI. Since then, the vision of an Information Society for All and the necessity for universal access to Information Society Technologies have acquired widespread acceptance and importance not only at a scientific and technological, but also at a European policy level, as demonstrated by the eEurope - eAccessibility initiative of the European Commission (http://europa.eu.int/information_society/eeurope/index_en.htm). The activities initiated by the International Scientific Forum are now being continued in the framework of the Thematic Network (Working Group) "Information Society for All" IS4ALL (http://is4all.ics.forth.gr).

In terms of on-going work, ERCIM WG UI4ALL is planning its active participation as a Network of Excellence in the context of the 6th Framework Programme of the European Commission.

The latest meeting of the ERCIM WG UI4ALL was held on October 29th, in Heraklion, Crete, as part of the ERCIM week of meetings (29 October – 3 November 2001), while the previous meeting, exploring avenues for co-operation in the light of the 6th Framework Programme of the European Commission, had taken place on the 6th of August 2001, in New Orleans, USA, in the context of UAHCI 2001.

http://www.ics.forth.gr/ui4all/

Matrix Computations and Statistics

The working group on "Matrix Computations and Statistics" was set up in 2001. The primary objective of the working group is to focus on solving computationally intensive statistical problems. The expertise of the group is in the domains of statistics, numerical methods, algorithmic design and computer science.

The working group aims to find new topics of research emerging from some statistical applications which involve the use of linear algebra methods. The members are especially concerned by the very large problems which necessitate the design of reliable and fast procedures. High Performance Computing including Parallel computing will be addressed. The working group comprises 27 members from 18 organisations.

Considered applications:
- Signal processing
- Econometrics
- Quantitative finance
- Data filtering
- Information retrieval
- Statistical data mining
- Data compression and representation
- Bioinformatics.

Generic problems in statistics:
- Model selection
- Outliers detection
- Regression diagnostics
- Linear and non linear model estimation
- Error analysis and error propagation
- Correspondence analysis
- Principal components analysis
- Cross-validation.

Relevant problems in linear algebra:
- Linear least squares problems
- Generalized inverse
- Singular Value Decomposition
- Eigenvalue problems
- Optimization
- Iterative methods
- Sparse matrix computations.

http://www.irisa.fr/aladin/wg-statlin/

Applications of Numerical Mathematics in Science

'Applications of Numerical Mathematics in Science is new Working Group established in 2001. This Working group was conceived when a number of researchers expressed their interest in building up stronger links between mathematicians within ERCIM.

This Working Group will build a forum within the ERCIM institutional organisations, in which a cross-fertilisation between numerical techniques used in different fields of scientific computing might take place. The Working Group therefore intends to focus on this underpinning theme of computational and numerical mathematics. The intention is that any resulting numerical algorithm will achieve wider applicability, greater robustness, and better accuracy.

Structure of the Working Group

A preliminary survey of active researchers within ERCIM laboratories indicates that the following four major fields have strategic interest:

- Numerical Linear Algebra. Topics range from sparse matrix theory, direct and iterative solvers for large and sparse linear systems of equations, to the computation of eigenvalues and eigenvectors for large-scale problems, including the use of symbolic manipulation techniques for the solution of polynomial systems of equations.
- Numerical Solution of Differential Equations. The topics of major interest are finite-element methods, mesh generation, multigrid methods, wavelets, spectral methods and time-stepping methods.
- Continuous Optimisation and Optimal Control. Of interest here are interior point methods for large-scale linear, quadratic and nonlinear programming, SQP methods for nonlinear programming and numerical methods for optimal control.
- Large Scale Scientific Computing. In this interdisciplinary field, topics of interest include many of those cited in the previous sections, but also include parallel computing and the production of mathematical software.

There is a strong interaction between the fields; each of them frequently uses techniques developed in at least one of the others.

A number of application areas are likely to benefit from the results and activities of the Working Group, including the simulation of electromagnetic phenomena, electrical circuit theory, errors-in-variable modelling and mathematical statistics, computational chemistry, computational biology, computational materials, CFD and structural engineering, mathematics for financial derivatives, finite-element modelling for medical simulation, and environmental modelling and image processing.

The Working Group will be organised by a steering committee involving one expert from each field of interest. The table summarises the interest of each organisation, as far as we can ascertain, in each of the specific topics.

The Working Group looks forward to broadening the scope of its main research topics into additional numerical areas. The Group strongly believes that the best way to build stronger links between the ERCIM laboratories is to encourage young scientists to act as intermediaries. The recruitment of young scientists justifies the involvement of several universities in our initiative.

Organization	Numerical Linear Algebra	Numerical Solution of Differential Equations	Continuous Optimization	Large Scale Scientific Computing
CLRC	x	x	x	x
CNR	x	x	x	x
CWI	x	x		x
DTU	x			x
IACM-FORTH	x	x		x
FhG		x		x
ICS CAS	x		x	x
INRIA-IRISA	x	x	x	x
SARIT	x		x	x
SINTEF	x	x		x
Univ. Utrecht	x			x
Univ. Patras	x		x	

Fields of interestof each working group member organisation.

Finally, the Working Group will, through its members, promote all possible initiatives within the European Programmes for Research. We will encourage grant applications and involvement in the research, technological development and demonstration (RTD) framework programmes of the European Union.

http://www.numerical.rl.ac.uk/ercim/WGanms.html

ERCIM is participating in several research projects as coordinator or partner. In these projects ERCIM institutes and their partners carry out the research while the ERCIM office takes care of administrative tasks.

The main purpose of ERCIM is Fostering cooperation and work among its members. The management of common research projects has become an important activity to achieve this goal and the ERCIM office is dedicating considerable effort to its project management activities. With a small team of experts, the office is able to help the institutes in identifying opportunities for funding, developing project ideas, finding project partners, writing proposals, negotiating contracts and managing the project. ERCIM has been involved in some 20 European projects including RTD projects, Thematic Networks and Accompanying Measures, either as coordinator or as a full partner. In these projects, the ERCIM office takes care of the financial and administrative tasks. This distribution of work has been a valuable asset, allowing the research institutes and the other partners to focus on the scientifc tasks at the core of the project.

Research Projects with the Participation of ERCIM

ANFAS – Data Fusion for Flood Analysis and Decision Support
The ANFAS project is developing a decision support system for flood prevention and protection, integrating the most advanced techniques in data processing and management.
Budget: 3 800 000 Euro
Supported by: European Commission, IST Programme, Chinese Ministry of Research
Duration: January 2000 - December 2002

CYCLADES - An Open Collaborative Virtual Archive Service Environment
CYCLADES will develop an open collaborative virtual archive service environment supporting both single scholars as well as scholarly communities in carrying out their work.
Budget: 2 151 523 Euro
Supported by: European Commssion, IST Programme
Duration: February 2001 - July 2003

DECAIR – Development of an Earth Observation Data Converter with Application to Air Quality Forecast
The DECAIR project provides air pollution models with good quality input data derived from earth observation satellites data, and to design a system prototype able to provide models with their required data under specific quality constraints.
Budget: 1 880 000 Euro
Supported by: European Commission, Centre for Earth Observation Programme
Duration: June 1999 - May 2002

DELOS - Network of Excellence on Digital Libraries
The DELOS Network of Excellence for Digital Libraries provides an open context in which an international research agenda for future research activities in the digital libraries domain can be developed.
Budget: 950 000 Euro
Supported by: European Commssion, IST Programme
Duration: January 2000 - December 2002

EU-US Collaboration - Joint Strategic Workshops
ERCIM has organised a series of strategic research workshops under the auspices of the European Commission and the US National Science Foundation to identify key research challenges and opportunities in Information Technology.
Budget: 495 000 Euro
Supported by: European Commssion, IST Programme
Duration: January 2000 - December 2002

SCHOLNET - A Digital Library Testbed to Support Networked Scholarly Communities
Scholnet provides an enhanced digital library infrastructure for immediate dissemination of and accessibility to the technical documentation produced by various globally distributed, multilingual communities.
Budget: 1 898 640 Euro
Supported by: European Commssion, IST Programme
Duration: November 2000 - April 2002

SIMES – Multimedia Information System for the Environment in the Subsaharian Region
SIMES developed a multimedia exchange platform to facilitate the dissemination of information produced by environmental monitoring systems. SIMES integratied various tools for the acquisition, management, processing and dissemination of full multimedia information related to environmental monitoring.
Budget: 610 000 Euro
Supported by: European Commission, INCO DC Programme
Duration: November 1997 - May 2001

TELEMAC - Telemonitoring and Advanced Telecontrol of High Yield Wastewater Treatment Plants
TELEMAC is designing a reliable modular system based on anaerobic digestion, which supports remote monitoring and control of wastewater treatment units without the need for local expertise.
Budget: 4 596 651 Euro
Supported by: European Commssion, IST Programme
Duration: September 2001 – August 2004

WADI - Water Supply Watershed Planning and Management: an Integrated Approach
The WADI project is to developing a decision support system for rational planning, operation and management of specific watersheds that are characterized by water scarcity and lack of groundwater, with the aim of improving the water supply and consequently helping to satisfy water demand.
Budget: 1 489 042 Euro
Supported by: European Commssion, INCO-MED Programme
Duration: April 2001 – March 2004

http://www.ercim.org/activity/projects/

TELEMAC — Telemonitoring and Advanced Telecontrol of High Yield Wastewater Treatment Plants

TELEMAC is a recent research project coordinated by ERCIM. The project's aim is to design a reliable modular system based on anaerobic digestion, which supports remote monitoring and control of wastewater treatment units without the need for local expertise.

