ERCIM NEWS

Special Theme:
e-government

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M ost people know that Ireland has become the key European location for the computer and software industry. They may not know that one of our current goals is to become Europe's leading knowledge economy. Achieving that goal means being at the forefront in electronic delivery of public services, or e-government.

The Internet is changing the way we live and do business. My government is working to build an agile, flexible and business-focussed public service positioning Ireland as a global leader in e-government, making it easier for both citizens and corporate citizens to access public services. It is not about building a wall of technology between service deliverers and those who need them. It is about enhancing the quality of information and delivering more effective services, responsive to the changing needs and expectations of service users.

Put simply, e-government is about using technology to liberate people, users and providers alike. It is not about forcing people to learn about complex interfaces or excluding them because of unfamiliarity with technology. The challenge for IT professionals is to ensure that the technology serves people to the maximum extent possible by fully exploiting all of the available and emerging information and communications technologies. The real test of success for the ICT sector is how accessible and usable they can make it for those who have no IT skills or who feel excluded by technology.

Our model is the Public Services Broker – a single point of twenty-four hour access to public services using a variety of channels - the Internet, phone, digital TV, or any public office. The 'Broker' is a collection of functions working virtually and primarily focussed on the needs of the citizen or corporate citizen and, using personal data vaults, protecting their rights and their data.

While the transformation to e-government is not easy, we have made significant progress over the last year or so. Indeed, this has recently been endorsed by the e-Europe benchmarking process, which rated Ireland at the forefront of e-government.

Visible components of e-government delivered to date include:
• the Revenue On-line System (ROS), for electronic filing of tax returns
• FÁS (our National Training and Employment Authority) operate an on-line recruitment system for businesses and applicants

• on-line driving test applications
• the Land Registry's 'Electronic Access Service' (EAS), which has transformed the way our legal profession interacts with that office
• public service portals for corporate citizens (www.basis.ie) and for private citizens (www.oasis.gov.ie) with comprehensive, standardised information on public services.

These are just some of the components of the Public Services Broker – which is growing in functionality as new services become available. We are making it easier for businesses and ordinary people to get the information they want from the State, and increasingly, to avail themselves of services on-line, at their convenience.

Bertie Ahern, Irish Prime Minister

The first phase of a national e-procurement initiative is already in place and all public sector procurement transactions will be 'e-enabled' as soon as possible. It is currently being used by public service agencies right across the spectrum of central and local government, with a significantly higher level of responses to 'e-requests' for tender than was the case before.

But to achieve real effectiveness in the operation of the public sector we have to look at the operational side of government – at how the availability of Internet technologies has the potential to re-shape the way we operate. We are now in a position to re-define the 'public' and the 'service' in a totally new context – the Information Age. Moving forward on this front presents many challenges to all of us, including the IT sector. But it also presents tremendous opportunities to make a difference to business and citizens through greater responsiveness and relevance in addressing the situations or predicaments that people face on a daily basis.

For the IT sector, it calls for openness to new ideas and concepts as well as a determination to remove barriers to the use of technology. Ireland, which has an open economy, has vast potential to further strengthen its position as one of the leading knowledge economies in Europe. And e-government has a vital role to play.

Bertie Ahern

AARIT becomes ERCIM's Austrian Member

by Wolfgang Hawlik

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).

Links:
AARIT: http://www.aarit.at/
ARCS: http://www.arcs.co.at/
OCG: http://www.ocg.at/

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	Constraints	Ctrl. & Sys. Theory	Data Base	Multimedia & e-Learng.	e-Com-merce	Environmental Modelling	Formal Methods	Health	User Inter-face
SR				+++	++				
OFAI	+++		+	+++	+	+	+	+++	++
VCPC			+++					+++	
IICM			++	+++	+++			+	+++
ARCS		+	+++	+	++	+++	++	+++	+++
RISC	+++			++			+++		
Info.Sys	+++		+++	+	++		+		

+++ strongly interested & committed,   ++ interested & participation,   + interested

AARIT's common research interests with ERCIM Working Groups.

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 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 (1993-97). 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.

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.

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 selected fellow will be invited to the ERCIM meetings in autumn.

Cor Baayen Award 2002
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.

Deadline
• 30 April 2002: nominations are to be received by the national contacts.

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

Links:
The ERCIM Cor Baayen Award:
http://www.ercim.org/activity/cor-baayen.html
National contacts:
http://www.ercim.org/contacts/execom/

Please contact:
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Strategic Research Workshops

by Jean-Eric Pin

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.

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,
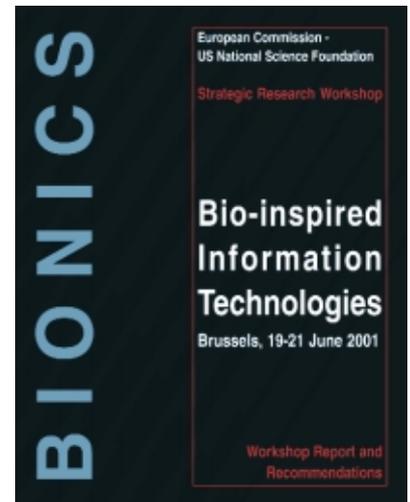
The workshop reports are available at http://www.ercim.org/EU-NSF/

and to develop testbed interfaces ready for standardised clinical trials
- to invent microsensor- and/or actuator-specific yet programmable multi-dimensional 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 dis-

eases, 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.

Links:
EU-NSF strategic workshops project:
http://www.ercim.org/EU-NSF/
EC Future and Emerging Technologies activity:
http://www.cordis.lu/ist/fethome.htm
National Science Foundation, Directorate for Computer and Information Science and Engineering:
http://www.cise.nsf.gov/

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CORRECTION

In our October issue (No.47) on page 40, we printed an incorrect version of the article on the Sixth ERCIM Formal Methods for Industrial Critical Systems International Workshop. Our apologies to the author and to our readers. The correct version is available at:
http://www.ercim.org/publication/Ercim_News/enw47/6FMICS.html

New ERCIM Working Group on Applications of Numerical Mathematics in Science

by Mario Arioli

At the last meeting of the ERCIM Executive Committee, the members approved the creation of a new Working Group on the Applications of Numerical Mathematics in Science.

Such a Working Group was conceived when a number of researchers, working for institutions participating directly in ERCIM, expressed their interest in building up stronger links between mathematicians within ERCIM. In particular, it was felt to be vital that a forum be created 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, which will have the target of stimulating initiatives that cross the various fields. One of these representatives will be able to participate in the ERCIM organisational meeting in order to promote the initiatives of the Working Group and to discuss the budget and the resources needed to accomplish them. The table summarises the interest of each organisation, as far as we can ascertain, in each of the specific topics.

Objectives

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.

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.

Fields of interest of each working group member organisation.

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	

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

by Olivier Bernard

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

Prototype of an anaerobic digester. Photo: INRA-COMORE.

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 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

Organic pollution from winery industry in the Champagne region in France in 1999 caused the death of over 70 tons of fish in the Marne river. The treatment of vinasses and alcoholic wastes is difficult and these wastewaters can cause tremendous damage in the water resources.

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.

Link:
Project website:
http://www.ercim.org/telemac/

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ERCIM PhD Fellowship Programme

ERCIM offers 18-month fellowships in leading European information technology research centres. This offer is available for PhD holders (or equivalent) from all over the world. Next Deadline for application: 30 April 2002

Fellowships are available in the scientific fields covered by the ERCIM Working Groups:
- Database Research
- Constraints Technology and Applications
- Control and Systems Theory
- Formal Methods
- Electronic Commerce
- User Interfaces for All
- Environmental Modelling
- Health and Information Technology
- Digital Libraries
- E-Learning
- Matrix Computations and Statistics
- Applications of Numerical Mathematics in Science

ERCIM institutes covering a broad range of research topics, fellowships are also available in areas not covered by the above topics. ERCIM is particularly interested in candidates with skills in:
- Software: real time and high performance programming, software specification, analysis and testing, operating systems, distributed and parallel systems, interactive software and systems
- Computing methodologies: speech, visualisation and virtual reality, image analysis
- Communication technology: communication networks, network architecture and management.

A detailed list of topics in which ERCIM institutes are active is available at http://www.ercim.org/activity/expertise.html

Conditions
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.

How to apply
Applications must be submitted electronically:
http://www.ercim.org/fellowship/

Links:
Detailed description
and online application form:
http://www.ercim.org/fellowhsip/

Please contact:
ERCIM office
Tel: +33 4 92 38 50 10
E-mail: office@ercim.org

WADI — Water Supply Watershed Planning and Management

by Fadi El Dabaghi

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.

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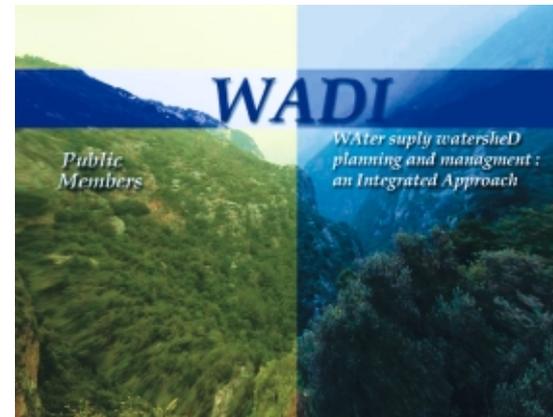
This multidisciplinary functions allows WADI to plan and to manage watersheds considering impacts and benefits in the region within the context of sustainable development. To our knowledge, no such integrated system exists for these purposes.

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.

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Introduction to E-Government

by Thomas F. Gordon

By definition, e-government is simply the use of information and communications technology, such as the Internet, to improve the processes of government. Thus, e-government is in principle nothing new. Governments were among the first users of computers. But the global proliferation of the Internet, which effectively integrates information and communications technology on the basis of open standards, combined with the movement to reform public administration known as New Public Management, has for good reason generated a new wave of interest in the topic. E-government promises to make government more efficient, responsive, transparent and legitimate and is also creating a rapidly growing market of goods and services, with a variety of new business opportunities.

To some, e-government might seem to be little more than an effort to expand the market of e-commerce from business to government. Surely there is some truth in this. E-commerce is marketing and sales via the Internet. Since governmental institutions take part in marketing and sales activities, both as buyers and sellers, it is not inconsistent to speak of e-government applications of e-commerce. Governments do after all conduct business.

But e-commerce is not at the heart of e-government. The core task of government is governance, the job of regulating society, not marketing and sales. In modern democracies, responsibility and power for regulation is divided up and shared among the the legislative, executive and judicial branches of government. Simplifying somewhat, the legislature is responsible for making policy in the form of laws, the executive for implementing the policy and law enforcement, and the judiciary for resolving legal conflicts. E-government is about improving the work of all of these branches of government, not just public administration in the narrow sense.

New Public Management is a kind of management theory about how to reform government by replacing rigid hierarchical organisational structures with more dynamic networks of small organisational units; replacing authoritarian, topdown decision and policy making practices with a more consensual, bottom-up approach which facilitates the participation of as many stakeholders as possible, especially ordinary citizens; adopting a more 'customer'-oriented attitude to public services; and applying market principles to enhance efficiency and productivity.

E-government gives New Public Management fresh blood. Not only does information and communications technology provide the infrastructure and software tools needed for a loosely coupled network of governmental units to collaborate effectively, the infiltration of this technology into government agencies tends to lead naturally to institutional reform, since it is difficult to maintain strictly hierarchical channels of communication and control when every civil servant can collaborate efficiently and directly with anyone else via the Internet.

Orthogonal to the division of power among the branches of government is the hierarchical organisation of supranational (eg, European), national, regional and local governments bounded by geographical territory. Information and communication technology creates a 'new accessibility', overcoming temporal, geographical and organisational boundaries. Thus e-government can facilitate new forms of collaboration among governments which cut across and diminish such boundaries. The EuroCities project is an example. Perhaps in the long term e-government will help to strengthen the identification of citizens with Europe.

E-government is not only or even primarily about reforming the work processes within and among governmental institutions, but is rather about improving its services to and collaboration with citizens, the business and professional community, and nonprofit and nongovernmental organisations such as associations, trade unions, political parties, churches, and public interest groups.

Using World Wide Web portals to create one-stop shops is one currently popular e-government approach to improving the delivery of public services to citizens. The basic idea of these portals is to provide a single, convenient place to take care of all the steps of a complex administrative process involving multiple government offices, bringing the services of these offices to the citizen instead of requiring the citizen to run from office to office.

Web portals can deliver government services with various levels of interaction. Three levels are usually identified: information, communication, and transactions. Information services deliver government information via static web pages and pages generated from databases to citizens, tourists, businesses, associations, public administration, and other government users. Communication services use groupware technology such as e-mail, discussion forums and chat to facilitate dialogue, participation and feedback in planning and

policy-making procedures. Transaction services use online forms, workflow and payment systems to allow citizens and business partners to take care of their business with government online. Typical applications of transaction services for citizens include applying for social benefits, registering automobiles, filing changes of address or applying for building permits. For businesses, perhaps the application of greatest current interest is the online procurement of government contracts.

Often one reads that these three levels of interaction are ordered by complexity, with transactions being the most complex. Presumably this is because of the apparent and challenging security and business process reengineering issues of online transaction processing. Providing high quality information and communication services, however, is no less challenging. Information services need to evolve into knowledge management services and become adaptive, personalized, proactive and accessible from a broader variety of devices. Communication services need to evolve into collaboration services providing better support for argumentation, negotiation, deliberation and other goal-directed forms of structured discourse.

Among the most interesting and challenging sociotechnological issues of e-government are in the area of eDemocracy, which aims to apply information and communication technology to improve the public opinion formation process central to government's primary regulatory function. Here the ambition is to broaden actual public participation, not just the technical possibility, and counter political apathy without disenfranchising the poor or poorly educated.

The following articles give a good indication of the large number and variety of governmental processes requiring specific solutions. Together with the trend towards outsourcing tasks and working with industry in private-public partnerships, this is likely to lead to rapid growth of the e-government market and create plentiful business opportunities, also for small and medium-size enterprises. Viewing e-government projects as mainly an investment in public infrastructure is too restricted, since the investment is also aimed at reducing the size and costs of government while accelerating the growth of the e-government market, helping to create new businesses and jobs in the private sector.

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Towards an Integrated Platform for Online One-Stop Government

by Maria Wimmer and Roland Traunmüller

The European project 'eGOV' focuses on concrete implementations for one-stop government. Its major developments comprise an integrated platform, a standardised data and communication exchange format and adequate process models for online public services.

One-stop government reflects a key trend within the current evolutions in e-government. It refers to a single point of access to public services and information. Online one-stop government requires that all public authorities be interconnected electronically. Public services are available to the customer (citizen, private enterprise or other public administration) through a single point of access, even if these services are delivered by different public authorities or private service providers. Further, the services and information are offered in a well-structured and easily understood manner, which meets the customer's needs and does not require specific knowledge about the functional fragmentation of the public sector.

The eGOV project – a European project co-funded by the EC within the 5th Framework Program (IST-2000-28471) – aims to develop, deploy and evaluate an integrated platform for realising online one-stop government. A consortium consisting of ten partners from governments, the IT sector and research institutions from five European countries should implement this overall goal. At the end of the two-year project, which commenced in June 2001, the platform will be deployed and evaluated in Austria, Greece and Switzerland by the governmental project partners.

Integrated Platform
The eGOV platform enables the public sector to provide citizens, businesses and other public authorities with information and public services that will be structured around life events and business situations, thus increasing public authorities' effectiveness, efficiency and quality of service. The technical components consist of:

- the next-generation online one-stop government portal and the according network architecture. The portal acts as the front-office and global entrance point to the electronic public services. It features a number of advanced functions such as personalisation, customisation, multilinguality, support of push services, digital signatures and access from different devices including mobile devices.
- One national and many local service repositories (SR). In addition to supplying online data and information relating to public services, the SR also provides a transactional service structure. Furthermore it provides the interfaces to local legacy systems already utilised by public administrations.
- Service creation environment (SCE). The SCE is a collection of tools that serves as the front-end to the SR. It allows the public services available in the Service Repositories to be maintained and updated.

GovML: Standardised Data and Communication Exchange
For a smooth online one-stop government, all public authorities need to be interconnected horizontally (eg, municipality and provincial authority) as well as vertically (eg, local municipalities). In this respect, an essential requirement is a standardised common data, document and communication exchange over the global web for administration-specific content. The Governmental Mark-up Language (GovML) will be developed within the eGOV project, and will represent the 'glue' connecting the portal and all public repositories. GovML will be based on XML technology and will provide a common, flexible and extensible syntax for the public sector. It will support the transport of data and information between the distributed back-offices and the portal (front-office).

GovML will fulfil specific requirements such as standardised data formats and filtering. It will further facilitate basic functionality like confidence, security etc. Similar to ebXML standardisation initiatives for e-Commerce (cf. http://www.ebxml.org/), GovML should become an open standard for governmental processes providing standardised data types and process model components for describing and performing
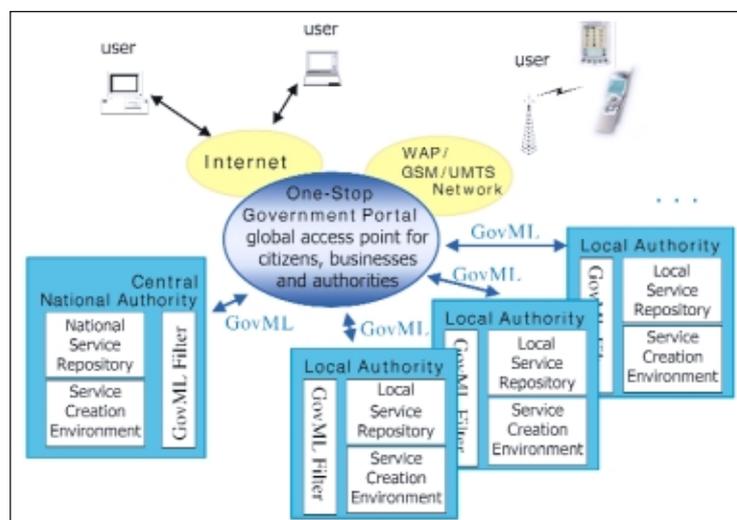
The overall system architecture for the eGOV online one-stop Government platform.

public services and processes which are structured according to the customer's needs (ie, life events for citizens and business situations for companies).

GovML will support access from different devices while the use of filters will enable service repositories to be easily accessed independently of the format of the repository data. In this way, existing content and services that live in heterogeneous sources (database, word file) may be reused. Appropriate filters will translate a given format into the required GovML format.

Modelling Public Services

As the general system architecture demonstrates, the portal represents the global entrance point to many different local services from distinct public service providers. Customers as well as public authorities can access these offers via the Internet or even on the move via devices such as mobile phones, handhelds, etc. This forms the external, or customer-focused view of public services. From a government-specific perspective (the internal view), the services are considered as the sequence of process steps that must be performed by the overall system in order to fulfil customer requirements.

Bringing together these two points of view is an important issue for the modelling of public services that are delivered through a global single access point. Several key aspects have to be addressed in order to meet this requirement:

- applying a holistic concept to modelling public services
- finding an appropriate mapping terminology
- developing integrated service models that cover both the front-office (portal) and back-offices
- adequate merging of service models with the technical components of the platform
- applying a user-centric and service-centric development approach.

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Managing the Interaction between Citizens and Public Administrations: the One-Stop-Shop Model

by Roberto Gagliardi and Paolo Fiorenzani

There are a number of European initiatives that aim at providing tools to support best value in the delivery of public services and to optimise the management of governmental operations within tight financial constraints. One of these activities is the One-Stop Shop (OSS).

The One-Stop Shop (OSS) is a service model that has been implemented by several European public administrations (PAs). The OSS acts as an interface between the citizen and the PA and is adopted for a series of both simple and complex tasks.

The TEN-Telecom project 'CLAIM' (Citizens and Local Authorities Interaction Management, contract no. C26398) focuses on the concept of the One-Stop Shop for business activities. This service will provide businesses with a single interface to the public administration for all those steps that have to be taken when creating a new business or industry or changing an existing one. We describe here the particular solution implemented in a pilot project aimed at validating this system in the Italian context.

A typical OSS procedure for processing a business application means involving a number of PA offices. For example, a request for authorisation to build a new factory requires approval from several offices belonging to different PA sectors: the Building Office, the Environmental Office, the Chamber of Commerce, the Health Service, the Fire Department, etc. In some cases, the offices involved have to establish a consensus-building procedure in order to be able to give a common answer to the application.

Within this framework, the OSS takes charge of:
- broadcasting the request to the offices and PAs involved
- co-ordinating the flow of the information between these bodies
- delivering the authorisations within the time constraint established by the legal framework

- making the results produced at each single step of the procedure accessible by the applicant.

CLAIM has developed an online service platform to handle these tasks. The services have been implemented on top of two basic software systems (see figure), namely: (a) the OSS Information Management System (OSS-IMS); (b) the OSS Workflow Management System (OSS-WMS).

The CLAIM Solution

Data Model: The request submitted by the user (the business man) to the OSS is called the All-In-One Procedure (AiOP). The AiOP is a digital dossier composed of one or more Sub-Procedures (SP); each SP corresponds to the digital information and documents required by a single PA office involved in the AiOP before it is able to release the authorisation or opinion required of it.

System Architecture: The OSS-IMS allows users to search the document archives using a web interface and standard Internet browsers. In addition, a tool is provided, the Interactive AiOP Builder, to support the user and the OSS operator when constructing the AiOP.

The tool dynamically generates a series of questions and presents them to the user in order to guide him/her in constructing the AiOP. For each service provider (SP) identified, the Interactive AiOP Builder evaluates a set of associated Boolean rules (expressions), removing unwanted SP sets and selecting the appropriate sub-procedures to be added to the AiOP.

The AiOP structure constructed by the Interactive AiOP Builder contains not only static data but also procedural information. The CLAIM OSS-WMS engine interprets the procedural information stored in the AiOP and configures suitable flows for the processing of each SP. It generates a number of requests, which are posted in the in-box of the OSS operator and of the operators located in the PA offices involved in the AiOP. The operators access their in-box through a web interface, check whether active AiOPs need actions (SPs) to be issued by their offices and perform the required actions.

As the PAs often use local software applications to process the SPs, interoperability is a crucial requirement in CLAIM. For this reason, all the data is stored, managed and transmitted in XML format in order to guarantee exchangeability. For example, in the market-validation pilot, the CLAIM system had to interact with a pre-existing workflow application running locally on one of the PA offices involved in the AiOP processing. In this case, the XML files containing the data and the procedural information related to the SPs, which are exchanged between the OSS and external offices, were imported into the local application after the implementation of a simple interface on top of the workflow engine.

The XML structure of the AiOP is compliant with the specifications of the Workflow Management Coalition
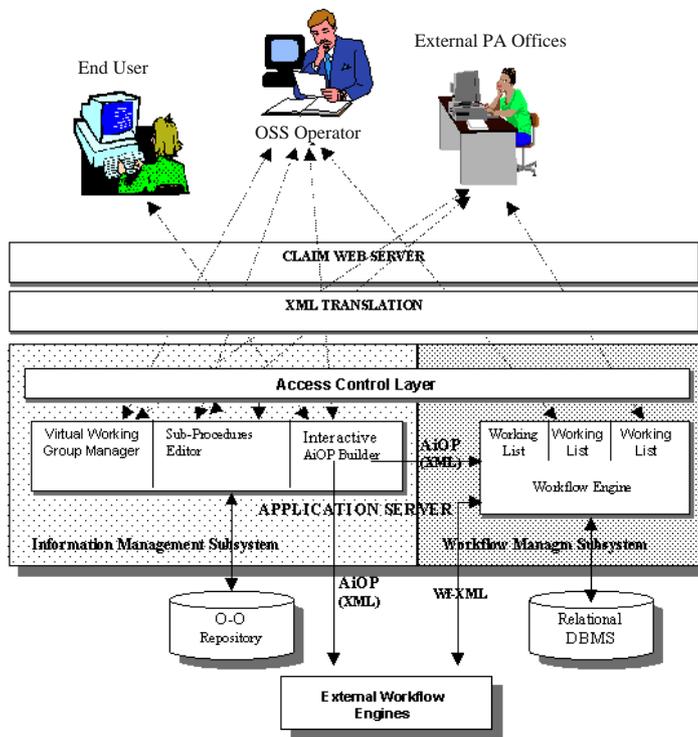
CLAIM System architecture.

(WFMC-TC-1012, May 2000, Interoperability Abstract Specifications). This directive describes the XML dialect used to model the data transfer requirements between workflow systems.

In order to manage persistent XML objects, the information repository management is performed by a W3C compliant DOM implementation, based on the Ozone open-source object management tool. The OSS-IMS and the OSS-WMS were implemented in Java.

The user authentication is based on a digital certificate. Any data (SPs, authorisations, opinions etc.) exchanged between OSS operators and operators of external offices are digitally signed. The CLAIM system features an internal Public Key Infrastructure, which handles both software certificates (weak certification) and smart card-stored certificates enabling legal digital signatures (strong certification). Weak certification is mainly used to authenticate service users (eg, the business men), whereas strong certification is used for the exchange of legally signed documents between PA officers.

The CLAIM service platform has been tested in several European municipalities. This has permitted an overall assessment of the services and an evaluation of the best-practices.The One-Stop-Shop is now operating in the Italian towns of Pisa, Lucca, Arezzo, in Brandenbourg in Germany, in Joannina in Greece and in several other smaller towns.

