

The background of the cover is a vibrant green with a pattern of binary code (0s and 1s) and glowing light effects. A hand is shown in silhouette, holding a transparent globe of the Earth. The globe is centered on the Atlantic Ocean, showing parts of North and South America. The overall theme is global telecommunications technology.

**ADVANCED  
SOFTWARE  
TECHNOLOGIES  
FOR TELECOM  
INFRASTRUCTURES**

**CURRENT TOPICS**  
**EURESCOM – new business model**

**IN FOCUS**  
**Portugal Telecom**

**EUROPEAN ISSUES**  
**Interview with Jo Groebel**

**EURESCOM Summit 2002**  
**21 to 24 October 2002 in Heidelberg, Germany**  
**Tutorials on 21 October**



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## **EURESCOM'S SECOND SUMMIT FOCUSES ON NETWORKS AND THEIR BUSINESS ASPECTS**

The EURESCOM Summit 2002 will explore the technologies for future networks and will put the networks into a broader context by adding the business related service aspects. The conference will bring together the technology research community, the experts of telecommunications services and products as well as leading telecommunications business personalities to share ideas and develop a common vision.

## **HIGH QUALITY PAPERS WILL BE PRESENTED AT THE CONFERENCE**

An overwhelming number of about 120 papers were received, from which the Programme Committee selected about 45 of the best papers. This ensures that all papers presented at the conference will be of high quality. Amongst the main subjects, which will be covered at the conference are:

- Optical networking
- Access networks, including wireless access and seamless mobility
- Network evolution, "enabling Next Generation Networks"
- Service evolution
- Network and service management, OSS, traffic engineering
- Quality of service, performance and security
- Multicast
- Terminal, user and business aspects

The detailed programme will be available in August.

## **THE TARGET AUDIENCE**

We are expecting about 250 participants including data communications experts, network technology specialists, systems engineers, telecommunication architects, business and product planners, application and service developers, product developers, visionaries, strategists, researchers, executives from network operators, service providers, IT vendors, content providers, manufacturers of IT/telecom software/hardware, application service providers, academia and consultant companies.

## **TUTORIALS ON "HOT" ISSUES**

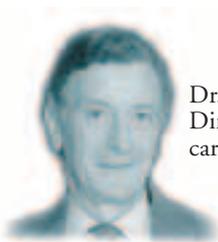
On 21 October four half-day tutorials on interesting topics in promising network-related areas will be offered.

## **EXHIBITION - EXPERTS MEET EXPERTS**

The conference will also host demonstrations and an exhibition where experts can meet experts and explore available and emerging products, devices and tools that support the building of powerful networks of the future. Please send requests for exhibition space to [summit2002@eurescom.de](mailto:summit2002@eurescom.de)

[www.eurescom.de/summit2002](http://www.eurescom.de/summit2002)

# THE NEW EURESCOM



Dr. Claudio Carrelli  
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In the last EURESCOM mess@ge issue of 2001 I predicted that 2002 would be a year of fundamental change for EURESCOM. Now this change is taking shape. On 1 July, EURESCOM will begin a new chapter in the success story of collaborative R&D with the adoption of a new business model.

The decision of EURESCOM's General Assembly in May to transform the company from a shareholder-financed R&D institute to a profit-oriented R&D management organisation has been certainly one of the most important milestones since EURESCOM was founded in 1991. This is the result of months of constructive discussions between the EURESCOM shareholders and its management. It took three consecutive Working Groups to come to the final proposals. And all this has been done in a truly co-operative spirit despite today's high turbulence in the telecommunications sector. This is proof for the possibility and increased necessity of collaboration especially in technologically and financially challenging times like we face today. The collaborative spirit in telecom R&D is as alive as ever, and – with the new EURESCOM business model – has now found a shape, which makes collaboration even more suitable for the innovative needs of the market.

## Expansion of collaborative R&D

One of the main elements of our new business model is that we are determined to support and to contribute to the European Community's 6th Framework Programme for European Research by managing some of the new large Integrated Projects. EURESCOM has the appropriate experience, tools and team and is one of the most suitable organisations to cope with this task.

Another core element is that we will expand our proven model of collaboration beyond the borders of Europe and beyond the area of telecom network operators and service providers. The strong interest from multinational telecom/IT vendors and suppliers and from telecom organisations from Asia and Latin America confirms us in our conviction that there is a worldwide demand for our unique project management services and our large network of experts.

EURESCOM's portfolio of services has also been extended to serve the innovation needs of our customers in the most effective way. These services are now also available to organisations and companies that are not shareholders or members of EURESCOM. We have opened up to extend the benefits of collaborative R&D to a growing community of companies who have realised that collaboration is a promising way for reducing the development cost and the time to market of new products and services. Of course, collaborative R&D has to be done in a highly efficient way to get the maximum benefits. EURESCOM has a proven record of efficient R&D programme performance, and has set even more ambitious goals for the future. By 2005 we want to be completely self-sustained.

## Driving the innovation process

In the long run, the fast development of interoperable, profitable products and services in telecommunications will only be possible with a certain amount of collaboration. Companies who think they can do it all alone or who try to save cost by cutting R&D expenditures will lack the pre-condition for success in tomorrow's high-tech world: fast innovation. EURESCOM's role in the future will be more than ever to drive and facilitate the innovation process in telecommunications, not only in Europe but world-wide.

Coming back to my forecasts, I also predicted in EURESCOM mess@ge 4/2001 that the telecom sector would emerge from the current crisis stronger than before. We are now experiencing a consolidation phase, following the big expansion due to the Internet bubble, and it is clear that the way out is no more based on new customers or geographical expansion, but mainly on the provision of new services.

For me it is still beyond doubt that a strong recovery of the telecom sector will occur soon, and innovations based on collaborative R&D will certainly be the fundamental drivers for its success.

*Dr. Claudio Carrelli*

# EURESCOM

## EDITORIAL REMARK

### Dear readers,

Though we are close to the summer vacations, no holiday feelings are coming up in the editorial board. The new business model of EURESCOM (see report on page 6) means also some change for EURESCOM mess@ge. From the next issue on, we will offer advertising space to interested companies from the telecoms domain – at reasonable rates, of course. With this we are actively supporting the company's goal to become more self-sustaining by expanding the scope of our serv-

ices. Addressing a targeted audience of more than 2,000 researchers and decision-makers world-wide is certainly added value for anyone who will book an advertising page.

However, we can guarantee that advertisements will not impede the attractiveness and readability of the editorial pages. We will only offer the two inner cover pages to advertising companies. We also guarantee that the unbiased stance of our reports will be kept. Our main purpose is to deliver valuable information to our readers.

In this issue, we can offer you again a number of exclusive reports you won't find elsewhere. As always, we would like to encourage you to give us feedback so that we can adapt the following issue in the best possible way to your informational needs.

**Your mess@ge editorial team**  
message@eurescom.de



# SN@PSHOT

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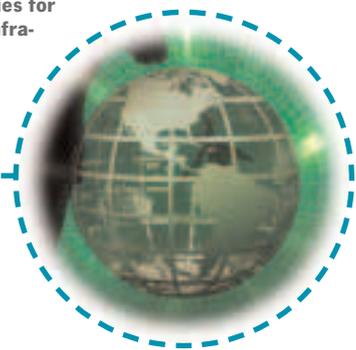
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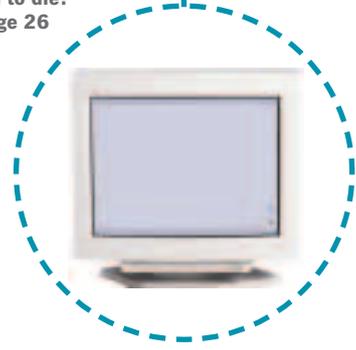
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# READY FOR EXPANSION

## EURESCOM ADOPTS NEW BUSINESS APPROACH TO COLLABORATIVE R&D



Happy after the successful GA: Heinz Gilgen (Swisscom, right) and Harald Johansen (EURESCOM) shortly after the General Assembly of EURESCOM agreed on the new business model.

On 1 July EURESCOM GmbH will expand its unique model of collaborative R&D beyond the domain of European telecom operators. The shareholders of EURESCOM unanimously approved a new business model and revised company statutes at their General Assembly in Heidelberg on 15 May.

The core element of the new business model is the expansion of the organisation to include all the organisations in the telecomms domain. This includes traditional and new players, who want to use collaborative R&D to speed up the migration to new systems and technologies and to multiply the impact of their R&D resources. All telecom-focussed organisations now have the opportunity

to become a member of EURESCOM or to employ the professional project and programme management services of EURESCOM.

Since EURESCOM was founded in 1991, it has been working almost exclusively for European telecommunication network operators and service providers. "For a long time, EURESCOM was a traditional operators club," says Dr. Claudio Carrelli, director of EURESCOM, "but in the global economy of today, this model is no longer appropriate".

EURESCOM is now open to vendors and suppliers as well as network oper-

ators and service providers. Moreover, EURESCOM will put emphasis on the commercial offering of R&D project and programme management services.

Members have preferred access to the services and the exclusive opportunity to participate in EURESCOM's own R&D work programme. In the new business, EURESCOM will offer comprehensive R&D project and programme management services for very attractive prices, typically a very small percentage of the value of the managed project or programme.

The company has set itself ambitious goals. But Dr. Carrelli is sure: "We are extremely competitive and attractive for companies who want to have a good return on their R&D investment."



EURESCOM Director Dr. Claudio Carrelli (third from left) with the heads of the working groups that prepared the new business plan (from left): Oddvar Hesjedal (Telenor), Michél Dupire (France Télécom), Richard Nicol (BT).

## COMMENTARY

# BACK TO THE FUTURE

## WHAT THE NEW EURESCOM IS ALL ABOUT



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Sometimes we get so caught up in the problems of today that we lose sight of the future. One beautiful aspect of the future is that we have the freedom to shape it, only limited by our own vision. However, if we get trapped in the issues of the “now”, we waste the opportunity to shape our future.