TELEMAC focuses on a re-emerging industrial wastewater treatment technology, namely anaerobic digestion, which up until this point has not been exploited to its full potential due to a lack of tools. The anaerobic wastewater treatment process is based on a complex ecosystem of anaerobic bacterial species that degrade organic matter. Compared with the traditional aerobic treatment, it has a high capacity to degrade difficult substrates at high concentrations, produces very little sludge, requires minimal energy and can even recover energy using methane combustion (cogeneration).

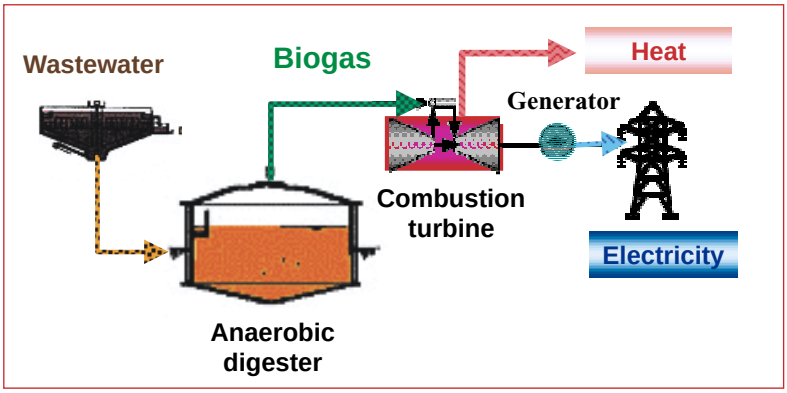
However, in spite of these advantages, industry is reluctant to use anaerobic treatment plants because they can become unstable under certain circumstances. A disturbance can lead to a destabilisation of the process due to accumulation of intermediate toxic compounds resulting in biomass elimination. In such a case, several months are necessary for the reactor to recover. It is therefore a big challenge for computer and control sciences to make this process more reliable, more profitable and usable on an industrial scale.

TELEMAC will develop an efficient and reliable monitoring system for controlling anaerobic digestion, despite the uncertainties and the variability inherent in the biology. Managing such an efficient but unstable nonlinear biological process remotely is a challenge that will require both environmental technical skills and IST competencies. With such a system, depollution will become possible even in remote areas. Using a network of smart sensors, robust advanced control procedures, fault detection and isolation techniques, a centre of remote experts will be able to manage the complex nonlinear anaerobic digestion process via the Internet and assist the local technician at the local treatment plant. The expected results are:

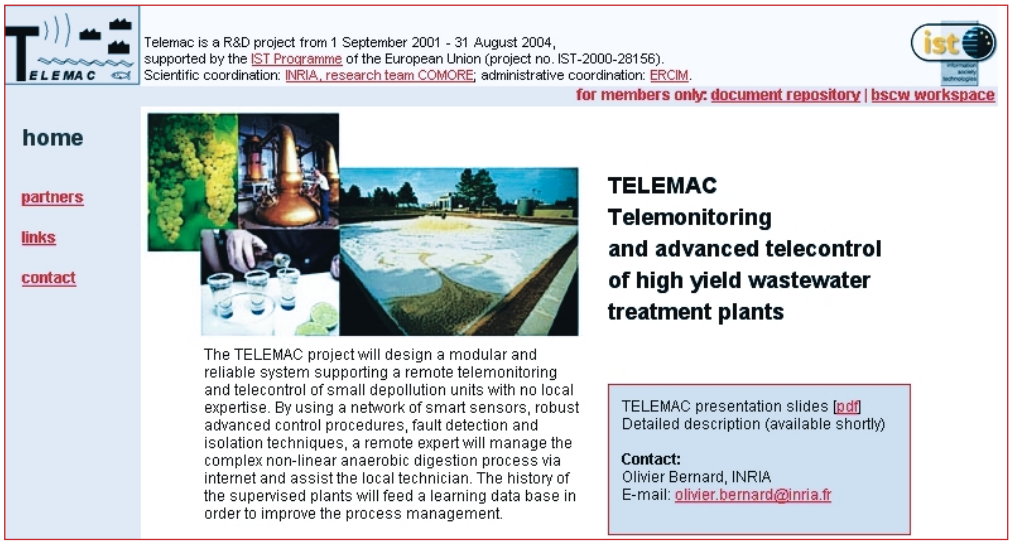
- new sensors which will measure and predict the main chemical components in the digester, including alarms and autocalibration procedures. These smart sensors will provide enough information to remotely monitor an anaerobic wastewater treatment plant.
- local software for the regulation of the wastewater treatment process in order to ensure viability, depollution requirements and a biogas quality suitable for cogeneration.
- remote software to allow an expert centre to telemanage a network of treatment plants by ensuring preventive maintenance and expert assistance in case of problems.

Coupling diagnosis and advanced control techniques is the core of the solution proposed by TELEMAC for the management of anaerobic treatment plants. The fault detection and isolation module must be able both to detect faults in the process and to determine the origin of the problem. When a failure is detected, the model corresponding to the symptoms of the process will be chosen from the model base developed specially for faulty situations. The software sensors and the control algorithms based on the selected model will then be activated. The supervision system must not only test the integrity of the process, but must also verify that the selected

Left: Prototype of an anaerobic digester. Photo: INRA-COMORE. Right: Anaerobic digester at industrial scale.



Anaerobic digestion.



algorithms (eg, controllers, software sensors, fault detection) do their job properly. In this case, it must therefore also be able to check the coherence of the algorithms' outputs with their theoretical properties (eg, convergence rate, dynamical behaviour). If they turn out to be inefficient, an alarm will be triggered. In addition, the supervision system will take advantage of the advanced methods relying on analytical models (eg, software sensor predictions, residuals generated from the model, process forecasts) to provide a new set of rules for the fault detection and isolation procedure, so as to improve the diagnosis. This synergy between advanced control (ie, mainly analytical model-based control) and advanced supervision systems (based on fuzzy logic, qualitative reasoning, machine learning) is a very promising and innovative idea for biological wastewater treatment processes.

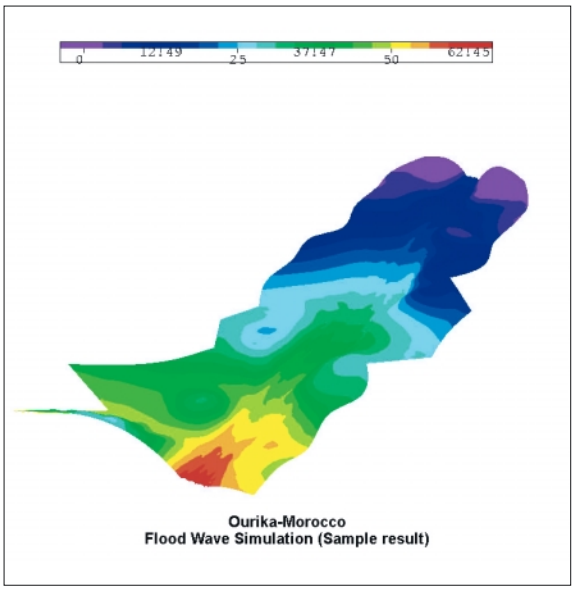
Another innovative aspect is the original management approach of a wastewater treatment plant. Data from the sensor network, faults, controller outputs, simulations, and expert consultancies are combined in a supervision system, and the outcome is structured, harmonious and formalised on-line information. The history of the plant can be invoked directly to feed and improve the management policy, and eventually, to make its telemanagement accurate and efficient. This will improve the knowledge of plant operation and will be employed to optimise the cost/performance ratio.

The system will be validated with partners from the winery industry. The treatment of vinasses and alcoholic wastes is difficult and these pollutants have a deep environmental impact both in Europe, where the wineries belong to the category of sensitive industries, and in other regions of the globe, where they are responsible for tremendous damage to water resources (Mexico, Brazil, etc). Most of these wastes are produced by SMEs and generate significant and disseminated pollution. For example, a middle-sized winery generates pollution equivalent (in Biological Oxygen Demand) to a town of 15 000 people. The project will provide SMEs and larger corporations with an efficient anaerobic wastewater treatment plant and a remote expert centre via the Internet. The project is being carried out by a consortium of European and South American partners under the scientific coordination of Olivier Bernard from INRIA.

http://www.ercim.org/telemac/

WADI — Water Supply Watershed Planning and Management

Water will play an important role in the next millennium due to fresh water shortage. It takes tremendous effort to protect lives, property, and water quality. Careless land development means increasing flooding and property damage. Implementing watershed planning, protection, restoration, and education are therefore of paramount importance. The situation is worst in semi arid to arid zones due to water scarcity. In fact, we have to deal with the management of scarcity, which adds another complexity to the problem.



Flood Wave Simulation (sample result), Ourika, Morocco.

WADI is a research project administered by ERCIM, aimed at developing a Spatial Decision Support System (SDSS) for rational planning, operation and management of specific watersheds that are characterized by water scarcity and lack of groundwater. With the continual increase of water demand due to socio-economic growth in the Mediterranean regions, among others, water will play a more and more important role in the next millennium. In the next decades, the Mediterranean countries labeled as arid and semi-arid areas, especially the Southern Mediterranean countries will be highly concerned with water scarcity.

The project will assess the technical and scientific requirements for watershed planning and management including social and legal aspects, as well as environmental constraints for sustainable development. This matter of fact has been highlighted in several recent studies and analysis reports carried out by independent organizations (ESCWA, World Bank, UNESCO, etc) as well as by the respective national water boards, agencies and offices: the principal recommendation outlines the fact that the main sustainable remedy is in the development of a rational dynamic water planning tool that focuses in priority on how to improve water supply in terms of quantity (optimal dam, water reuse, aquifers, etc) and quality (sediments, pollution, etc).