Link:
CLAIM project: http://claim.cpr.it/

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IT Solutions for Interstate E-Government

by Reinhard Riedl

Are interstate e-government services feasible for regions as heterogeneous as Europe? Is it possible to live without personal documents in paper? The simple answer is "Yes, indeed, but ... a project which tries to realise these visions will face serious convergence problems."

We have investigated both questions in the European IST-project 'FASME - Facilitating Administrative Services for Mobile Europeans'. And we involuntarily found out about the third item appearing above: "Is it possible to manage development projects for interstate e-government services?"

Our vision is global, mobile access to one-stop government, which is secure and trustworthy, which is user-friendly for all, and which respects European data protection laws. Basic requirements for such services are citizen process orientation, context-sensitivity and context-transparency, selectable system transparency, and service delivery without paper documents (on demand). In addition, service architectures should allow for integration with commercial services.

Migrating European citizens have to spend a lot of time to find information about the required administrative processes, unless this burden is taken over by a specialised department of their employer. The collecting of required documents costs a lot of time and money for citizens, while the issuing of legally valid documents still means loss-making transactions for the governmental authorities. Moreover, services for foreigners are on the average more time-consuming and expensive, than equivalent services for native citizens. This applies to both citizens and government agencies. Thus, on the one hand, one-stop government should provide both native and foreign citizens with the possibility to carry out all activities involved with migration in one transaction, while on the other hand, it should 'automate' the incurred work of clerks. The latter would give clerks more time to deal with citizens having more serious problems or it could alternatively reduce the costs of administration. Clearly, service provi-

sion should involve context-aware user guidance for all citizens, independent of their cultural background, their knowledge, and their expectations. Furthermore, knowledge management systems should support the human exception handling wherever necessary.

This requirements scenario is nearly ideal for basic research on e-government. It is easy to communicate, which makes interdisciplinary co-operation an easier task, but still it has a nearly maximal complexity, which stems from the heterogeneity of Europe. We may observe heterogeneity in Europe on all

A Java Card prototype with a fingerprint sensor.

levels where it can be imagined: legal and administrative ontology, processes, work-flows, legacy systems, law, administrative culture, and knowledge and expectation of citizens. Any solution for international e-government must respect local traditions in order to gain acceptance from civil servants, but nevertheless it must achieve some soft standardisation of the necessarily digital communication. It must also bridge the cultural gap between local clerks and foreign citizens, which is usually created by knowledge deficits on both sides.

In the FASME-project, we have developed a holistic architecture for interna-

tional e-government services, which fulfils the basic requirements of one-stop government depicted above (although access relies on trustworthy kiosks rather than mobile devices). In the requirements analysis, it turned out that electronic services were needed, which enable the citizen to initiate the creation of a trustworthy digital version of a personal document at a remote agency. This once again stressed the importance of the question about the need for paper documents. Further, the citizen must be enabled to control the secure transfer of an ad hoc generated document to a selected agency. This is only possible if a dependable, scaling solution for digital identity and for inter-organisational information exchange is available, one which respects data protection guidelines.

Therefore, two key components of the FASME deliverables were the design and implementation of digital identity and the realisation of the citizen-controlled ad hoc transfer of information from one agency to another. Thereby, the project has emphasised seven basic engineering principles for international e-government:

- Framework: The phases of service processes should be modelled on documentation and document handling.
- Separation and flexibility: Digital identity and services have to be separated. Solutions for digital identity must support flexibility with respect to trust for both government agencies and citizens.
- Context management: User guidance has to provide foreign citizens with knowledge on the local administrative system. Context sensitivity of service

delivery includes cultural issues and must not violate context transparency.

- Materialisation: User acceptance for digital identity depends on materialisation and visualisation. Physical aspects have to be tested for acceptance in the specification phase.
- No consistency: The system must not try to handle personal data of citizens on a global scale, rather it may only handle documents with statements about the local validity of well-defined personal data at a given time and at a given location.
- No workflow federation: It is impossible to design inter-organisational workflows for international e-government, but a loose coupling based on the client/server paradigm is possible. It can be realised with document transfer via a well-structured virtual information transfer space.
- Boundary objects: The complexity of problems requires the co-operation of

experts from different disciplines and different countries, which in turn requires strict convergence management. The latter can be achieved with boundary objects as convergence products, but the role of these boundary objects must be clearly defined.

A thorough discussion of the above issues is beyond the scope of this article. In our architecture, a Java Card speaks in effigy of the citizen with the e-government application, after he or she has verified his or her identity with a fingerprint sensor. The citizen can control the ad hoc creation and transfer of digital versions of personal documents with the Java Card based on digitally signed document requests. In order to achieve information transfer across organisational boundaries, self-describing, time-stamped and signed XML-documents are used, whose DTD refers to a virtual ontology.

The feasibility of these concepts was demonstrated with a prototypical implementation, but work on this prototype and on concepts for its organisational implementation has pointed to lots of open questions, in particular with respect to digital identity. Nevertheless, we would like to stress the evidence produced by the project, that data protection and forensic monitoring of criminal activities can jointly be achieved. There is no need to give up data protection standards. Instead, we should design working concepts for digital identity.

www.help.gv.at – A Service Platform for Official Proceedings

by Brigitte Eichler

HELP (www.help.gv.at) is the national e-government portal of the Austrian government and a platform for all Austrian authorities to support official proceedings. It offers information, interaction and an increasing number of transaction services.

HELP (www.help.gv.at) was established in 1997 upon the joint initiative of the Federal Ministry of Finance and Telekom Austria AG within the framework of the administration development program. The Federal Computer Centre has been entrusted with the project implementation.

On 1 April 2000, responsibility for the contents of help.gv.at was assigned to the Austrian Federal Ministry of Public Service and Sports which was formerly attached to the Federal Ministry of Finance. HELP is a major contribution to the e-Europe initiative.

The e-government portal HELP is a national platform and a turntable on the Internet for all Austrian authorities to support official proceedings. HELP is

strictly customer-oriented and focuses on the individual life situations of citizens (marriage, passport, childbirth etc), on 'life events' of companies, and on all interactions with authorities relevant to these life situations and events. HELP does not pretend to be a 'superauthority', nor does it compete with authorities. Responsibilities for and in official proceedings are not changed by HELP.

The unique characteristics of HELP are the combination of its structure according to life situations and its organisational embedding on the highest level – the federal government and the federal ministries. All Austrian authorities are invited to cooperate.

Electronic government services on the Internet are often classified according to

three phases as: information services, interaction services and transaction services. HELP covers all three.

In 1997 HELP started as an information service, and information on life situations still forms the core of HELP's activities. Every life situation is explained in a simple and uniquely structured way, which includes the application form, the documents to be presented, the fees to be paid, special terms, and a series of useful tips.

The HELP homepage (see Figure) shows a list of all life situations for citizens on the one side, and a list of 'life events' for companies on the other. These act as starting points (links) for all further information. Additionally, information on authorities (links and addresses),

forms to be downloaded, and links to legal information systems are provided. A full text retrieval functionality provides a rapid and direct search in all HELP pages as well as in the entries of the guest book.

HELP provides a uniform interface to users for all contacts to public authorities. On the informational level, HELP provides links to the various federal, provincial and municipal authorities. This makes HELP a 'turntable', redirecting citizens automatically to the

Today HELP provides links to all Austrian federal ministries, to all Austrian states, and to over 60% of Austrian local municipalities. About four million hits to HELP and over 1.5 million page impressions per month confirm the need for such a platform.

HELP operates on a high-performance web server (AIX, Netscape Enterprise Server, Oracle Application Server) at the Federal Computer Centre Ltd. in Vienna. All data and most of the programs are stored in an Oracle database.

HELP and of technical defects (some of which were caused by incorrect usage of the web interface).

The most outstanding development stage of HELP was and still is the possibility for users to handle complex official proceedings via the Internet. In mid-March 2001, a kind of prototype was established to allow users to fill in forms online and send them to HELP. Five official proceedings with fifteen partners Austria-wide (most of them municipal authorities) are currently supported. The official proceedings are:
- application for information on a person's residence
- dog registration
- company tax declarations
- notice of loss
- registration of public events.

The HELP homepage.

Standardised interfaces (based on HTTP(S), HTML and XML) are provided to public authorities for accessing their applications and docking their software systems with HELP.

'Virtual administration' is the ultimate goal in the development of HELP. Legal, organisational and technical preconditions have to be established. Processes have to be optimised and organised in a more customer-oriented way. For example, technical prerequisites include the support of electronic payment services, smart cards, and various other devices (eg, mobile phones, personal digital assistants).

Once this phase has been reached, citizens will be able, in a single procedure, to handle all dealings with authorities required in a particular life situation. This true 'one-stop government' is the vision of HELP.
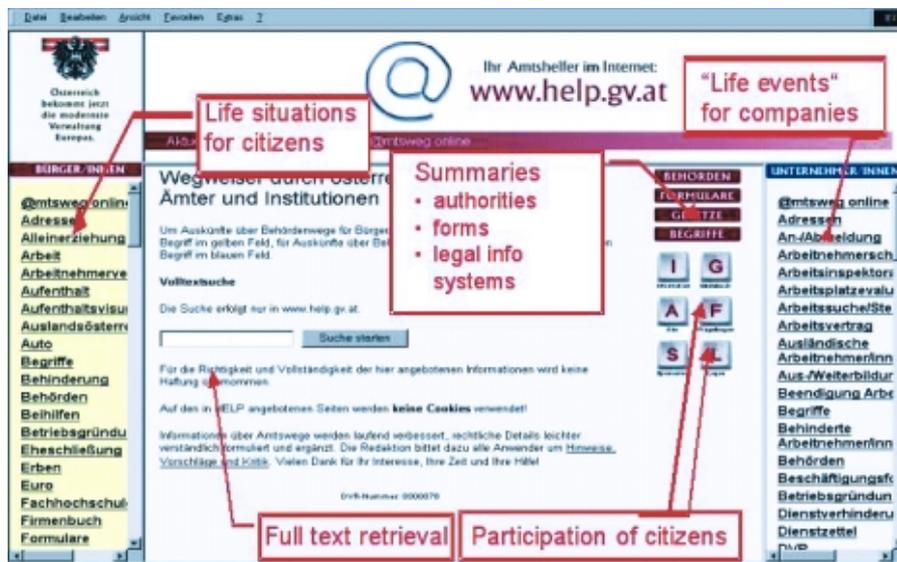
responsible authority. For this functionality a comprehensive database containing the regional structure and all public authorities of Austria is used, including basic data (name, address, telephone number, e-mail, etc), links to life situations and topics (qualified links), and responsibilities (relationships between authorities and regions).

The HELP system leads the user from a certain life situation or topic to the responsible authority based on his regional information (zip code or municipality), either by linking to the corresponding page of this authority's website, or (in case a link is not available) by showing the authority's basic data to the user. All links/URLs (uniform resource locators) are checked automatically at regular intervals. Where a link is not available, the responsible HELP partner is notified immediately by e-mail.

The main interactive functionality of HELP is the popular guestbook, also structured according to life situations. Users may pose questions which are then automatically sent via electronic mail to the responsible partners (eg, experts in federal ministries). A dedicated web application is used by these partners to provide answers. In addition, other users can make comments. Answers and comments are automatically routed via e-mail to the asking user. Citizens can also help each other in this way.

In 1999, 2000 entries were stored in the guestbook. Last year there were more than 4500 entries, and by the end of October 2001 this number had increased to over 6800. More than 75% of the entries in the guestbook are questions, about 10% are suggestions for improvement, over 5% praise and about 5% contain criticism of public authorities, of

Artificial Intelligence supporting the Citizen-Friendly Information Society

by Tibor Vámos

A new project, entitled 'Means and systems of information society' has been launched, creating an experimental but real-life environmental model of a participating democratic information society. It is a joint venture of the SZTAKI, the Budapest University of Economical Sciences and Public Administration, and the local telecommunication service provider. A three-year term is planned for the first period of the project, sponsored by a Hungarian programme for research into future trends in informatics.

The project consists of eighteen sub-tasks starting with a general survey on the present and future requirements and sociological picture of the user environment. The next item is modelling the network and its interactive dynamics. The model includes relations among the population, administration and enterprises and the services of the system. Consequences related to the organisation of the patterns form a separate sub-project. The design of the hardware and software environments is also part of the model. The influence of ideas of equal opportunity is treated in a special sub-project. Finally, real-life experimentation is envisaged. The real-life experimentation will take place in the region of Kaposvár, a relatively well-developed town in the south-western part of Hungary, with a traditional intellectual life. The objective is to surpass the usual local administration-based information society that does little more than modernise the existing administrative relations inherited from previous and very different social-political relations.

Two major sub-projects apply artificial intelligence methods in a direct way. The first is an agent-based technology for decision support, investigating the limits of automatic administrative decisions. This system is mainly rule-based, but applies case-based reasoning as well. The system should be transparent for the user-citizen, accessible not only in its progress but also clarifying the rules applied and displaying anonymous cases similar to the one concerned. In this way, the citizen may investigate his/her own chances and limitations. The flow of the decision-making process is also a check for the civilian representatives of the community and for the supervising authorities.

Earlier work in children's care after divorce and legal decisions in bankruptcy cases are the starting points of the new efforts.

The system will be an appropriate basis for the reorganisation of the administrative agenda and the organisation as a whole.

The other artificial intelligence tool is related to language understanding and man-machine communication. The citizens should receive an interface which can be easily understood and utilised by all social strata of the population. We investigate the need for personal communication and the limits of machine interfaces, bearing in mind that the problem is educational and psychological rather than technological. We intend to surpass the rigidity of the usual questionnaires and try to apply machine understanding of natural language communication, albeit limited to the subject at hand.

Understanding in general is a key problem in artificial intelligence. In our case it should be a man-machine system applying the positive qualities of the machine objectivity, working transparency and of the human face of the helpful agent. Hungarian presents a special task for achieving understanding, since its structure differs so markedly from Indo-European languages. The project involves the usual problems of contradictions between privacy and control action, and their legal, sociological, educational and technological issues. Democracy is exercised using an electronic agora, and involves all the problems of democracy and efficient work, civil participation and professional administration, majority opinions vs. minority rights, free access and authority.

Beyond the regular administrative tasks, some other public services will be included in the system. Citizens who do not possess direct access in their homes are and will continue to be served by so-called telehouses, a public access network available through schools, libraries, post offices and cafes.

Several similar initiatives have been launched, mostly in European countries and in Japan, and a special study has analysed the lessons that emerged. However, this project differs significantly in two respects. The first is the local environment, its sociological and cultural background. Hungary has less experience with democracy, especially in the conscious participation of society in the common agenda. The system should therefore focus on these issues. The other difference is the more advanced level of application of artificial intelligence tools, as detailed above. We hope that after the design of the relevant models, ie, after about a year, we can join the other European efforts. The fifth and the future sixth framework of the European Union's research and development agenda have a special emphasis on systems like ours.

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E-Government and Municipal Transformation: Some Experiences

by Eevi Beck

A research project carried out at the University of Oslo during 1996-2001 has been studying how a Swedish municipality is creating an 'IT Society'. Asking what is shaping this introduction of 'IT Society', and why, provides practical experience highly relevant for e-government projects.

E-government has become a popular term, as governmental organisations in numerous countries wish to capitalise on the potential of increased reliance on information technologies (ITs) in their service provision. The promise of the twin benefits of quality information for citizens and cost savings for governments has proved evocative. However, what e-government is to mean remains elusive. In particular, issues remain in the breadth of reach of such efforts, as substantial problems are still unresolved in how to ensure equal or equivalent provision of services to all citizens. This is an issue that goes to the heart of the ideal of democratic society and government as the mediator of services for all.

This article presents a research project on IT and governance, focussing on a long-term effort by a local government to transform itself and its citizens into an 'IT society'. This started before the word e-government arrived on anyone's lips, yet brings up issues and experiences of great relevance for e-government planners. The research project studying developments in Ronneby has aimed to explore 'IT society' as an idea and a reality through practical (empirical) studies. It started in 1996, and will last until early 2002. Its prime aim is to understand and explain concerns that shape the policy-led introduction of an 'information society'.

The Ronneby Case
Ronneby is a rural municipality of approximately 30,000 inhabitants in Blekinge, Sweden. In 1993, the municipal authorities adopted a policy statement to the effect that Ronneby was to become an 'IT society' by 2003. A ten-year project was initiated, led by municipal civil servants and organised as an umbrella project. The '2003' project encompassed any activity to do with IT in the municipality. Over the years a substantial number of sub-projects have been carried out, largely externally funded (national and EU research moneys). Current plans include efforts towards e-government as part of the general vision.

The research has comprised repeated interviews with the '2003' project management over six years, in-depth field research in one area of municipal services (the Home Help Service) over the same period, and supplementary interviews with managers of specific (short term) sub-projects and with library and school managers. The municipal web pages as well as other material have been studied. This has allowed tracing of changes over time in the orientation of the '2003' project and in the home help service. Findings within each are summarised next, while a general conclusion for policy makers follows below.

The '2003' project management had as their starting document a 'Vision 2003' which centrally included broad participation in the transformation of the municipality. Ronneby was to be known as a place where the citizens know IT. Specific measures were to be taken to counteract exclusion of groups of citizens. The former has largely been successful, while the latter has not. This poses difficulties for the usage of IT by the municipality and its services, as despite their efforts, large numbers of citizens do not use IT such that they could access services online.

Individual projects have covered numerous topics in schools, libraries, for tourist development, etc, and have met with international interest. Despite this, however, broad participation has been difficult to achieve.

The Home Help Service
While clearly defined projects with a limited time span have facilitated focus and experimentation in the '2003' project, the home helper study has demonstrated the magnitude of the difficulties in implementing anything 'e'lectronic in the daily management of this essential service. Although IT research usually is oriented towards technical novelty and experimentation, the present research project finds the observed obstacles to increased IT use interesting precisely because of their ordinary, rather mundane character. It turns out that precisely the 'non-research' character of the difficulties makes them hard to address as a topic for the '2003' project management: external money is not available, and internally, the Home Help Services are already stretched to meet the much-publicised increasing demand on their services. Thus, while experiments have been initiated in the HHS to save resources through increased use of ICT, the pressures of everyday running have not allowed the time for resolving the obstacles encountered. In summary, the service is busy doing their work and, while managers are using networked computers and might conceivably contribute to an e-government effort in the Home Help Services, the home help workers – who are closest to the users of the service – are not. The service would require a concerted effort focussing on IT use to remedy these problems.

Learning from Ronneby, a local authority wishing to embark on e-governance would need to ask of itself whether it is prepared for the considerable effort of building up new kinds of infrastructures of knowledge among its most 'ordinary' employees. Thus, issues at the heart of the possibilities of e-governance include:

how will 'all' staff be trained? Will a technical support network that understands their specific needs and concerns be easily available for them?

Concluding findings for policy makers: Introducing an 'Information-,' 'IT-', or 'Knowledge Society' is an elusive endeavour. The popular terms cover a range of possibilities; even more clearly as Ronneby and others are trying to implement them. Broad coverage among citizens is particularly difficult to achieve. A reason seems to be that research funding and the project as a form of organising are well suited for exploring new possibilities, but poorly for implementing these broadly. Another reason is lack of inclusion of citizens in shaping such efforts, meaning existing differences may be preserved or magnified. Thus, if EU or national agencies wish to promote changes towards greater understanding and usage of 'information', 'IT', or 'knowledge', the focus should be placed on citizen and employee involvment, evaluation and broad scale implementation of previous experimentation.

This post-doctoral research project formally ends 24 January 2002. Documentation of the research will continue after this date; a book is expected in 2002-2003. The project is funded by the Norwegian Research Council. The project has had regular contacts with Blekinge Tekniska Høgskola and with other researchers mostly in the UK, Norway and Sweden.

DEMOS – Delphi Mediation Online System

by Gernot Richter and Thomas Gordon

DEMOS stands for Delphi Mediation Online System. DEMOS is an e-democracy research and development project funded by the European Commission (IST-1999-20530).

DEMOS offers innovative Internet services facilitating democratic discussions and participative public opinion formation. The goal is to reduce the distance between citizens and political institutions by providing a socio-technical system for moderated discourses involving thousands of participants about political issues at the local, national and European level. The vision and long-term goal of DEMOS is to motivate and enable all citizens, whatever their interests, technical skills or income, to participate effectively and actively in political processess which are both more democratic and more efficient than current practice.

The DEMOS system provides support for three phases of discussion processes: broadening, deepening and consolidating the discussion. In the broadening phase the discussion is initiated and information about the problem situation and the interests, positions and ideas of the stakeholders are gathered from as many sources as possible. The DEMOS system supports this phase with tools to help moderators with clustering and structuring discussion forum articles and visualise relationships among them. The result of this phase is an outline and summary of the discussion thus far. The main task of the second phase is to address selected issues in more depth. For this purpose, the DEMOS system provides tools for helping the participants to break up into sub-groups, for conducting online surveys, and for collaborating on the formulation of joint position statements. The task of the third and final phase is to consolidate the results from the sub-groups into a document summarising and visualising the main points of the discussion. Ideally, this structured discussion process can lead to political consensus. In practice, we would be satisfied with 'rational dissent': the participants may continue to disagree, but the reasons for the disagreement will have been made clear and comprehensible.

The argumentation and mediation component of the DEMOS system is being designed and implemented jointly by the AiS and FOKUS institutes of
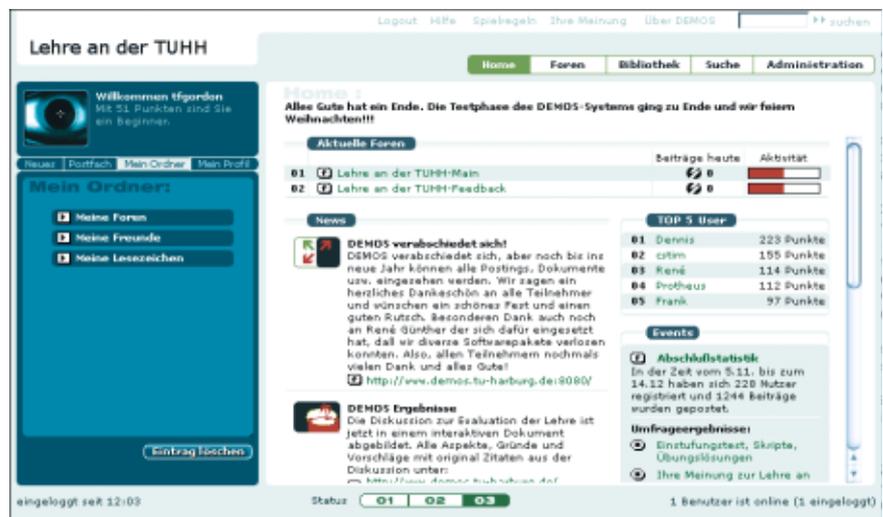
DEMOS demonstrator for the City of Hamburg.

Fraunhofer, using our Zeno system. Zeno is an Open Source Internet groupware system, written in Java. The latest version, Zeno 2, unifies and simplifies shared workspaces, content management, discussion forums, group calendars and basic task management under a common 'journal' concept. Apart from the usual features of groupware systems, Zeno provides special support for the moderators and mediators of consensus building and conflict resolution discourses. For example, the data model of Zeno journals generalises threaded discussions from trees to arbitrary directed nets with any number and type of user-defined relations between the contributions of the participants. This allows moderators to define and apply a broad range of models of rational discourse, including but not limited to the Issue-Based Information

System model (IBIS), to structure and visualise discussions.

Coming to terms with the complexity resulting from the inherent distribution of users and their asynchronous participation in a discourse combined with the multiple structures of information resources is one of the main research goals pursued by Fraunhofer within DEMOS. The tasks range from overall system specifications via semi-formal and formal system and process models to formal specifications of core functional units. The results are used for developing concepts of discourse awareness, discourse rules (including rules of order) for asynchronous discussions or system-supported argumentation structures. The DEMOS system is being validated in pilot applications in the cities of Bologna and Hamburg.

Partners
Comune di Bologna; Fraunhofer AiS, Sankt Augustin; Fraunhofer FOKUS, Berlin; Freie und Hansestadt Hamburg; Ibermatica SA, Madrid; Ipsos-RSL Ltd., London; NEXUS–IBA, Milano; Pixelpark AG, Berlin (until December 2001); TUHH–Technologie GmbH, Hamburg-Harburg.

Links:
http://www.ais.fhg.de
http://www.fokus.fhg.de
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Internet-Based Public Consultation Relevance - Moderation - Software

by Oliver Märker, Hans Hagedorn and Matthias Trénel

In the city of Esslingen in Germany, the Internet was used to involve citizens in an informal discussion about plans for a neighbourhood development project.

Between 21 May and 21 June 2001, the city provided – besides extensive information – a moderated discussion forum in which twenty-six people communicated very actively, and approximately eighty participated passively. The case study demonstrates that the potential of the Internet is supported by the following three pillars: external relevance through organisational embedding in the decision-making process, internal relevance through professional facilitation of forum discussions, and its use as a dynamic tool for asynchronous communication.

Design and conception of socio-technical systems for online citizen participation should not be technology-driven but should be oriented towards the basic principles of cooperative planning approaches. These are known as the 'new planning culture', and, among other things, they:
• enable participation at an early stage

• assure an equal opportunity to participate
• remain open with respect to both process and results
• assure communication and dialogue
• integrate multiple perspectives
• allow moderation by neutral third parties.