EURESCOM, as the leading collaborative research organisation in the operational domain of telecommunications, has experienced the pressure of the reductions in the telecommunications industry. In the industry budgets have been reduced, staffing levels have been reduced, and in some cases research and development has been cancelled totally. At the same time the complexity of the networks and services we must provide is growing exponentially.

Despite the turmoil in the industry communications is still the core business. What is changing dramatically is the type of information that is now being communicated. Supporting these changes is a wide range of new and exciting technologies that are only limited by our imagination.

Faced with this situation EURESCOM has gone back to first principles and redefined the role and the business model of the organisation so that it is effective and viable in the new market.

### Increasing tasks for collaborative research

The cornerstone of EURESCOM is that there are an ever-increasing number of research functions that are pre-competitive and can be done in a collaborative fashion, such as the assessment of new technologies, the preparation of positions on standards, and even product assessments. Doing this type of work centrally results in substantial cost savings for the participants in EURESCOM.

The next type of work being undertaken is the joint research that can lead to new opportunities for the EURESCOM participants. Working

together on feasibility experiments can generate technical solutions for a fraction of the manpower that companies would have to devote to achieve this by themselves. This multiplying factor becomes increasingly significant as internal research resources get reduced. It allows more results to be achieved for less resources.

The business model of EURESCOM has changed dramatically as well. There are two points which highlight the nature of the changes: firstly, the funding of the projects has shifted from centralised funds to self-funded participation, and secondly, the operational costs will be paid through a simple, fee-based structure rather than the old cost-sharing principle.

### Tighter links to the business units

This new approach to the projects will result in an even tighter linking of the EURESCOM projects to the business units in the participating companies as the business units will directly finance their research units' participation in the projects. This can only improve the applicability and uptake of the results.

On the operational side, EURESCOM GmbH will be paid by its members, on a commercial basis, for the services it provides. In addition the company will offer the professional project and programme management services to third parties. The focus to this work will be the 6th Framework programme of the EU. Under the 6th Framework the EU is proposing to outsource large-scale research programmes as “Integrated Projects”, and EURESCOM will secure the work of running several of these. In this context EURESCOM is unique as an organisation capable of stimulating, initiating, managing and administering collaborative research programmes with values in excess of 50 million euro per year.

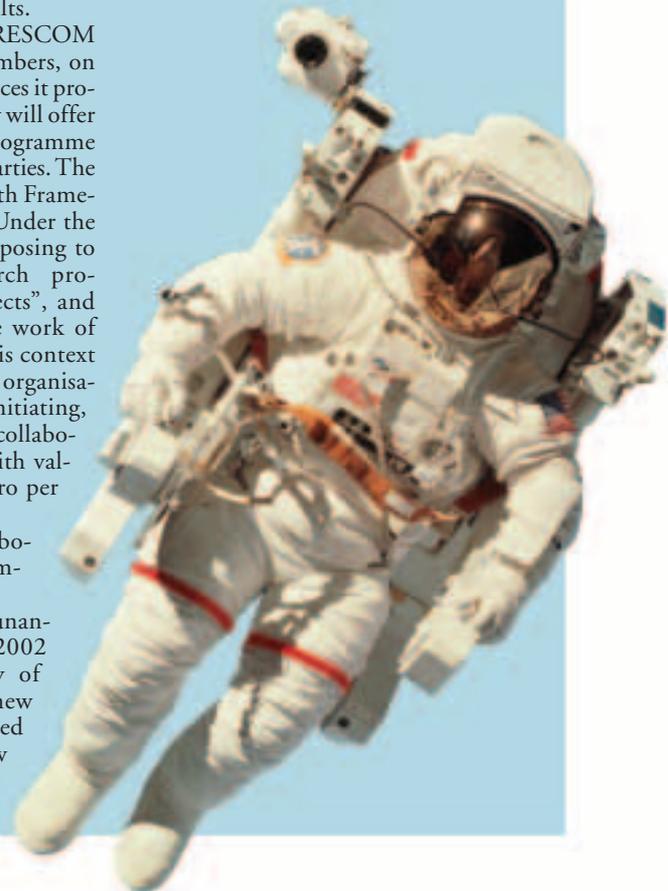
This new approach to collaborative research in the telecommunications domain was adopted unanimously on the 15th May 2002 when the General Assembly of EURESCOM approved the new business plan and the associated legal documents. They allow

that all organisations with an interest in the operational aspects of telecommunications networks – fixed network operators, mobile network operators, Internet network operators, service providers, vendors, suppliers, and others – can play a role in determining the future of telecommunications.

### Integrating new technologies becomes ever more demanding

As we look to the future, our collective challenges will be to absorb new technologies into the existing infrastructure to provide operational efficiencies and advanced personal services. This work is getting more difficult as the number of technologies and options grow exponentially. Maintaining interoperability and seamless inter-working between new and existing networks and technologies is a complex and demanding issue.

So now we have the effective mechanisms and structures for collaborative research designed, we must get the focus of our joint efforts clearly directed to making the new networks and services happen. We must get back to the future!





ETIS director Otto Baireuther (right) at his old workplace together with Dr. Claudio Carrelli, Harald Johansen and Karin Becker (from left).

## NEW ETIS DIRECTOR RETURNS TO EURESCOM

When Otto Baireuther, the new managing director of ETIS, came from his office in Brussels to Heidelberg for visiting his EURESCOM colleague Dr. Claudio Carrelli, he saw many familiar faces. Mr Baireuther worked at EURESCOM as one of the first project supervisors in the early nineties. However, meeting old colleagues was not the primary purpose of his visit. The main goal of the meeting on 19 April was to explore how both organisations could intensify their co-operation. ETIS, which means 'e- and telecommunications infor-

mation services', is an international platform for co-operation and discussion on IT-related matters in the telecom domain. In the open-minded discussion it emerged that both companies face similar challenges in adapting to the changes in the telecoms market. Both sides agreed to increase the exchange of information and support each other in supporting their respective events, which are relevant to the members of both organisations.

More information about ETIS: [www.etis.org](http://www.etis.org)

## VISIT OF CINTEL DIRECTOR



Manuel Martínez, executive director of the Colombian telecom research centre CINTTEL, visited EURESCOM during his tour to major European telecom organisations

and companies on 30 April. Bogotá-based CINTTEL is a leading telecom organisation in the Andean region dedicated to the promotion of the information society. The meeting with the EURESCOM representatives led by EURESCOM's senior manager for strategic studies, Harald Johansen, concluded with an informal agreement on mutual information and on linking both organisations' networks of experts for prospective co-operation in areas of common interest.

On the day before, Mr Martínez, who studied in Karlsruhe, visited Deutsche Telekom's Future Lab in Darmstadt. On the pictures he takes part in a demonstration of holographic communications.



Further information (in Spanish) is available at the CINTTEL Web site: [www.cinttel.org.co](http://www.cinttel.org.co)

## Changed date for EURESCOM workshop

"e-commerce-based service and network management" now on 2-3 July

The date for the EURESCOM workshop on "e-commerce-based service and network management", which was announced for June in the last issue, has changed. The event will now be held at EURESCOM in Heidelberg on 2-3 July 2002.

Changes in the telecommunication industry are forcing operators and service providers to explore new ways of doing business. These new value chains are responses to the need of forming efficient industry structures that deliver unprecedented value to end customers while main-

taining and improving service quality. In other industry segments the adoption of e-commerce methods and technologies has allowed flexible and efficient structures to be formed and reformed.

The workshop will present results of several EURESCOM projects that have been working on the following topics:

- Impacts of e-commerce techniques on operation support systems (OSS) and operations methods: ebXML, Web services.

- Case studies such as regulatory interconnect for leased circuits, DSL, and others.
- Practical experimental results looking at four key Telecom B2B processes.
- Impact of Web services on services and OSS component integration.

Several prototype system demonstrations and vendor product presentations will accompany the workshop.

Further information and registration: [www.eurescom.de/public/Events/](http://www.eurescom.de/public/Events/)

# ADVANCED SOFTWARE TECHNOLOGIES FOR TELECOM INFRASTRUCTURES

Information and Communication Technology (ICT) is a key factor driving economic growth worldwide. In the knowledge society the demand for the ability to locate, process and store information increases as well as the number of companies and products that offer ICT services. There is no doubt that the telecommunications network is a key facilitator of the knowledge society.

Software has been powering both the telecommunications network and the Internet for many years now. Software will continue to power the network in the future too, while networks and services become more complex and sophisticated. Telecommunications systems are among the most complex systems that have ever been built by humankind. This complexity, along with the high variety of systems and their longevity pose very high requirements on the software engineering.

## Where do we stand today?

Telecommunications has penetrated many aspects of our lives. It has become an almost ubiquitous utility in Europe and elsewhere, always available when we need to use its services. Beyond that, telecommunications support many mission and safety critical applications in our lives. Emergency calls, like calling help after a road accident, depend solely on a reliable telecommunications infrastructure. At the same time software runs in the core of all telecommunications systems, being a key element not only to sustain the knowledge society, but literally to support our safety and well-being in emergency situations and beyond.

As all commercial companies are under extreme market pressure, telecommunications operators face a dilemma. How to remain competitive without sacrificing thorough quality controls? In order to ensure a highly available, reliable, robust and fault tolerant telecommunications network, industry has developed and is continuing to develop advanced software technologies to increase the quality of the software embedded in the telecommunications infrastructure.

Sustaining and increasing competitiveness in the telecommunications market is another area where advanced software technologies are contributing. Although business process efficiency has generally improved, this improvement was usually very expensive due to proprietary solutions. Standards and the introduction of 'Common Of The Shelf' (COTS) software components promise a dramatic improvement in this area too.

ness process efficiency has generally improved, this improvement was usually very expensive due to proprietary solutions. Standards and the introduction of 'Common Of The Shelf' (COTS) software components promise a dramatic improvement in this area too.