The WADI project will focus on the development of tools and methodologies that can assist decision making in watershed management boards and water planning authorities having to determine where to locate new dams/reservoirs. The tools and methodologies will address the various elements related to reservoir identification (eg, geographic location, water volume, infrastructure cost) given the watershed characteristics (water demand requirements, water researches, DEM, etc) in an integrated manner that considers socio-economic issues as well as environmental aspects related to flood and drought risks. In addition, WADI will develop advanced data processing tools for modeling and simulations related to floods, reservoir design, and optimization of the complete planned network of a watershed. The WADI development involves Mediterranean end-users who will specify the requirements, refine the objectives, contribute to the system design, and finally evaluate

simulation results and compare them to available observations. End-users will also carry out an impact assessment analysis for sustainable development, taking into account the socio-economic context as well as legal issues and environmental constraints.

The output of WADI is summarized below:
- data organization and handling for possible watersheds monitoring and follow-up
- visualization: thematic maps for the extent of the flood, environmental impact, reservoir location
- impact assessment: evaluation of the total affected area; regional and statistical analyses over the affected area; simple socio-economic assessment of damage directly caused by flood
- a user-friendly SDSS under an integrated platform for data access, studying, analyzing, modeling and simulating while exploiting HPCN facilities, and visualizing thematic aspects of the watershed environment for planning and management purposes.

This multidisciplinary functions allows WADI to plan and to manage watersheds considering impacts and benefits in the region within the context of sustainable development. To our knowledge, no such integrated system exists for these purposes.

The Project Consortium

The project manager is Fadi Dabaghi from INRIA/ERCIM, he is assisted by Prof. Driss Ouazar from EMI-Morocco for the scientific co-ordination and by Bruno Le Danted from ERCIM for the financial and administrative tasks. The project partners are: IACM-FORTH, Greece; INRIA-Rocquencourt; University of Calabria, Italy; ENP - Ecole Nationale Polytechnique d'Alger, Algeria; CREEN-Regional Centre for Water and Environment Beirut, Lebanon; ESIB-Ecole Supérieure des Ingénieurs de Beyrouth, Beirut, Lebanon; EUCLID Beirut, Lebanon; EMI - Ecole Mohammadia d'Ingénieurs, Rabat, Morocco; ONEP - Office national de l'Eau Potable, Rabat, Morocco.

http://www-wadi.inria.fr/

Strategic Research Workshops

ERCIM has organised a series of strategic research workshops under the auspices of the European Commission's Information Society Technology Programme, Future and Emerging Technology activity, and the US National Science Foundation, Directorate for Computer and Information Science and Engineering.

These workshops have been set up to identify key research challenges and opportunities in information technology. On the European side, ERCIM was assigned to solicit ideas for high-level workshops from the European IT scientific community and to then organise the workshops. Based on over 350 suggested topics, a strategic workshop review committee selected the areas for joint research initiatives according to the following criteria:
- long-term/high-risk nature of the research involved, justifying risk-sharing at an international level
- high potential payoffs in both the EU and the US which make up for the long-term/high-risk nature of research
- existence of sufficient scientific and technological bases in both the US and the EU to support balanced research efforts.

'Bionics', 'Future Information Processing Technologies' and 'Semantic Web' were three of five strategic emerging topics selected by the Strategic Workshop Review Committee. ERCIM organised a workshop on each of these three topics in 2001. The workshops were intended to facilitate breakthroughs in innovative domains, and stimulate research activities and scientific discussions of mutual interest. The respective programme committees were nominated by the strategic workshop review committee. Participation was by invitation only, and each workshop was attended by a total of twenty participants from both Europe and the US. In addition to these three workshops, a fourth workshop on 'R&D Strategy for a Dependable Information Society', partly supported by the NSF/EC scheme, was organised in December 2001.

Bionics - Bio-Inspired Information Technologies

In a collaborative effort among leading researchers from the US and Europe, the workshop 'Bionics – Bio-Inspired Information Technologies', held in Brussels on 19-21 June 2001 under the scientific coordination of Tamas Roska from SZTAKI, explored the possibilities of a joint EU-NSF research agenda in the field of bionics.

Strategic workshop reports published by ERCIM: Bionics, Semantic Web and Future Information Processing Technologies.

BIONICS is a common term for bio-inspired information technology, typically including three types of systems, namely:

- bio-morphic (eg, neuromorphic) and bio-inspired electronic/optical devices
- autonomous artificial sensor-processor-activator prostheses and various devices built into the human body
- living-artificial interactive symbioses, eg, brain-controlled devices or robots.

The Workshop has been divided into four areas: (i) sensing, interfaces and sensors, (ii) human-machine interaction with autonomous sensors and various prostheses (iii) bionic systems and brain-controlled automata, and (iv) bionic and bio-inspired device technologies.

New technologies will have to be developed in order to provide the bionics industry (sometimes also called info-bionics) with reliable tools and techniques for making commercially viable products and services. From this perspective, several key research challenges are to be studied and overcome. The main challenges to be addressed are:

- to understand the metal-to-bio contact mechanisms for some key interface classes in the deep submicron range, and to develop testbed interfaces ready for standardised clinical trials
- to invent microsensor- and/or actuator-specific yet programmable multidimensional signal-processing platform prototypes, the sensing and actuator parts being integrated into the platform
- to study the inherent dynamic plasticity and interaction between the sensing and computing (signal processing) parts, especially if the signal is topographic (eg, vision)
- to develop and invent new mixed mode VLSI design techniques for implementing the low power design of analogic topographic microprocessors
- to uncover the neuromorphic functional models in key living sensing-processing-acting (navigating) organs, especially the visual and tactile pathway, and to study cross-modality
- to develop and invent analogic CNN array computing algorithms for dynamic and multidimensional signal processing, fusion, detection and activation functions.

The drafted results and recommendations are intended to serve as a basis for a joint EU-NSF research program. Such a program for discovering and implementing new ideas, methods, and devices in the field of bionics would be beneficial for millions of people suffering from various handicaps and diseases, and could create a new industry in the 21st century.

International Workshop on Future Information Processing Technologies

The International Workshop on Future Information Processing Technologies (IWFIPT) was held on 3-6 September 2001 and brought together top-level scientists and strategic thinkers from all around the world. Debate ranged over those research and technology frontiers which promise to extend progress in information processing into the 21st century. The scientific coordinator was Giorgio Baccarani from the University of Bologna. The format was chosen to follow that of a Gordon-type conference in order to promote openness in discussions and a completely free exchange of ideas. Participation was limited to thirty European, thirty American and thirty Asian participants. All sessions had a main subject and were driven by invited presentations delivered by leading scientists from Europe, USA and the Far East.

The selected topics in the workshop were: 'Future System and Technology Challenges' (two sessions), where emphasis was placed on the convergence among PCs, PDAs, cell phones and the related network infrastructure; 'Silicon Evolution and the

Future', which addressed system-on-chip design challenges, reconfigurable computing and low-power design issues; 'Enabling Technologies', such as optical networking and human interfaces; and 'Emerging Technologies', addressing smart dust, superconducting devices and new implementations of quantum computers.

Semantic Web

The strategic workshop on the 'Semantic Web' was held on 3-5 October 2001 in Sophia Antipolis, France. The scientific coordinator was Jérôme Euzenat from INRIA. The workshop gathered twenty US and European researchers from the fields of knowledge acquisition and representation, database, web and man-machine communication. The aim was to envision the future of the 'Semantic Web' and identify emerging research areas in order to pinpoint expected breakthroughs and put forward recommendations to the funding bodies.

The Semantic Web can be thought of as an infrastructure for supplying the web with formalised knowledge in addition to its actual informal content. No consensus exists on how far the formalisation should go: it ranges from precise metadata schemes (like the Dublin core metadata markers) to fully-fledged logical representation languages. One of the challenges of current semantic web development is the design of a framework in which all these systems can coexist. The participants have agreed that the best achievement of the Semantic Web would simply be called 'the web'. The workshop itself was composed of two days of presentations, each participant having a negotiated topic. These presentations were grouped into four sessions (Languages; Resources and Infrastructure; Clients and Human Interface; and The Semantic Web in Application Areas). After each session, a general discussion was held in order to isolate topics for further discussion. On the third day, the participants were split into four working groups (Language; Infrastructure; Human-Related Issues; and Ontologies) and research perspectives and agendas were elaborated for the years to come.

There are a few application scenarios that have retained the attention of the audience: the Semantic Web for electronic commerce, knowledge management and bioinformatics. It seems that some of these could be seeding further applications (both test benches and early adopters for Semantic Web techniques: the bioinformatics community could be for the Semantic Web what the physics community has been for the web).

The participants expressed a need for transcontinental and transdisciplinary collaboration, ie, since the web is a worldwide resource, research should also occur on a worldwide scale. They also strongly supported the idea of seeing entities like EU or NSF supporting open-source realisation of high quality software and shelter organisations for this software (like the Apache Foundation).

R&D Strategy for a Dependable Information Society

The aims of this workshop, which was held in Düsseldorf on 1-2 December 2001, were to discuss collaboration between the EU and the USA on R&D for information infrastructure dependability, reliability and security, and to roadmap priority areas for future collaboration. The workshop started with position papers from each head of delegation on the state of play of the EU-USA R&D on dependability, followed by a review of the EU-USA collaboration in this field. Future steps of a collaborative roadmap were discussed based on the outcome of three parallel working group sessions on 'Dependability Challenges in the Information Society', 'Information Assurance of Complex Networked Systems' and 'Interdependencies'. Jean-Claude Laprie, from CNRS, LAAS, presented the conclusions and recommendations of this workshop in a specific session dedicated to dependability during the IST Conference in Düsseldorf, 3-5 December 2001.