On the other hand, the realities of city politics cannot be ignored; that is, participation procedures usually cannot achieve more than is allowed by the existing context of communication and power relationships. Therefore, concepts which are to involve citizens must make use of elbow room.

Assuring External Relevance
Opportunities for more participation only make sense if they can be made practically relevant to the existing planning process. Establishing and securing this practical external relevance is a key element of every participation concept. In

Esslingen, several steps were necessary before, during and after the 'online public hearing' to assure its external relevance:
• Conflict analysis. The analysis of conflicts of interest at the beginning of the project was the starting point for all further tasks.
• Publicity. The moderation team involved the local newspaper in Esslingen in opening the online hearing to a broader public, with the aim of creating some social pressure for the hearing.
• Involving decision makers. During the preparatory phase and the entire four-week period of the online hearing, the moderation team repeatedly encouraged city administrators and members of the city council to participate.
• Securing and applying results. The moderation team documented the entire online hearing and prepared a summary of the discussion in collaboration with and approved by the active participants. The summary was also

published on the web and officially handed over to the responsible building committee.

Moderation: Internal Relevance

In addition to embedding the online debate in its administrative environment, it is important to actively structure and manage the debate itself (see Figure 1). As in 'real' town meetings and other kinds of discussion groups, competent moderation is decisive for achieving practical results. Therefore, in the online hearing of the City of Esslingen, the tasks of the moderators were not limited to preventing offensive contributions or reminding participants to stay on topic. Rather, the most important tasks of the moderation team included:

- structuring and focussing the discussion
- assuring lively debate
- encouraging and developing argumentation
- encouraging feedback.

These measures ensured the resulting discussion was of a high quality, a fact evidenced by the relatively high degree of cross referencing among the contributions and a constructive dialogue between the opponents of the development project and the city planning department. However, the measures were not at all effective in motivating politicians to participate.

Software - Dynamic Internet Tool

Besides a good moderation strategy, online participation requires a flexible software tool that should be easy and intuitive to use, and a rich set of moderation tools to dynamically adapt to the
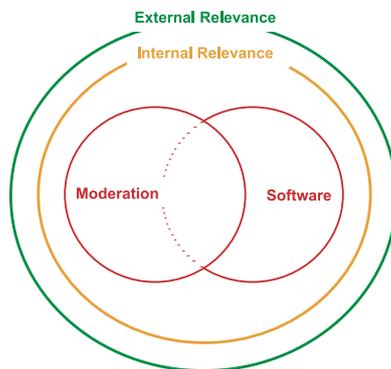
Figure 1: Main socio-technical dimensions of internet-based citzien particiaption.

emerging discourse requirements. The software of the pilot project in Esslingen presented the content in three main areas:

- Front page. The front page gave a short introduction to the online hearing, describing its aims, procedure, and timetable, the members of the team of moderators, etc, and was updated repeatedly by the moderators to announce the current status of the online hearing and the follow-up. From the front page, users could access a 'shared workspace' and the moderated discussion forums.
- Public information. In this part of the website, information about the residential development project was made available in a 'shared workspace' of the Zeno system. Using the shared workspace, members of the city administration and the moderators were able to easily upload documents and create links, and to organise this information in a hierarchical directory of folders. Zeno's access control mechanism was used to allow only the moderators and particular registered

members of the city administration to make modifications while still enabling everyone, including unregistered guests, to view the information.

- Moderated discussion forums. Zeno forums were provided for comments on the residential development project and the online hearing. The moderators added brief instructions on how to use the forums and other relevant information, as well as announcements to the 'description' fields of the folder containing the forums and to the forums themselves. This 'description' provided a convenient place to explain moderation activities, such as the restructuring of message threads, announcements of new sub-forums, 'mini-tutorials' about Zeno features, or publications of important dates or events.

Conclusions and Future Work

The concept for the online hearing developed within the case study largely met the new planning culture criteria of dialogical communication, integration of multiple perspectives, and equal opportunity. To what extent this positive experience will have a general impact on the planning culture in Esslingen in the future remains to be seen: 'The willingness to communicate is a scarce resource, which must used conscientiously if it is to be preserved'. This is also true for Internet participation.

In further projects in co-operation with other German cities, Hammerbacher GmbH, and WZB-Berlin, we will realise further internet-based consultation processes based on the three sketched conceptual pillars. The gained experiences will be taken into consideration in the ongoing development of our new system, Zeno2, which is occurring in close co-operation with the ECCO group of Fraunhofer FOKUS, Berlin.

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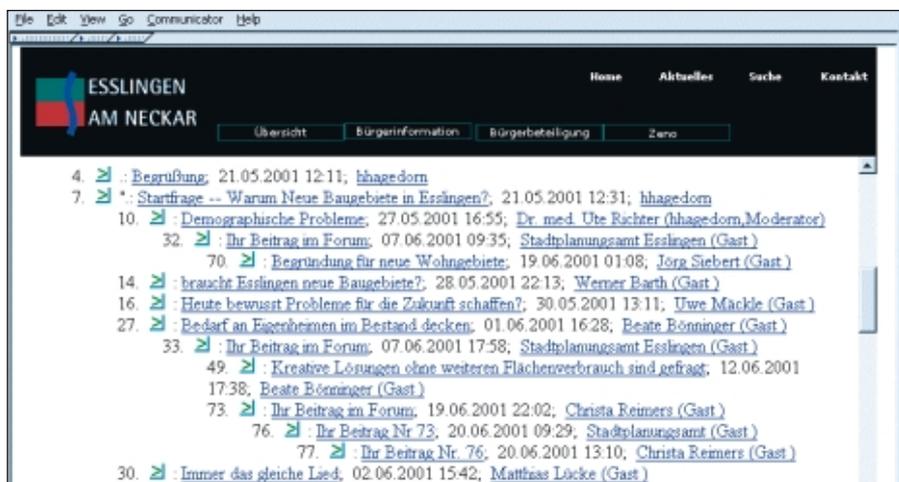
Figure 2: Part of the main discussion forum.

E-Governance:
The Case of the Finnish Parliament

by Olli Mustajärvi

A major portion of information management in the public sector consists of document management. Therefore, implementation of better services for the citizens in an information society requires effective implementation of electronic document management. This case has been characterised as the most important document management project in the Finnish public administration ever.

SGML offers for the purposes of e-governance a technology for document management by enabling long-term accessibility of information in documents. SGML and XML are definition languages by which standard document structures can be defined.

The SGML standardisation project in the Finnish Parliament was carried out with the University of Jyväskylä. The effects of the standardisation have concerned documents, document production, archiving practices, information distribution, and inter-organisational collaboration.

Discussion about building and supporting e-governance by means of SGML started in 1994. The goal of the project was to evaluate alternatives for standard document formats, to design preliminary standards for parliamentary documents, and to develop methods for standardisation. During later phases the Ministry of Foreign Affairs, Ministry of Finance, Prime Minister's Office, and a publishing house also participated in the project. During 1995-1998, a method for document analysis was developed in the project and four domains were analysed. As part of the analysis, preliminary DTDs were designed for 21 document types. Since Finland has two official languages, Finnish and Swedish, all legislative documents have to be available in both of the languages.

The use of SGML (or XML) on a specific domain requires document standardisation. The standardisation means agreement upon rules, which define the way information is represented in the documents of the domain. SGML standardisation does not concern documents only. Successful implementation of the standards of a domain may require major changes in work processes as well as in the tools used in the work. Especially inter-organisational document standardisation covering many document types has proven to be an extremely complicated task.

The work of the first project has been followed by projects where selected companies have developed and implemented SGML solutions (DTDs and tools) for a specific subset of documents, and the Parliament and ministries have redesigned their work processes. The first implemented document repository in SGML form was the archive of laws and statutes which was published by the Ministry of Justice in 1997. In the archive, links to documents in the archive of the Parliament are automatically created. The SGML format was produced by a conversion from word processing files. Conversion of text files was also used in the early version of a new SGML-based budgeting system implemented by the Ministry of Finance in 1998. In the Parliament, the goal was to initiate document production where documents would be originally authored in a structured form. Changing the document production processes and authoring tools has been a major reengineering effort.

The quality of the documents available on the web has however improved as a consequence of the SGML implementation. Documents are now available in three forms: HTML, PDF, and SGML. People working in the Parliament are able to print documents with slightly different layouts for different purposes, eg, for different phases of legislative drafting.

In February 2000 the Finnish Parliament decided on new goals for information distribution, including a goal for the distribution of consolidated legal texts. After the decision, the Ministry of Justice commenced a project for implementing an SGML-based consolidation. A pilot system implemented in the Parliament demonstrated that using the SGML form as a basis, the consolidated
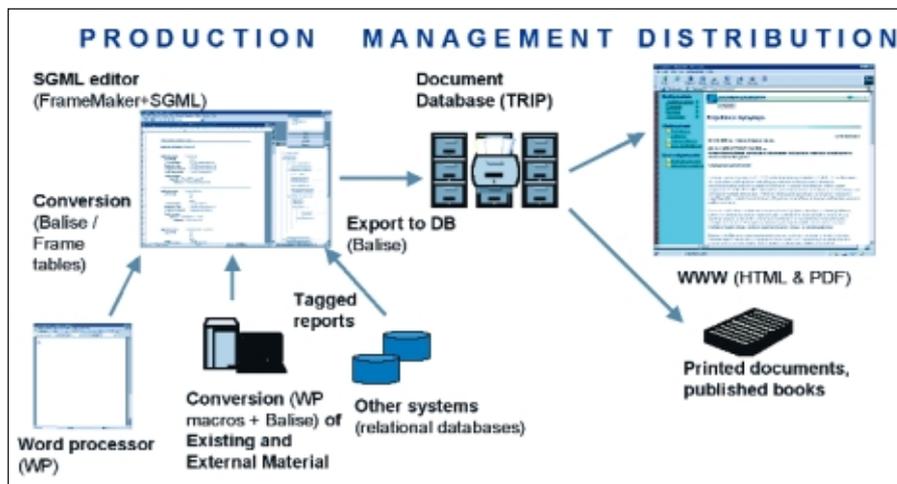
Technical solution for document production management and distribution.

legal database can be realised and updated with reasonable costs. The consolidated Finnish legal database is expected to be in use in 2002 at the latest.

Technologies and their Functionalities

The text databases of the Parliament are connected to the web servers of the Parliament. One is for public use on the Internet (http://www. parliament.fi, http://www.riksdagen.fi, http://www. eduskunta.fi) and the other, called Facta, is for internal use. Between the two servers there is the firewall and a mirroring technique is used for the data transfer from the internal server to the public server. Because the Trip databases form the basis of the Parliament's text processing system, all Internet users can get up-to-date information about the Parliament's work, documents, speeches and voting in sessions, etc. The web services offer powerful retrieval capabilities utilising document structures. Compared to the pre-standardisation situation, capabilities for defining queries have significantly improved. The latest version of the Trip system, including support for XML, will cause some further changes. The XML support will be utilised in the Parliament. According to some preliminary testing, the SGML form of the docu-

ments in the Parliament does not cause significant problems in the new Trip/XML database.

Impacts for the Organisation

The availability of the parliamentary documents on the web has significantly decreased the dissemination of paper documents both in the Parliament and from the Parliament. The costs of the standardisation project are very acceptable compared to annual printing costs or annual expenditure on information technology in general. A major change at the organisational level can be recognised in the relationship of the Parliament and the publishing house. The deployment of SGML has made the Parliament less dependent on the publishing house. The Parliament is able to place a call for bids for printing parliamentary documents. This is expected to lead to savings in printing costs in the future, estimated to be as high as 40-50%.

In relation to society, the feedback received has indicated a clear improvement in the public image of the Parliament. The Parliament has been referred to as a pioneer in its work for improving openness, web services, and usability. The activities in the Parliament have been seen as a model for other organisations.

Impacts for the Society

The implementation of SGML standards in the Finnish legislative work has radically improved the accessibility of information and thus supports democracy and transparency of governance. All documents are available to all citizens free of charge. The tasks of the Finnish public libraries are now changing towards services by which citizens are helped to reach legislative archives via the Internet. A major impact to society is expected as a consequence of the implementation of the SGML-based consolidation. In the future both legal experts and laymen will have improved capabilities for legal information retrieval by the accessibility of consolidated law on the web.

As a whole, the document management development activities in the Parliament can encourage other organisations in the public sector, both in Finland and in other countries, to work towards delivering their documents more quickly and with improved quality to everyone who needs them.

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Case Study: Using a Database-Driven Website to improve Co-ordination of Government-Funded Initiatives

by Ellis Pratt

In March 2001, Lord Falconer launched the UK Government's Regional Co-ordination Unit new interactive website on Area Based Initiatives. Developed by Digitext, it provides for the first time data on key initiatives and is an important new information resource to government departments, local government, community and voluntary groups and those with a research interest in area-based policies.

The Government Offices for the Regions (GOs) and their corporate centre, the Regional Co-ordination Unit (RCU), work on modernising government and are responsible for delivering policy in the regions. Their objectives are better policy making, providing responsive and quality public services, developing the concept of information-age government and delivering a valued public service.

The unit is located in the Deputy Prime Minister's Office within the Cabinet Office. It has a multi-departmental constitution, which makes it ideally placed to implement cross-cutting initiatives and to consider government initiatives with a regional or local dimension. These regional Area-Based Initiatives (ABIs) are government programmes that concentrate on tackling deep-seated

problems in a joined-up way. Rather than being applied uniformly across the country, they are targeted in particular areas of need.

The RCU wanted a website that provides an efficient and user-friendly information service, covering the issues and updates that are of concern to the RCU and its stakeholders. They wanted a

major part of the website to be devoted to providing guidance and information to those concerned with running ABIs, as well as for general members of the public who may have an interest in other areas of work that the RCU undertake.

Aim of the Website Project

The objectives for the domain were to:
- allow users to find details about ABIs occurring within their Local Authority District, County or Regional level, as well as being about particular topics or sponsored by particular Government Departments
- be easily maintained by RCU staff
- be accessible to all members of the public, including those not using graphical browsers.

Techniques employed

The core of the site was based around a Microsoft SQL Server database, holding information about each ABI, the sponsors, geographical areas, etc. Pages were generated from this database using Active Server Pages.

Stakeholders can list all the existing ABIs or search the database by looking for an ABI in many ways:
- Full Text Search
- Title only
- Government sponsor
- Government Office
- County
- District, Unitary Authority or Metropolitan Authority.

UK Government's Regional Co-ordination Unit new interactive website on Area-Based Initiatives.

Pages are edited by entering a custom-designed secure online editing suite. RCU staff can add new ABIs, delete old ones or change the details of existing ones. They can also browse to a specific page in the live site and, by adding a special code to the URL, be taken directly to the correct page in the editing suite.

Accessibility

By building the site with the W3C's Web Content Accessibility Guidelines in mind, Digitext was able to meet the RCU's strong target for universal accessibility without resorting to a separate, text-only version of the site, with all its attendant maintenance problems.
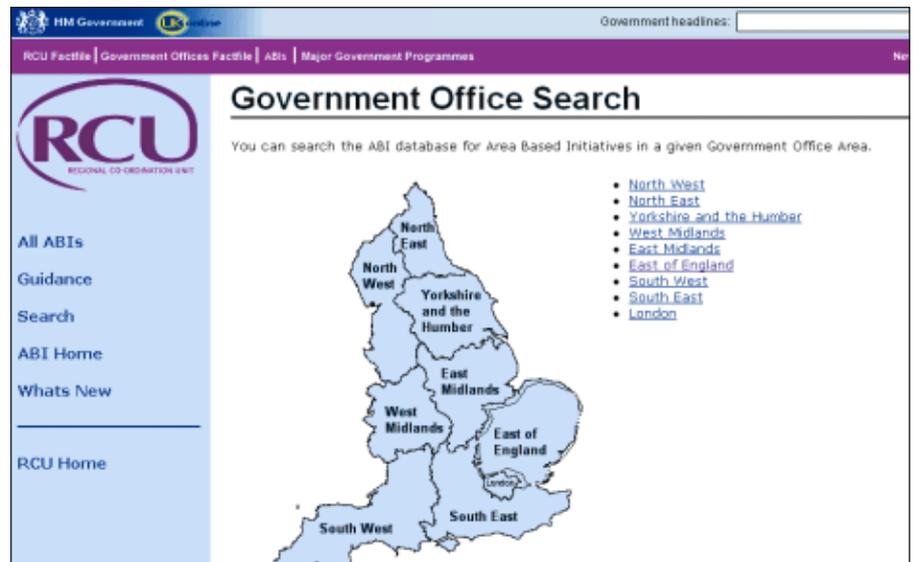
The pages were accredited to the W3C's Web Content Accessibility Guidelines, Level Double-A. This ensured that they were available to a wide range of users with a variety of limiting conditions such as blindness or inability to use a mouse. In addition, this lean, device-independent strategy of page creation also resulted in real gains in speed and usability for users in a conventional graphical web-browsing environment.

The solution passed its first major test when the RCU needed to update the site so that it reflected the changes to Government Departmental names and responsibilities following the June 2001 General Election.

The site could be developed by increasing the number of ways in which stakeholders can search the site – for example by parliamentary constituency or by postcode.

Links:
http://www.rcu.gov.uk/abi/default.asp
http://www.digitext.com

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Shining Light into Policy-Making Recesses

by Tamara Fletcher

One of the more interesting prospects of 'e-democracy' – the use of the Internet and other new technologies to improve democracy – is its potential for opening up the governmental policy-making process.

Traditionally policy formation in the UK has been a closed and secretive affair, undertaken by advisors and ministers in the backrooms of Whitehall with input from a select group of think-tanks and lobbyists. Public consultation does sometimes occur, but it is anyone's guess to what extent the results actually affect the decision-making process.

The Internet has been hailed for some time as a potential tool for shining some light into these recesses, to allow more people to take part in consultation and to introduce more transparency into subsequent deliberation processes by publishing more official materials online, such as the minutes of meetings.

Joseph Stiglitz, former Chief Economist of the World Bank, summed up this vision when he told last year's online debate 'Boosting the net economy 2000' (www.netecon2000.com): "Many key decisions are complex, and there is considerable uncertainty about the consequences of alternative measures. The policy-making bureaux in most governments are limited in size, and are typically overloaded. The new technologies hold out the promise of drawing upon far wider expertise.

"The challenge is how to do this in the most effective way. I suspect that the more structured the questions that are posed in the Internet dialogue, the more meaningful will be the responses. Participants in the dialogue could be required to provide evidence backing up their arguments. "One advantage of this approach is that it would widen the circle of expertise which the government could draw upon, which all too often is limited by circles of personal acquaintance."

So much for the potential, but how far is it being realised? Britain's first virtual policy think-tank was Nexus (http://www.netnexus.org/), set up in 1996 by a small group of Oxbridge graduates at Tony Blair's invitation and with initial funding from the Joseph Rowntree Foundation. Blair was interested to see how he could reach the academic community – already heavily wired up – to spread the New Labour word, and through Nexus initiated an open discussion between Downing Street and visitors to the site on his 'third way' political philosophy.

Bill Thompson, former head of the New Media Lab at the Guardian who joined the Nexus project to help with the technology, says: "Nexus did exactly what Tony Blair wanted it to do – it got academics to support New Labour and got people much warmer to the idea of online debating. It was dead easy to plug into and offered a low-tech solution. We had a high level of intelligent contributions."

"The third way debate was the first time online debate directly influenced number 10 and public policy. It established the Internet could generate serious content, not just attracting nutters."

Another pioneer of online democratic debate is the International Tele-democracy Centre at Napier University in Scotland (http://www.teledemocracy.org), which for the past few years has been carrying out detailed research into online petitions and consultation, including live trial projects with the Scottish Parliament and Downing Street.

Ann Macintosh, director of the centre, says, "We are looking at ways to gather opinions from individuals and groups through the use of technology - voting, surveys and debates - to get more open views. We have an opportunity to gather opinions before the policy document is produced to the specified target audience.

We would like e-consultations based on issues pre-policy document but you have to be careful with the term e-consultation – just publishing a draft policy document online as a PDF and asking for comments is not e-consultation in my eyes. You need to use the technology to first find out what people want and to inform them with adequate resources so you get informed responses which encourage debate - the process needs to be open and transparent".

The more traditional think-tanks such as the Institute for Public Policy Research and the Social Market Foundation are looking to use the Internet as well. The IPPR has an extensive digital society programme, and although this is composed ironically largely of physical seminars and mailed-out questionnaire surveys, it is now set to include one or two online debates as well.

Some 15 think-tanks have joined to create the 'Policybrief' initiative, an online portal to policy information (http://www.policybrief.org/).

And the IPPR and the SMF, along with the Industrial Society and Headstar, the publisher of E-Government Bulletin, were among supporters of the recent Voxpolitics project (http://www.voxpolitics.com) which looked at the use of the Internet in political campaigning.

Writing for VoxPolitics, Ian Kearns and Nick Hardy of the IPPR said: "The net, by its very nature, is inclusive. It reduces the barriers to human interaction. That said, for the Internet to . . . transform and not to perpetuate our political circumstances, three further conditions must be met. The first, most obviously, is universal Internet access. The second is a citizen body . . . which is willing and able to use the net to become connected and re-engaged. And the third, perhaps most importantly, is a formal political class with some predisposition to take Internet politics seriously.

"Of these, there is evidence to suggest that the big problem lies with the formal political class. Levels of Internet access in the UK, after all, are increasing, and there have been many cases of citizen use of the net to organise protest and agitation for political ends. What though, do we find when we examine our formal politics? Are our political representatives and masters embracing the new opportunities to engage with the rest of us?"

Not according to Thompson, who says that while in 1996 in the early days of net hype it was possible to influence Labour's thinking, people are much more cynical now.

"Those who were active in net policy-making at the beginning have gone back to traditional forms as they feel it won't have impact as the government have already formed their policies." So the problem of online policy-making has nothing to do with technology, but everything to do with the processes it feeds into, and how receptive the government is to wider input.

"If we don't understand [how people make decisions and formulate policy] then we may be wasting time with the technology", says Frank Bannister, a senior lecturer at Trinity College Dublin and e-democracy expert.

"Each new generation of nerds thinks it has the answer, only to run into the same brick wall of human behaviour. We must understand people and organisations before we can determine how to meld them with technology."

This article first appeared in E-Government Bulletin, a free monthly newsletter. To subscribe, send a blank email to egovbulletin-subscribe@head-star.com

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The Ethical Impact of IT on Government: Democracy and Responsibility

by Bernd Carsten Stahl

The idea of this research project is that democracy can be understood as an institutionalised form of responsibility. If this is true then the results that the use of information technology (IT) has on responsibility can teach us something about the ethical implications of e-government.

The aim of the project so far is to help understand some of the fundamental problems and opportunities that arise from the use of IT in government and administration. In order to understand how IT can affect ethics in general and the ethical side of government in particular the main moral notion is that of responsibility. Responsibility is understood to be a social construct with the aim of ascribing a subject to an object. The process of ascription is based on communication and usually aims at imposing sanctions, be they positive or negative. Responsibility is clearly a moral notion because it reflects our moral beliefs and it affects our social conventions.

On the other hand, responsibility is not part of any one moral tradition, which makes it an ideal concept for discussing ethical theory in general. Democracy is the most widely recognised form of legitimate government today. It is based on moral ideas such as human dignity and equality. The underlying view of humans is shaped by enlightenment's view of mankind, and its explicit goal is to facilitate and improve our social situation. There are many parallels between responsibility and democracy. Both are inherently dependent on communication, both are based on the assumption of man as a rational and moral being. Both are purely formal constructs that aim at the good, but leave it to the process to answer the question of what that might be. It can be concluded that democracy is a kind of institutionalised form of responsibility. It depends on its being perceived as moral in order to acquire the necessary legitimacy. At the same time responsibility can work best in a democratic environment.

IT, understood as the totality of technological artefacts and processes used to exchange and disseminate information, obviously has an effect on responsibility as well as democracy. Especially the latest development, the universal accessibility of the Internet and the World Wide Web promises fundamental changes in the way we communicate. IT changes distributions of power, money, rights, or obligations. At the same time there is a growing body of literature about the effects of IT and the Internet on government. I will briefly discuss the opportunities and the threats that this development has from an ethical point of view.

The opportunities that the use of IT offers to responsibility and democracy are mostly the result of the increased scale and reach of communication. It is possible to find like-minded people all over the world, exchange information about politically sensitive matters in almost no time, to document this information and to make it available to an almost unlimited number of people. IT can also be said to have a democratising effect on society due to the equal access it allows and to the promises it holds in the area of education. Another point is

the economic side of IT that seems to blend in well with the positive relationship that some authors see between democracy and the market economy. Finally, IT allows for more accountability by recording and providing more detailed information that classical communication channels. This accountability is a condition for responsibility as well as the democratic processes.

On the other hand IT also threatens the moral fundament of democracy. The reasons for this can be divided into accidental ones, which result from the particular way in which IT is used, and necessary ones, which are inherent to IT. Computers and IT sometimes change the distribution of power in an undesirable way. People with power over information also dominate democracies. This problem is linked with the question of access and the fact that the traditionally poor now also become the information poor and are increasingly separated. Another danger can be seen in the increasing domination of the Internet by commercial interests which then threaten to dominate democracy as well. Finally there are all the ethical problems usually discussed in computer and information ethics such as privacy, intellectual property, surveillance, quality of data etc, all of which can threaten the legitimacy of democracy.