## Solutions

These are only two examples of challenges that are a constant concern for telecommunications operators and service providers. In this issue of EURESCOM mess@ge we present the main activities and results of EURESCOM projects in the area of advanced software technologies for telecom infrastructures. However, the whole area of software for telecommunications systems is so broad that we can only capture a snapshot.

The EURESCOM study on "Impacts of changes in enterprise software construction for telecommunications" (P1149) is reporting on the assessment of OMG's Model Driven Architecture (MDA) and its suitability for the telecommunications domain. To complement the view of the project we have asked the Object Management Group (OMG) to provide us with their own vision of where the MDA can be beneficial to the whole ICT market.

The OLIVES Project on "Workflow-based On-line Validation of Complex Component based Internet Services" (P1108) investigated fully automated, coordination-based techniques for the control and adaptation of the behaviour of distributed software applications – in particular Internet services – with the goal of validating and augmenting their Quality of Service (QoS).

Addressing the increased importance of automated business-to-business (B2B) processes amongst players in the ICT industries the EURESCOM project on "e-Commerce Based Service and Network Management" (P1106) has developed a framework to support the evolution of Operation Support Systems (OSS). Automated B2B for OSS will be among the most important capabilities for next generation networks based upon IP and open network APIs.

## Future demand

While hard facts and estimated market figures about future demand in ICT are debatable, we can assume that the next generation networks will have to support a much wider variety of services and applications than today. Support for ubiquitous computing and communications will certainly dominate the forthcoming challenges in future advanced software technologies for telecommunications infrastructures.

The vision of the next step of the networked knowledge society is that billions of small, intelligent devices will be equipped with spontaneous peering capabilities and have access to information and provide access to services on the

One of the visions is increased efficiency in managing the complexity of next generation networks

network. The industry today makes small steps to try to envisage the impacts of the vision of the Ubiquitous Network on the software infrastructure of next generation networks.

The innovative solutions presented in this cover story have to be seen as part of the effort of telecommunication operators and service providers to provide flexible, reliable, robust and fault tolerant information infrastructures.

Experience from the past has taught us that there will soon be services out there we did not plan for today. To stay competitive we have to be prepared for the unplanned. Advanced software technologies can be of great help for this.

The telecommunications network is highly reliable and robust

# IMPACTS OF MODEL DRIVEN ARCHITECTURE ON TELECOMMS



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Computing infrastructures are expanding their reach in every dimension. New platforms and applications must interoperate with legacy systems. New implementation platforms are continually coming down the road, each claiming to be “the next big thing”.

To protect investments and maximise flexibility, telecom operators buy hardware that implements open interconnection standards, and software that uses open interface standards like CORBA and EJB (Enterprise Java Beans). However, those interconnection standards evolve rapidly. How can telecom operators ensure that their mission-critical information systems are rooted in standards that will adapt to new hardware capabilities and software platforms? The Object Management Group addresses this reality with the Model Driven Architecture (MDA).

## New insights on MDA

EURESCOM conducted a project (P1149) to examine the MDA itself and its impact on the way telecommunications operators design, specify and operate telecommunication systems. The project provided insights on how to improve the current definition of MDA to reflect the specific needs of telecommunications systems.

The project tried to identify the impact of the MDA for telecommunications operators with respect to the specifics of telecommunication systems. Techniques were studied that can be used to utilise the

MDA in the telecommunication arena. Moreover, the project proposed an evolution path for how the MDA needs to be adapted or specialised in order to enable its efficient utilisation in the telecommunication domain.

The main objectives of the project were to:

- Analyse the foundation of the MDA and identify its constituting parts.
- Identify fields in the telecom domain, where MDA or parts of it are applicable, focusing on the key elements of MDA and their telecom specific capabilities.
- Investigate necessary adaptations to or specialisations of MDA to reflect telecommunications needs.
- Explore the market for available products that support identified key technologies relevant to MDA, with a focus on telecom specific capabilities.

## An assessment of key technologies for MDA

With MDA, systems are constructed by modelling system aspects using formal and semi formal modelling techniques and by transformations between the resulting models. The core of the MDA is made up by a number of important, already available and industry wide supported OMG standards: The Unified Modelling Language (UML), the Meta Object Facility (MOF), the XML Metadata Interchange (XMI), and the Common Warehouse Metamodel (CWM). These standards define the core infrastructure of the MDA, and have greatly contributed to the current state-of-the-art of systems modelling.

These core technologies, necessary to apply model driven architectures in the telecom industry, are already available. Some of them (UML, MOF, CWM) are well established and mature, and a variety of products are available on the market. Others, especially those that are required for model transformation will soon be available. Based on these core technol-

ogies, scenarios have been identified, demonstrating how the MDA can be applied in the business domain of telecom operators. These scenarios are not restricted to telecom system development, but include also data warehousing and information management.

The core paradigm of MDA is the model transformation paradigm. Models of systems, system components as well as data models are developed on different levels of abstraction and transformed in subsequent steps into the specific targets – either physical system components, data conforming to different data models or other models. Technological and engineering details are hidden during that process as much as possible and captured only by the transformation logic. This approach enables flexibility and preserves investments even if underlying infrastructures for the systems change over time.

Almost every new technology or computing paradigm has drawbacks or open issues. The risks identified for MDA include the unpredictable acceptance of modelling by system designers and developers, the lack of tools that enable the model transformation and the re-engineering of existing models and code, as well as the large amount of non-standardised and incompatible modelling profiles. However, none of these risks is a hindering factor for model driven approaches.

## The future of MDA in telecom environments

There is a strong indication that MDA addresses the challenges of today's highly networked, distributed and constantly changing systems environment, providing an architecture that assures

- Portability
- Increased application component re-use and
- Reduction of cost and complexity of application development and management, now and into the future.

However the success of MDA crucially depends on the availability of tools. These tools should support the creation and transformation of models as well as the code generation for the targeted platforms. So far, there are a few tools that support an MDA based development of software. Also most of the CASE-tool vendors have made announcements to support MDA in the future. Especially for the evaluated software engineering usage cases like Parlay or TMN, the existing tools are generally

applicable and allow an MDA based approach. Telecommunication specific modelling profiles can be integrated in these tools as well as specific code generators targeting the telecom infrastructures.

Conclusion: The Model Driven Architecture is a promising paradigm for the telecom domain. For more information about the conclusions, please visit <http://www.eurescom.de/public/projects/P1100-series/P1149/default.asp>.

All issues that need further research and development work have been identified and manifested in a project proposal, which was submitted to IST responding to the 8th call of the 5th framework programme. The proposal is titled "MODATEL – Model Driven Architectures for Telecommunication System Development and Operation" and has been invited for negotiations with the European Commission as a shared cost Research and Technological Development project.

## OMG'S MODEL DRIVEN ARCHITECTURE



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When the first middleware platforms emerged in the mid-1980s, no one could have predicted that these were the first instances of a class of software. However, over the intervening years our industry has added a new platform to the list about once every year or two, on average, each promising to replace all of the existing platforms by virtue of its universality and appeal. None has ever lived up to this promise, of course, with the result that today's wired enterprise has to support many platforms simultaneously. Worse yet, there's no sign that this parade of new platforms is ever going to end!

It is difficult – in fact, next to impossible – for a large enterprise to standardise on a single middleware platform, for many reasons including differing requirements in different departments; mergers; interoperability with customers and suppliers, and B2B markets. Still, supporting a middleware platform is expensive. Com-

panies need a way to maintain middleware flexibility without letting costs rise out of control.

### Addressing the problem: Model Driven Architecture

To meet these enterprise needs, the Object Management Group is standardising a *Model Driven Architecture* (MDA; Figure 1) which extends from the modelling layer, where architects and designers concentrate on business functionality and behaviour, to the implementation layer where middleware strengths and differences come to the fore.

By unifying modelling and development into a comprehensive standard architecture implemented by compliant tools provided by vendors, the MDA provides a unique set of advantages. The first step in an MDA development project focuses on modelling the business functionality and behaviour.

The wall between modelling and development has been removed by automating the transition, so that

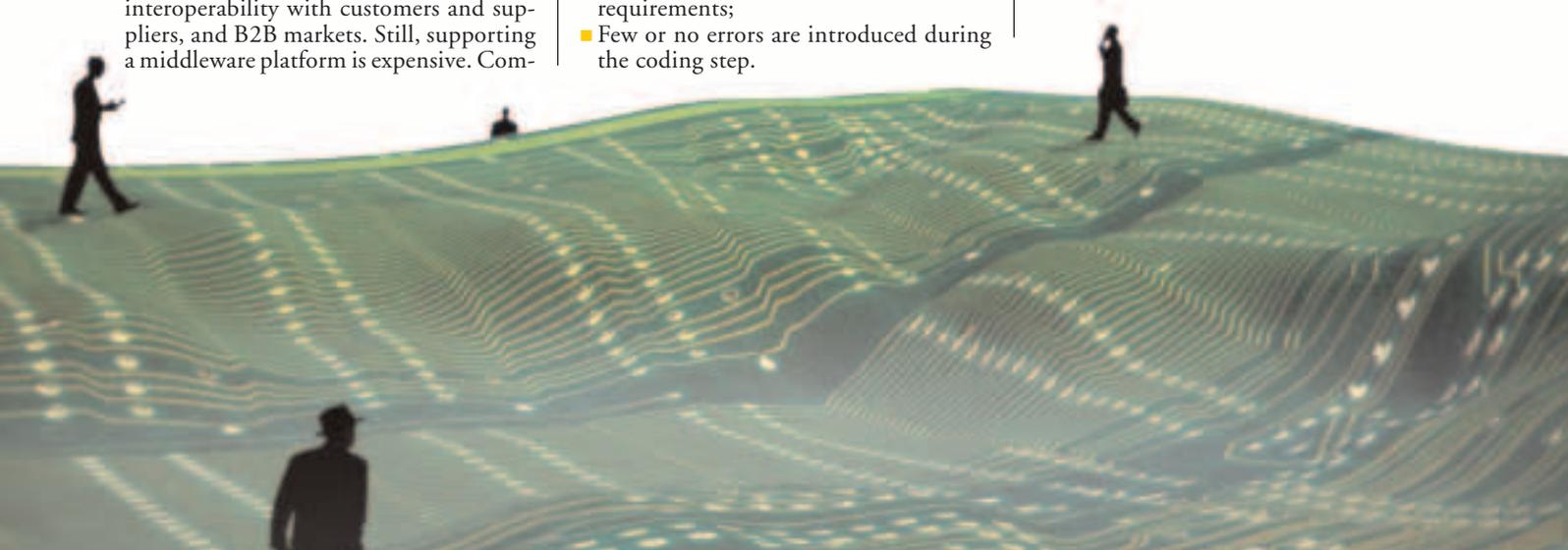
- Development time and costs are reduced;
- Code always conforms to design, meeting both functional and non-functional requirements;
- Few or no errors are introduced during the coding step.