This series of strategic workshops will continue in 2002 with a possible extension to newly identified research priorities.

http://www.ercim.org/EU-NSF/

19 young scientists started an ERCIM PhD Fellowship in 2001. This was the most successful year for the Fellowship Programme since its establishment in 1990.

The ERCIM Fellowship Programme is open to young researches from all over the world. It mainly focuses on topics of interest identified by the ERCIM working groups. Ideally, a fellow will work in two ERCIM institutes, thus contributing not only to the work done locally, but also to cohesion between ERCIM partners and to the cross-fertilisation and co-operation between research groups working in similar areas in different laboratories.

The fellowship scheme also helps young scientists to become involved in one of the ERCIM working group initiatives, to improve their knowledge of European research structures and networks and to gain more insight in the working conditions of leading European research institutions.

Conditions for Application

Applicants must:

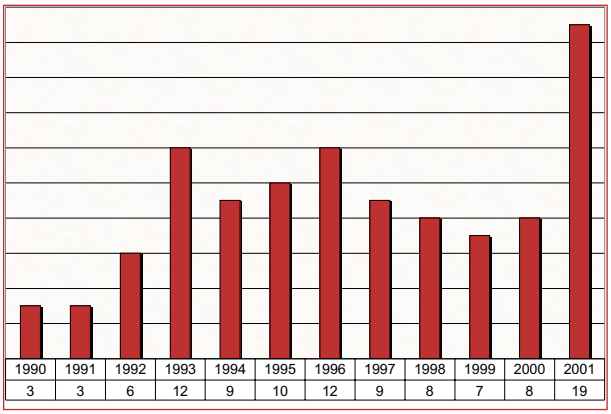
- have a PhD degree (or equivalent) or be in the last year of the thesis work
- be fluent in English
- be discharged or get deferment from military service.

Fellowships are of 18 months duration, generally spent in two institutes. The fellow will receive a monthly allowance which may vary depending on the country. In order to encourage the mobility, a member institution will not be eligible to host a candidate of the same nationality.

http://www.ercim.org/fellowship/

Fellow	Nationality	Visited Institute(s)	
Laurie Ricker	Canadian	INRIA CWI	01/09/99-31/05/00 01/06/00-28/02/01
Jan-Georg Smaus	German	INRIA CWI	01/10/99-30/06/00 01/07/00-30/03/01
Ercan Kuruoglu	Turk	INRIA CNR	01/11/99-31/07/00 01/08/00-30/04/01
Luc Onana Alima	Cameroonian	SICS	24/11/99-23/05/01
Amine Chohra	Algerian	GMD CNR	01/12/99-31/08/00 15/10/00-14/07/01
Nicolas Roussel	French	GMD SARIT	06/12/99-05/09/00 06/09/00-05/06/01
Stephane Sire	French	SARIT CWI	01/04/00-31/12/00 15/01/01-14/10/01
Conrado Daws	Uruguayan	CNR CWI	12/05/00-11/02/01 12/02/01-11/11/01
Alexander Kurz	German	CWI CRCIM	01/08/00-31/04/01 01/05/01-31/01/02
Oscar Mayora-Ibarra	Mexican	VTT	01/09/00-31/05/01
Frederic Goulard	French	CWI SARIT	01/09/00-31/05/01 01/06/01-28/02/02
Kjetil Noervaag	Norwegian	INRIA	01/01/01-30/09/01
Miroslav Skrbek	Czech	FhG	01/04/01-31/12/01
Ilya Burkov	Russian	INRIA	01/04/01-31/12/01
Enrico Capobianco	Italian	CWI	01/04/01-31/10/02
Yingwen Song	Chinese	INRIA	01/05/01-31/01/02
Daniel Smutek	Czech	TCD VTT	01/05/01-31/01/02 01/02/02-31/12/02
Michalis Vazirgiannis	Greek	INRIA	01/06/01-28/02/02
Weerasinghe Ruvan	Sri Lankan	INRIA	09/07/01-08/10/02
Christoph Sprenger	Swiss	SICS INRIA	01/08/01-31/07/02 01/08/02-30/04/03
Andreas Rauber	Austrian	CNR INRIA	01/09/01-30/05/02 01/06/02-31/01/03
Dharmendra Singh	Indian	INRIA	01/09/01-31/05/02
Gakuhito Hirasawa	Japanese	INRIA	01/09/01-31/05/02

Fellows hosted by ERCIM institutes during 2001.



Number of fellows hosted by ERCIM institutes from 1990 to 2001. The number refers to the fellows who started their grant in the given year.

Phong Q. Nguyen Winner of the 2001 Cor Baayen Award

The annual ERCIM Cor Baayen Award was presented to Phong Nguyen during a ceremony in Crete on 31 October 2001. The award is given every year to the most promising young researcher in computer science and applied mathematics having completed a PhD thesis in one of the 'ERCIM countries'.

Phong Nguyen is currently working as a CNRS researcher at the Computer Science Department of the Ecole Normale Supérieure in Paris. He received his PhD in 1999 from the Université of Paris 7 - Denis Diderot, under the supervision of Professor Jacques Stern. He is an alumni of the Ecole normale supérieure de Lyon (1993-1997). He has been working in the highly competitive field of cryptanalysis, in which one tries to attack cryptographic schemes. Cryptography is becoming more and more important, thanks to the development of the Internet and electronic commerce. Phong showed the inadequacy, both from a theoretical and a practical point of view, of several cryptographic schemes proposed in the past few years by eminent cryptographers to replace schemes currently in use. Despite his young age (26), Phong is now regarded by the international cryptographic community as one of the foremost specialists of number-theoretical cryptanalysis.

ERCIM president Gerard van Oortmerssen (right) presents the Cor Baayen Award to Phong Q. Nguyen during a ceremony in Crete on 31 October 2001.

The Cor Baayen Award for the most promising researcher in computer science and applied mathematics was created in 1995 to honour the first ERCIM President. The award, up to 1998 restricted to researchers working in an ERCIM institute, is now open to any young researcher having completed their PhD thesis in one of the 'ERCIM countries', currently: Austria, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Slovakia, Sweden, Switzerland, the Netherlands and the United Kingdom.

The award consists of a cheque for 5000 Euro together with an award certificate. The selected fellow will be invited to the ERCIM meetings in autumn

Cor Baayen Award
Rules for Nomination

Nominations for each country are made by the corresponding ERCIM Executive Committee member (also referred to as the 'national contact'). Those who wish a particular candidate to be nominated should therefore contact the ERCIM Executive Committee member for their country (see http://www.ercim.org/contacts/execom/execom.html).

Nominees must have carried out their work in one of the 'ERCIM countries' and they must have been awarded their PhD (or equivalent) no more than two years prior to the date of nomination.

Each ERCIM institute is allowed to nominate up to two persons from its country. A person can only be nominated once for the Cor Baayen Award. The selection of the Cor Baayen award is the responsibility of the ERCIM Executive Committee.

How to Nominate

For proposing a nomination to your national contact, fill out the Cor Baayen Award Nomination Form available at the ERCIM website.

Further information can be obtained from your national contact or from the ERCIM Cor Baayen Award coordinator Lubos Brim.

http://www.ercim.org/activity/cor-baayen.html

Conference and Workshop/ Summer School Sponsorship

ERCIM sponsors up to twelve scientific events per year, like conferences and workshops or summer schools.

Conferences
ERCIM invites sponsorship proposals from established conferences with an international reputation, where substantive overlap can be shown between the conference topic and ERCIM areas of activity. Typical cases would include annual conferences in computer science with international programme committees, substantial international participation, and proceedings published with an established international science publisher.

Workshops/Summer Schools
ERCIM sponsors workshops or summer schools under the following conditions:

- they must be organised by an ERCIM institute
- named individuals from ERCIM partners must be involved in the organisation committee
- at least 2 non-ERCIM institutes should participate in the organising committee
- signature from one ERCIM partner.

The additional funding provided by ERCIM should be used to enhance the workshop by, for example, increasing the number of external speakers supported.

http://www.ercim.org/activity/sponsored.html

Events sponsored in 2001

Seventh International Conference on Principles and Practice of Constraint Programming
Paphos, Cyprus, 26 November - 1 December 2001

SOFSEM 2001, 28th Conference on Current Trends in Theory and Practice of Informatics
Piestany, Slovak Republic,
24 November - 1 December 2001

VLDB 2001 - 27th Conference on Very Large Databases
Rome, Italy, 11-14September 2001

Eurographics 2001
Manchester, United Kingdom, 3-7 September 2001

MFCS'2001 - 26th Symposium on Mathematical Foundations in *Computer Science*
Marianske Lazne, Czech Republic,
27-31 August 2001

International Joint Conference on Automated Reasoning (IJCAR)
Siena, Italy, 18-23 June 2001

15th ECOOP - 15th European Conference on Object-Oriented Programming
Budapest, Hungary, 18-22 June 2001

IEA/AIE-2001, 14th International Conference on Industrial & Engineering Applications of Artificial Intelligence & Expert Systems
Budapest, 4-7 June 2001

UIDIS 2001 User Interfaces to Data Intensive Systems
Zurich, Switzerland, 31 May -1 June 2001

ICDT 2001, International Conference on Database Theory
London, UK, 3-6 January2001

Publications

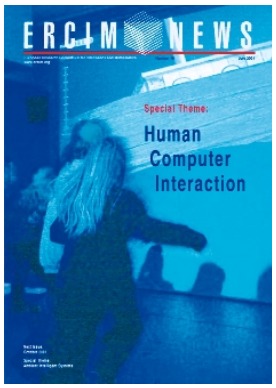
ERCIM publishes

'ERCIM News', a quarterly newsletter, workshop proceedings and policy documents.