While all of these problems can be remedied, there are also some other problems that seem to be fundamentally linked to IT and that I call necessary threats. Here we find the metaphysics of the computer. It can only represent objects in 0s and 1s and therefore necessarily blends out most of the relevant facts. This is especially grave in regard to human beings who can lose their relevance in computer mediated communication, which can lead to the loss of the other and consequentially to the loss of the necessity of ethics.

The conclusion of this theoretical overview over the ethical impact of IT on democracy is that there are chances and problems to which politics can react. Politicians can enforce the chances and avoid the accidental problems. However, the necessary problems cannot be overcome by political action. Here we need new concepts and notions and a high degree of sensitivity to the dangers. Further research based on this theoretical foundation should include empirical exploration into the relevance of the threats and opportunities. From there it might evolve in a framework that politicians might use for their dealings with computers and especially with basic questions of policy such as the financing of information infrastructure.

eVote: Practical Electronic Large Scale Elections

by Douglas Wikström

The primary aim of this project is to create a secure and cost-efficient electronic balloting system that makes it possible for voters to vote from their PCs at home.

Traditional election systems are costly, inefficient and error prone. Consider for example the US presidential election! It often takes days of vote counting before the result can be announced. Some countries have problems with corrupt election administrators who either report false results or try to coerce the voters. These are problems that could be solved by cryptographic protocols.

When asked, most people would list the following as the most important requirements on an election:
- correctness: the computed result should correspond to the votes cast by the voters
- valid voters: only persons that have the right to vote should be able to cast a vote

- anonymity of the voter: it should be impossible to determine what a person voted for.

It turns out that the traditional method for ensuring anonymity also implies that it is impossible for a voter to prove that she voted in a specific way. This makes it impossible for a buyer of votes to verify that the seller voted the way she promised. Additionally the traditional method implies that a voter can not correlate his vote to an arbitrarily chosen other vote. For many protocols proposed in the literature these implications do not hold. This shows that the requirements listed above are not sufficient to ensure that an electronic voting protocol should be considered secure, and formal definitions are needed.

Another important issue is correctness. In traditional elections there are many physical obstacles that prevent large-scale cheating in most situations. These obstacles are not present in the electronic world; if an adversary can mount a successful attack once he can do it many times, with marginal additional effort.

Consider also the counting of votes. In many traditional systems the votes are counted at least twice by independent groups of people in different physical locations. We assume that at least some of the officials will protest publicly if the results differ.

The above and other similar problems highlight that there are many implicit assumptions that make the traditional election system secure. To construct a
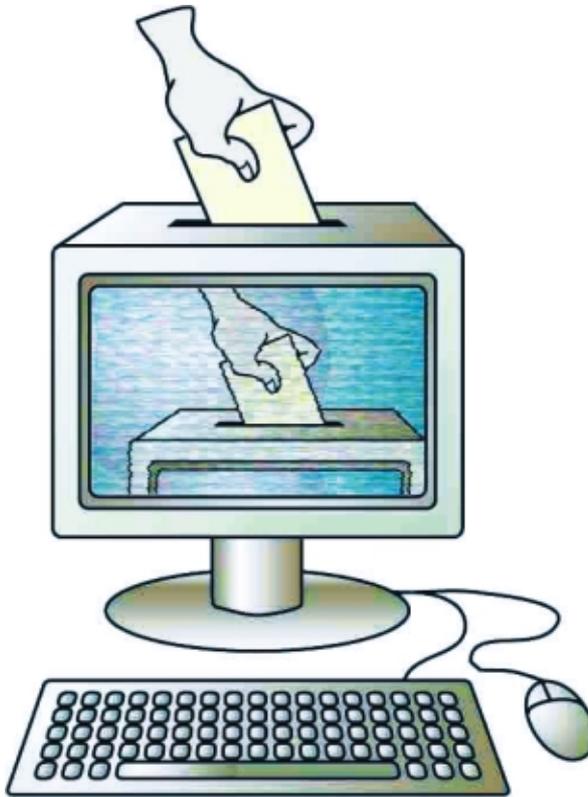
**Vote from your PC at home
(Illustration: Orc Lönn, SICS).**

secure electronic election system we need to identify these assumptions.

Electronic Election Systems

The idea of electronic elections is old. It was one of the initial examples of secure distributed function evaluation. There is a vast body of literature on the subject. Earlier the research focussed on general results about computability of functions, but lately the interest in more practical solutions has increased. SICS has been working on practical election systems for more than two years, and implemented two prototypes.

When constructing an election protocol system we try to mimic traditional elections, in that the trust is distributed. To do this we apply traditional cryptographic primitives like encryption, commitments, and computational proofs. There are different approaches to the problem, and they all have their advantages. SICS has focussed on protocols based on a construct called a mix-net. A mix-net can, if properly constructed, ensure anonymity of the voter and at the same time correctness. The advantage of mix-nets is their flexibility, and that they can be applied in other scenarios too.

The idea of this approach is simple. Each candidate holds a secret key and has published a public key. From these public keys a joint public key is computed which corresponds to a joint secret key that is unknown to all candidates. To cast her vote the voter encrypts her vote using the joint public key of the candidates and sends the encrypted vote to the candidates. Then the candidates perform a protocol, where they sequentially mix the encrypted votes. Each candidate gets a list of encrypted votes as input and produces a new list containing encryptions of the same votes, but in a different random order. After having done this they jointly decrypt the list of encrypted votes. Now the connection to the voter is broken, and anonymity is ensured.

To ensure that only valid votes are counted, each voter holds a secret key, for example on a smart card, and a public key is associated with the voter. The voter can use her smart card to digitally sign her encrypted vote, and the candidates can verify that the data was indeed signed by a specific voter.

Unfortunately the use of digital signatures and mix-nets allows the voter to sell her vote, since during the encryption and signing process, she computes data that prove that she voted in a specific way. There are some partial solutions to the selling problem, but they are all very impractical, and mainly of theoretical interest.

Ensuring correctness efficiently is the other big challenge. How can we do this without forcing the candidates to disclose anything about the exact choice of reordering the inputs? It turns out that this is difficult to solve efficiently, and even harder to prove to be secure. A number of published constructions have been broken. Interestingly, solving this problem also gives a solution to the problem of handling software bugs or hardware errors as they will be discovered as well with high probability.

Future Research

The major advantages of electronic election systems are cost efficiency, speed, correctness, and privacy. The researchers of SICS have constructed a very efficient protocol, and are now working on security models and a proof of security for this and similar protocols.

Link:
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Coalition Logic for Voting Procedures

by Henk Nieland

Voting is at the core of democracy, ranging from choosing the president of the chess club to parliamentary elections. Hence, fair and non-manipulative voting procedures are very important. However, a satisfactory definition of what is 'fair' has not been given yet. Logic can help in reasoning about correctness and efficiency of voting and other social choice procedures. At CWI social processes were analysed with logics derived from formal methods used in computer science, including a Coalition Logic which could lead to automatic generation of the 'fairest' voting procedure.

$$\rho^k = \bigwedge_{\{C \subseteq N \,:\, |C| > 1\}} ([C]^k p \wedge [C]^k q) \wedge \bigwedge_{1 \le i \le k} [\emptyset]^i \neg(p \wedge q)$$

Description of the Telephone Democracy problem in Pauly's Coalition Logic.

Explanation:
A father wants to re-marry and has two candidates in mind. He wants his three daughters to decide by majority voting. Since all three live abroad he decides to phone them. Which procedure warrants that any two daughters are free to choose between the candidates, with minimal telephone costs for the father? This question can be written down in Coalition Logic and given as input to a computer, which automatically generates a procedure. The naïve solution is that the father calls No.1 and 2, and if their preferences differ, No.3. However, there is a solution with only two calls: the father calls No.1, and asks her which of the other sisters he should call. This still guarantees that any two daughters can 'reach' both prospective stepmothers. Of course, the daughters may have to consult each other about their preferences, in which case the father lowers his telephone costs at the expense of his daughters.

Elections are daily bread for our newspapers. Potential EU members must guarantee democratic elections in their country. Such elections should be the basis of a new state in 'tabula rasa' Afghanistan within a few years. However, all voting procedures which have developed during more than two centuries, have drawbacks. With a slightly different, but still plausible voting system in the US, we would now have Gore in the White House instead of Bush. Well known is the Bonn vs Berlin question from ten years ago: should parliament and/or ministries move to Berlin? Here too, it was not the preference of the citizen that was decisive, but the adopted voting procedure, which was determined by a committee of 'wise men' (ie the parliamentary council of elders, in German 'Ältestenrat').

Half a century ago, the later Nobel laureate Kenneth J. Arrow proved that, given five highly desirable properties that any reasonable voting system should possess, no voting method would always satisfy these properties, thus destroying a dream of social philosophers. Hence, in practice one should look for a compromise. One such property is that the outcome should not exclusively depend on the voting behaviour of one single individual (absence of a 'dictator'). Another is the exclusion of 'strategic voting', where for example a group can prevent the adoption of a law by not voting according to their own preference, but such that the voting process never reaches a decision.

At CWI, researcher Marc Pauly has developed a language in which notions like 'coalition' are defined, together with their rules of operation. This Coalition Logic enables for example a voting procedure to be tested for undesirable properties like strategic voting. In his PhD thesis, Pauly applies this logic to several practical problems in the area of social choice. Pauly also studied a Game Logic, which enables reasoning about 'fair division' problems. The standard example here is cutting a cake, for which an algorithm based on the two-person 'I cut, you choose' strategy leads to a fair division. Such problems occur for example in settling an inheritance, or converting election results into parliamentary seats.

Pauly's new Logics are extensions of logics used to reason about computer programs. There formal methods are applied to prove that a program really does what it is supposed to do. However, interpreted as a game a computer program is rather primitive: there is just one player – the computer. With the Game Logic and Coalition Logic one can reason about social processes or games with two or more players.

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Digital Signature Applications for E-Government

by Marlies Ockenfeld

In the course of the Federal Ministry for Trade and Commerce's Media@Komm competition for German municipalities, the city of Esslingen's proposal won support for an e-government project, which started in spring 2000.

Online services for e-government are to be realised through a co-operation between research institutes, industrial partners and the municipality. IPSI is one of the two research institutes involved. The services have been divided into five groups: local services, cultural services, social services, educational services and business services.

The selected applications range from pure information services through interactive services to the secure exchange of official documents via the Internet. They must conform to the regulations of German law.

The increasing opportunities created by innovative systems and programming techniques have given rise to a new kind of application scenario, commonly referred to as electronic government. The digital signature is a technology that enables safe and legally binding transactions based on networked communication and the exchange of electronic documents. To explore possible application areas and the potential of this technology requires the modelling of processes, focussing, among other things, on administrative matters, their interlinking and interaction with other applications. The project therefore has been analysing different application areas as to their interconnection and, in doing so, concentrates on secure and legally binding information exchange on various levels.

In e-government, electronic documents and their exchange are the core of any application. Therefore, our work focuses on the following topics:
- standards for semantic information structuring; separation of content and layout
- meta-information and standardisation for the reuse of information
- standards for the electronic exchange of documents which are used by several applications

- embedding digital signatures in the document structures.

Due to international developments and, in particular, the extensions and enhancements of the Internet, XML and XML-based applications have become particularly important. This is why we have been focussing on a number of XML-relevant topics, especially in sub-projects dealing with trade, education, and culture, including:
- concepts of uniform data modelling
- administration and storage of data
- exchange and distribution of data
- information brokering.

The results will be applied to various legally binding processes. To design a comprehensive system that meets the requirements of Media@Komm, it is necessary to base the work on the advanced technologies of the Internet Application Framework as well as the Distributed Internet Application and to analyse content and organisational application aspects in terms of the security technology available. Relevant base technologies comprise:
- web computing (DHTML, scripting, server technology)
- component software (COM, CORBA)
- network services (transactions, security).

The scientific and technical aims of the project are clearly directed towards technological aspects, ie, the implementation, use, and long-term application of existing (international) standards and the tools available for electronic commerce. This will lead to new challenges concerning the redesign of a number of application areas. Co-operation with key companies such as IBM and Oracle has been secured. The reorganisation of application processes as a result of introducing digital signatures will enable the integration of single service steps into one customer-oriented function, thus
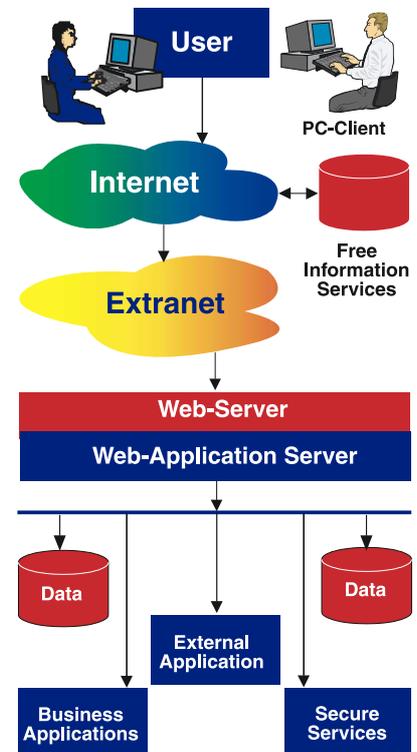
The overall architecture of the system.

reducing the number of partners and expenditure required for communication with citizens, organisations and enterprises.

To be successful, the use of information technology for the support of multimedia communication, security issues, and legally binding relationships must be accompanied by efforts to introduce new process models (and thus new models for organisational infrastructures). From a technical point of view, it will be necessary to utilise future-proof standard tools for the prototypical realisation of legally binding business transactions, and to evaluate their usefulness in terms of the project goals in the course of the project.

The security concept must be adaptable to changing legal prerequisites, and corresponding components need to be developed and applied. Furthermore, all developments have to comply with standards and an open-system philosophy, in order to guarantee efficient extensibility, adaptability and reuse. The duration of the project is from January 2000 to December 2002.

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Adopting the Digital Signature:
A Proposal for Cooperative Work in the Italian Judicial System

by Domenico Laforenza

The creation of a system for cooperative work between Italian law courts and Italian lawyers using the national public administration network could greatly improve the efficiency of the Italian judicial system. At the basis of this co-operation is the safe and secure transmission of electronic documents.

The widespread employment of computational tools by Italian courts and Italian lawyers has greatly encouraged the easy and economic exchange of electronic documents between them. In particular, the introduction of Electronic Filing (EF) systems has resulted in considerable benefits to all those involved in the Italian legal system, including the ordinary citizen who, in some way or another, interacts with it.

Clearly, in order for EF systems to be used in legal operations, the confidentiality and inviolability of documents must be guaranteed. Methods that ensure the privacy and security of electronically transmitted information must be employed, and data encryption techniques are becoming increasingly common for this purpose. For example,

while traditional e-mail systems do not guarantee security, if they are used together with an encryption system, it is possible to ensure that the document transmitted:
- comes from a given, identified sender (guarantee of authenticity)
- cannot be disclaimed by the sender (guarantee of non-repudiation)
- cannot be read by third parties during transmission (guarantee of confidentiality)
- cannot be modified by third parties during transmission (guarantee of data integrity).

The problem of the correct identification of individuals is crucial in modern society, see for example the use of badges that permit selective access to public or private sites. Computerised

systems can be adopted in a similar way to control the access of users to given services.

A new approach to the identification of individuals is the use of electronic or digital signature technology, which is based on Public Key Cryptography (aka Asymmetric Key Cryptography). Each person is associated with a pair of asymmetric keys, one of which is 'private' and used to sign documents, the other is 'public' and used to verify signature authenticity.

The digital certificate has been introduced as a means of guaranteeing the safe transmission of the 'public' key. A digital certificate associates the personal data of an individual with one or more 'public' keys. It has a function in
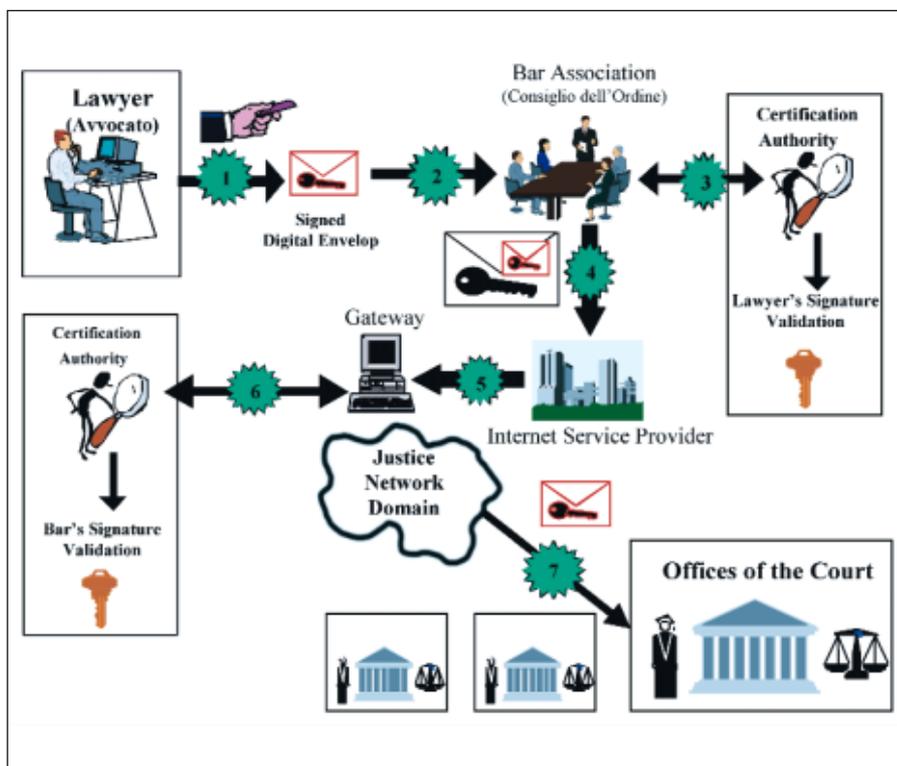
Model for Co-operation between Italian Courts of Law and Lawyers

A document is transmitted as follows:
Lawyers:
- prepare an electronic document and sign it using their private key (step 1)
- transmit the electronic documentation to their Bar Association (BA) (step 2).

The Bar Association:
- validates the authenticity of the documentation through the Certification Authority which holds the public key of the lawyer (step 3)
- adds its own digital signature and transmits the documentation (step 4) to the ISP of the BA so that it can be sent to the gateway of the National Justice Network Domain (step 5)
- when the documentation is received by the gateway the following controls are made:
- validation of the authenticity of the documentation received by the BA (step 6)
- transmission of the document to its final destination, the receiving court of law (step 7).

Internet/Intranet transactions similar to that of an identity card or passport in the non-virtual world. A digital certificate is validated by a Certification Authority (CA). Standards have been studied to define the data structure of digital certificates and the distribution procedures that can be used by a CA. The currently most popular standard for digital keys is ISO X.509 version 3.

A Model for Co-operation between Italian Courts of Law and Lawyers

The figure shows a proposal for co-operation within the Italian legal system, presented in the framework of a broader feasibility study commissioned from CNUCE-CNR by the Italian Ministry of Justice at the beginning of 2000. Most of the operations described below are performed automatically.

In order to authenticate the lawyers, documents sent by them to the Courts must obtain a countersignature from their professional association (Bar Association). For this purpose, they will have a pair of asymmetric keys for authentication, one private (and kept in safe custody in a smart card, for example) and the other public (and known to a Certification Authority). Lawyers should have the facilities available (eg, smart card writer/reader) to be able to generate their own keys rather than entrusting the supply of the keys to the Bar Association. In this way, the risk of the private key being used by unauthorised persons is reduced to a minimum. With this model, the lawyer is free to use any suitable Internet Service Provider (ISP) and can transmit a legal document to any Italian court, complete with a digital signature.

Costs and Benefits

The model proposed specifies that the document transmitted by the lawyer must be countersigned by the Bar Association. This introduces an additional level of security and also speeds up the process of validation of the electronic documents received by the gateway (of the Justice Network Domain). In this way, it is not necessary to check the authenticity of each single lawyer, just of the relevant Bar Association (in Italy there are 164 Bar Associations for more than one hundred thousand lawyers). However, this model implies that each Bar Association must possess the necessary hardware and software and implement a suitable infrastructure. An alternative and more cost-effective solution would be for Bar Associations to entrust specialized (outsourcing) agencies with the task of digital signature verification.

The model for nationwide telematic co-operation between Italian lawyers and the courts proposed above is both technically and legally feasible, and could play an important role towards alleviating many of the problems that are the cause of the current inefficiency of the Italian civil judicial system.

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Secure Dissemination of Census Results using Interactive Probabilistic Models

by Jiří Grim, Pavel Bo ek and Pavel Pudil

A research team at the Institute of Information Theory and Automation of the Czech Academy of Sciences has proposed a new user-friendly method of interactively presenting census results. The method is based on estimating a probabilistic model of the original microdata in the form of a discrete distribution mixture, which can be used as the knowledge base of a probabilistic expert system.

Last year, the countries of the European Union organised a complete coordinated census as an important basis for future co-operation. Both the scope - the entire population of the European Union was included - and the corresponding cost of this General Census made it unique. The huge expenses are officially justified by the key significance of a census for the national economies and their institutions. Even more, it holds for the coming 'e-government' age of decision-making. Unfortunately, despite the considerable related costs, the availability of census results is greatly limited by the necessary confidentiality conditions. The new user-friendly method of interactive presentation of census results developed at the Institute of Information Theory and Automation of the Czech Academy of Sciences can help to solve this problem. The method is based on estimating a probabilistic model of the original microdata in the form of a discrete distribution mixture, which can be used as the knowledge base of a probabilistic expert system. The final software product is able to deduce any required information solely from the estimated model - without any further contact with the original data.

In this way the information contained in census data can be made freely accessible without any risk of confidentiality violation.

The availability of census results is greatly limited because of the necessity of preserving confidentiality. As the anonymous respondent can often be identified by combining a sufficient amount of external information, the individual census records (microdata) must not be directly accessible to general users. Thus the confidentiality conditions, however inescapable, become rather restrictive for economic and social

research, causing under-utilisation of data that have been collected at great cost.

Census results are mostly published in the form of tables. The exact relative frequencies of suitable feature combinations are stored into cells of multiway tables. Usually only small order tables (eg, 6-10 variables) can be stored and distributed because of technical limitations. The number of table entries quickly increases with the number of combined variables. For example, if we combine only pairs of variables (questions), we obtain hundreds of thousands of possible table cells, whereby many of them could be interesting and useful for users in specific situations. The problem of accessibility of census information can hardly be solved by choosing some 'relevant' subsets of variables since potential users may formulate very specific and diverse queries. Regardless of the choice adopted, a huge part of the potential statistical information would remain unpublished. Moreover, appropriate techniques must be employed to test if the published cells are sufficiently anonymous.

The most informative method of publishing is the dissemination of representative subsets of microdata displaying statistical properties similar to that of the original census database. For this purpose, the selected subsets of microdata have to be made anonymous using various techniques, such as data swapping, identification and perturbation of unsafe records to disable any disclosure of individual respondents. Different disclosure risk models are used to guide the identification of unsafe records in a microdata file to provide maximum data protection with minimum loss of information content. Unfortunately, both the choice of a subset of the original data and the manipulation of the chosen original records negatively influence the accuracy of the contained statistical information. Despite careful preprocessing, the distribution of microdata is a sensitive task because of the remaining diclosure risk. For this reason, the access to microdata is not guaranteed in all European countries and is regulated in almost all cases.

In view of these problems there is a common interest in developing new techniques to exploit the full information potential of census data. With this aim we have proposed a new flexible and user-friendly method of interactive presentation of census results by means of a probabilistic expert system. The method is based on maximum likelihood estimation of the underlying joint probability distribution of data records in the form of a discrete distribution mixture with product components. In this way the statistical properties of data are described in a highly compressed form by a distribution mixture which can be used without change as the knowledge base of a probabilistic expert system. Once estimated from the original data, the mixture model contains all statistical information about the microdata. Hence the final software product can derive statistical information from the estimated model without any further access to the original data, meaning that the information supplied by the census can therefore be made generally accessible without any risk of loss of respondent anonymity.

The fundamental motivation of our research has been the application of the proposed method to the General Census of the Czech Republic in 2001, organised in coordination with all the countries of the European Union. However, the realisation of the proposed project has an obvious international dimension because of the possibility of the proposed approach being applied in other European countries. The following facts illustrate the significance of the proposed project:
- since it is based on a probabilistic model, the method makes the statistical information contained in a census freely available to a large community of potential users
- the confidentiality protection is perfectly guaranteed by avoiding user contact with the original microdata
- the user may formulate questions relating to the statistical information without any constraints
- the final software product could be easily distributed on CD or via the Internet
- the proposed solution could effectively increase the information potential of the statistical offices.

The project presentation was awarded the 'F. de P. Hanika Memorial Award' at the Eleventh European Meeting on Cybernetics and Systems Research in Vienna, April 1992. The practical application of the proposed method to the General Census in 2001 may extensively benefit from its complete verification on the database of 535,000 Prague households from the 1991 Czechoslovakian census. In this experiment all aspects of the proposed solution have been successfully tested.

Catching up with the Banking Revolution

by Phil Cain

Public sector bodies in the UK have been curiously slow to offer online payment facilities to citizens for taxes, fees or fines, given that they stand to benefit hugely from moving away from labour-intensive paper-based systems. Citizens in turn gain the convenience of instant, 24-hour service.

The most recent 'snapshot' survey of local authority websites by the Society of IT Managers in local government – taken around December 2000 – found just ten councils that offered an online council tax payment facility. However, the last few months have seen something of a rush to fill this gap, prompted by the steady advance of the government's targets for all transactions to move online and growing public confidence in Internet payment.