The architecture and tools support the application over its entire life-cycle from analysis and design, through coding and testing, to deployment, support, maintenance, and ultimately evolution to a new platform should that be required.

MDA applications are *portable*: Because MDA tools implement OMG-standardised mappings from platform-independent to platform-specific UML profiles, an MDA application can be produced on multiple middleware platforms from a single Platform-Independent Model (PIM).

MDA applications *interoperate*: Because MDA tools can generate code for remote method invocations in virtually any middleware, they can generate interoperability pathways between any two MDA-based applications.

MDA applications are *future-proof*: When a new middleware is introduced, OMG will standardise mappings to it, and vendors will implement these mappings in their tools, enabling automatic interoperability with, or porting to, the new middleware.



**The Platform-Independent Model (PIM)**

As Figure 1 shows, the basis of an MDA-based application is a *Platform-Independent Model (PIM)*, defined in OMG's industry-standard Unified Modeling Language (UML). UML allows an application model to be constructed, viewed, developed, and manipulated in a standard way at analysis and design time. Just as blueprints represent the design for an office building, UML models represent the design for an application.

An MDA-based development project works in platform-independent mode in this first step, for several reasons: First, platform independence allows the domain expert to focus on business functionality and behavior, undistorted by technological concerns. This allows the design to be evaluated and critiqued when changes are easiest and least expensive to make, before it is coded. Another important benefit: the PIM represents functionality that can be mapped to and implemented on multiple platforms equivalently in the next steps.

This model, however, must be extremely detailed: the application will be generated from it, and will include only functionality represented explicitly. PIMs are designed in one of a number of OMG-standardised *UML profiles* – that is, subsets of UML tailored to specific environments. For example, OMG has defined a profile for Enterprise Distributed Object Computing (EDOC), tailored to enterprise needs, and a profile for Enterprise

Application Integration (EAI), specialised for applications based on asynchronous communication. Additional profiles are used to define Platform-Specific Models (PSM).

**The Platform-Specific Model**

Middleware platforms differ: Some differ in fundamental ways, others more subtly. Because of this, no single model can generate implementations on multiple platforms. To enable this, the MDA splits application modelling into two stages: the PIM, and the *Platform-Specific Model (PSM)*.

Just as PIMs are constrained by platform-independent UML profiles, PSMs are constrained by profiles specific to the technologies that they represent. OMG has already standardised a UML profile for CORBA, and is working on one for Web Services. The Java Community Process is working on one for Enterprise JavaBeans. Profiles for additional platforms are underway.

Standard *mappings* define the pathway from a platform-independent profile to each of the platform-specific profiles. This framework of profiles and mappings enables MDA tools to automate, for the most part, the transformation from PIM to PSM that will end, ultimately, with generation of the application code itself in the final development step.

Like the PIM, a PSM will be extremely detailed: it contains the same information as a fully-coded application, expressed in UML instead of code and associated files.

**The Implementation**

In the third and final step defined by the MDA, a tool generates application code and associated files from the PSM. Working from the detailed model defined in the PSM, the tool identifies patterns which it implements using the library of best practice implementations in its database. Compared to the PIM-to-PSM transformation, code-generation engines are much more advanced and closer to market.

However, most of these tools do not generate all of the application code. So, developers will have to add missing sections and check the generated code to ensure that all is ready for the build step which follows. As tools and algorithms mature, less adjustment will be necessary. Eventually, code generation will be regarded in the same way we think of optimised code now – as one more area, where computer processing can equal or nearly equal the hand coding of the best programmers and easily surpass the work of the average crew.

MDA tools will output not only application code, but also interface definitions, configuration files, make-files, and deployment descriptor files. Most of the steps generating the deployable application will be automatic.

**Interoperability**

An MDA application is not constrained to make all of its remote (and even internal) invocations using the middleware of its PSM – the code generation process is flexible, and the code database of an MDA tool includes invocation formats for every supported middleware platform.

Taking advantage of this, developers will pull models of existing applications and services from libraries into the project's environment as they construct new PIMs, and set up cross-platform invocations by simply drawing the connections in their new model. It's possible, and even likely, that some of these existing applications will not be on the same platform as the new PSM. Taking its cue from the actual middleware platform of these existing applications, MDA tools will generate cross-platform invocations so that interoperability results naturally.

**Integrating legacy applications**

Any legacy application based on a UML model and a supported middleware platform can be included in a company's circle of MDA interoperability by simply importing its model into tools as PIMs for new applications are built. Stand-alone legacy applications can be wrapped with a layer of code that exposes key functionality to the network on a suitable middleware, and the model for this functionality and its interfaces stored in a library for use by MDA developers.

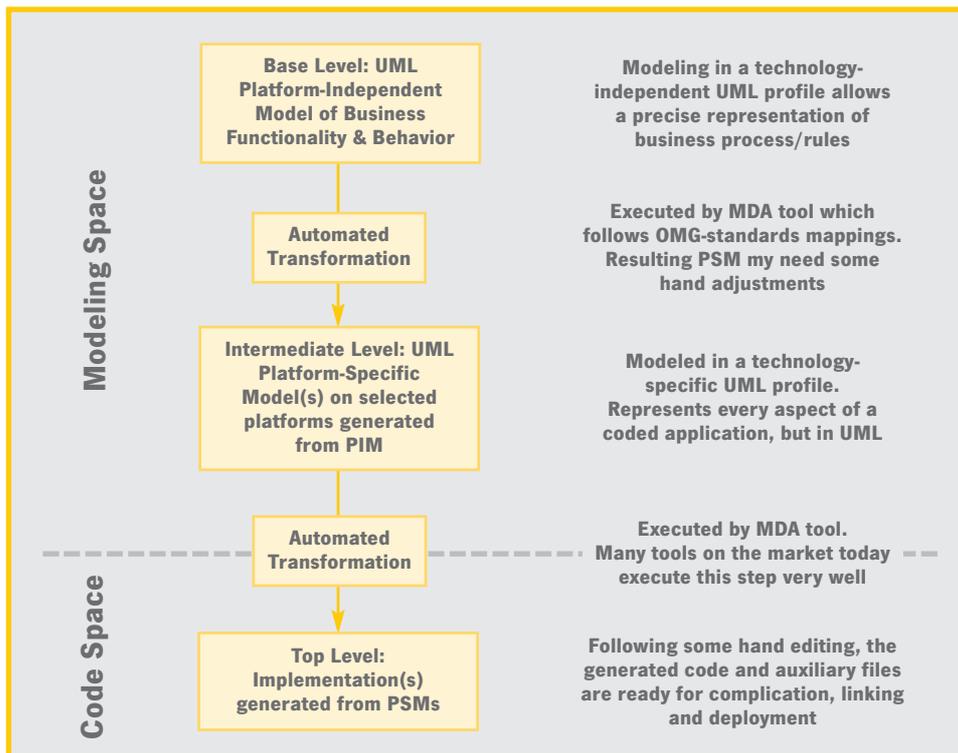


Figure 1: Basic structure of OMG's Model Driven Architecture

### Pervasive Services

Every distributed application needs essential services: Naming/directory, transactions, distributed event handling, and security are virtually always needed, but others come in handy as well. OMG's Object Management Architecture, currently defined only for CORBA, contains the most mature set of standardised services. As part of their work defining the MDA, OMG members are constructing UML models of these services and defining their functionality and interfaces in multiple middleware targets. In the MDA, these are labelled the *pervasive services*.

### Industry-specific MDA standards

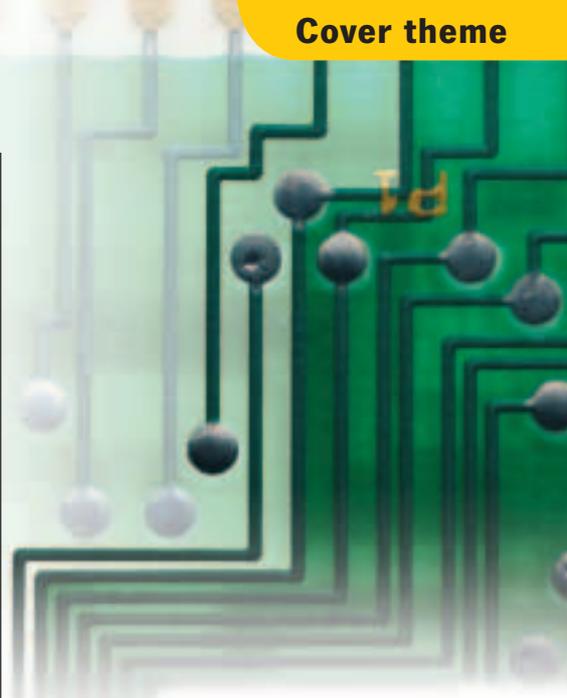
Until now, industries have typically defined computing standards in a particular technology. This is necessary to guarantee interoperability, but requires every company to use the same middleware. Worse yet, when industry advances and the chosen middleware platform is superseded, the standard and all of its users are forced to port to something new.