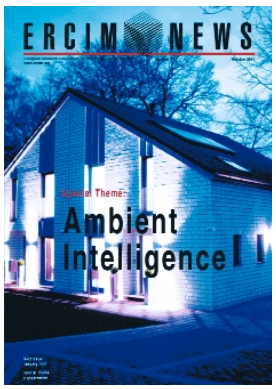
Published quarterly, ERCIM News reports on joint actions of the ERCIM partners, and aims to reflect the contribution made by ERCIM to the European Community in Information Technology. Through short articles and news items, it provides a forum for the exchange of information between the member institutes and also with the wider scientific community. ERCIM News is published in printed and electronic form. The printed edition has a circulation of over 7500 copies and is distributed in over 70 countries. The online edition offers full-text search and the numerous sites and documents quoted can easily be accessed on the web. ERCIM News significantly contributed to make ERCIM better known.

Concerning scientific publications, ERCIM published the workshop proceedings of the DELOS Network of Excellence and reports on the EU-NSF strategic workshops. An electronic version of all published proceedings and reports is available on the ERCIM website.

ERCIM News No 45
Special Theme: Grids: e-science to e-business
Keynote: Lord Sainsbury of Turville, UK Minister for Science and Innovation



ERCIM News No 46
Special Theme:Human Computer Interaction
Keynote: Gavriel Salvendy, Professor at Purdue University.



ERCIM News No 47
Special Theme: Ambient Intelligence
Keynote: Erkki Liikanen, Member of the European Commission.

ERCIM News No 48
Special Theme: e-government
Keynote: Bertie Ahern, Irish Prime Minister.

In 2001, AARIT, the Austrian Association for Research in Information Technology joined ERCIM becoming ERCIM's fourteenth member institute. ERCIM members are national centres of excellence, strongly involved in European research programmes; they have strong links to the national academic community, and are involved in joint projects with both small and medium size enterprises and large industrial companies.

AARIT, the Austrian Association for Research in Information Technology

AARIT, the Austrian Association for Research in IT (Österreichische Vereinigung für IT-Forschung), officially joined ERCIM in October 2001. AARIT will be ERCIM´s gateway to the Austrian information technology research community.

AARIT was founded in May 2001 as a platform for the Austrian information technology research community. AARIT is a legal entity and an independent not-for-profit association.

Co-founders of AARIT were the Austrian Research Centres Seibersdorf (ARCS) and the Austrian Computer Society. ARCS (www.arcs.co.at) is the largest application-oriented information enterprise in the country. It serves as a research centre for the private sector and government agencies. Five hundred employees work at locations across Austria. ARCS designs products and processes – from drafting to development and testing to industrial applications. The Austrian Computer Society (OCG – Österreichische Computer Gesellschaft, www.ocg.at) is Austria's umbrella organisation of associations and institutions involved in information processing. Founded in 1975, OCG now has more than thirty institutional members, among them independent research organisations and university institutes working in the field of informatics and mathematics.

The mission of AARIT is to promote information technology and related subject areas. To achieve this, AARIT aims to strengthen scientific co-operation among its members on a national level, through international co-operation and through transfer of know-how and knowledge.

The activities of AARIT include co-operation with and participation in scientific organisations nationally and internationally. The Association carries out, participates in or commissions research projects, organises meetings and courses, and participates in conferences. Further activities include the granting of fellowships, awards and sponsorships and the collection and exchange of information among members and third parties.

AARIT has both institutional members and individual members. Institutional members are scientific institutions or associations and enterprises, currently including OFAI (Austrian Research Institute for Artificial Intelligence), Salzburg Research, VCPC (European Centre for Parallel Computing in Vienna), RISC (Research Institute for Symbolic Computation) and the Department for Information Systems at the Vienna University of Technology.

Among the individual members are scientists and honorary members, such as Pro-IT, an Austrian association which brings together scientists working in universities as professors or senior lecturers, and senior research scientists working in public or private/industrial research institutions.

The institutional members of AARIT cover a wide range of research activities within informatics and mathematics (see chart below), similar to the Working Groups of ERCIM. In addition, AARIT members participate in other research projects such as AGRID (Austrian GRID Consortium), image processing and advanced computer vision, safety and security of software intensive systems, embedded systems, natural language processing, bio-informatics and social aspects of IT (social inclusion and IT applications for people with special needs).

http://www.aarit.at/

CLRC – Central Laboratory of the Research Councils

RESEARCH AT THE LEADING EDGE

CLRC is the largest UK public sector science and engineering R&D laboratory. It is publicly owned - under the UK Office of Science & Technology (Department of Trade & Industry).

The Central Laboratory supports world class research activities by providing leading-edge facilities and extensive expertise, particularly in physical and life sciences and engineering at its three sites in the UK: Rutherford Appleton Laboratory (Oxfordshire), the Daresbury Laboratory (Cheshire), and the Chilbolton Observatory (Hampshire).

Major CLRC Facilities:

- Central Laser Facility - including "Vulcan" and "ASTRA"
- Central Microstructure Facility - including nano-engineering
- "ISIS" - Spallation Neutron Source
- Synchrotron Radiation Source
- New Synchrotron Light Source - "Diamond"
- Focus / Hub for the UK e-Science Initiative.

Real-time decision making: the RAMSES flood control centre in Bordeaux (© Suez-Lyonnaise des Eaux et Communauté Urbaine de Bordeaux)

Computing Facilities

CLRC's partners in the Universities and in Industry are supported by such facilities as:

- The EPSRC Superscalar Computing Service - "Columbus"and a Central Simulation Facility
- Various clusters - an NT farm; a Beowulf (Linux) cluster; clusters of DEC Alphas - the OSF Service
- Atlas Datastore
- Digital Media,Visualisation Facility and a Virtual Reality Centre.

Recent Initiatives

GRIDs. Building upon its long tradition of IT research, development and support, the CLRC will act in a pivotal rôle in the new UK initiative to support the development of e-Science. A major component of this will be the GRIDs (not just a data repository, but using meta-data and related techniques to utilise knowledge for research and industrial developments).

Recent Applications

Virtual Solutions to Real Problems
virtual reality techniques have been used to help build giant super-conducting magnets for the ATLAS detector at CERN and to improve the use of EISCAT arrays for studies of the atmosphere.

Modelling Reaction Processes
simulation of molecular dynamics has been exploited by a company in collaboration with CLRC's computer scientists.

Software that Explains its Decisions
development of a simulation system related to flood control. In contrast with previous approaches, the system advised engineers, giving reasons for the action. As a consequence flood problems were reduced or eliminated.

Partnerships

Can range from a one-off contract to truly integrated partnerships, collaborating with CLRC staff.

Budget and Staffing

Budget for IT related areas (2000-2001): 23 Million €
- 80% research council contracts
- 20% income from government departments, European Commission, universities and industry.

1,744 total staff, 200 IT staff (average whole-time equivalent, 2000-2001).

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Fax:+ 1235 445385
http://www.cclrc.ac.uk/

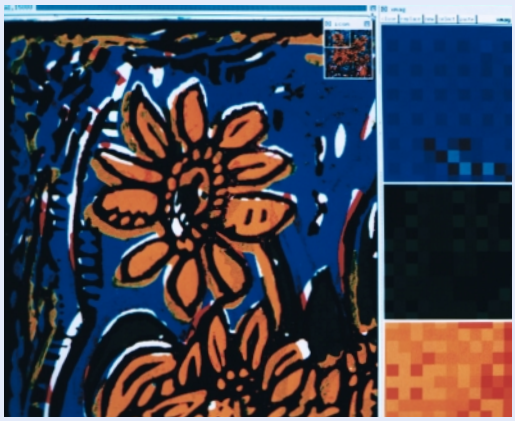
CNR – Informatics and Applied Mathematics at the Italian National Research Council

The Italian National Research Council (CNR) CNR is a government funded organization which conducts research in nearly all the main scientific disciplines through a network of research institutes.The institutes are largely independent. The responsibility of the central body is limited to middle and long-term scientific programming and evaluation. CNR funding covers the main infrastructures, permanent staff, and basic research. Individual institutes must find additional funding from national and international contracts.

Information Technology at CNR

The IT area at CNR is mainly covered by the following institutes:

- Istituto di Scienza e Tecnologie dell'Informazione (ISTI), Pisa
- Istituto di Informatica e Telematica (IIT), Pisa
- Istituto di Analisi dei Sistemi ed Informatica (IASI), Rome
- Istituto per le Applicazioni del Calcolo (IAC), Rome
- Istituto di Calcolo e Reti ad Alte Prestazioni (ICRAP), Cosenza
- Istituto di Matematica Applicata e Tecnologie Informatiche (IMATI), Pavia.



Partial Ordered Dithering on 'Girasoli' by Giancarlo Caldini, Museo San Matteo, Pisa.

Research

The strategic research areas covered include: formal methods and software engineering, system engineering, system optimization and control, database systems, multimedia information systems, information engineering, parallel computing, parallel algorithms and architectures, image and signal processing, computer graphics and visualisation, computational complexity and numerical linear algebra, advanced telematics applications, computer networks, information security and protection, computational mathematics, numerical analysis, mathematical models, statistics.

Budget

An estimated 50 Million € for institutes working in ERCIM related areas

- 60% national funding
- 40% participation in (inter)national research programmes and contracts with industry.

Staff

Approximately 500 in IT related areas.