The most popular ready-made solution being used by councils is Girobank's BillPay service (https://www.billpay-ment.co.uk). By signing up to BillPay, some 94 local councils are now accepting or gearing up to accept online payments - or to be more accurate, to allow the bank to accept payments on their behalf, with councils receiving electronic notification that can feed directly into their databases.

Several other public sector bodies including NHS trusts have followed suit. In January this year the mother of all public service revenue collectors, the Inland Revenue, turned to BillPay, although it is believed to be considering more sophisticated home-grown web efforts plans for the future, where tax payers could use a PIN number to access their account histories and stump up online. For a complete list of organisations accepting payment through BillPay see:
https://www.billpayment.co.uk/who.asp

The beauty of BillPay is its simplicity. To make a payment, people registered on BillPay enter their username and password and then enter the Girobank number on the invoice and their debit card details. Because the site contains no confidential billing or account information it cannot be incorrectly disclosed. Though BillPay currently accepts only debit card payments, a spokesman said it is working on an upgrade that will accept allow credit card payments in the future.

As well as using the Internet as an adjunct to its traditional payment intermediary business, Girobank is hoping to use digital technology to streamline its traditional Post Office-based payments business. As part of the trial, citizens of Taunton Deane Borough Council (http://www.tauntondeane.gov.uk) are currently able to pay bills at the Post Office using smart cards rather than paper slips.

For extra flexibility and control, not least over costs, a number of councils have developed their own online payment solutions. Among them is Camden, which in June launched online payment services for council tax, business rates, housing rents and parking tickets in conjunction with Datacash and Barclays Merchant Services. In the three months since its launch, the online payment facility (http://www.camden.gov.uk/pay) has taken 209,000 UK pounds, says project manager John Stoddart.

Stoddart says the decision to develop the system, on which he said the council had so far spent 200,000 UK pounds, was taken to provide a 'complete solution'. Readymade alternatives, Stoddart said, do not offer the level of customisation the council required. Unlike the Girobank system, users of the Camden payment system are able to see the final balance of an account, but cannot yet see a full transaction history.

The challenge of accepting online payments was part of a wider programme of reform for Camden, said head of IT Glynn Evans. He said the council ultimately hopes to offer services seamlessly, more efficiently and at no extra cost.

Another example of a council going its own way is Brighton and Hove, which is using a system supplied by Radius to take debit card payments for a range of services (https://ww2.brighton-hove.gov.uk).

However, no UK council has yet achieved the comprehensive online transaction solutions of the best councils in other highly wired-up countries including the US and Australia.

The government of Australian Capital Territory, for example, which serves the nation's capital city Canberra, offers its citizens a wide range of online payment and transaction services, from conveyancing fees to firewood collection permits (https://www.trading.act.gov.au/ACTUS) and in the US, the city of Boston offers a similarly impressive range of services (http://www.ci.boston.ma.us/transactions/default.asp).

It may be some time before UK councils catch up with this level of service, but at least this year they seem to be making good headway at last.

This article first appeared in E-Government Bulletin, a free monthly newsletter. To subscribe send a blank email to egovbulletin-subscribe@head-star.com

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Cooperative Processes for e-Government

by Carlo Batini and Massimo Mecella

The Italian approach to e-government is based on (i) the development and deployment of a nationwide Public Administration Network, a 'secure Intranet' interconnecting all the public administrations, and (ii) an overlying common Cooperative Architecture, a distributed computing model in which each administration offers its services through Cooperative Gateways. Recent experience shows that the design of these services should be based on co-operative processes.

E-government is the civil and political conduct of government, including service provision, using information and communication technologies. The modernisation of government using new technologies should follow three main directions:

- Electronic Service Delivery: provision of services to citizens and businesses; this often requires the integration of different systems, in ways that are possibly more complex than in other application domains.
- Electronic Democracy: online polling; eg, the new legislatures in Scotland and Wales are experimenting with electronic voting systems in their chambers.
- Electronic Governance: digital support for policy and decision making, group work between ministers and senior civil servants working on policy formulation, development and management, and with policy advisors.

E-government systems targeted to Electronic Service Delivery are currently being investigated by both researchers and practitioners, as they constitute the basis for supporting efforts in all other directions.

In Italy, the need for a better coordination of efforts and investment in the area of government information systems led the Italian parliament to create, in 1993, the Authority for Information Technology in the Public Administration (AIPA). More recently, the Italian government has activated the e-Government Action Plan, with the aim of achieving inter-administration co-operation for Electronic Service Delivery by the end of 2002.

As shown in the figure, the initiatives undertaken by AIPA and by the e-Government Action Plan include:
- The definition, design and deployment of a nationwide Public Administration Network to connect public administrations and enable the development of cooperative applications. The network architecture consists of three layers offering Transport Services, Basic Services and Cooperative Services. The term Cooperative Architecture refers to the distributed computing model on which the development and deployment of all new cooperative applications among administrations will be based. Each administration will be able to exchange services with other administrations through Cooperative Gateways. The Cooperative Service layer will offer a set of technologies, application protocols and services (eg, repositories, gateways, cooperative process managers, etc) enabling effective co-operation among administrations. The design for this layer has not yet been completed, as a number of
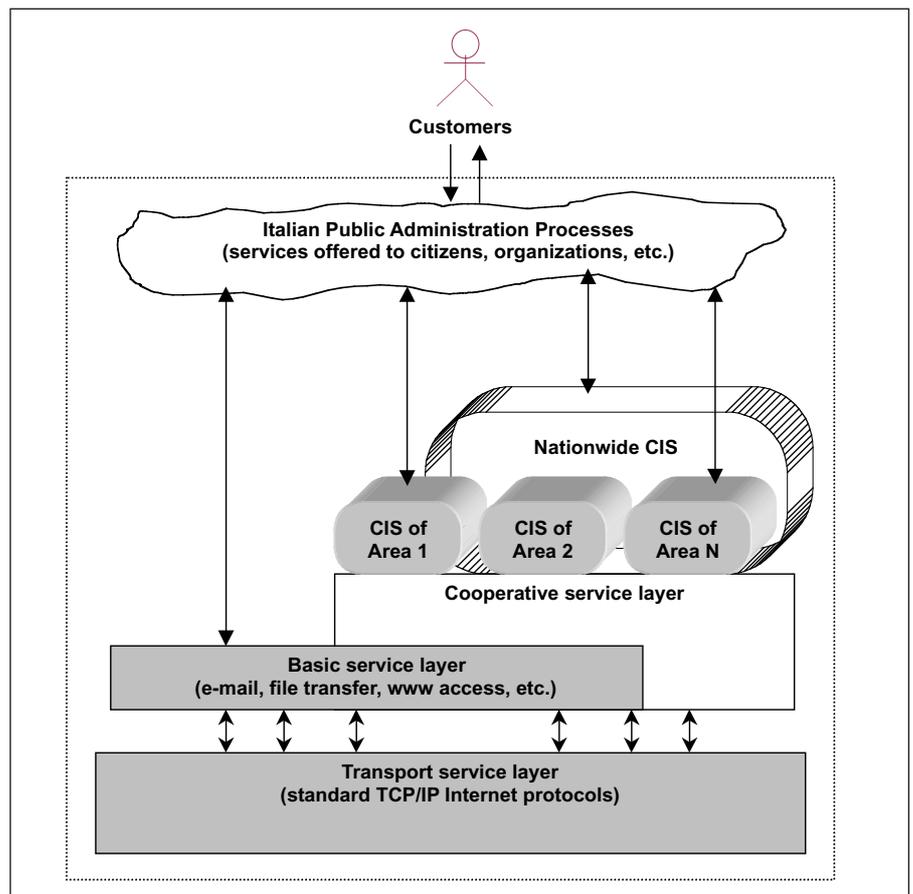
The architecture of the nationwide Public Administration Network; the gray elements (Transport service and Basic service layers, and some CIS's of Area) have been implemented; the white elements (Cooperative Service layer and the nationwide CIS) are in the design stage.

initiatives are now experimenting with and validating different solutions.

- The launching of pilot projects, adopting different technologies, architectures and approaches to co-operation, in order to develop specific cooperative information systems (CIS's) in various areas (eg, territorial and cadastral systems, services to enterprises, etc). It is expected that these systems, and others yet to be implemented, will later be integrated. The main technologies that have been evaluated in these cooperative projects are OMG Common Object Request Broker Architecture (CORBA), SUN Enterprise JavaBeans (EJB), Message Oriented Middleware and SUN Java Message Service (JMS), Microsoft .NET, traditional technologies (eg, file transfer, message switching) and web technologies (eg, servlets, script server pages, HTML/HTTP, XML).
- The definition and (imminent) deployment of a nationwide Cooperative Information System. The nationwide CIS will be developed on top of the Cooperative Service layer based on the Cooperative Architecture. From our experiences so far, we are convinced that a viable approach to the design of public administration services implies macro-process technological improvement instead of deep business process reengineering.

In a deep business process reengineering approach, redundant processes in specific organisational units would be eliminated, and some activities would be reassigned to new organisational units: this would eliminate many information exchanges, thus addressing the main issue of the excessive fragmentation of responsibilities among administrations. Unfortunately, certain issues hamper large-scale radical changes in the short and medium term, such as the impossibility of assigning new legal responsibilities to given organisational units (due to the difficulty of changing existing laws), the lack of specific skills and resources in some public administrations, the time needed to create such skills, and so on.

In the technological improvement approach, technologies can be used to (semi)automate macro-processes through cooperative applications, thus obtaining cooperative processes. An approach of this type does not necessarily require initial radical changes, neither in the macro-process structure nor in the internal processes. Each administration interfaces the others by offering specific services, independently of their realisation, and therefore internal changes do not impact on the macro-process, as they are hidden by the service interfaces presented to other administrations.

Separate administrations are thus loosely coupled, and each can reengineer its own processes without impacting on the cooperative process and related applications. Later, when the internal processes have been improved and new services are ready to be offered, the cooperative process will be modified, thus obtaining global and more substantial improvements through a more radical macro-process reengineering.

E-Government Programme in Hungary

by Erzsébet Csuhaj-Varjú

On 10 July 2001, Hungary introduced an electronic government programme. It was designed by the Office of the Government Commissioner in charge of Information Technology, a department of the Prime Minister's Office. The programme aims at integrating the strategies and IT development projects of various sectors and institutions in order to provide the citizens with better services.

The Office of the Government Commissioner in charge of Information Technology (otherwise known as the Government Commissioner's Office for IT) was set up in the summer of 2000 to design and implement a uniform programme that cuts across boundaries between institutions and sectors, improves the service-providing capabilities of the state, and at the same time, satisfies the requirements of citizens. Accordingly, in 2001 and 2002 the office is coordinating a total of thirty-six pro-

grammes, to be implemented at seventeen public administration entities.

In May 2001, the Office issued Version 1.0 of the National Information Society Strategy (NISS). According to this strategy, one of the priority areas is the implementation of e-government. To ensure that the objectives formulated in the e-government programme satisfy the requirements of citizens, a series of public opinion polls, wide-ranging research and surveys preceded the

drafting of the strategy. The Office also drew upon the European Union's analyses, guidelines and recommendations, as well as relevant documents of the OECD and other international organisations. The government has allocated approximately 48 million euro for the realisation of the programme during 2001 and 2002.

The two main objectives of the e-government programme are to provide citizen-friendly services and to improve the effi-

ciency of internal operations according to its motto: "a service-provider state in the service of its citizens." The increased efficiency of the offices is promoted by the improved utilisation of public registers, the rationalisation of IT developments, and the IT support of organisational functions, which will also result in cheaper operating costs for public administration. For these purposes, the necessary foundations and infrastructure must be created, the security of the government IT systems must be improved, and civil servants must be trained in the use of e-government applications and tools.

The expected result is a more efficient and transparent administration. The digitised basic registries will provide public information as if they were public utilities. A 'smart passport' is planned, which will enable citizens to securely access governmental systems from home, work or any other wired environment. This single passport will replace half a dozen personal documents used for different functions. Citizens will have access to a steadily increasing number of services via the government portal. The programme will also improve the traditional methods of administration and people who do not have access to the Internet would also benefit from the electronic governance. In the first phase, the government portal will function as a 'compass', a starting point for finding public information. In the following phases, in addition, it will be a treasure trove of vital practical information, and will enable citizens to manage their administrative issues over the Internet. Moreover, it will facilitate communication between public administration, politicians and the public, and become a forum for public opinion. According to the programme, the first services will be available within a year from the announcement.

The above services would significantly help in the management of administrative issues, since Hungarian citizens spend around 18 million hours every year on administrative tasks. Although there are recent improvements in certain fields (eg, the issuing of passports), there still remain plenty of time-consuming,

Hungarian government portal.

complicated and complex tasks, such as registering vehicles, issuing birth and marriage certificates, and determining maternity allowances.

Simultaneously, the efficiency of the traditional administration must be improved. Laying the foundations of electronic administration in government is also necessary, and this entails, among other things, the realisation of tasks concerning the development of standard electronic governmental document handling. Hungary's central public administration has already been fully computerised. Nearly 70% of its computers are networked, and all but a few ministries operate their own websites. However, most local governments and offices went their own way in this regard, resulting in the development of isolated systems. The electronic administration tools planned in the e-government programme will change this situation.

Rationalisation of public registers is also among the tasks ahead. This will lead to the replacement of uneconomical and uncoordinated registries by efficient and continuously updated central registries.

The realisation of the e-government programme requires that a series of tasks be completed. In 2001, the most important projects are the launch of the government portal, the development of the integrated governmental backbone network, integration of the KIKERES metadatabase search system, and developments concerning a new phase of the electronic document handling system.

The Government Commissioner's Office for IT periodically issues tender invitations and calls for project proposals to realise the programme. In autumn 2001, the successful applications were awarded approximately eight million euro.

Links:
Details on the Programme:
http://www.ikb.hu/ekormanyzat/pdf/angol_ekp.pdf
Details on the Government Portal:
http://www.ikb.hu/ekormanyzat/pdf/angol_portal_folder.pdf.
http://www.ikb.hu/ekormanyzat/
Government Commissioner's Office in charge of Information Technology
http://www.ikb.hu
http://www.kancellaria.gov.hu

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A Model to benchmark International E-Government

by John McIlroy

Research carried out by BestValueCommunity has developed a model for measuring e-government progress that can be used by any government to benchmark their performance and identify future objectives.

BestValueCommunity, an online e-government research unit providing research and information to assist councils with the move towards e-government, carried out a research project to identify the current state of play in international e-government and develop a model that will allow for international comparison. This proved more reliable than national governments, which, if they mention them at all, tend only to emphasis positive moves towards their targets.

Such analysis was possible due to the similarities that existed in both the e-government objectives and processes of all the countries in this study (Australia, Canada, Ireland, New Zealand, South Africa, United Kingdom and United States). This was discovered by examining the e-government strategy documents of each country. Based on this analysis, three strands emerged on how to make the e-government vision a reality: developing a central portal, providing online services, and improving online relations with business. All governments see the central portal as key to their e-government strategy and the means by which they can deliver services. The central portal is the first point of contact for the citizen and a badly developed portal can quickly put off or confuse those unfamiliar with technology or the workings of government. Good online services are made ineffective if citizens cannot find them and therefore progress is measured by the design and usability of the portal. The central portal should be a 'citizen-centric' site in that it is designed from the perspective of a citizen looking in at government rather than an official looking out. Therefore information is classified by its use to citizens rather than the department to which it belongs.

The delivery of services electronically represents the cornerstone of e-government policy, however if this is to realise the e-government vision they need to offer convenience to the citizen and a more efficient running of the government. Easier online trading with business emerged as an important factor in the e-government vision. Looking at how governments intend to achieve this shows that progress can be measured in terms of the levels of e-procurement in government, the use of single identity numbers, and the simplification of an organisation's reporting duties to government.

The second phase in the research was to apply the above framework to actual e-government initiatives in each country and three groups emerged to demonstrate progress: the leaders, the closing pack, and late starters. The leaders were Australia, Canada and the United States followed by Ireland, New Zealand and the United Kingdom (the closing pack) with South Africa the late starter.

The leaders were countries with a well-developed second-generation central portal, which although not complete, had been rolled out and was being further refined. These countries were well on the way to meeting their e-government targets and were able to provide citizens with more interactive services online. Perhaps the strongest reason to place these countries ahead of the others was that they offered the complete e-government vision by having strong online relationships with businesses. All three countries had developed e-procurement and/or e-tendering systems beyond a pilot stage.

The closing pack represented countries that knew exactly where they were going with their e-government programme. Ireland and the United Kingdom had the beginnings of a citizen centric portal; they were progressing well with online service delivery and had begun a pilot scheme with e-procurement. New Zealand had recognised the need, and set aside resources, to develop a new government portal, had a number of online services and was also piloting e-procurement.

The final group was the late starter South Africa. This had a central portal organised around departments rather than citizens with only a few online services such as downloadable forms. The use of the Internet for advertising tenders is commendable when compared to the cautious approach taken by other countries. For obvious political reasons the country has had more pressing concerns than e-government but they now have a vision and programme in place to create the infrastructure and training necessary to develop e-government.

In conclusion, what this research has shown is that there are a number of common themes both in the e-government vision and methods of implementation among countries around the world. This has allowed for the development of a model to compare and list the progress of different countries. However, perhaps more importantly than listing one country against another, this model represents a tool by which other countries (especially the late starters) can benchmark their progress. The movement from 'late starter' to 'closing the gap' to 'leader' shows that e-government is an evolutionary process rather than a giant leap in the dark, and this framework provides a route map for emerging countries to guide their e-government initiatives.

Link:
More information on a variety of e-government research and resources:
http://www.bestvaluecommunity.com

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A Reference Model to develop Strategic E-Government Concepts

by Heide Brücher

The E-Government Competence Centre at Berne University of Applied Sciences developed a six-stage reference model to assist the town of Luzern and the canton of Berne in their definition of an overall e-government strategy.

The domain of e-government is not independent from developments in other areas. It is affected by and has impacts on related areas. Therefore it seems very suited to address the topic from an overall perspective. The E-Government Competence Centre at Berne University of Applied Sciences accordingly took this perspective when consulting the town of Luzern and the canton of Berne in their definition of an overall e-government strategy. The major outcome of these projects was a six-stage reference model to assist in the planning process of e-government. The stages cover vision, strategy, concept, project-portfolio, projects and measures. The objective of the developed reference model is to support the planning process from a strategic to an operational level, so that the definition of an overall concept and the final derivation of specific implementation measures can be done under the same guidelines.

In the long run, an overall blueprint saves time and money. It allows planners to consider alternatives, select the best option, work out details, and achieve agreement before anyone starts building the application. It's much less costly to use a model than it is to modify an e-government application after it has been assembled. More importantly, a good model documents the application's structure and simplifies modifying it later.

The first stage of the reference model covers the development of an overall e-government vision for a five to ten year planning interval. The vision specifies the objectives of e-government in the long run. Strategy grids, scenario analysis and estimates on future development can be used to figure out these objectives.

The model's second stage contains the definition of the strategy. This stage paves the way for an implementation of the e-government vision in the next three to five years. Two supportive tools are used for the strategy definition. First, weights are assigned to the objectives of the e-government vision. This leads to a prioritisation of the respective objectives. Secondly, the general proceeding is defined by specifying the reference framework. This provides the basis for the concept development.

The subject of the third stage is the pre-definition of an e-government concept valid for three to five years. The concept incorporates the implementation guidelines for the strategy. The implementation guidelines are derived from detailing the general proceeding in planning phases and necessary resources.

On the fourth stage of the model, the definition of the project-portfolio follows the above fixed concept. The project-portfolio is valid for the same time horizon as the concept. All projects of the project-portfolio are means to achieve the vision's objectives. Therefore various project streams as well as pilot projects have to be defined on this stage of the reference model.

The projects form the subject of the model's fifth stage. In this stage the projects are described using milestones, detailed resource planning and pilot projects. The planning interval on this already quite detailed level thus is up to two years. The sixth and last stage of the reference model specifies operational measures to implement the strategy. Due to this fact the time horizon is quite short, normally between one and two years.

Summing up, the developed six-stage reference model yields a number of benefits. First, the vision specified on the first stage of the model provides the base for an overall and precise e-government strategy and implementation. Secondly, the tight link between the three stages of strategy, concept and project-portfolio forces those responsible for stipulating the strategic planning to deal not only with the abstract strategic level but also to cope with the strategy's impacts on the following stages of the reference model. Thirdly and finally, the definition of projects and measures derives from the specification of the guidelines and the general proceeding in the above stages and thus in reference to the same general framework. While the assistance in development, implementation and use of overall strategic concepts provided by the visualised reference model does not ensure the success of an e-government strategy, it can improve the chances of success. The model outlines in an abstract way the main stages of a tested and presently still investigated proceeding. Nevertheless the model cannot help an e-government vision to succeed that is beyond reality.

Concerning future activities in this research project the author will investigate the critical success factors of each stage to specify the reference model more precisely. The critical success factors will also be used to analyse interdependencies of the stages and impacts in more detail. This project is already part of the Competence Centre's project portfolio for 2002 and it is planned to work this out together with broad municipal assistance. Further it is intended to conduct an inquiry to find out the main obstacles, hassles and pitfalls of e-government implementations.

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An Interactive Stroll in a Walled Garden

by Dan Jellinek

The Office of the e-Envoy's long-awaited paper on the use of interactive digital television for e-government services is finally set to be published in November 2001.

The government's attitude towards the development of public services within proprietary digital TV systems or 'walled gardens' – rejected out of hand in an earlier version of the policy paper – is to be softened in the new version, sources say.

The earlier draft, considered by a Cabinet Office working group in June, had suggested that public service channels should never be carried exclusively by a single commercial delivery channel such as a set-top box, since this would raise the potential for companies to hijack or exploit these services for commercial ends.

But following heated internal debate, and in the absence of open standards for public service channels, the revised policy will sanction further exploration of the use of walled gardens.

At the heart of the report will be the government's belief that digital television will play a key part in achieving its ambitious, intertwined targets of universal access to the Internet; placing of all public services online; and the establishment of Britain as a world-leader in e-commerce.

The paper will examine the potential of all the various uses of digital television – from reference information services to enhanced television programmes – for public services. It is envisaged that the government's main Internet portal, UK Online, will also brand its digital TV services. It will conclude that the key challenge for interactive services is not technical, but the provision of compelling content of kinds that will stimulate consumer demand.

Once the paper is published a 28-day consultation period will follow, concluding before the Christmas break. In January, the results of the consultation will be woven together with no less than three other major policy exercises in an impressive display of joined-up thinking – assuming it all works – culminating with a final digital TV policy paper for January launch.

The first of the three supplementary strands is the recent Broadband Stakeholders Group first report which urged convergence between government broadband policy and digital TV policy (see E-Government Bulletin, October 2001). A beefed-up version of the broadband report is due to be released by ministers in the next fortnight, and the government acknowledges that it will make little sense to consider the roll-out of a national broadband network separately from working towards the switchover from analogue to digital TV in 2010.

The second is a recent consultation exercise on a 'Digital TV Action Plan' from the Department of Trade and Industry and the Department for Culture, Media and Sport (see http://www.digitaltv.culture.gov.uk).

And the final strand is a little-noticed but highly significant 'channels strategy' paper, which was posted up on the 'GovTalk' (http://www.govtalk.gov.uk) policy and standards consultation site for 28 days ending on 5 November.

Though it was also circulated to a few consultation email lists, observers were surprised that the channels paper, a high-level document drawing together many key aspects of e-government policy for the first time, was not posted for consultation on the e-Envoy's own site.

The channels paper suggests all public sector bodies in the information age must have a strategy for which channels, from mobile phones to paper, it will use to deliver its whole range of services and in what proportions. It is particularly sig-nificant in floating the idea of private companies such as Internet portals, broadcasting or telecommunications companies becoming intermediaries for the delivery of public services - the abstract form of the digital TV 'walled garden' debate. Local councils could also become formal intermediaries for central government services, and the paper suggests a mix of channels will be required. Representatives of local government feel strongly that there should be a presumption in favour of localised intermediaries in the final version of the policy, which will also be launched before Christmas, maintaining the frenetic pace of policy development.

Once all these strands have been woven together, the digital TV policy will be an important building block towards the Communications Bill in the New Year, which will set out a new pattern of combined regulation for the broadcasting, telecommunications and online content industries. A wonk's work is never done.

This article first appeared in E-Government Bulletin,a free monthly newsletter. To subscribe send a blanke-mail to egovbulletin-subscribe@head-star.com

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Towards a Virtual Coaching Service for SMEs in Developing Countries

by Sarra Ben Lagha, Alexander Osterwalder and Yves Pigneur

The information systems department (INFORGE) of the business school (HEC) of the University of Lausanne (UNIL) launched a project to develop an e-Business Model Handbook. If designed to be an openly accessible resource on the web and to contain illustrative case studies for typical business models in different contexts, this handbook can be a coaching service for small- and medium-sized enterprises in developing countries.

The key idea of the e-Business Model Handbook (eBMH) is that a repository and the associated computerised tool can significantly enhance the creativity and the efficiency of business model designers, particularly in small and medium sized enterprises (SMEs). Institutional and public players in developing countries could use such a tool as a virtual coaching service that gives special attention to the opportunities that arise out of the use of information technology (IT) and particularly the use of the Internet. These players would adapt the handbook to the country-specific environment by feeding it with illustrative case studies and outlining the national legal framework to exploit opportunities.