By defining standards in the MDA, industries avoid both of these severe disadvantages: Defined fundamentally as a

PIM, their standard can be implemented equivalently and interoperably on multiple middleware platforms. Over time, if one or some of these platforms become obsolete, the industry can define new implementations on new platforms from the original PIM.

### Conclusion

In this article, we have listed many of the benefits of the MDA and described, in a very general way, how the architecture supports them. OMG members adopted the MDA as the group's base architecture in September 2001. Many developments at OMG support the MDA, including adoption of profiles for additional platforms. Upgrade of the UML specification to revision 2.0, is being tailored to MDA needs. Upgrade of the MetaObject Facility (MOF), just started, was specifically designed to support MDA. And OMG's domain Task Forces were quick to expand from their CORBA-only architecture to work in multiple platforms with the first non-CORBA domain specification, the Gene Expression Model from the Life Science Research Domain Task Force, being adopted in May 2002.



OMG members invite you to learn more about the MDA and the specification adoption processes that surround it at the OMG Web-site. More information about the MDA including more extensive technical descriptions is collected at [www.omg.org/mda](http://www.omg.org/mda). OMG's home page is [www.omg.org](http://www.omg.org).

## e<sup>2</sup>OSS:

### ENABLING SERVICE PROVIDER VALUE CHAINS



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Changes in the ways that service providers deliver novel services to end users have increased the importance of automated business-to-business (B2B) processes amongst players in the Information and Communication Technology industries. This trend is seen in the practical delivery of regulated interconnect services such as number portability, local loop un-

**bundling, and in competitive services such as support of Mobile Virtual Network Operators. It will be an important Operations Support Systems (OSS) capability for Next Generation Networks based upon IP and network APIs such as Parlay.**

Project P1106 is studying the impact of B2B business methods and technology changes on the OSS of the co-operating organisations, which are BTextact, Telecom Italia Lab, Telenor and OTE.

### Evolution of telecom B2B

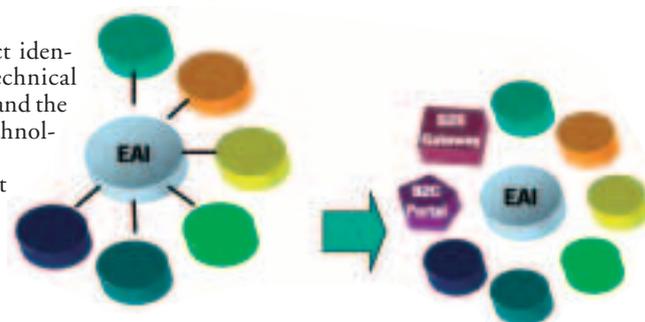
The initial part of the project identified the business and technical requirements of telecom B2B and the evolution of solutions and technology.

It is proposed that the first step is to integrate legacy OSS applications onto a

common information framework through the use of Enterprise Application Integration (EAI) technology. This allows the creation of consistent, enterprise-wide data that is an essential precursor to efficient B2B operations.

Then, B2B gateways and B2C portals can be introduced as a relatively small incremental development as compared to integration with a wide range of disparate legacy applications.

### Integrate internally, then outside ...



B2B e-commerce gateways based on open public standards facilitate the emergence of automated marketplaces (e-trading) leading to lower costs, and great efficiency.

These markets, when supported by appropriate financial instruments, could support e-trading of advanced connectivity services.

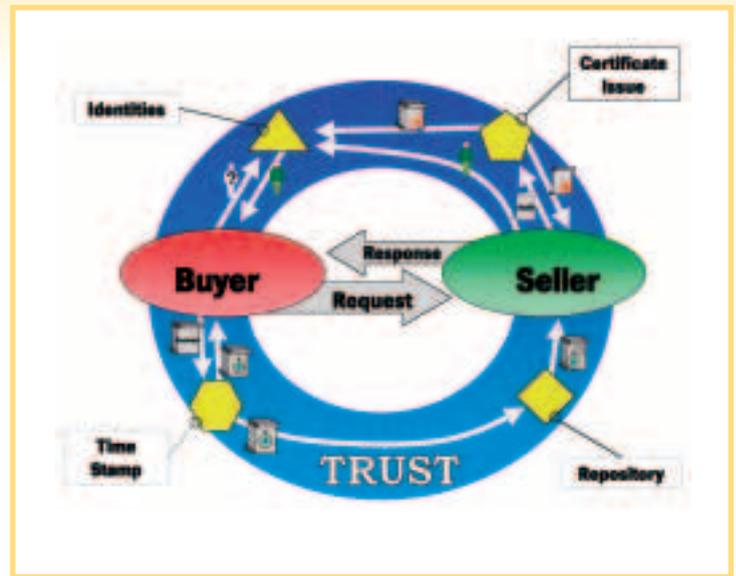
ument, this enterprise, this person? The framework diagram shows a buyer and a seller during a B2B transaction. The yellow entities are third party trust service providers, allowing the trading partners to trust each other.

**The e<sup>2</sup>-OSS framework**

This framework is identifying the critical 'touch points' between the technologies used to form, establish and operate B2B processes for telecom and the internal frameworks used to integrate OSS applications such as those being specified in the TeleManagement Forum (www.tmforum.org) NGOSS programme and the OSS through Java programme (java.sun.com/products/oss).

It shows all the main issues that a telecommunications operator must deal with to support these automated B2B processes, and how to exploit and collate the initiatives for the inter- and intra-company domains existing at different logical levels: business, process, technology.

Linking internal and external processes and technologies B2B processes are defined using the methods being developed in ebXML (www.ebXML.org) that use a Business Process Specification Scheme (BPSS) as a meta model.



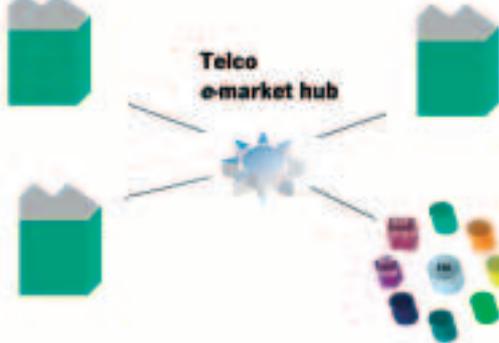
Internal processes within an enterprise support a broader range of functions than is appropriate for external processes and can be specified using a range of methods including workflow management principles and the use of BPML (www.bpmi.org).

**Conclusion**

The project has identified a number of important impacts of the emerging ICT value chains on the implementation of telecom B2B and the OSS supporting them. The most important are:

- Complexity of defining telecom services
- Wide range of telecom B2B processes with diverse response time requirements
- Importance of identity management to ensure trust and to minimise fraud
- Importance of third parties in supporting the emergence of telecom B2B

**... create a market**



**Broad range of telecom B2B processes**

Most B2B solutions for the supply of physical goods focus on the ordering, fulfilment and invoicing process.

Telecom B2B needs to support a broader range of processes: For telecom the initial delivery of a service starts 'in-service' assurance processes covering repair, and performance monitoring, service level agreement (SLA) management, and periodic billing, which also need to be automated.

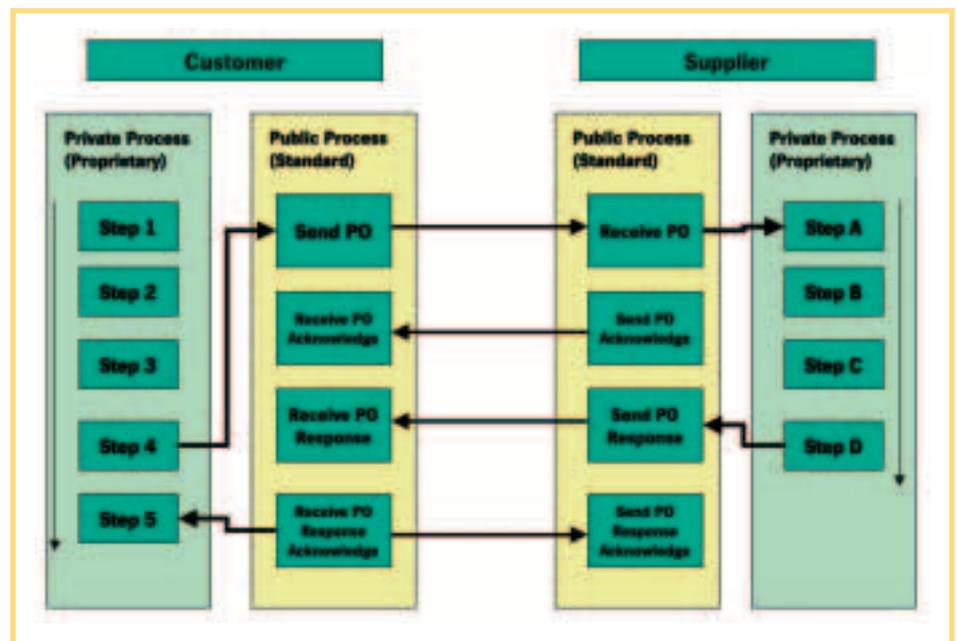
Moreover, the response times needed for telecom service value chains can be more stringent than traditional B2B with order cycle times as low as a few minutes compared to the usual 24 hours for physical products. For repair processes repair times less than two hours across the full supply value chains are needed, which also need third party intermediaries to facilitate them.

Services have a number of endpoints with configuration of both electrical and logical capabilities. The services and connectivity between the endpoints are complex and have service surround processes associated with them in support of SLA guarantees.

**Building trust in the supply chain**

Security is important, because e-commerce enables transactions between buyers and sellers to be made more swiftly and with less human interaction. Also, enterprise application integration increases the security impact that a single transaction can have. Therefore, security must be built into the e2-OSS framework, since there will be less opportunity to spot risks and less time to react to them.