Contact:

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56124 Pisa, Italy
Italy

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Fax: +39 050 315 2810
http://www.iei.pi.cnr.it/

Dutch Centre for Mathematics and Computer Science

FRONTIER RESEARCH FOR PRACTICAL APPLICATIONS

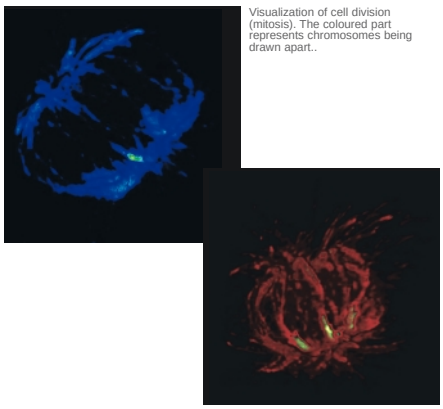
CWI is the national Dutch research institute for mathematics and computer science. Since its foundation in 1946, the institute has acquired a prominent position in the research world. CWI is a co-founder of ERCIM. The mission of CWI is twofold:

- to perform frontier research in mathematics and computer science
- to transfer new knowledge in these fields to society in general and trade and industry in particular.

Research

CWI's research is organized in clusters of related themes:

- Probability, Networks and Algorithms
- Software Engineering
- Modelling, Analysis and Simulation
- Information Systems.



Visualization of cell division (mitosis). The coloured part represents chromosomes being drawn apart..

Recent Applications

Railroad timetables; Integrated services in telecom networks; Traffic control of motorway networks; Multi-resolution methods in image processing; Image processing across the Web; Software renovation; Testing of embedded software with formal methods; Evolutionary methods for E-commerce and management; Mathematical models of living cells; Optimal shape of ship hulls; Factoring methods and data security; Interactive visualisation; Querying large distributed multimedia databases; Multimedia presentations on the Web (SMIL).

Co-operation and Knowledge Transfer

CWI maintains a broad spectrum of contacts with companies and institutions through joint participation in projects. Besides, there are direct commissions from industry and the government. CWI participates in some 30 European projects, and is a partner in over 70 national projects. CWI pursues an active policy of creating spin-off companies, and has created to this end CWI Incubator Ltd.

Budget

Total annual budget: 14 million €

- 70% basic national funding
- 30% participation in (inter)national research programmes and from contracts with industry.

Staff (in full time equivalents)

- 160 Researchers
- 50 Supporting staff.

Contact:

CWI
Kruislaan 413
NL-1098 SJ
The Netherlands

Tel: + 31 20 592 9333
Fax: +31 20 592 4199
E-mail: secr@cwi.nl
http://www.cwi.nl

Czech Research Consortium for Informatics and Mathematics

CRCIM is a consortium consisting of four major Czech R&D institutes active in informatics and mathematics:

Charles University, Faculty of Mathematics and Physics, Prague

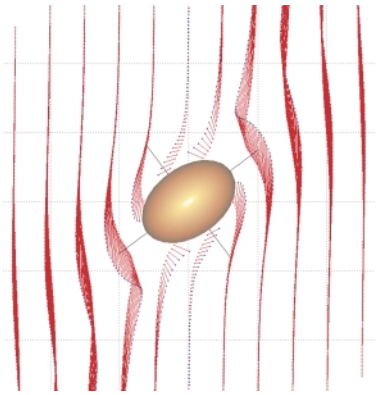
Institute of Information Theory and Automation, Academy of Sciences, Prague

Masaryk University, Faculty of Informatics, Brno

Institute of Computer Science, Academy of Sciences, Prague.

Mission

The mission of CRCIM is to perform frontier research and teaching in mathematics, informatics and computer science and to transfer acquired new knowledge to society.



A two-dimensional cut throuhg a rigid ellipsoidal particle rotating in a viscous flow in a regime of simple shear. Arrows indicate the velocity field in a set of chosen markers (point) of the moving fluid.

Research Topics

- Complexity Theory, Automata, Logic, Combinatorics, Computational Geometry, Parallel and Distributed Algorithms, Neural Networks, Computer Graphics, Formal Linguistic, Databases, Distributed Systems, Operating Systems, Software Engineering;
- Informatics: Control Theory, Econometrics, Pattern Recognition, Image Processing, Statistics and Data Processing;
- Software Engineering and Methodology of Programming, Distributed Systems Design, Computer Networks, Electronic Typesetting, Advanced Man-Machine Interfaces, Data Visualization, Information Systems;
- Theoretical Computer Science: Artificial Neural Networks,Knowledge-based Systems, Nonlinear Modelling, Numerical Nonlinear Analysis and Optimization, Applied Linear Algebra.

Budget

Total annual budget: 12 million €:

- 70% basic national funding
- 30% participation in (inter)national research programmes and from contracts with industry.

Staff

1120 Researchers / Teachers (estimation).

Contact:

Czech Research Consortium for Informatics and Mathematics
co/ FI MU Botanicka 68a
CZ-602 00 Brno
Czech Republic

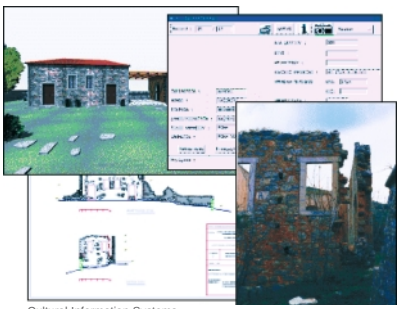
Tel: +420 2 6884669
Fax: +420 2 6884903
http://www.utia.cas.cz/CRCIM/home.html

Foundation for Research and Technology – Hellas Institute of Computer Science

Since its establishment in 1983, the Institute of Computer Science (ICS-FORTH) has a relatively long history and an established tradition of internationally acknowledged excellence in conducting basic and applied research, developing applications and products, and providing services. The research directions take into consideration the state of the art, international trends, research and technological challenges worldwide, as well as the needs of the public and private sectors in Greece. ICS-FORTH is a pioneering contributor towards the deployment and adoption of Information Society Technologies in Greece and plays a leading role in worldwide efforts towards the development of an Information Society accessible and acceptable by all citizens.

Research & Development Activities

On-going research and development efforts focus on: information systems; data and knowledge-based systems; information retrieval, including content-based approaches; image processing and pattern recognition; computer vision; sensor technologies; robotics; machine learning; digital communications; network management; computer architectures; VLSI design; computer aided design; human-computer interaction; virtual reality; universal access and usability; information and communication technologies in Healthcare; and assistive technologies for people with disabilities. Based on existing research experience and available know-how, efforts in the near future will also include basic and applied research in bio-informatics, Web systems and technologies, embedded systems, and GRID and large-scale computing.



Cultural Information Systems

The institute is organised into the following units:

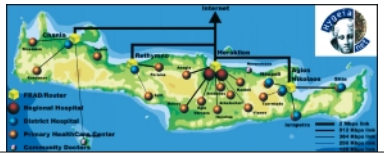
- Information Systems Laboratory
- Computer Architecture and VLSI Systems Laboratory
- Telecommunications and Networks Laboratory
- Distributed Systems Laboratory
- Center for Medical Informatics and Health Telematics Applications
- Computer Vision and Robotics Laboratory
- Human-Computer Interaction Laboratory
- Center for Universal Access and Assistive Technologies
- FORTHnet R&D
- Department of Internet Domain Names Administration for [.gr]
- Department of Education and Training
- Department of Systems and Networks Administration.

Budget

Annual Budget (2000): 11,2 Million €.

Staff

ICS-FORTH employs a total of 245 people: 9 researchers, 16 university faculty, 101 technical personnel, 10 administrative and auxiliary personnel, 60 graduate research assistants, and 49 trainees.



HYGEIAnet: The Regional Health Telematics Network of Crete

Contact:

Foundation for Research and Technology - Hellas
Institute of Computer Science
Science and Technology Park of Crete
GR-711 10 Heraklion, Crete, Greece

Tel: +30 810 39 16 00
Fax: +30 810 39 16 01

E-mail: ics@ics.forth.gr
http://www.ics.forth.gr

Fraunhofer Gruppe Informations- und Kommunikationstechnik

The Fraunhofer ICT-Group (Information- and Communication Technology Group) founded in 2001 represents a strategic alliance of the 15 Fraunhofer Institutes focussing on Information and Communication Technology. The IuK-Gruppe as a key player in ICT applied research on a European and worldwide level

- develops shared visions and strategies in basic and applied ICT
- combines the various competences of the institutes
- initiates joint medium and long term R&D projects
- supports the institutes in technology transfer, marketing and sales.

Collaborations

Cooperation with industry (more than 100 national and international companies), universities and other research institutions is an integral part of the FhG research activities. The institutes participate in more than 70 research projects and generated numerous spin-off companies.

Main Research Topics

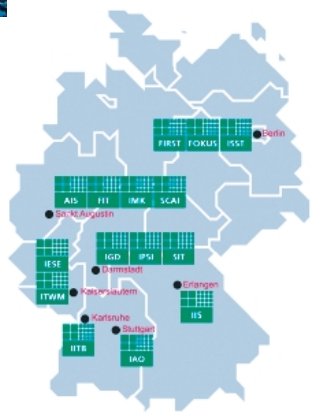
- New Generation Internet Software Engineering and Innovative Systems Architectures
- Multimodal Dialogs and New Media
- Knowledge and Content Engineering
- IT Security
- Computing and Biology
- Simulation and Virtual Engineering
- Engineering and Enterprise Systems
- Innovative Applications and ICT Based Services.

Budget

Annual budget: approx. 200 million €

Staff

Approx. 2300 scientific and administrative personnel.