The first objective for this ongoing research is to propose a theoretical framework for defining, classifying, assessing, measuring and modelling business models. The second issue aims at deploying an empirical phase for describing, cataloguing, and analysing case studies illustrating typical business models. The third goal is to develop a computer-aided design tool for supporting the design, the assessment, the benchmarking, the critics, and the simulation of new business models (see Figure 1 for a general overview of this research).

The core of our ongoing research and the foundation for the eBMH is the development of an e-business model ontology or e-business model framework (eBMF). Just as any other ontology, this one shall explicitly specify the terms and concepts used in a specific domain – in our case the e-business model domain. To achieve this goal we rely on an extensive study of e-business and e-business model literature.

In our framework we identify the most important concepts in building in e-business models and show how these concepts are interrelated and rely on each other. We have divided our model into four principal components:
- The products and services a firm offers, representing a substantial value to the customer, and for which he is willing to pay (ICT have theoretically opened up new opportunities for products and services for firms in developing countries).
- The relationship a firm creates and maintains with the customer, in order to satisfy him, to create trust and to generate sustainable revenues (this element is particularly critical for firms operating in international export markets).
- The infrastructure and the network of partners that are necessary in order to create value and to maintain a good customer relationship.
- The financial aspects that can be found throughout the three former components, such as cost and revenue struc-
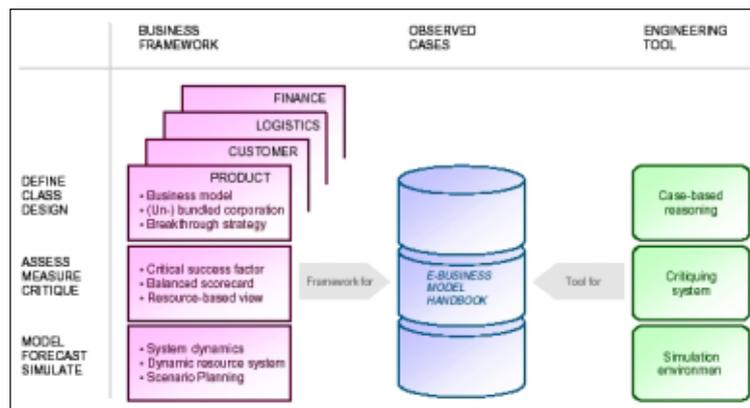

Figure 1: General overview of the research.
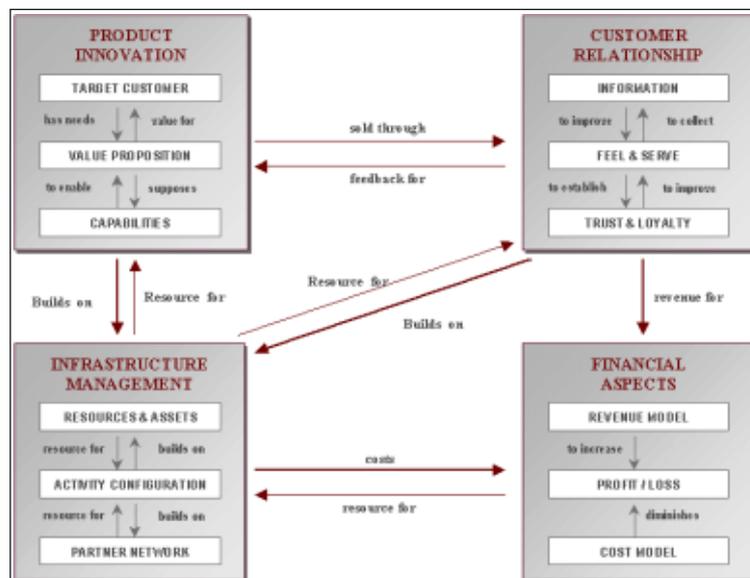
Figure 2: The basic e-business model framework (eBMF).

tures (see Figure 2 for the basic description of the eBMF).

To formalize the eBMF, we developed the eBML (electronic Business Models Markup Language). It is an XML grammar that represents the vocabulary of the framework and the relationships between the concepts. Many XML projects (xCBL, cXML,etc.) are developed to represent business processes. Since business processes are implementations of business models it makes sense to develop a new XML language to represent the eBM generated in the context of the eBMF and illustrated in the eBMH.

As explained above, the eBMF is the core and foundation for a number of ongoing projects in our research:
- The e-business modelling language (eBML). An XML-based markup language, which formalises the eBMF and helps communicate and share business models among deciders, managers or other stakeholders.
- The e-business model handbook (eBMH). A web-based tool that illustrates and explains the eBMF and uncovers the opportunities in the e-business domain.
- An e-business model design tool, which helps business model designers

rapidly design, adapt, assess and critic e-business models.
- An e-business model simulation tool, which helps managers learn about the implications of their decisions in e-business model matters in a risk free environment.

Links:
http://inforge.unil.ch/yp/
http://inforge.unil.ch/aosterwa

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Open Archives Forum

by Donatella Castelli

An 'open archives' approach is gaining popularity in the cultural heritage, knowledge-based and learning communities. The technology adopted makes it possible to disseminate and access content that is currently 'hidden' to the wider public at a very low cost. If the full potential of this approach is fulfilled, it will have a significant impact on the building of new service provisions.

The Open Archives Forum is a new EC 5th Framework Accompanying Measure for supporting the dissemination of information about European activities that adopt an open-archives based approach. OA-Forum will build a framework where European and national initiatives that use this approach can share their experiences and co-ordinate the development of software tools and infrastructures. Special attention will be dedicated to those initiatives which are implementing or using the Open Archives Initiative Metadata Harvesting Protocol (http://www.openarchives.org).

The main activities of this project will be aimed at:
- Disseminating the basic concepts underlying the open archives philosophy and of the Open Archives Initiative (OAI). OA-Forum will provide a common vocabulary for OAI implementations in Europe by creating a glossary and defining the history and background of concepts such as harvesting, acceptable use, rights, ownership, identifier resolution, metadata sharing, etc.

- Promoting the use of the open archives approach in providing access to a broader range of digital resources. Four European workshops will be organised over two years to encourage the sharing of experiences and propagation of good practice in opening-up archives. They will be targeted towards different domains, eg, cultural institutions, research organisations, public sectors, community services and commercial organisations, and towards different classes of users, eg, potential implementors, service and data providers.
- Validating the European experience in implementing and using the OAI harvesting protocol and other similar approaches to interoperability. Information on the different experiences will be collected and made available to the public. This knowledge will provide useful input for future projects and activities based on open and interoperable archives. The project will also encourage European initiatives to share and reuse software solutions. In order to inform these processes, the project will set up a web-based inventory of software products in use and under development in

Europe and elsewhere. Each product in the inventory will be accompanied by a metadata description and, when possible, an evaluation of the product, existing documentation, etc.
- Reviewing and analysing a variety of possible business models for the implementation of open archives, and exploring the added value that the open archives model might offer in different application communities. This will lead to an understanding of the issues necessary to ensure that European organisations benefit from the potential of open archive technology. Particular attention will be dedicated to the issues relating to Intellectual Property Rights, terms and conditions of use, and quality assurance, within an OAI-based system.

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IWICOS Broker: Meteorology, Sea-Ice and Ocean Data Interoperability in the Northern Seas

by Robin Berglund and Jyrki Haajanen

As a result of the potential exploitation of natural resources, requiring safer navigation along the shipping routes of the Northern Seas, the importance of the interoperability of data provided by the national meteorological and research institutes is rising significantly. Furthermore, the need for efficient monitoring of ongoing climate change creates new requirements for the accessibility of this kind of data by researchers.

VTT is currently taking part in the European Commission-funded IWICOS project, part of the IST Programme. The goals of the project are to research, evaluate and demonstrate the technologies and approaches required for an interoperable weather, ice, and ocean data service. The aim of the demonstration is to plan and implement a service chain for interoperable cross-organisation GIS data production and delivery for seafarers, and to illustrate the use of such data.

IWICOS Architecture

The system architecture consists of four different subsystems: the Producer Server, the Broker, the Facade, and the Client Software. Together, the Facade and the Client Software form the End-User System. Data providers implement the Producer Server and integrate it into their existing production process. Correspondingly, each Service Provider implements an End-User System. The subsystems form an interoperable service chain for producers and users of met, ice, and ocean data (see Figure).

The IWICOS service chain starts from the Producer Server creating the GIS data products and XML-based metadata descriptions of their contents. The next element in the service chain is the Broker. The Producer Servers inform the Broker when they have new data available. The Broker then collects their metadata for a single central storage. The Facade forms the next stage of the service chain - it functions as a ground station for a ship out at sea. The Facade has a high-bandwidth Internet connection and can perform the necessary filtering and selection of data prior to sending it over to the Client Software on the ship. Using the End-User system, the customers can query the metadata to find suitable products.

The Metadata and Data Formats

The metadata in the IWICOS project was specifically defined for the purposes of the project – existing metadata standards for GIS services were found to be too large to implement within the scope of a research project. The metadata definition is given as an XML Schema and the metadata files are XML documents instantiated from this schema.

In order to reduce the complexity of the implementation, the set of data formats for the communication between the Producer Servers and the Facades is limited to Binary Sequential Files (BSQ), GRIB (GRIdded Binary), Shapefile, and XML. Within the End-User Systems (Facade and Client Software pair) there are no such limitations. The Facades can use the base types listed above to generate products in any format. Basically, the End-User System is a black box – the subsystems outside should not (and will not) need to be interested in what happens therein.

IWICOS Broker

The Broker communication is implemented using Remote Procedure Calls (RPC) implemented over the Simple Object Access Protocol (SOAP). The marshalling of arguments in the Broker is based on an automatic Java to XML-type conversion provided by the SOAP framework.

The aim, when choosing the Broker software platform components, was to minimise the cost. Freely available components were available for each major task: operating system, web server, servlet engine, database, and communication.
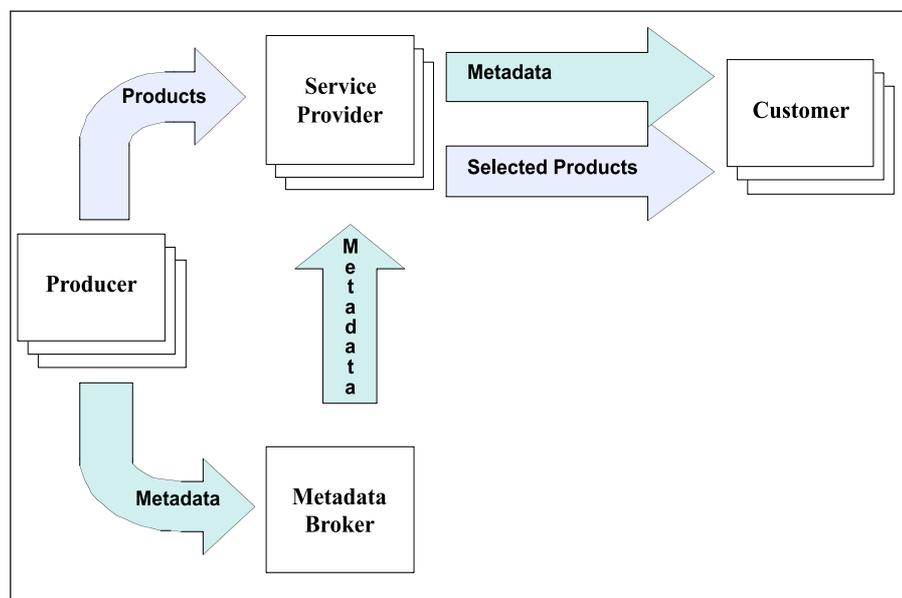
The IWICOS service chain.

The Broker has two external interfaces, one for the Producer Servers to manage the Broker's metadata content, and one for the End-User Systems to pose queries on the Broker's metadata content. Altogether these interfaces hold four separate operations. The access is based on common low-level web service technologies SOAP and XML.

The basic elements of the web services and Semantic Web technologies XML and SOAP protocol can be used efficiently to implement an interoperable service chain. In the near future, more feasible development of business-to-business solutions and networked service and supply chain implementations will be available as the higher layers of this technology family are brought into use.

ICEMA: the Digital Heart

by Frédérique Clément

Making the best of the fantastic capabilities of the new cardiac imaging technologies, such as continuous 3D cardiac ultrasound, is the challenge taken up by INRIA through the ICEMA (Images of Cardiac Electro-Mechanical Activity) cooperative research initiative (ARC).

ICEMA commenced in January 2000 and is developing into a skilled and multi-disciplinary initiative. Modelling experts, numerical analysts and image specialists are pooling their resources to design a fine numerical model of the activity of the heart, based on what is known of its functioning at the level of cardiac fibres. The originality of the researchers' approach is to take into account both the electrical and the mechanical components of the organ activity. In effect, heart mechanical contractions are controlled by a conduction network issuing from the sinus node, the electrical depolarisation of which triggers muscular fibre contraction. Such an approach is not without difficulties, since it requires the coupling of two complex systems. It does, however, better conform to physiological models.

Initially, project Sosso was able to describe the behaviour of the fibres that make up the myocardium by writing down a system of differential equations compatible with the molecular and cellular descriptions of contraction. Coupling this system to a model of the electrical activity of the heart – the control – makes it possible to locally describe the electromechanical activity. The global description takes into account geometrical aspects (the shape of the heart), dynamical aspects and the cou-

pling with the other organs that take part in the system (blood volumes, vessels, etc.). The result is a system of partial differential equations developed by numerical analysts from projects Macs (INRIA Rocquencourt) and Sinus (INRIA Sophia Antipolis). These models are then tuned with the heart image reconstructions performed by the Epidaure research team at INRIA Sophia Antipolis, thereby obtaining a numerical description of the heart that is as realistic as possible.

For their part, Epidaure researchers have reconstituted heart movements with the highest possible precision, based on 3D cardiac ultrasound image sequences supplied by Philips Medical Systems. For purposes of image segmentation, they have designed a volumetric model of the heart with an associated mechanical behaviour, which accounts for the heart's very special torsional contraction. This model is in the process of being coupled with a reconstruction of the electrical field at the surface of the heart from electrocardiograms.

The simulation of the mechanical behaviour of the heart thus obtained already provides satisfactory results. At the end of the initiative, one year from now, basic tools should be available that, once integrated into a platform, will
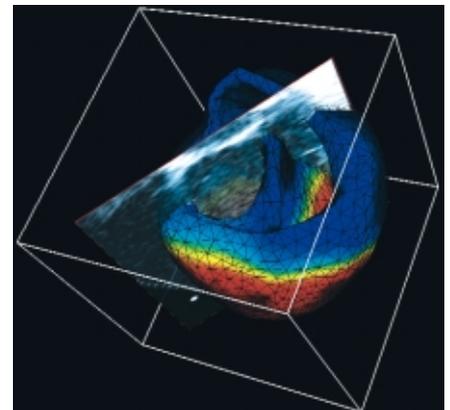
Biomechanical Model of the Heart (© INRIA Epidaure Research Project).

allow clinicians to associate macroscopic perturbations visible on images or electrocardiograms with localised dysfunctions, either of muscular origin or related to the electrical control. The simulation aspect, which allows for prediction, could also be of interest in the study of surgical or pharmacological treatments.

Universal Multimedia Access – A Part of the Midgard Media Lab Research Portfolio

by Andrew Perkis

Midgard Media Labs vision is to establish a common Media Base/Media Player for NTNU serving their internal needs as well as those of collaborating interest groups in Norway. Further, they want to establish a common Service Centre and Help Desk functionality for individuals and institutions needing help to build and understand content for the new digital media and to provide a common platform for advanced research within multimedia content generation, digitisation, distribution and presentation.

Midgard Media Lab is organised in four parts:
- Midgard Research: Long term, basic, multidisciplinary media research initiative based on PhD and Masters students in collaboration with industrial Sponsors and Thematic consortia
- Midgard Media Base and Midgard Net: Common media base and media net for application developments and collaborations
- Midgard Education: Common educational initiative in new digital media and media technology at NTNU.

Midgard Research involves building consortia for collaboration on development of media technologies. We are currently focussing on broadcast, telecommunications, medical, and advanced interactive media consortia, which involve partners such as NRK, Telenor, FAST Search and Transfer, GRID-MEDIA, aha.com, AVID, Apple, IBM and others.

Midgard Research addresses issues regarding access to rich multimedia content through a variety of possible schemes and systems according to the terminals capabilities and network conditions (Digital TV networks, very high speed IP networks, ATM networks, IEEE811.x networks, IEEE1394, GSM, UMTS, TETRA, etc). The application focus is towards multimedia distribution (communications, broadcasting, webcasting) using future generation mobile and wireless communications systems. The Universal Multimedia Access – UMA – concept will ensure the user gets the same reliability and seamlessness in the mobile system as in a fixed environment. The problems addressed are QoS issues in network solutions for multimedia communications and reconfigurable architectures and network control based on source adaptations through media conversions.

Universal Multimedia Access (UMA) is about how users can access the same media resources with different terminal
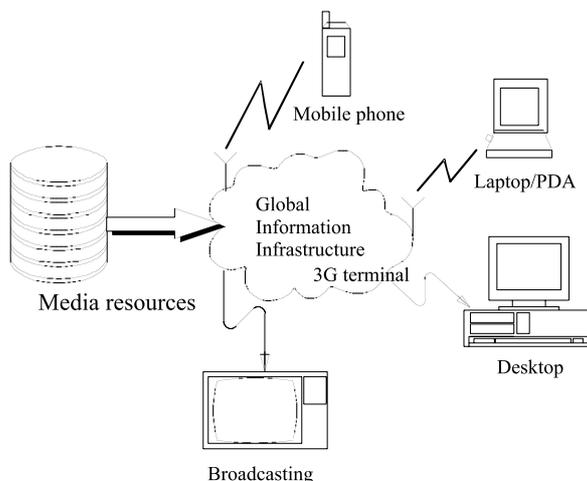
Universal Multimedia Access.

equipment and preferences. For this to be enabled, the media resources have to be adaptable and flexible according to the users' needs and capabilities. To accomplish this a media delivery architecture has been developed taking advantage of some of the possibilities in the upcoming Multimedia Framework, MPEG-21. A test bed, used for experimentations and developments of MPEG-21, is under development, which models parts of the UMA concept and MPEG-21. The test bed emulates media resource delivery in a streaming environment, with various terminal and network capabilities. The paper describes the test bed concepts and discusses issues on media representation and presentation relating to a streaming media environment.

Our work has had a strong impact on ISO standardisation work such as JPEG2000, MPEG-4, MPEG-7 and MPEG-21. Contributions to JPEG2000 lead to the establishment of a Working Group under the ESPRIT program (EUROSTILL), coordinated by personnel from our department. Further efforts were continued within the ACTS project SPEAR with NTNU as partner. This collaboration has lead to ongoing co-operation with Ericsson Media Lab, EPFL, IMEC, and the University of Wollongong, and is currently kept up through our involvement in MPEG-7 and MPEG-21. At the European level we are part of COST action 276 Information and Knowledge Management for Integrated Media Communications Systems.

Our current project portfolio consists of projects funded by the Norwegian Research Council (UMA - Universal Multimedia Access from Wired and Wireless Systems), NORDUnet2 (Nordic Minister Council, including universal access to the multimedia portal) and industry consortia through Midgard Media Lab.

The Norwegian Research Council funds a PhD based research program focussing on fundamental issues of Universal

Multimedia Access. The project involves PhD topics that currently are:
- Adaptive Network architecture and QoS (Dr.Ing.)
- Streaming media and media conversions: Dynamic adjustment of coding rates/active networks (Dr.Ing.)
- Authoring, content production for distributed, layer-structured, scaleable media services (web, TV) (Dr.Art.).

The Nordic Minister Council funds a co-operation between NTNU, Ericsson Media lab, Framkom and SINTEF Telecom and Informatics with the main goals of developing the Communication Infrastructure and streaming media and media conversion for Universal Multimedia Access. In addition there is an educational programme for student and personnel exchange between the partners. Through Midgard Media Lab we are currently establishing a Norwegian initiative in Interactive Advanced Media Technology based upon the Midgard Media Lab framework.

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COTE – Component Testing using the Unified Modelling Language

by Claude Jard and Simon Pickin

COTE is a French national project which aims to prototype an integrated testing environment for software components modelled in the Unified Modelling Language (UML).

A mass market in reusable software components requires a high level of component quality, making testing a crucial part of software quality assurance. For components modelled in UML (the Unified Modelling Language widely used in industry), there are significant advantages in also using UML for the test description language. This language is to be the pivotal formalism of a UML testing environment. It will be used as input by the executable test generator and, in work of a more tentative nature, will be produced as output by the test synthesiser. The prototyping of such an integrated testing environment is the goal of the COTE project.

After more than thirty years as a desideratum, component-based software is finally becoming a reality. In a software component economy, the provider needs to have confidence that the components will work correctly in widely differing contexts, while the client needs to have a clear, simple and reliable path to integrating components that ensures their correct functioning in the relevant application. The different players involved in the provision and acquisition of software components therefore need methods, tools and techniques to verify, test and certify them. Testing is a crucial part of software quality assurance, and the potential gains in productivity that can be obtained by automation of the testing process are large.

The notion of testing currently used in many approaches to object-based software testing is restricted to checks on the result of single method invocations using fixed parameters, or possibly to the execution of a sequence of such checks. Beyond these aspects, we wish to be able to correctly treat asynchronous messages, callbacks, branching, loops, explicit concurrency and active objects. We therefore seek inspiration from telecom testing, and in particular from the work carried out on conformance testing of telecom protocols. We are interested in black-box testing, and among the properties we wish to test are those concerned with correct ordering of the messages interchanged between the system under test conditions (the component being tested, possibly combined with other components whose communications are not all visible to the tester) and the tester, who plays the role of the system's environment. Among the different views used in UML modelling, interactions are most suitable for describing message orderings. With sim-
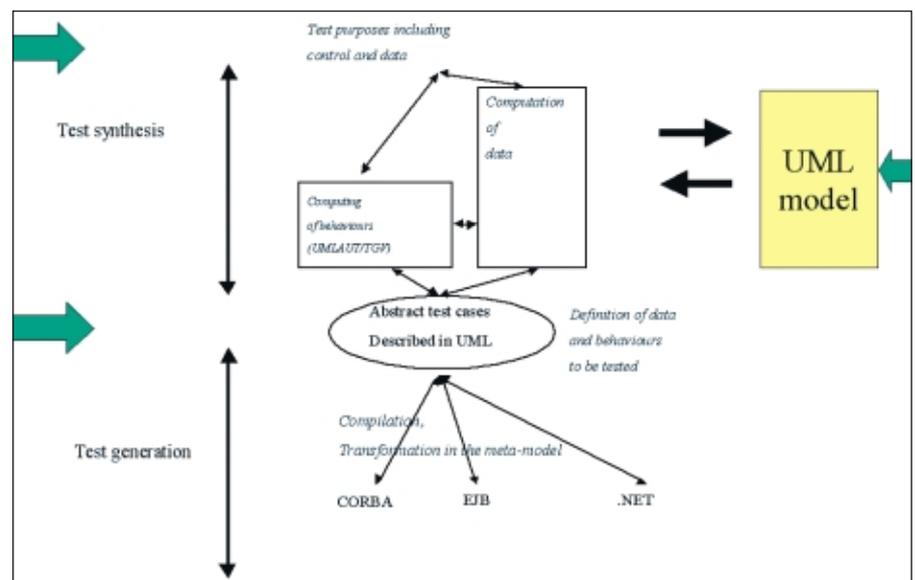
General architecture of the UML integrated case tool.

plicity and user-friendliness in mind, we set ourselves the goal of providing a UML test profile based on the UML sequence diagram.

The COTE project is supported by the French Government through the RNTL (Réseau National des Technologies Logicielles) programme. It started in November 2000 and will last for a total of two years. The members of COTE are: France Telecom, GEMPLUS, IMAG/LSR, IRISA and Softeam (the project leader). The project is adapting those model-based testing techniques which have achieved a certain level of maturity (like TGV, mainly developed at IRISA and partly transferred to industry), in order to transpose them to the component setting. As well as test synthesis (from test purposes to abstract tests) and test generation (from abstract tests to concrete tests for particular platforms), work is also being carried out on techniques for statically certifying conformance and consistency. The intention is to obtain a good external coverage with a minimum of test definition work. The different techniques are being defined and employed at the level of the abstract model in order for them to be applicable in all currently employed component technologies (eg, EJB, CORBA or COM/.NET). The work of the project centres on black box unit testing of two types: behavioural tests generated from dynamic information, such as state diagrams, and functional tests generated from static information, such as pre- and post-conditions. It is not within the scope of the project to attempt to unify these two approaches in a systematic manner by treating data symbolically and using abstract interpretation and proof techniques. However, the interaction of the two types of technique is being studied with the aim of using them jointly in a complementary fashion. Several case studies are under development: a telecom information system and a smart card application in electronic commerce.

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Ambient Network

by Philippe Jacquet

At home or outdoors, wireless networks are different. Mobile or ad hoc, Hiperlan or Bluetooth communications must be merged into an ambient network, transparent to the user.