The critical problem of e-commerce security is that of establishing trust between trading partners. How do I trust this doc-



# ENVISIONING FULL-CYCLE AUTOMATED COORDINATION FOR DISTRIBUTED SERVICES



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The EURESCOM project P1108 (OLIVES) investigates fully automated, coordination-based techniques for the control and adaptation of the behaviour of distributed software applications – in particular Internet services – with the goal of validating and augmenting their Quality of Service (QoS). Those techniques are collectively called Continual On-line Validation (COLV).

We present an overview and some early results of OLIVES, related to application-level management and service optimisation. Other application domains for COLV are controlled and flexible service composition, and on-line testing.

## The need for Continual On-Line Validation

Distributed computing is becoming a commodity upon which we increasingly rely. Value-added services built as distributed (often component-based) systems on top of a networking infrastructure pervade our everyday lives for a variety of purposes. Those “systems of systems” become increasingly harder to analyse and validate in advance in all their functional and non-functional features, and consequently more difficult to construct, update, deploy and manage. In this context, provisioning adequate application-level, “soft” quality of service (QoS) becomes more and more challenging and costly.

## COLV in a nutshell

We employ external, fully automated facilities to take up the challenge above, and exploit to that end the latest results in software coordination mechanisms, formal architectural representation paradigms, and distributed monitoring and control technologies.

The OLIVES project is building a Java-based reference COLV platform that integrates components devoted to architectural system modelling, wide-scale communi-

cation, application monitoring (probes), “smart” analysis and reporting of probe output (gauges), decision and action coordination (COLV workflow), and response/adaptation agents (actuators). The heart of our approach is a decision and coordination engine using application-to-application workflow techniques. Such a COLV workflow is triggered by gauges and enables the effective closing of the control loop upon the target service in a highly automated way. It allows the platform to autonomously decide upon and enact situational policies for the active management and adaptation of the target service, and to coordinate the work of actuators (such as mobile code) upon the target service components. Among other advantages of our approach, there are the clear-cut separation between the target service and its control facilities, and the ability to reason about and acting upon the target system starting from its architectural knowledge.

## COLV in action: Some early results

The OLIVES project is experimenting with and evaluating COLV principles and tools in a variety of application domains, such as automated on-line testing, service composition (focusing on the upcoming Web services framework) and application-level management.

In particular, Telecom Italia Lab is performing a case study in the latter domain, working on an industrial multi-channel instant messaging service for person-to-person and community-based communication. The case study goals include service optimization, related to the maintenance and enhancement of QoS factors such as availability, scalability and responsiveness, and simplified service management related to multiple aspects, such as the monitoring, control, deployment, maintenance and evolution of the underlying software components.

Prototypical COLV facilities derived from early design and implementation efforts in OLIVES have been put to test, and the results in the lab have proven interesting: The current implementation of the case study is able to handle the deployment, configuration and instantiation of the service on a server farm, monitor critical QoS parameters and thresholds, capture scalability issues related to the peculiar nature of the service at hand and overcome them in real time, without any reactive or proactive human intervention.

All of the above has the potential to greatly lower the time and cost of service deployment and post-deployment support, while improving QoS factors, such as service uptime and availability. Furthermore, it has been achieved without interfering with the service design and development process, and with extremely lean levels of application-dependent effort on top of the facilities offered by the COLV platform prototype.

## Contributions and forecast

COLV provides a vision of fully automated, enhanced control and coordination of distributed software applications and related value-added services, which can result in advancements in critical domains as application management, service composition and on-line testing. In turn, that translates into QoS improvements, as well as technical and business benefits with

respect to traditional approaches to service deployment, monitoring and management, provisioning and offering.

In the P1108 – OLIVES project, we

keep investigating COLV issues, such as the standardization of service interfaces providing access point to COLV probes and actuators, and the automatic capture and exploitation of the service knowledge that informs the COLV workflow with techniques and tools for the description of software architectures. We are also evaluating case studies on all the above-mentioned domains

You can find more information on COLV and the OLIVES project at [www.eurescom.de/public/projects/P1100-series/p1108](http://www.eurescom.de/public/projects/P1100-series/p1108)

**Continual On-line Validation can maintain and augment the Quality of Service of your Internet Applications**

# PORTUGAL TELECOM INOVAÇÃO

CREATING VALUE THROUGH INNOVATION



Inovação



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In 2000, PT Inovação completed its first year as a new company in Portugal Telecom Group. In the same year, PT Inovação celebrated its 50th anniversary as the largest telecom R&D entity in Portugal.

Portugal Telecom (PT) was formed in 1994 resulting from the merger of the three operator companies existing in Portugal. In 1999, the R&D department of Portugal Telecom became Portugal Telecom Inovação, a new company that inherited almost half a century of know-how in the development of telecom products and solutions.

## Portugal Telecom Group

The Portugal Telecom Group is the largest telecommunications and multimedia business organisation in Portugal. It offers a wide range of products and services at the level of the most advanced international companies in the sector, in which quality, diversification and innovation are decisive aspects.

The group dominates the market of local, long distance and international telephone services and the circuit rental service. It is also national leader in mobile phone services, paging, cable television, data communication, value added and television broadcasting.

In the last five years, PT has made the transition from a state-owned company to a private one, and 90 per cent of its shares are now owned privately. It has also gone from being a fixed network operator to an

information, media and communications group that offers a wide range of services from fixed and mobile telecommunications to multimedia and contents and from business solutions to entertainment.

Rapid growth and diversification of business areas and markets are now the main strategic areas through which PT aims to create value for shareholders. As leader in the telecommunications sector, Portugal Telecom is one of the largest Portuguese companies quoted on national and international markets.

## 50 years of R&D

Portugal Telecom Inovação, SA, is the branch for research and development in the Portugal Telecom Group. Fully owned and operated by PT and headquartered in Aveiro, the company also operates regional poles in Oporto and Lisbon having recently established a Brazilian subsidiary in São Paulo.

Formerly CET, this young company has inherited the expertise gathered in 50 years of pioneering frontline activities in the telecoms business in Portugal, augmented with the knowledge base and resources of Marconi Labs (Lisbon) and Inesctel (Oporto) in 1999.

The main objective for PT Inovação is to participate in key projects as the leading group on knowledge areas of research, engineering and training, which are strategic for the development of the Portugal Telecom Group's business. This

mission is met through the commitment to the promotion of the innovation process at both the service, technology and operations levels, so as to ensure competitiveness for the PT companies in both the domestic and the international market. The technological solutions developed by this organisation have proven essential in the internationalisation strategy of the PT Group. The company was a pioneer of the prepaid card technology innovating in what became famous brands as MIMO in Portugal, BABY in Brazil and MediJHAZ in Morocco.

PT Inovação develops its activities around four main axis: Technology Studies and Applied Research; Technology Integration/Development of Telecommunications Solutions, Services and Systems; Engineering and Consulting Services; Technologies and Services training.

The skills and qualification of PT Inovação's staff have enabled the acquisition and development of competence in such broad domains as Intelligent Networks (next generation/convergence approach), Access Networks, Multimedia and IP Solutions, Mobile Networks and Services, Business Intelligence (Network Analysis, Business Analysis, Customer Access, Self-provisioning), Network Management (specification, systems development, architectures and standards, management interfaces), IT Systems and Software Engineering as well as telecommunications business processes.

The focus at PT Inovação is customer-orientated and always in line with the requirements of the various market segments. Technology and market drive the company's actions, which are translated into projects of significant social and commercial impact by addressing fields as diverse as telework, telemedicine, distance learning, applications and services aiming at people with special needs, and digital communities initiatives.



Figure 1: Brand figures in Portugal (Mimo and Telecom Card) and Brazil (Baby) using PT Inovação prepaid solutions for mobile and fixed networks



During the last two decades, PT Inovação was responsible for most of the Portuguese representation in international telecommunications standards bodies (CEPT, ETSI, CCITT, ITU). The deep commitment to the promotion of co-operation with universities and other national and international R&D institutions has enabled PT Inovação to play a decisive role as an agent for the technological knowledge transfer between the market and the industry environments. Besides demonstrating the high capability of its engineering team, this active stance also accounts for the significant participation of PT Inovação in R&D programmes at both national and European level. PT Inovação has participated in CIÊNCIA, COST, RACE, ACTS, ORA, CTS, and ESPRIT programmes and, of course, in EURESCOM projects.

The operations of PT Inovação rely on a young staff of 300 persons, 70 per cent of which hold degrees in telecommunication and information systems engineering. Almost half of these engineers are less than 35 years old.

#### PT and EURESCOM

PT has been committed to EURESCOM's research work since the beginnings of the institute in 1991. This has led PT Inovação to assume the role of project leader for the first time in project P226 – TMN Management of IN-based Services, followed by other projects on testing methodologies (P412), network computing technologies (P1005), IP VPNs (P1107) and access networks (P1117).

PT participation in recent EURESCOM projects has covered various technical areas such as voice technologies, open source, quality of service, optical and access networks, IP networking and evolution, middleware and Internet technologies, e-commerce, mobile networks, usability, fraud and security, etc. The results achieved by these projects are used in PT Inovação's effort to build innovative solutions for its customer companies operating in Portugal, Africa and Brazil. A special methodology for results dissemination has been set-up by PT Inovação and the PT Group so that the most promising research results are presented to the PT companies operating in the various telecom market segments.

In projects P923 BabelWeb and P1104 MUST the work performed by PT Inovação using its technological service development platforms has enabled the

building-up of projects demonstrators for multilingual Web services and multimodal service interfaces using small terminals (PDAs). This work helped in proofing the concepts and guidelines developed in the projects and at the same time enabled an effective approach for presentation of innovative results on interactive voice and Internet services.

PT Inovação is leading and participating in project P1117 FAN (Future Access Networks). The project aims at understanding and anticipating possible evolution scenarios towards an access solution that better fits the actual challenges related to the sustained growth of IP traffic compared to the legacy PSTN/ISDN (circuit switched) traffic, which is likely to stagnate or perhaps even decline in the coming years.