Locations of the institutes in Germany

Contact:
Fraunhofer IuK-Gruppe
Kekuléstr. 7
D-12489 Berlin
Tel: +49 30 6392 1800
Fax.: +49 30 6392 1812
http://www.iuk.fhg.de/

Institut National de Recherche en Informatique et en Automatique

INRIA

Set up in 1967 at Rocquencourt near Paris, INRIA is the French National Institute for Research in Computer Science and Control. It is a scientific and technological institute operating under the dual authority of the Ministry of Research and the Ministry of Industry. INRIA is a co-founder of ERCIM and hosts the ERCIM office.

Mission

- fundamental and applied research in mathematics, computer science and related topics
- designing prototypes and experimental systems
- technology and knowledge transfer
- promoting scientific international co-operation
- provide expertise.

Research

INRIA focuses its research on four major research themes:

- Network and Systems: parallel computing and architectures; performance evaluation; distributed and real-time programming
- Software engineering and symbolic computation: semantics and programming; algorithms and computer algebra
- Human-computer interaction, images, data, knowledge: data and knowledge management, cognitive systems; vision, image analysis and generation
- Simulation and optimization of complex systems: automatic control, robotics, signal processing; modelling and scientific computing.

Co-operation and knowledge transfer

The transfer of research results towards industry is one of INRIA's main assignments, in addition to its fundamental and applied research in computer science and control. This industrial transfer takes place at three different levels:

- contracts and partnership with industry (currently some 300 contracts)
- development initiatives
- the setting up of high-tech companies (some 50 companies since 1984).

Budget

Total annual budget: 100 Million €

- 75% basic national funding
- 25% own resources.

Staff

- 1700 scientific staff including some 550 PhD students
- 400 supporting and administrative staff.

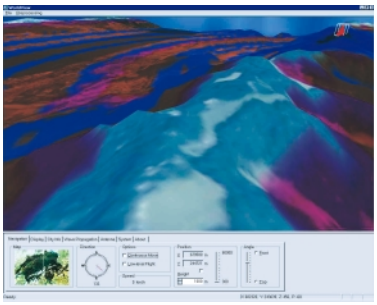
Contact:
INRIA
Domaine de Voluceau
BP 105
F-78153
Le Chesnay Cedex
France
Tel : +33 1 3963 5511
Fax : +33 1 3963 5330
email: info@inria.fr
http://www.inria.fr

SARIT – The Swiss Association for Research in Information Technology

SARIT is a national scientific association with the goals of improving national and international relations within the IT research community and the visibility and recognition of IT research done in Switzerland.

SARIT was founded in 1989 with the purpose of improving the mostly small Swiss research groups in computer science and of providing Swiss computer scientists with access to top international research activities within the European Union and the United States.

In 1998, SARIT was completely restructured; all professors of IT related topics in Swiss universities and Federal Institutes of Technology became individual members of SARIT together with industry based IT research units.



Automatic Antenna placement with WorldView.

On the national level, SARIT participates – in close co-operation with the Swiss Federation of Information Processing Societies (SVI/FSI) – in selected key activities, in particular:

- the Swiss Computer Science Conference (every 2-3 years),
- the nomination procedure of Swiss delegates to international IT organizations such as IFIP,
- the better integration of the new Swiss Universities for Applied Sciences in the existing IT research community,
- the presentation of IT research and academic education within the comprehensive WWW site "Informatics in Switzerland" (http://www.i-s.ch).

On the international level, SARIT's activities are focussed on two major liasons, one in Europe and one intercontinental:

- SARIT is the Swiss member in ERCIM. For this cooperation, SARIT takes the role of a "virtual research centre" combining the efforts of the distributed Swiss IT research community and being its representative to all other ERCIM partners, eg, for exchanges of scientific visitors.
- SARIT maintains contacts with the International Computer Science Institute (ICSI) in Berkeley, USA.

SARIT maintains an office at the Swiss Federal Institute of Technology (ETH) in Zurich and a contact point at the Swiss Federal Institute of Technology (EPFL) in Lausanne.

Contact:
SARIT Office
Departement Informatik
ETH Zentrum, IFW
CH-8092 Zürich
Tel: +41 1 632 72 41
Fax: +41 1 632 11 72
http://www.sarit.ch/

The Swedish Institute of Computer Science

The Swedish Institute of Computer Science, SICS, is a research institute with approximately 90 highly qualified researchers in a wide range of areas. The research is carried out in close collaboration with industry and the international research community.

SICS participates in collaborative R&D programs, national and international, such as ACTS and IST funded by the European Commission.

SICS has a well developed collaboration pattern with high-tech SMEs in Sweden.

Main Research Themes

- Infrastructure
- Network-based systems
- Security and privacy
- Industrial IT (process, biotechnology etc)
- HCI, usage, applications.

Examples of Recent Applications

- Coordinated resource scheduling to increase the global efficiency of rail traffic
- A platform for personal user interaction with electronic services
- Emotionally rich gaming environment where the point is to maintain friendships and relations
- An entertaining desk-projection based system for search, visualization and transactions of data elements
- Procuring packages of goods from multiple simultaneous markets, maximizing utility and minimizing cost
- A small independent implementation of the TCP/IP protocol suite that reduces the RAM usage while still having a full scale TCP
- E-vote, a secure electronic balloting system.

Budget

Overall Budget 9 million €

- Basic national funding 7%
- Private funding 25%
- Competetive national funding 47%
- International competetive funding 15%
- Royalties and software licensing 6%.

Staff

90 Researchers, thereof 30 PhDs

Contact:
SICS
Isafjordsg. 22
Box 1263
S-164 29 Kista,
Sweden
Tel: +46 8 633 1500
Fax: +46 8 633 7230
info@sics.se
http://www.sics.se

SRCIM – The Slovak Research Consortium for Informatics and Mathematics

SRCIM consists of five major Slovak R&D institutes active in informatics and mathematics, including three universities and two research institutes of the Academy of Sciences of the Slovak Republik.

Comenius University, Faculty of Mathematics and Physics: The Mathematics Pavillon with the Statue of Copernicus.

Mission

SRCIM aims to advance research and development in IT in Slovakia through enhancing collaborative work among its member institutes and participation in the IT research and development in Europe.

Activities

- Research and education in informatics and mathematics
- Co-operation and coordination of research activities
- Expert advice to government bodies and industry
- Organization of conferences, workshops, seminars.

Institutions of SRCIM

- Comenius University, Faculty of Mathematics, Physics and Informatics, Bratislava
- Slovak University of Technology, Faculty of Electrical Engineering and Information Technology, Bratislava
- Pavol Jozef Safarik University, Faculty of Science, Kosice
- Department of Informatics of the Institute of Mathematics, Slovak Academy of Sciences, Bratislava
- Institute of Informatics, Slovak Academy of Sciences, Bratislava.

Budget

Annual budget: 3 million € (estimation, taken for parts of the member institutes relevant for ERCIM)

- Basic national funding: 75%
- Participation in (inter)national research programmes and from contracts with industry: 25%.

Staff

250 employees in the member institutes relevant to SRCIM.

Contact:

SRCIM Office
MFF UK, Mlynská dolina,
SK-842 15 Bratislava
Slovak Republic

Tel: +421 2 6542 6635
Fax: +421 2 6542 7041
E-mail: srcim@dcs.fmph.uniba.sk
http://www.srcim.sk/

SZTAKI – Computer and Automation Research Institute Hungarian Academy of Sciences

SZTAKI is the Hungarian representative of ERCIM. SZTAKI was granted the prestigious title of EU Centre of Excellence in Information Technology, Computer Science and Control in 2001.

A new analogic cellular supercomputer system, a visual microprocessor, performs a trillion operations per second.

Mission

SZTAKI's mission is to carry out basic and application-oriented research in an inter-disciplinary setting in the field of computer science, intelligent systems, process control, wide-area networking and multimedia. The activities cover the C^3I – computing, control, communication and intelligence – quadruple. SZTAKI's mission includes the transfer of up-to-date results and research technology to university students and the Institute runs four external university departments.

Research Programme

- Computer Science and Information Technology
- Applied Mathematics
- Automated Control Systems
- Artificial Intelligence
- Analogical and Neural Computing
- Integrated Design and Control Systems.

Co-operation and Knowledge Transfer

SZTAKI has wide external relationships in its R&D profile. In addition to ERCIM the Institute is a member of the W3 Consortium led by the MIT, of the European Software Institute and of other international organizations. Researchers of SZTAKI contribute extensively to European scientific co-operation projects. Some research programmes are supported by US Agencies, including NSF, ARO and ONR.

Budget

Total annual budget: 9,8 million €

- Basic national funding: 30%
- Participation in (inter)national research programmes and from contracts with industry: 70%.

Staff

- researchers on payroll: 204
- supporting staff: 82

Contact:

SZTAKI
P.O. Box 63
H-1518 Budapest

Tel: + 36 1 466 5644
Fax: +36 1 644 7503
http://www.sztaki.hu/

Trinity College Dublin

Trinity College, represented through its Computer Science Department is ERCIM's gateway to the Irish Information Technology research community.

Trinity College Dublin: front square and the Campanile.

Research

The Department is deeply committed to research with groups spanning virtually all areas of computing from formal methods to applied information systems and computer architecture. Members of the Department publish widely in International Journals and Conference Proceedings and have received many awards for their research. The Department also publishes a Technical Report series, which is available on the Web.

Co-operation and Knowledge Transfer

The Department has a long record of participation in EU funded research programmes and has developed close links with industry, both nationally and internationally. The Department is strongly committed to technology transfer and commercial exploitation of its research. Over its 31 year history, the Department has spun-off a number of companies of which the most well-known is Iona Technologies. Other spin-offs include Ireland's first Internet Service Provider, IEUnet, now EsatNet, X-Communications in multimedia technology, MVT in machine vision, and most recently Havok.com which develops software tools for the computer games industry.