Scenario: Arthur, a student, is leaving his school and walking home with his friends. During the day, the wireless network of the school campus has provided all the multimedia support needed by his teachers for their lectures. The mobile network from school to home allows Arthur to exchange data via his portable device as he is walking home; generally games and jokes, and sometimes information about lectures. Once at home, Arthur enters the home network, which is connected to the residential network. His portable device exchanges data with the home computers. Arthur knows exactly where all the other members of his family are (cat included, thanks to a low-power positioning implant). His sister Sabrina is not at home; she has exported her homework next door to her friend Marina's place, and will stay there for a couple of hours. The oven informs Arthur via his portable device that there are cookies ready, but his mother has left instructions that Arthur should not eat more than two before his sister is back. When his homework is completed (with some multimedia support reviews on the home TV screen) and the results acknowledged by the teacher e-mail system, Arthur can play soccer with his friends. No need of a referee, since the ball contains a low-power wireless chip and a complete description of the ground that enables it to automatically detect offside play, goals, and some other extra rules specifically invented by the team. The video surveillance of the playground can provide an automatic replay on the portable device in case of arguments. When dinner is ready, Arthur is called back home through the residential network via his portable device.

As described in this scenario, an ambient network refers to the presence of a digital environment that is sensitive, adaptive, and responsive to the presence of people. An ambient network can thus be characterised by the following basic elements: ubiquity, transparency, and intelligence. For an ambient network to succeed it must address many chal-
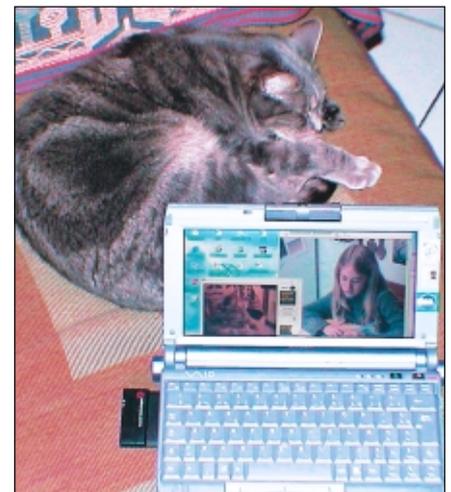
Home ambient network for the whole family.

lenges, and as a consequence, the relevant research covers several areas:
- hardware must become adaptable, scalable and stream-efficient to provide computational resources that are both energy-efficient and powerful for a variety of computational tasks
- software and protocols must become adaptable to provide flexibility and spontaneity, eg, by supporting smooth vertical hand-offs among communication technologies. Services and soft-

ware objects must be named by intent, for example, 'the nearest printer', rather than by address.

There is no universal radio technology that suffices for all Arthur's communicating devices as they are described above. Indeed it has been theoretically proven that capacity is inversely proportional to range. For example, the 100 kbps of a single GSM frequency can cover up to 10km, OK for a call for dinner. But the 10 Mbps needed for video transmission (IEEE802.11, Hiperlan) is limited to 100m. The causes of the limitation have long been known. In 1948 Shannon proved that the number of bits per Hertz was bounded by the logarithm of the ratio of signal to noise. This naturally limits the capacity of low-power portable devices compared with more highly powered versions. The very limitation of wireless capacity lies in the digital signal processing (DSP) ability, ie, the algorithms used to extract the data from the signal. Since surrounding buildings, walls and other obstacles signifi-

cantly distort this signal, the DSP becomes crucial at high throughput when close to Shannon limit. The stronger the DSP, the more power it consumes.

There is therefore a need to maintain the co-existence of various wireless standards. Thanks to reprogrammable DSP or multiple interface devices, Arthur's portable device switches from Hiperlan to GSM when exiting campus. It switches to IEEE 802.11 when Arthur gets home and during his homework. It switches to Bluetooth on the playground, to IEEE 802.11 again for game replay and finally to mobile phone for the call to dinner.

INRIA is working on wireless network algorithms that manage such protocols within the best performance and quality of services. In particular, ad hoc networking offers the possibility of considerably augmenting the range of high-speed networks by relaying from host to

host, or of adding flexibility with multiple interface routers.

Moreover, these algorithms mean that heterogeneous traffic can be efficiently routed in response to application demands, through nodes that differ in connectivity, computational power, and resources. Other research subjects concerning ambient networks cover security and service location protocols.

In the near future, thanks to this promising research, our homes will have a distributed network of intelligent devices providing us with information, communication, and entertainment. Of course, Arthur shouldn't even be aware of all this, since he has plenty of homework to do.

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MASCOT — Adaptive and Morphological Wavelets for Scalable Video Coding

by Henk Heijmans

The European MASCOT project seeks to improve the quality and efficiency of video coding systems by exploiting metadata information, and to design a scalable video coding scheme by exploiting novel morphological and adaptive wavelet decomposition methods. The project is funded by the EC 5th Framework IST Programme and is coordinated by CWI.

The explosion of multimedia applications is leading to a great expansion of video transmission over heterogeneous channels such as the Internet, mobile nets and in-home digital networks. The requirements for bandwidth availability and quick and easy access to large multimedia databases are becoming increasingly stringent. However, the improvement in compression efficiency between MPEG-2 and MPEG-4 is not significant, and new techniques are needed to meet these requirements. The MASCOT project explores two such techniques, namely non-linear (morphological) and adaptive wavelet decompositions, and the utilisation of metadata.

In the future, audio-visual documents will as a rule be indexed and presented in a database together with metadata describing their content. Image and video sequence encoders may use this metadata information to improve their efficiency or to optimise their strategy. MASCOT seeks to validate this approach and to develop an efficient compression scheme exploiting such information, for example metadata representing the structure of a video program, governing shot boundary descriptions (cuts, dissolves, fades), and metadata for face recognition.

Compressed data representation with good scalability properties enhances efficient transmission of video over heterogeneous networks with limited channel capacity. Here 'scalable' means that the bit-stream can be compressed such that only partial decoding is necessary, its degree depending on the conditions (bit-rate, errors, and resources). Of course, the quality level depends on the percentage of the bit-stream used by the decoder. Scalability can be spatial, temporal or with respect to quality (SNR).

A new tool for building a fully scalable video codec is the 3D wavelet (or 3D

subband) decomposition, providing both spatial and temporal scalability. A single bit stream is encoded at very high bit rate, full frame rate and original display size. Scalability markers enable truncation of this bit stream, at the encoder or the decoder side, by jumping from one spatial/temporal resolution level to another. Bit budget management can be used at both sides to stop decoding at the targeted bit rate, thus enabling any desired combination of spatial resolution and frame rate. SNR scalability is achieved by embedded coding algorithms such as the 3D SPIHT algorithm. The 3D wavelet codec developed in MASCOT is based on an approach developed by MASCOT partner Philips Research France (see Figure).

3D wavelet analysis, consisting of consecutive temporal and spatial filtering, leads to a spatio-temporal multiresolution decomposition of the input group-of-frames (GOF), enabling smaller display sizes and/or lower frame rates. Temporal filtering is performed along the motion trajectory, requiring motion compensation for each pair of frames. Temporal Haar filters are used for GOF's consisting of 16 frames. (The example in the Figure starts with eight frames for reasons of convenience.) In the first step this gives rise to eight high-

pass frames (shown in pink) and eight low-pass frames (shown in blue). In the second step, the group of low-pass frames is again spatially filtered leading to four low-pass frames (LL) and four high-pass frames (LH), etc. Eventually, one ends up with 15 high-pass and one low-pass frame. These frames are decomposed spatially using 2D wavelets. Roughly speaking, low-pass frames contain the low-frequency part of the temporal signal in the GOF corresponding to an average, and the high-pass frames contain the high-frequency part corresponding to a difference or detail signal.

The wavelet coefficients are encoded using an algorithm, called fully scalable zerotrees, which preserves the initial subband structure of the 3D wavelet transform. The hierarchy of temporal and spatial levels can be transposed to the motion vector coding. In the Figure the motion vectors are denoted by MV_k, where k denotes the decomposition level.

In their original form, wavelet decompositions are linear. This may lead to various artefacts when coding image or video sequences containing sharp edges. One of the aims of this project is to propose new wavelets able to preserve

significant structures inside scenes such as edges, textures, etc. A general and flexible framework for the wavelet construction is provided by the lifting scheme that enables one to modify existing wavelet decompositions, and to include nonlinearities and/or data-dependencies. Thus families of wavelets are developed based on mathematical morphology (morphological operations such as taking the maximum or the median are non-linear), as well as adaptive transforms based on the lifting scheme. The structure of such adaptive transforms may vary according to the nature of the input signal. Both linear and nonlinear filters may be used in the lifting steps and nonlinear criteria may be employed in order to select the best structure. This should lead to higher compression ratios for video sequences as well as to a superior subjective quality of their reconstruction. Recently we have succeeded in developing adaptive update lifting schemes that do not require any bookkeeping for perfect reconstruction. In these schemes, the choice of the update lifting filter is triggered by a binary threshold criterion based on a generalised gradient that can be chosen in such a way that it only smoothes homogeneous regions.

CWI's partners in the MASCOT project are: ENS des Telecommunications Paris, Heinrich Hertz Inst. Berlin, ENS des Mines Paris, Poznan University of Technology, UPC Barcelona, Vrije Universiteit Brussels and Philips Research France. The project comes under the Commission's FET (Future and Emerging Technologies) initiative that enables research of a bold nature involving high risks. MASCOT started last May and runs for two years. A public demonstration of the MASCOT codec is planned during a major international exhibition at the end of the project.

- → motion compensation
- → low-pass filtering
- → high-pass filtering
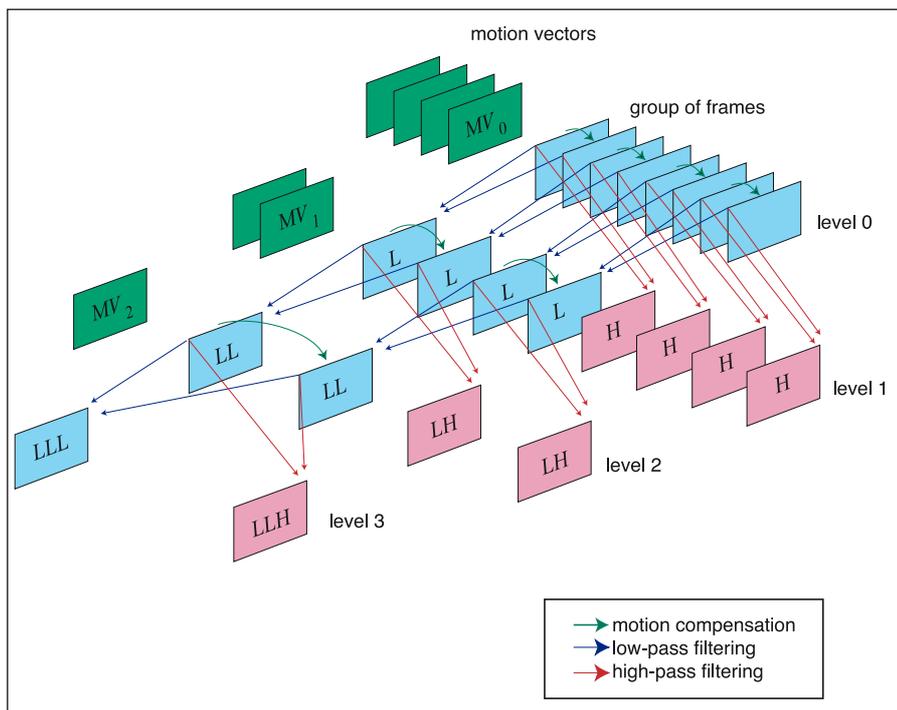
Overview of the 3D wavelet codec.
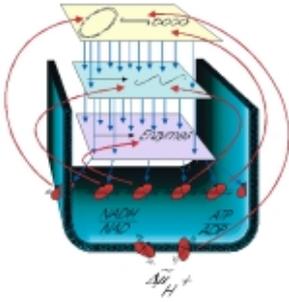
The Silicon Cell

by Joke Blom

The Dutch Silicon Cell Initiative aims at computing Life at the cellular level, on the basis of our rapidly expanding knowledge of a cell's genetics, biochemistry, and molecular dynamics. Four Amsterdam-based research institutes have formed a Consortium (SiC) to realise this aim, which is expected to take decades. CWI's involvement concerns the analytic and numerical study of models, and visualisation.

The Silicon Cell Consortium consists of the Swammerdam Institute for Life Sciences (SILS) and the Institute for Informatics, both of the University of Amsterdam, the Institute for Molecular Biological Sciences (IMBS, coordinator Westerhoff) of the Vrije Universiteit in Amsterdam, and CWI. A collaboration with the Humboldt University (GraduiertenKolleg) in Berlin started recently.

The long-term goal of the Consortium is 'the computation of Life at the cellular level on the basis of the complete genomic, transcriptomic, proteomic, metabolomic, and cell-physiomic information that will become available in forthcoming years'. SiC combines theory and experiment: on the basis of real experimental data and mathematical models, the implications for cell functioning will be computed. In this way we may hope to achieve a fundamental and quantitative understanding of the cell. If the cell can be approached in a rational and integrated way, it can be utilised as a 'factory' to produce chemicals or pharmaceutical components. In biomedical research, once the molecular basis of diseases is known, a rational treatment can be developed which can even be personalised based on the patient's gene information. Of course, these are dreams of the future. A well-known metaphor is that the genome is a parts list for Life, but that no one knows how to build the engine.

SiC's current, more modest ambitions are: computational modelling of specific modules of cell metabolism, and development of specific tools and approaches for modelling living cell behaviour. Model cells are *E-coli* (prokaryote) and *S. Cerevisiae* (baker's yeast, eukaryote), since for these two cells, extensive experimental knowledge and facilities exist at SILS and IMBS.

Some of the mathematical and computational requirements concern the application of already existing techniques, including the analysis and numerical solution of partial differential equations, parameter estimation in non-linear dynamical systems, and graph theory.
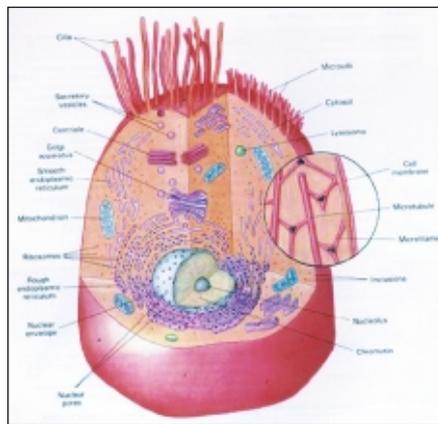
Anatomy of a eukaryotic cell (Picture: Dr. Barry Golden, Yavapai College, Prescott, Arizona).

New challenges concern the interaction between phenomena involving a wide range of scales (both in space and time) and organisational complexity, and the incorporation of uncertainty into the models. An important aim of SiC is the discovery of principles to reduce the size of the problem without losing essential information.

Current research at CWI concerns:
- Numerical and analytic studies of the influence of spatial variations in concentrations of biochemical species. Here a new type of control coefficient summation theorem was found
- Mesoscopic description of biological membranes by PDE's with a computationally expensive non-local component (also numerical and analytic studies)
- Reduction of models for very complex chemical networks in bacteria, involving about thousand different proteins. Study of the existence and stability of equilibria. Mathematical modelling of enzyme influence on cell processes
- Interactive visualisation of protein dynamics by essential dynamics methods (cf. articles by Robert van Liere, ERCIM News 44, January 2001, p.35, and p.39)
- Visualisation of time-dependent confocal microscopy data, eg, (de-)condensation of chromosomes during cell division with the interactive VR system proteus.

Future research:
- Modelling of spatial structures: comparison between the microscopic (particle-based), mesoscopic, and macroscopic (continuum PDE-based) approach
- Numerical solution of stiff biochemical reaction systems (many different time-scales) with 'noisy' kinetic parameters
- Study of cellular processes with time-critical characteristics, eg, in metabolic or in cell-cycle oscillations. Issues include feedback and regulatory mechanisms
- Mathematical modelling of ternary protein structure using dynamic graph theory.

Link:
The CWI Silicon Cell website:
http://www.cwi.nl/~gollum/SiC/

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Remote PC Applications on a PDA Device

by Charles Woodward and Petri Honkamaa

The Motion Vector Quantization (MVQ) method developed at VTT enables mobile operation of PC application software from a remote viewing unit. One of the first applications of the method is wireless viewing of 3D CAD models on a PDA device.

VTT has during the past years developed a strong video coding technology called MVQ (Motion Vector Quantization). The MVQ method is very light and fast at the receiving end, being especially well suited for implementation on low performance receiving devices and for low bitrate applications. The MVQ method is currently being licensed for international distribution by the companies Oplayo Oy (Finland) and ON-AIR A/S (Denmark).

Recently, the scope of video coding has been extended to new applications, ie, streaming moving imagery from computer sofware application's display. The new XVQ (X Windows VQ) method enables users to operate practically any application running on a PC workstation from a remote display unit, such as a PDA device, linked to the computer over a mobile phone connection.

Remote 3D CAD Viewing

The XVQ development work was performed in co-operation with a Finnish CAD vendor, DeskArtes Oy, in the Intellivideo project. According to

DeskArtes, mobile solutions for viewing of CAD files would bring significant time and cost savings to the production process by cutting short critical communication delays. DeskArtes provided to the project their View Expert software and programming work related to it, while all other work was done by VTT Information Technology.

For using the Wireless CAD Viewer, the user first establishes a GSM connection from his/her PDA device to a PC server workstation. The server program running on the workstation launches the View Expert software, supplies file browser information, and starts grabbing View Expert display area to be shown to the PDA user. With the available interaction commands, the client software lets the user rotate, zoom and pan, and ask for distances, angles and radii within the CAD model. Other CAD interaction commands will be straightforward to implement, as well.

The XVQ software is highly transparent: in effect, the user gets the feeling of operating straight with the CAD model
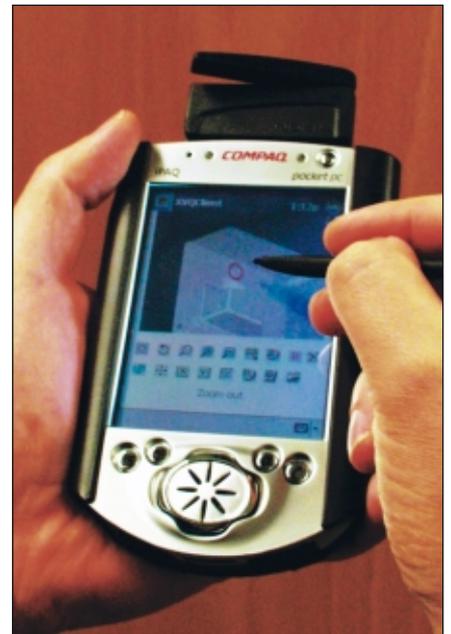

Remote CAD Viewing.

as it would actually reside on the PDA device. The XVQ method requires much less memory and processing power compared to methods of (down)loading the CAD model locally on the PDA device. The method offers reasonable interaction speed with data transmission rates as low as 5-10 kbits/sec, while the CAD file size is limited only by the computing resources of the server machine.

Software Architecture

XVQ has been written in C (libraries) and in C++ (user interfaces). XVQServer runs under Windows and it can be used on any common PC workstation. XVQClient is currently implemented in the Windows CE environment and it is compiled for the Compaq iPAQ and Casio Cassiopeia devices. Future work includes implementation on other operating systems and platforms, such as laptop PCs and the Nokia Communicator.

The communication between the XVQServer and the XVQClient is made through a TCP/IP connection. Two sockets are used: one for streaming the MVQ-compressed application view from server to client, and the other for application specific control commands and info messages in ASCII form. High flexibility of the implementation is obtained by separating all the application-specific parts, like communication with the application and the client user interface, in dynamically loadable drivers.
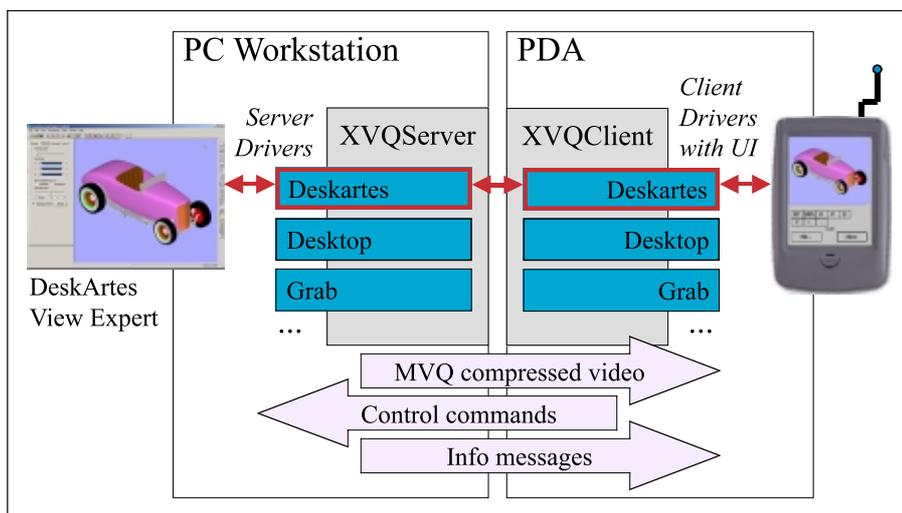
XVQ Architecture.

General Applications

The usage of dynamic drivers makes it easy to develop XVQ remote operation solutions not only with CAD software but with any software that allows external control commands. The change of the external application can be made on the run, just by changing the drivers. And as the client user interface is also contained within the driver, the PDA

view can always be optimised for the application in use.

At the date of writing, the VTT has already developed three further applications for XVQ: viewing the desktop area of the PC workstation, controlling and capturing the view from an external video camera, and remote control of a VCR device connected to the PC work-

station. We look forward to extending the list of applications, the most suitable ones for implementation with XVQ being those characterised by large document/database size and/or lively graphic content.

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Spatial Data Mining Platform based on Enterprise Java Beans

by Michael May and Alexandr Savinov

The rapidly expanding market for data mining and Geographic Information Systems (GIS) technologies is driven by pressure from the public sector, environmental agencies and industry to provide innovative solutions to a wide range of problems. The main objective of the SPIN! project is to offer new possibilities for the analysis of geo-referenced data. The SPIN! Spatial Data Mining System integrates state-of-the-art Geographic Information Systems and data mining functionality in an open, highly extensible, internet-enabled architecture based on Enterprise Java Beans.

SPIN! architecture.

So far, data mining and Geographic Information Systems (GIS) have existed as two separate technologies, each with its own methods, traditions and approaches to visualisation and data analysis. Particularly, most contemporary GIS have only very basic spatial analysis functionality. Many are confined to analysis that involves descriptive statistical displays, such as histograms or pie charts.

Data mining, which is the partially automated search for hidden patterns in large databases, offers great potential benefits for applied GIS-based decision-making. Recently, the task of integrating these two technologies has become critical, especially as various public and private sector organisations possessing huge databases with thematic and geographically referenced data begin to realise the huge potential of the information hidden there. Among those organisations are:

- statistical offices requiring analysis or dissemination of geo-referenced statistical data
- public health services searching for explanations of disease clusters

- environmental agencies assessing the impact of changing land-use patterns on climate change
- geo-marketing companies doing customer segmentation based on spatial location.

As a response to this demand a promising prototype has been developed which demonstrates the potential of combining data mining and GIS. This initial prototype encouraged the formation of the SPIN! project, which is funded by the European Commission under IST-10536-SPIN! The coordinator is the Fraunhofer AIS, and the partners are Univ. Bari; GeoForschungszentrum Potsdam; Univ. Leeds; Univ. Manchester, Manchester Metropolitan Univ.; Professional GeoSystems, Amsterdam; and Russian Academy of Sciences, Moscow. The overall objective of the SPIN! project consists in developing a web-based spatial data mining system by integrating state-of-the-art Geographic Information Systems (GIS) and data mining functionality in a closely coupled, open and extensible system

architecture. Thus the new generation SPIN! system pays special attention to such features as scalability, security, multi-user access, robustness, platform independence and adherence to standards.

The general SPIN! architecture is shown in the Figure. It is an n-tier Client/Server architecture based on Enterprise Java Beans for the server-side components. It has the following major sub-systems:
- client
- application server with one or more EJB containers
- one or more database servers
- optionally compute servers.

The client is a GUI Java application or applet. Clients can access the server by using RMI (or by HTTP/Servlets). Thus the system can work in Intra- and Internets. The application server is an Enterprise Java Bean container. It manages the client workspace, analysis and visualisation tasks, data access and
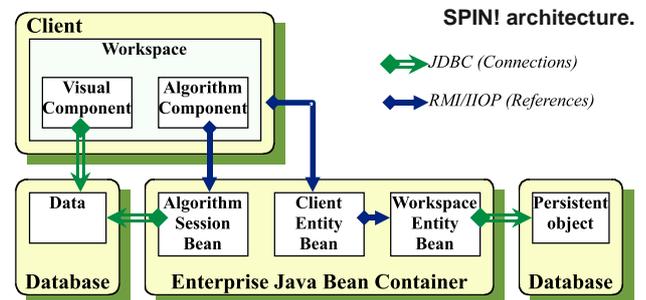
persistency. User data are stored in primary data storage, which is a relational database system (it may be the same machine as the application server). There may be one or more optional secondary databases for analysis data and/or workspaces. In addition, data can be loaded from other sources – databases, ASCII files in the file system or Excel files. Analysis tasks can run on one or more compute servers (it may be the same machine as the application server). The client creates one remote object for each analysis task to be run so that data is transferred directly from the database to the algorithm. After the analysis is finished, the result is transferred to the client for visualisation. A connector machine, a

Java Virtual Machine running on the application server, is used for accessing non-Java analysis tasks. These may run on additional compute servers.