The IP area has been covered by the participation in several EURESCOM projects. In project P1006 Discman PT Inovação contributed with significant knowledge and experience in the area of IP QoS, through the practical evaluation of DiffServ implementations. More recently, this knowledge has been complemented by studies and experiments carried out in project P1107, lead by PT Inovação, in which advanced aspects of IP VPNs were addressed. This knowledge is currently used in the development of PT IP networks, being very important to produce recommendations, define test plans and also in the design and deployment phases of the real IP network.

At the same time PT Inovação has addressed other IP areas with its participation in EURESCOM projects. P1009 Armstrong and P1114 Mc-a-roni addressing, respectively, IPv6 and Multicast,

allowed PT Inovação to participate in early experiments with these technologies. Due to this fact and to the participation in other R&D programmes (IST), PT Inovação is ready to integrate these technologies in its products and services and to help other PT companies start using them.

PT Inovação participates in studies and projects that are setting a common operator view on services and networks beyond 3G introduction in Europe. Both last year's P1145 and the ongoing P1203 project have been producing a common operator standpoint and vision-setting deliverables while promoting workshops to stimulate discussion and ensure operators develop a common strategic view on Next Generation fixed and mobile networks.

PT Inovação has been an active promoter of the collaborative research attitude that made EURESCOM projects successful in sharing innovation risks and promoting the exchange of experiences and results in emerging technologies, pre-normative definitions, services and systems interfaces studies and in building strategic insight for PNO's evolution.

More information about PT Inovação can be found at: [www.ptinovacao.pt](http://www.ptinovacao.pt)

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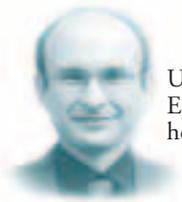


Figure 2: A 4G terminal developed at PT Inovação by Project SAMBA (ACTS)



## EURESCOM WORKSHOP ON SERVICE CREATION IN NEXT GENERATION NETWORKS

# IS SIP THE SOLUTION?



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On 5-6 June, a EURESCOM workshop took place in Heidelberg, which tried to answer, among others, the above question. The overall objective of the workshop was to present and discuss, how next generation service platforms can provide advanced services.

A number of leading experts in this area from network operators, manufacturers and academia have given presentations on their experience with the new service programming technologies, and have also given an overview of the variety and status of related products currently available.

A clear favourite from today's viewpoint is the Session Initiation Protocol (SIP), which was the subject of many presentations. The adoption of SIP by 3GPP for use in further versions of the UMTS standard was an important step in this respect.

There are, however, other strong candidates that could be used for creating services in Next Generation Networks (NGN). They include technologies like the eXtensible Markup Language (XML) and its various application areas, e.g. VoiceXML and XTML. They also include JAIN, which is a set of Java based APIs that enable the rapid development of Next Generation telecom products and services on the Java platform, but also the recently started definition of the Parlay-X programming interface.

The workshop participants got a good overview of the ideas and concepts behind NGN service programming, and also about the current status in both technology and products. A large number of live demos from trials and products was underlining the theory from the presentations, as well as the numerous discussions and exchanges of views between the workshop participants.

More information about the workshop can be found at:  
[www.eurescom.de/ngn-workshop](http://www.eurescom.de/ngn-workshop).



More than 140 participants attended the workshop

## EURESCOM AT NOMS 2002



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The EURESCOM project "E-commerce Impacts on Service and Network Operations and Management" (P1106) demonstrated first working prototypes at the exhibition of the Network Operations and Management Symposium 2002 (NOMS), which took place in Florence (Italy) from 15 to 19 April.

In a joined effort, the project team of P1106, supported by a number of system vendors, demonstrated three working prototypes from the ongoing work to define a new reference framework for building e-

commerce compliant network and service management solutions. One of the objectives of the project has been to validate the implementation of the framework by practical demonstrations of products and technologies. This objective was achieved by the demonstration of three working solutions at the exhibition of the NOMS 2002.

### Three innovative solutions

BEA Systems and Sodalía demonstrated the use of ebXML for telecom service ordering, focusing on trading of network connectivity services for IP QoS and end-user service fulfilment in a multi-domain, inter-operator context.

BTextact demonstrated a working example of an identity management service providing credential information to two trading partners. The service integrator and the network operator were

using the ebXML protocol to agree provision of a VPN with a given QoS.

Finally, Vertel demonstrated Ticket Exchange as an interconnection service for automated information exchange between companies using dissimilar customer care systems. The large number of visitors interested in the P1106 demonstrations confirmed that the project is working at the leading edge of technology and is addressing an issue of vital importance to all network operators and service providers.



# JAIN BRINGING JAVA TECHNOLOGIES INTO COMMUNICATIONS



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Service providers and network operators are mandating standard network interfaces for building open network computing service architectures. With revenues from simple network access in the decline, operators are turning their attention to building out network infrastructure to support differentiated services that bring in more revenue. This is where Java™ and JAIN™ technologies make a difference. The JAIN Initiative points Java right into communications, defining a standard set of interfaces and fusing the Java language with fundamental networking concepts and interfaces. At the “JAIN Community Meetings” at Eurescom on April 22-26, network operators clearly spelled out a common message to the communications vendors: Standard application programming interfaces (APIs) are required to open the network for new cost effective services.

So what is the great divide? The difference between what operators want, and what vendors deliver. This may sound mundane

and service architecture convergence. Vendors’ products, Paul Jaramillo is convinced, will need to integrate with other vendors at the right places that the carrier requires, not just at the point that the vendor wants.

This sentiment was repeated several times. Hidefumi Nakamura, Senior Architect at NTT, delivered a succinct message: “NTT’s vision for open architecture is to enforce vendors to develop systems according to carrier-oriented API/interfaces, which will reduce costs of network components by introducing competition among vendors”. The operators were very forthcoming with their agenda – open network architectures through standard communications APIs.

Chris Shaw of Orange announced that his company would offer JAIN SPA (Service Provider APIs) as one of their external third party access interfaces. Orange regards JAIN SPA as a minimal entry requirement for vendors. “Open network interface is the thrust of our whole Next Generation Services Environment. JAIN SPA in the service creation and service execution layers will definitely be needed as one part of our solution”, explained Chris Shaw.

Steve Mueller of SBC, author of ‘APIs and Protocols for Convergent Network Services’, raised the bar. For him, the question ‘Will there be any new services at all?’

is more important than time-to-market for new services. He is convinced that “we must have APIs in order to build services. The protocols are the glue, but the APIs are what allow you to do interesting things.”

So what is JAIN technology? Java into communications, taking Java

to the next logical step for network computing: Service Portability, Network Convergence, and Secure Network Access.

## Let it rain JAIN!

The world of enterprise computing meets the world of network computing, and JAIN technology is making it happen. Important facts:

- Over 85 communications companies defining JAIN APIs
- 8 JAIN certified products
- over 25 JAIN based products
- 28 JAIN Specifications Requests



Swee Lim (Sun) explaining the JAIN components

- over 100,000 hits per month on the JAIN Website
- adoption of JAIN APIs into wireless standards such as 3GPP and 3GPP2
- the formation of the Java Realization Workgroup within the Parlay organization

The Community moved the JAIN initiative to the next step by introducing a JAIN Council, and focus teams around IP Communications, JAIN Service Provider APIs, and Operators. The Focus teams and the JAIN Council consist of Community members driving technical and marketing direction for the JAIN Community.

The JAIN meetings also included:

- Service provider/Operator summit
- JAIN tutorials
- JAIN show cases featured solutions by Truetel, Personeta, Teltier, Incomit, Ubiquity, and Siemens.
- Expert group meetings – JCC, SCE (SCML), SLEE, SIMPLE, JPAY, SIPLite, SPA UI, Frameworks, and PAM.

## Conclusion

While JAIN technologies are not the panacea to solve all network problems, JAIN solutions provide an integral path forward to open the network to a wide variety of services and expand the industry into new markets by levelling the playing field. Elmar Weber of Vodafone summarized nicely – “Telco-specific development will be facilitated by using off-the-shelf middleware platforms, along with component-centric software platforms and architectures, such as J2EE and JAIN SLEE. With this we can see a reduction in infrastructure costs and opportunities for new revenue-generating services.”

## For more information:

<http://java.sun.com/products/jain> or email to [JAINteam@sun.com](mailto:JAINteam@sun.com)

JAIN Discussion Lists:  
<http://archives.java.sun.com>



About 100 participants attended the JAIN Technology Workshop

and obvious, however, this was a key message repeated by all the network operators at the service provider/operator summit held during the JAIN community meetings at Eurescom. For Paul Jaramillo of Qwest, “System Integration is the key.” His message to vendors: “Don’t view your application server as the central point of control for all services in the network. We need to assume a multi-vendor environment where integration is required.”

He further explained that system integration complexity must be mitigated through the promotion of key interfaces

# ALWAYS-ON ADSL CONNECTIONS

## PRESENT AND NEAR FUTURE SECURITY CONCERNS AND SOLUTIONS



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ADSL offers high speed Internet connections which are normally independent of the connection time. This allows users to have their PCs permanently connected ("always-on") to the Internet and other networks and take advantage of a number of popular applications. However, the very notion of an always-on Internet connection without a qualified administrator to handle security issues raises serious security concerns.

The Eurescom study P1151 (security aspects of DSL always-on services)

- investigated these security threats and estimated their potential impact,
- investigated security solutions and their impact on popular user applications and services,
- suggested potential opportunities for security services,
- recommended further actions, future research and experiments.

### The nature of threats

ADSL as a technology is no less secure than for instance cable modems. Although some router-specific vulnerabilities exist, the main source of security problems is the always-on rather than the broadband nature of the connections, in conjunction with the absence of a qualified administrator. This can result in user PCs being compromised by malicious attackers. The most serious threats at present appear to be related to various kinds of identity theft

(e.g. PINs, credit card numbers, digital signatures) as well as using these compromised PCs and the high bandwidth to run Distributed Denial of Service attacks.