Budget

Research income: 2 million €, of which approximately 60% comes from EU framework programmes.

Staff

- 50 academic staff
- 100 researchers/ postgraduate
- 18 technical and supporting staff.

Contact:

Trinity College Department of Computer Science Dublin 2 Ireland

Tel: +353 1 608 1765
Fax: +353 1 677 2204
http://www.cs.tcd.ie/

Technical Research Centre of Finland

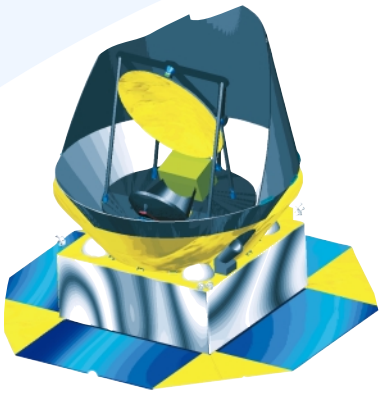
VTT — Technical Research Centre of Finland performs research and development in the fields of information systems, microelectronics, microsensing, telecommunications, media and human interaction technologies. Part of the research is performed as large national and international projects, part is done as commissions for industry in order to support their own product development. Expertise for technically new solutions is obtained from VTT financed activities.

Core R&D

Silicon based semi-conductor technology, microsystems, wireless communication, network technologies, network modelling and service platforms, data overload management, media technologies and human-centred design.

Recent applications

- ViewIce. A route planning tool for ships in ice-covered waters. Uses geocoded satellite images and icecharts
- WEBTRAN - Generic Controlled Language Translation Software
- RapidBase active time series system. A reasoning, fast-response, main-memory based database system for time series data
- MVQ video compression method aimed for low bitrate transmissions (wireless, modem, web, ...), with very flexible real-time software implementation
- IMU - integrated publishing. News from TV and newspapers on personalized web channels, delivered on fast networks like bidirectional cable TV network
- APRO – transcoding WWW proxy server
- WAP Proxy server for terminal and application UI adaptation
- WAP protocol stack and simulation environment
- V·I·P Intelligent Pagination Software for automatic layout of advertisement pages
- PostPressSim. Computer aided training system for book binding, finishing and mailing
- FSR ATM Switch. Gigabit rate switching for broadband applications.



Ultra low noise 70 GHz receiver.

VTT hosts Millilab

Millilab is an External laboratory on Millimetre Wave Technology. The main purpose of MilliLab is to support European space industry to meet the demands of future ESA missions. Non-space companies and organizations use our expertise on millimetre wave technology as well.

Staff

- 410 researchers
- 40 supporting staff.

Budget

Turnover 2001: 37 Million €

- Budget funding 34%
- Income from the private sector 28%
- Income from the public sector 26%
- Income from abroad 12%.

Virtual Reality application at VTT.

Contact:

Technical Research Centre of Finland P.O. Box 1200, FIN-02044 VTT Finland

Tel: +358 9 456 6041
Fax: +358 9 456 6027
http://www.vtt.fi/tte

Fields of Competences

	AARIT	CLRC	CNR	CRCIM	CWI	FORTH	FhG	INRIA	SARIT	SICS	SRCIM	SZTAKI	TCD	VTT
algebra, analysis and geometry														
algebra and geometry			●	●	●			●	●		●	●		
computer algebra				●			●	●	●			●		
combinatorics (2000 MSC 05)														
combinatorics			●	●	●			●	●	●	●	●		●
graph theory		●	●	●	●			●	●		●	●		
number theory (2000 MSC 11)														
number theory and security			●	●	●		●	●	●	●	●	●		
control and system theory (2000 MSC 49/93)														
control and system theory	●	●	●	●	●	●	●	●	●	●	●	●	●	
stochastics (2000 MSC 62/65)														
classification		●	●	●			●	●			●	●	●	●
probability and statistics	●		●	●	●			●			●	●		●
statistical informatics		●	●	●				●						●
stochastic analysis and finance				●	●		●	●	●		●	●		
stochastic geometry				●	●							●		●
numerical mathematics and differential equations (2000 MSC 65, 33-35)														
non-linear systems in physics, life sciences and the environment			●	●	●		●	●	●		●	●		
parallel software for implicit differential equations				●	●		●				●	●		
hardware (2000 ACM B)														
evolvable hardware	●						●		●					●
microwave and radio frequency circuits	●								●		●			●
silicon systems	●							●	●		●	●		●
storage architectures			●						●				●	
video	●	●						●	●				●	●
software (2000 ACM D)														
adaptive programs and systems			●	●	●		●	●		●		●	●	●
compilers		●		●	●		●	●	●	●		●		●
component based programming	●	●	●	●				●	●			●	●	●
constraint programming	●	●		●	●		●	●	●	●	●	●		
coordination languages			●		●									
distributed and parellel systems	●	●	●	●	●	●	●	●	●	●	●	●	●	●
domain specific languages	●				●		●	●			●			●
embedded systems	●		●		●			●						
interactive software and systems	●	●	●		●		●	●		●	●	●	●	●
operating systems		●	●	●		●		●		●	●	●	●	
real time and high performance programming		●	●	●	●	●	●	●	●	●	●	●	●	●
standards	●	●	●		●				●			●		
software optimisation	●				●			●						●
software renovation					●			●			●	●		
software specification, analysis and testing	●	●	●	●	●	●	●	●	●	●	●	●		●
structured documentation		●	●					●			●			●
trace analysis													●	

	AARIT	CLRC	CNR	CRCIM	CWI	FORTH	FhG	INRIA	SARIT	SICS	SRCIM	SZTAKI	TCD	VTT
theory of computation (2000 ACM F)														
computer arithmetic			✓					✓	✓					
concurrency	✓	✓	✓	✓	✓		✓	✓					✓	
correctness proofs and verification	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
cryptography, complexity and security	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
DNA computing			✓				✓	✓	✓			✓		
formal methods		✓	✓				✓	✓		✓			✓	
fuzzy logics		✓	✓	✓					✓		✓	✓	✓	✓
neurocomputing	✓	✓	✓	✓				✓	✓		✓			✓
quantum computing	✓	✓	✓	✓	✓		✓				✓	✓		
information systems (2000 ACM H)														
coding, indexing and retrieval	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
data mining	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
design and analysis of dependable systems	✓	✓	✓				✓	✓					✓	
cultural information systems	✓	✓	✓			✓	✓					✓		
geographical information systems	✓	✓	✓			✓		✓	✓					✓
knowledge management	✓	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓
man machine interaction	✓	✓	✓		✓	✓	✓	✓		✓		✓		✓
multimedia databases	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
computing methodologies (2000 ACM I)														
autonomous systems	✓	✓					✓		✓	✓			✓	✓
dual dynamics							✓							
evolutionary algorithms			✓	✓	✓		✓	✓			✓	✓	✓	✓
facial and physically based computer animation			✓		✓		✓	✓	✓				✓	
Hypertext and hypermedia	✓	✓	✓		✓		✓	✓			✓	✓		
image analysis	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
information visualisation	✓	✓	✓		✓		✓	✓	✓	✓		✓		✓
language engineering	✓	✓	✓	✓				✓	✓	✓			✓	✓
machine learning	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
metacomputing		✓	✓			✓		✓				✓	✓	
requirements engineering		✓	✓											✓
reverse engineering			✓								✓	✓		
robotics	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		
speech	✓		✓	✓				✓	✓		✓		✓	
visualisation and virtual reality	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

and intelligent vehicles

	AARIT	CLRC	CNR	CRCIM	CWI	FORTH	FhG	INRIA	SARIT	SICS	SRCIM	SZTAKI	TCD	VTT
computer applications (2000 ACM J)														
bio-informatics	✓	✓	✓				✓	✓	✓	✓		✓	✓	✓
business process modelling	✓	✓		✓		✓	✓	✓	✓			✓		✓
computerised help to handicapped	✓	✓	✓		✓	✓				✓	✓		✓	✓
computer music and cognitive musicology	✓	✓	✓								✓			
decision support systems	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓
medical informatics	✓	✓	✓	✓		✓			✓				✓	✓
production informatics	✓							✓		✓		✓		✓
aerospace engineering	✓	✓	✓					✓						✓
fluid dynamics (2000 MSC 76)														
fluid dynamics		✓	✓	✓	✓		✓	✓	✓			✓		
electromagnetism (2000 MSC 78)														
applied electromagnetism		✓	✓		✓			✓	✓		✓			✓
information and communication technology														
applied information technology	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		✓
communication networks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
digital, VLSI and microelectronics technologies	✓	✓				✓		✓	✓					✓
(advanced) ICT applications and technology														
digital libraries	✓	✓	✓	✓	✓		✓			✓		✓		✓
e-commerce	✓	✓	✓		✓				✓	✓			✓	✓
computer supported co-operative working		✓			✓		✓	✓		✓			✓	✓
e-learning	✓	✓	✓	✓			✓						✓	✓
GRIDs	✓	✓	✓				✓	✓			✓	✓	✓	✓
IP protocols, routing and real time services	✓	✓	✓				✓	✓	✓	✓	✓			✓
mobile and wireless computing	✓	✓	✓			✓	✓	✓	✓	✓			✓	✓
network architecture and management		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
radio technology	✓	✓							✓		✓	✓		✓
World Wide Web														
community Web portals		✓	✓			✓			✓				✓	✓
DataWeb	✓	✓	✓	✓			✓		✓					
WWW applications	✓	✓	✓	✓			✓	✓		✓		✓		✓
WWW future		✓	✓		✓			✓				✓		✓

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