The first prototype of the SPIN! spatial mining system has been implemented using the Java 2 platform on both the client and the server sides. The EJB components run on a Borland Application Server. One analysis algorithm EJB component uses a Java Native Interface to call procedures in a dynamically linked library. We used Oracle 8.1.7 as the database, which is accessed by means of JDBC drivers. The choice of EJB technology has allowed us to meet the requirements for web-based dissemina-

tion of census data, eg, security, scalability and platform independence, in a principled manner. The system is tightly integrated with a relational database and can serve as a data access and transformation tool for spatial and non-spatial data.

Links:
European IST SPIN!-project website:
http://www.ccg.leeds.ac.uk/spin/
Sun Microsystems EJB website:
http://java.sun.com/products/ejb/

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The Caml Consortium: Federating Industrial and Academic Partners around a Free Programming Language

by Michel Mauny

INRIA has recently launched the Caml Consortium, gathering industrial and academic partners around the development and the promotion of the Caml programming language and its open source implementations.

Free software is now recognised as an efficient way for promoting new software techniques and products. However, when those techniques and products emerge from academic research groups, there still remains a further step to be taken before being accepted by industry. This is particularly the case for programming languages, where the choice of a particular language doesn't depend only on the intrinsic qualities of the language and of its compilers. Questions such as: the continuity of the programming environment, the user base, the volume of existing code, and the availability of programmers are just as important, if not more.

In order to bring answers to such questions for the Caml programming language (see the related article in ERCIM News no. 36), INRIA recently decided to launch the Caml Consortium, whose aim is to gather highly motivated users around the development and the promo-

tion of the Caml programming language and related tools.

This language and its best-known implementation, the 'Objective Caml system' whose qualities are widely acknowledged, enable substantial gains in productivity to be obtained. This is due to its great expressiveness and to the static verifications carried out by the compiler which detects the majority of programming errors even before the program is run.

The Caml Consortium tries therefore to bring together, around the language development team, industries, research centres and educational institutions interested in contributing to the design and development of the language and related tools. The Consortium is designed as a place where the members can identify their common requirements, exchange their experiences and solutions, and co-operate to propose particular develop-

ments of general interest. One of the Consortium's roles is to stimulate information exchange between users. It is here that a true community will be created with the specific intention of assisting in the development of the language and to provide it with such a visibility that this community will expand by itself.

The motivation and industrial importance of its members should also attract to the Consortium companies which want to be present on the Caml applications and training market. Another role of the Consortium will therefore be to attract new members, whether they are users of the language or service providers.

Link:
Caml consortium website:
http://caml.inria.fr/consortium/

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ObjectWeb

by Gérard Vandôme

ObjectWeb is an Open Source software community created at the end of 1999 by France Telecom R&D, Bull/Evidian and INRIA. Its goal is to develop innovative middleware components available under an Open Source licence. These components can be used to build distributed platforms that can be adapted to specific application requirements.

ObjectWeb aims to define and implement a component-based, efficient and scalable middleware architecture which can be easily configured and adapted to different application domains. Targeted systems may range from small objects of nomadic computing to large application servers for electronic commerce. ObjectWeb is not targeted to the definition of new standards, but to the development of a coherent set of high-quality Open Source middleware components, including implementations of major standards in the area of distributed systems. The ObjectWeb code base already supports most of the relevant middleware standards, such as Sun's EJB™ and OMG CORBA.

ObjectWeb Consortium

ObjectWeb is organised as an open international consortium hosted by INRIA. The technical work is organised in projects corresponding to the development of the technical components of the ObjectWeb distributed infrastructure. Any individual, organisation or company can become member of ObjectWeb.

The ObjectWeb code base represents an industrial-strength platform. This code base is already widely used, for operational applications, experimental services and advanced distributed applications (in particular in the fields of telecommunications and enterprise infrastructure applications).

ObjectWeb already fosters industrial activity and will actively continue to do so, in particular through companies and start-ups, which are members of ObjectWeb and offer value-added solutions exploiting the ObjectWeb code base. By joining ObjectWeb, members are participating in a wide community providing them with the Open Source Middleware they need for the support of their distributed applications.

ObjectWeb Projects

ObjectWeb hosts technical projects providing support for the main standards in the area of distributed systems. The main projects currently running are:
- Jonathan is an adaptable distributed object platform, which currently provides several personalities, including one compliant with the OMG CORBA specifications and another with the RMI™ specification.
- JOnAS (Java Open Application Server) is a distributed platform compliant with the EJB™ (Enterprise Java Beans) specifications. JOnAS provides object distribution, security, distributed transactions and object persistency support according to these specifications. JOnAS also provides JMS™ (Java Messaging Service) and JCA™ (Java Connector Architecture) support through its integration with JORAM and JORM.
- JORAM (Java Open Reliable Asynchronous Messaging) is an Open Source implementation of the JMS™ (Java Messaging Service) specifications. JORAM provides a MOM (Message Oriented Middleware) built on top of the A3 (Agent Anytime Anywhere) distributed agent technology.
- JORM (Java Object Repository Mapping) is an adaptable persistence service offering various personalities, including one compliant with the CMP EJB™ specification and another with the JDO™ (Java Data Objects) specification. JORM provides object persistency through different secondary storage supports, such as files, relational databases or object-oriented databases. JORM includes an implementation of the JCA™ (Java Connector Architecture) specifications.
- OpenCCM (Open CORBA Component Model platform) is the first publicly available Open Source implementation of the CCM (CORBA Component Model) defined by the OMG (Object Management Group). OpenCCM allows design, implementation, compiling, packaging, deployment, and the execution of distributed applications compliant with the OMG's CORBA Component Model. It includes a complete OMG IDL3 compiler, an OMG IDL3 Repository, generators for CCM's OMG IDL2 mapping and extended Java component skeletons, a Java component server to host Java components, and a distributed deployment infrastructure.
- RmiJdbc is a remote JDBC ™ driver which, in conjunction with a local JDBC driver, allows remote access to a relational database through RMI™.

These projects are regularly extended in order to provide enhancements and new functionalities. New ObjectWeb projects will also be created in order to better satisfy emerging needs.

The ObjectWeb initiative is supported by various projects: Parol, sponsored by the RNRT (Réseau National de Recherches en Télécommunications), IMPACT, sponsored by RNTL (Réseau National des Technologies Logicielles) , and other French and European projects.

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ECDL — European Conference on Digital Libraries 2001

by Ingeborg Solvberg

ECDL2001 is now history, and it was a great success! The conference was the fifth in the series of European Conferences on Research and Advanced Technology for Digital Libraries, and the event took place in Darmstadt, Germany, 4-9 September 2001. It was jointly organised by the Technical University of Darmstadt, FhG-IPSI, and Die Deutsche Bibliothek (The German National Library).

ECDL2001 was seen as a good opportunity to review the impact that Digital Libraries have had on science, technology and society in general. This was partly answered in the 38 papers and in the three panel sessions presented at the conference. The topics of the conference are reflected in the names of the sessions: Data and metadata models; Digitisation, interpretation, and annotation of documents; Information retrieval and filtering; Integration in user communities; Knowledge management; Multilinguality; Multimedia digital libraries; User modelling.

Three invited talks from very different perspectives were given in plenary sessions by Mike Keller from Stanford University, Eric Miller from W3C, and Michael Türkay from Senckenberg Museum.

The panels were popular. Rather different topics were discussed. A specific type of digital library was discussed under the title 'What's holding up the Development of Georeferenced DLs?.' No answers were given, but the importance of georeferenced DLs was stressed. The topic of 'Open Archive Initiative, Publishers and Scientific Society: Future of Publishing – Next Generation Publication Models' raised important questions from a wide variety of panellists. The funding of research and the political side were covered in 'Collective Memories Programs.'
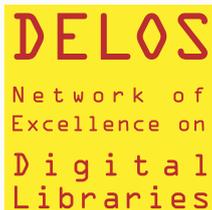
ELSEVIER Science Award at ECDL2001

The Elsevier Science Prize was given to Jon Riley from Great Britain in the closing ceremony of ECDL2001. Jon Riley won the prize for the best entry to the MetaLibrary of the DELOS Digital Library Test Suite during the Demonstration session at the conference.

The building of a European Digital Library Test Suite is one of the key objectives of the DELOS Network of Excellence which will provide DL researchers with a dedicated testbed for their investigations, enabling them to match their requirement needs with possible testbeds. To achieve this objective, a preliminary step has been the creation of a MetaLibrary service which is an extensible survey database where each DL collection/test-bed can register and provide information about itself. It provides intelligent testbed selection functionality for researchers. The hope is that the MetaLibrary will allow researchers to compare their digital libraries with others, to stimulate the interest of other researchers, and to assess future needs in this field of research.

A questionnaire was developed based on a novel holistic approach to DL classification and evaluation covering all major dimensions of DL systems: users/usage, collection, technology. Each dimension is subdivided into smaller areas resulting in a hierarchy of descriptive items.

If you are involved in a DL project, please fill in data about your Digital Library. The questionnaire can be accessed on the web at: http://sztaki.hu/delos_wg21/metalibrary

The organisers of ECDL2001 appreciate the financial support given to the conference by Elsevier Science, and the DELOS Test Suite Task expresses its thanks for the prize supporting the MetaLibrary.

Six workshops and four tutorials were arranged immediately before or after the conference and extended the range of subjects and the opportunities for exchange of knowledge and possibilities for establishing professional and personal networks.

The ECDL2001 conference was a real international event. The 350 participants of the conference and the affiliated workshops and tutorials came from 34 different countries, and the authors of the accepted papers were from twenty different countries.

The first ECDL conference in Pisa in 1997 attracted mainly computer scientists. The number of participants from other areas, such as librarianship, social science and information providers, seems gradually to have increased over the years. A special thanks to ERCIM for awarding 21 fellowships to young researchers! We are already looking forward to learning more about exciting DL research and to meeting new and old colleagues at the next ECDL

– ECDL2002 in Rome, 16-18 September 2002.

The proceedings of ECDL2001: Panos Constantopoulos, Ingeborg T. Sølvberg (Eds.). Proc. 5th European Conference on Research and Advanced Technology for Digital Libraries (ECDL2001). Lecture Notes in Computer Science Vol.2163, Springer Verlag, 2001, 462p.

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Third DELOS Workshop on Interoperability and Mediation in Heterogeneous Digital Libraries

by Matthias Hemmje and Umeshwar Dayal

The Third DELOS Workshop on Interoperability and Mediation in Heterogeneous Digital Libraries was held in Darmstadt, Germany, 8-9 September 2001 at Fraunhofer IPSI.

Recent years have seen an explosive growth in the number and diversity of networked digital libraries and information sources. Some of these sources provide general content, others are specific to particular domains. Increasingly, users want to transparently and uniformly access information from these different sources, to integrate information from multiple digital libraries, and to exchange content assembled from different sources.

The workshop was intended to bring together researchers and developers working on digital libraries and related areas for in-depth analysis and discussion of new models, theories, frameworks, and solutions to interoperability in digital libraries.

Interoperability and mediation in distributed, heterogeneous digital libraries require a middleware that provides transparent access to inherently heterogeneous digital collections. Among other things, such a middleware must support data translation between different data types, representations, detection of same-objects, and data propagation for ensuring global consistency. There are research and industrial efforts under way to develop techniques for the modelling, creation, and management of metadata and ontologies for integrating and exchanging content. Transparent search (and metasearch) and consolidation of information from multiple digital libraries pose many challenges beyond the typical problems encountered in web searches and distributed heterogeneous databases. Therefore, this workshop provided a forum for discussing these problems and the approaches that have been taken to address them.

The two-day workshop was organised into four regular paper sessions: 'Semantics', 'Metadata', 'Mediation', 'Applications', presenting three to four papers each.

The topics of general interest included several aspects: (1) Design and generation of mediators/wrappers/agents for transparent access to heterogeneous data sources, specific methods supporting various degrees of global consistency; (2) Scalable architectures, approaches supporting dynamic registration of heterogeneous collections at mediators/wrappers/agent levels, query planning, processing, and optimisation in (partially) redundant, heterogeneous data sources; (3) Indexing, integration, adaptation, and transformation of heterogeneus datatypes, meta-data generation, registration, reconciliation and exchange; and (4) Web-based end-user oriented mediation, brokering, as well as sharing of and collaboration within heterogeneous collections.

The workshop brought together researchers and practitioners from fourteen countries. Twenty-seven papers were submitted to the workshop; thirteen were accepted, covering a range of topics from semantics, metadata and mediation to applications. The workshop was also fortunate to include invited talks by Leonid Kalinichenko ('Subject Information Mediation for Integrated Access to Heterogeneous Collections') and Steffen Staab ('Metadata for the Semantic Web'). Furthermore, a plenary discussion on Georeferenced Information was presided over by Michael Freeston.

The organisers are grateful to the DELOS Network of Excellence on Digital Libraries and the National Science Foundation whose support made it possible to organise the workshop as a high quality event.

The proceedings are available on the ERCIM website at http://www.ercim.org/publication/ws-proceedings/DelNoe03/

Link:
Delos website: http://delos-noe.org/

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International Mediterranean Workshop on Digital Libraries

by Hachim Haddouti

A joint DELOS and South Mediterranean countries Workshop on Digital Libraries was held at Al Akhawayn University in Ifrane, Morocco, from 8-9 November 2001.

One of the tasks of the DELOS Network of Excellence on Digital Libraries is to encourage the exchange of ideas and knowhow and to establish collaborations with non-European research communities active in the DL domain. The objective of the workshop held recently in Ifrane, Morocco, was therefore to bring together researchers and users from both sides of the Mediterranean to discuss their experiences and best practices in this area. It aimed also at exploring subjects of common interest for possible synergy and co-operation.

The workshop, organised and sponsored jointly by Al Akhawayn University in Ifrane (AUI) and DELOS NoE, was attended by about 40 participants from both Europe and the Southern Mediterranean area. The attendees came from a wide range of backgrounds, including universities and research institutions, libraries, documentation centres, software companies, and other information providers.

As this was the first workshop in what may hopefully become a series, it was decided that the programme should provide an overall introduction to some

Participants in the workshop at Al Akhawayn University in Ifrane, Morocco.

key areas in DL research. A series of project presentations was also included in the programme in order to provide an overview of ongoing activities on both sides of the Mediterranean and to identify areas of common interest. It is to be expected that future follow-up events will focus on technologies of specific interest to a given thematic area.

The meeting was opened by Professor Benmokhtar, President of AUI, who stressed the importance of co-operations of this type in strengthening the ties between European and southern Mediterranean research communities. The Workshop Chair, Driss Kettani, then presented the workshop programme and Costantino Thanos, Director of DELOS, briefly outlined the activities and goals of DELOS.

The first talk by Hachim Haddouti, the workshop co-chair, introduced basic DL concepts and technology stressing the new roles played by libraries and information providers, and presenting the main issues that must be tackled in designing and implementing a DL. Tom Baker from FhG then gave a presentation on metadata modelling which included a description of the Dublin Core Metadata Initiative. Carol Peters, CNR, discussed problems involved in developing systems for cross-language information retrieval and mentioned recent trends in this area. The final talk on basic technology was given the following day by Mounya Elhilali, University of

Maryland, USA. Mounya Elhilali gave a comprehensive overview of issues raised when processing sound (music, speech, etc) in multimedia applications.

Other talks from the South Mediterranean basin included Saleem Zougbi from Bethlehem University, Palestine, who spoke about integrating knowledge-based techniques into DLs, and Nejib Abida, IRSIT, Tunisia, who described his activities in Distance Education underlining the importance of building links between programmes for Distance Education and DL applications. Mohammed Chafchaouni from the Al Andalous Foundation gave a presentation on the preservation of cultural heritage, in particular the Andalusian patrimony, and on the relationship between art, science and the spirit. One of the last talks was by John Murray, who presented the current status of the AUI DL and future milestones. Murray asked for suggestions from the audience as to how AUI should best proceed with the design and the implementation of its digital library.

The other communications during the two-day workshop were mainly dedicated to EU-funded project presentations, with particular emphasis on areas of interest for potential co-operation. Projects presented included: COLLATE, CYCLADES, ECHO, E-Maktaba, MIND, LEAF and Italian/Arabic Linguistic Tools.

The final session of the workshop was directed towards identifying possibilities for co-operations and joint future actions. Multilinguality and metadata were immediately identified as being areas of common interest. However, as a first action, before beginning to discuss plans for collaborative work in detail, it was decided to apply for an extension to the DELOS Network to include the Southern Mediterranean countries. The workshop was closed by Amine Bensaid, Dean of the Computer Science and Engineering School, who thanked all the speakers and attendees for their contributions and by Costantino Thanos who expressed the appreciation of the external participants for the warm hospitality provided by Al Akhawayn University.

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iEX — Internet Expo 2002

Zurich, Switzerland, 6-8 February

Internet Expo 2002 has two parts: a tradeshow and a conference. The target attendee is the Internet professional. Last year the iEX tradeshow attracted some 40,000 visitors. This year it will have four sections: business Internet services; systems and software; web agents, publishing and networking; and security. The conference portion attracted some 4000 attendees last year. This year the topics are e-commerce, intranet, webmastering, and network planning strategies.

More information:
http://www.iex.ch/

CLEF 2002 — Cross-Language Evaluation Forum

The CLEF series of system evaluation campaigns aims at (i) providing an infrastructure for the testing and evaluation of information retrieval systems operating on European languages, and (ii) creating test-suites of reusable data which can be employed by system developers for benchmarking purposes. Registration is now open for participation in CLEF 2002.

Agenda
CLEF 2002 will offer tracks for the evaluation of multilingual, bilingual and monolingual information retrieval systems. Tracks testing domain-specific and interactive text retrieval systems are also offered. The multilingual test collection will consist of documents in at least six languages (Dutch, English, German, French, Italian and Spanish) and query sets in many more.

Important Dates
• Registration opens: 1 January 2002
• Data release: 1 February 2002
• Topic release: 1 April 2002
• Receipt of results from participants: 15 June 2002
• Release of relevance assessments and individual results: 1 August 2002.

Workshop
A two-day Workshop will be held on 19-20 September in Rome, immediately after the sixth European Conference on Digital Libraries (ECDL 2002). The aim of the Workshop will be to present and discuss the results of the CLEF activity and allow researchers and developers to compare performance between systems using different cross-language strategies.

More information:
http://www.clef-campaign.org

ECDL2002 – 6th European Conference on Research and Advanced Technology for Digital Libraries

Rome, Italy, 16-18 September 2002

ECDL 2002 is the sixth conference in the series of European Digital Libraries conferences. The focus of ECDL 2002 is on underlying principles, methods, systems and tools to build and make available to final end users effective digital libraries.

Important Dates
• 1 May 2002: Deadline for all proposals
• 15 May 2002: Notification of acceptance for tutorials and workshops
• 15 June 2002: Notification of acceptance for papers, panels, demos and posters
• 1 July 2002: Camera ready papers from the authors.

Scientific Programme
Submissions on all topic areas are welcome and will receive full and equal consideration. Submissions may be full papers, posters, demos, panels, tutorials, or workshops. Although submissions are not restricted in topic or scope, we expect that submissions will fall into one or more of the following broad areas:
• Research: Significant research results on all aspects of digital libraries, focussing on integration of methods, interoperability across different services, data and metadata structures and algorithms, information and text mining, knowledge and multimedia content management, validation also through implementation and use, as well as evaluation.
• Policy: Discussion of significant policy issues related to the design, operation, and economics of digital libraries.
• System: System issues in design, implementation, and building of digital libraries, preferably based on prototypes and strongly backed by practical experience.
• Experience/Evaluation. Analysis of actual implementations of and user interactions with digital libraries in different application areas, possibly including contributions from the humanities, semiotics, and other areas.
• Fundamentals: Studies associating digital libraries with previous areas of thought and discourse. This explicitly includes topics ranging from library/information science to philosophy. However, contributions in this area, as with the other areas, must be accessible to the range of conference attendees, including the more practical outlook of system developers.

ECDL 2002 also provides a forum for discussing applications of digital library concepts and techniques in areas not yet really considered as being part of the Digital Library world, such as education and health care applications, digital earth-sky-law-art and music, humanities, social sciences, environmental monitoring, natural sciences, and historical and scientific archives.

More information:
http://www.ecdl2002.org

EU/NSF Digital Libraries All Projects Meeting

Rome, Italy, 25-26 March 2002

The European Commission and the US National Science Foundation (NSF) are supporting substantial research concerned with digital libraries. This ongoing research addresses both enabling technologies as well as basic principles for DL design, implementation and operation, and aims to provide a better understanding of the social and organisational contexts in which DLs will operate. There is no regular forum where scientists involved in EU and NSF projects can meet regularly. A coordination effort in the DL field can help avoid duplication of effort, prevent the development of fragmented digital systems, and encourage productive interchange of scientific knowledge and scholarly data around the world.

Based on the above considerations, under the auspices of the Cultural Heritage Applications Unit of the European Commission, the Delos Network of Excellence on Digital Libraries, in co-operation with the NSF, is organising a two-day concertation meeting for all projects funded by the Commission's IST programme and the DLI programme in the field of Digital Libraries. Representatives of other relevant initiatives in Europe are also invited. The meeting will be held in Rome, 25-26 March 2002.

The aim of the meeting will be to bring together EU and US projects in order to exchange working experiences, share research results, establish collaborative links between projects which share common objectives, identify topics of common interest and establish joint working groups, define joint research activities/projects, and jointly promote relevant standardisation activities.

More information:
http://delos-noe.org/

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SAFECOMP 2002 – The 21st International Conference on Computer Safety, Reliability and Security

Catania, Italy, 10-13 September 2002

SAFECOMP is an annual 2.5-day event covering the state of the art, experience and new trends in the areas of computer safety, reliability and security regarding dependable applications of computer systems. SAFECOMP provides ample opportunity to exchange insights and experience on emerging methods and practical applications across the borders of the disciplines represented by participants.

Important Dates
• Full paper submissions:
  10 February 2002
• Tutorial proposal submissions:
  7 April 2002
• Notification sent to authors:
  5 May 2002
• Camera-ready submissions:
  23 June 2002

Co-located and Co-ordinated Events
SAFECOMP 2002 will be co-located and coordinated with ECCE-11 (8-11 September 2002). The ECCE-11 conference is organised by EACE - the European Association of Cognitive Ergonomics. The ECCE series of conferences has been organised biannually since 1982, thereby making it the oldest conference series of its kind internationally. ECCE brings together researchers in the domain of cognitive ergonomics, which aims at combining cognitive engineering and technical information processing system developments together to improve the design of joint interactive systems.

More information:
http://www.safecomp.org/

VTT — **Caj Södergård** will continue as research professor in Digital Media Technology at VTT -Technical Research Centre of Finland. The new appointment is commencing in January 2002.

CWI — **Mart de Graaf** has won the annual Civi Prize for industrial research. The prize (11,000 Euro) was awarded for his Master's Thesis 'The Quantum Yao Principle'. De Graaf did his research under Prof. Harry Buhrman (University of Amsterdam/ CWI), and is now preparing a PhD thesis at CWI in the project 'Extending Feasible Computing: Quantum Computing', led by Buhrman. It came as a surprise that an industrial prize went to research as fundamental as quantum computing. If realised, quantum computers can solve certain computational problems much faster than classical ones, for example factoring numbers. See also: http://www.cwi.nl/~mgdgraaf/

CNR — **PISATEL** - a new Software Laboratory - was inaugurated in December at the CNR Research Area in Pisa. Pisatel (Pisa Initiative in Software Architectures for Telecommunications) is the result of a long-term agreement for collaboration between IEI-CNR and Ericsson Lab

From left to right: Emilia Peciola, Manager ERI; Paolo Ancilotti, Vice-director Scuola Sant'Anna; Piero Maestrini, Director IEI-CNR; Salvatore Improta, Managing Director ERI; Antonia Bertolino, Coordinator PISATEL; Maurizio Bonuccelli, Pisa University.

Italy (ERI), Rome, a centre of excellence of the Ericsson Group. The laboratory will host students and young researchers studying software engineering and its applications to the telecommunications sector, under the direction of senior researchers from CNR, Pisa University and the Scuola Sant'Anna, and in continuous contact with ERI staff. At the inauguration, the coordinator of the lab, Antonia Bertolino, presented its organisation and objectives to an audience consisting of representatives of the local authorities and Pisan academic institutions.

INRIA — **Over 300 job opportunities** available at INRIA in 2002. Taking advantage of a unique growth rate for the next years (over 50% between 2000 and 2003), INRIA will offer a very large variety of positions in 2002. Among them are hosting positions for visits from six months to two years for French and foreign specialists, with academic or industrial background, and staff positions for junior and senior research scientists. In addition to these job opportunities, INRIA offers more than 200 proposals for preparing a PhD thesis within one of the INRIA research project-teams, in co-operation with partner universities, and for young foreign researchers joining INRIA for postdoctoral visits. A competitive selection for recruiting seven experienced research scientists (directeurs et chargés de recherche 1ère classe) has been opened recently. The deadline for returning application forms is January 14. A second competitive selection will be made in Februar for fourty research scientists (directeurs et chargés de recherche 2e classe).Other recruitments between March and June 2001. For details, see http://www.inria.fr/.

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ERCIM – The European Research Consortium for Informatics and Mathematics is an organisation dedicated to the advancement of European research and development, in information technology and applied mathematics. Its national member institutions aim to foster collaborative work within the European research community and to increase co-operation with European industry.

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