As a result it is important to take steps to avert major security breaches, which could in turn adversely affect customer trust in ADSL as a technology. Furthermore, business opportunities arise from responding to this need to provide security for such connections. Third parties are already offering some partial solutions and Telcos are in a better position to offer more attractive security packages.

### Security solutions

Tools that may be employed to overcome these security issues are manifold and may be applied either at the customer equipment level (for instance a firewall) or at the network level (for instance intrusion detection). While by itself no single tool is sufficient, the combination of different types of these tools can offer a satisfactory solution. Solutions at both the user level (i.e. equipment) and the network level are considered.

Various types of customers have been identified based on their usage characteristics, security needs and assumed willingness to pay. Security solutions are considered separately for each customer type. However, the precise packaging of these offered security solutions is a delicate issue and must be done in a way that does not give the user a negative impression of ADSL. It is suggested that an inexpensive basic security package be offered, plus an additional, optional advanced package.

The **basic package** might include services, such as regular backups, installation and configuration of a firewall with subsequent monitoring of log files and reports, installation and regular update of antivirus software, regular upgrade and patches installation for application programs and operating systems, configuration and review of security settings, awareness campaign and a disaster recovery plan.

The **advanced package** might include port scans, IP hiding, integrated firewalls, customer and network based intrusion detection and 'passport-type' services where the provider handles security and financial transactions over the Internet. The customer will be able to benefit from a more

secure Internet experience while the provider can benefit from these services both financially and in terms of enhanced security reputation.

### Always-On security in the near future

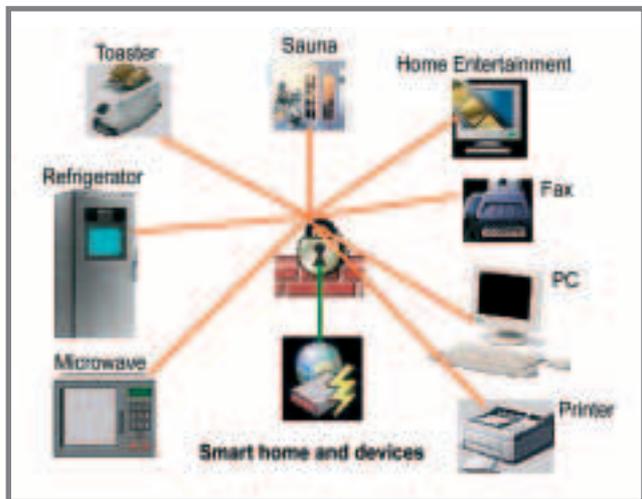
In the near future, we can expect the emergence of smart homes and office automated environments with devices/ appliances always connected and remotely controllable by embedded Web servers. Because the main threats are related to the always-on character of these connections, security issues will remain regardless of whether ADSL or some other broadband technology will be used.

In particular, the future smart home will involve some important changes affecting not only the personal, but also the professional life (e.g. teleworking). It will integrate a number of Internet-enabled appliances like heating controls or electronic door openers as well as home entertainment and home office facilities in a home network. Residential gateways or Home Servers are, together with the PC or set-top-box the central control unit of the home network, and therefore the most vulnerable nodes in the future home. Since security for these connections is very important, the security requirements of future smart homes and their impact on services operators may offer, should be investigated in detail and the most promising ways of applying security mechanisms should be identified (see figure).

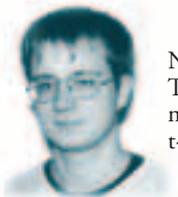
Additional topics that were identified by the project to deserve further study include always-on data stores, e.g. information stored on a central location and accessible by different devices/ gadgets, e.g. mobile phones, PCs etc. With the convergence of fixed and wireless technologies, all devices can have access to the same data, regardless of location. A particularly attractive solution is a central, always-on and secure data store out in the net, where, for example, the family of a traveller can update the calendar on the home PC and these data will be immediately available to the traveller's mobile phone.

### Conclusion

The main security issues are always-on connections with no qualified administrator. Telcos should fill this security gap, as serious security incidents can undermine confidence in ADSL. Filling this security gap can create new business opportunities and new appreciated customer services.



# MULTICAST IN IP NETWORKS: **BENEFITS FROM INTEGRATION**



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IP-Multicast as a core technology has been investigated for many years. Still unresolved issues have delayed the deployment of multicast services. New technologies, for instance Source Specific Multicast, are removing the limitations of the old models and are opening the market for point to multipoint data distribution on the network level.

With the fast growing market of today's Content Delivery Networks (CDN) the need for point to multipoint data delivery increases as well. Many applications like current peer to peer and streaming solutions deliver identical content to a large number of users at the same time deploying inefficient point to point communication models.

The EURESCOM MC-A-RONI project (P1114) aimed at evaluating the different existing ways of multicast content provision, their advantages and disadvantages and, above all, their possible integration.

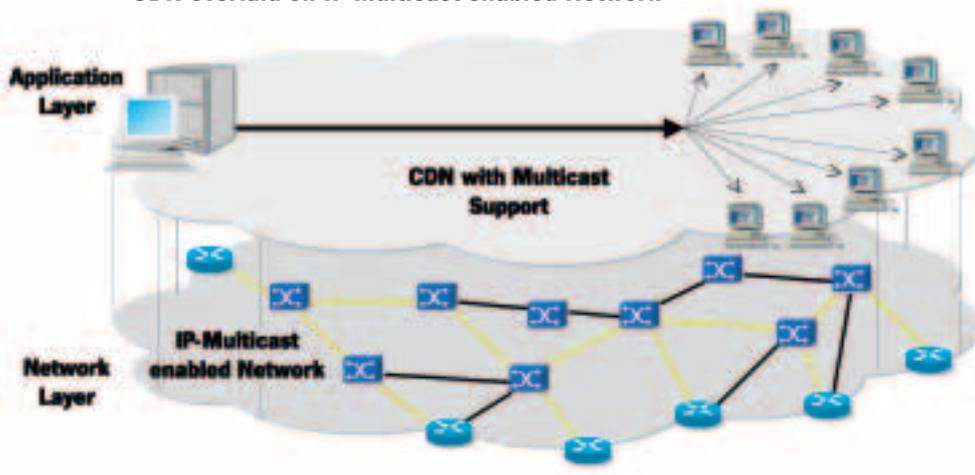
## The ISM model

The Internet Standard Multicast (ISM) model is also known as the Any to Any Multicast or Any Source Multicast model. In this model each multicast group is identified only by its multicast address. Senders use this address as the destination address of a packet. This allows any host on a network – member or non-member and possibly even malicious – to send data to a multicast group. This characteristic opens the door to large Denial of Service (DoS) attacks, which is one of the biggest problems of ISM.

## The SSM model

Source Specific Multicast (SSM) is a new model to implement IP-Multicasting according to the One to Any model. SSM provides multicast channels, which are

CDN overlaid on IP-Multicast enabled Network



identified by a group address as destination and the source address of the sender. A receiver can receive traffic by subscribing to the SSM channel. SSM reflects the requirements for single source multicast raised by CDN and streaming solutions.

In addition, SSM solves many problems, which exist in the ISM model, like DoS attacks and address allocation, which is now – with the use of SSM – in the scope of the sender. From the Internet Service Providers' (ISPs) point of view, SSM is the optimal solution to offer IP-Multicast based streaming services. It can be expected that SSM will be deployed in large networks to replace ISM in the future.

## Multicast on the application layer

CDNs used to be some kind of implementation of Multicast on the application layer, building point to multipoint distribution based on unicast connections. Recent CDN solutions are starting to support native IP-Multicast to benefit from the underlying network resources and to optimise content distribution (see figure). There is still work ahead, but first attempts within the Internet Engineering Task Force (IETF) are promising. Tests in the lab environment, performed by MC-A-RONI, have shown that multicast enabled CDN scenarios offer excellent services.

## Conclusion

IP-Multicast is becoming a core part of new emerging networks. Many networks, which are currently being built (like the Defence Research And Engineering Network – DREN), will support native IP-Multicast from the beginning, and several ISPs are starting to offer IP-Multicast services to their customers.

MC-A-RONI has shown that CDN based services can greatly benefit from traditional IP-Multicast and that the ideal solution for content distribution is the integration of application layer multicast and IP-Multicast.

It can be expected that SSM is going to be one of the major building blocks for upcoming IP-based networks. Router vendors are already working on solutions for the integration of IP-Multicast and MPLS to benefit from the features offered by MPLS.

The project partners have agreed to continue the work on IP-Multicast beyond the project's lifetime. The goal of the combined activities is to produce an IETF draft based on the results of the project. The draft will focus on IP-Multicast deployment issues in order to provide the results to a wider community and is scheduled for 2002.

For further information please have a look at [www.eurescom.de/public/projects/P1100-series/P1114](http://www.eurescom.de/public/projects/P1100-series/P1114)

# OSA & PARLAY

## ENABLING AN OPEN SERVICES MARKET



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The provision of value-added telephony services is by now mainly in the hands of network operators. This might change soon: OSA and Parlay specify an open, secure interface to the telephony network, which can open the telephony network to third party service providers. This tutorial gives an overview on the OSA/Parlay interface (API) and describes some possible application areas.

20 years ago, the implementation and deployment of value-added telephony services was the domain of manufacturers of telecom equipment. Telecom services of these days were, for example, call forwarding or televoting. Manufacturers were implementing the services according to the requirements from the network operator. Later, in the early nineties, the concept of Intelligent Networks (IN) was introduced and deployed in the networks. By this, network operators were getting the means to develop and deploy value-added services on their own. The creation of services is done with a Service Creation Environment (SCE). Services are created graphically by putting single service building blocks together to form the service logic chain, and by customising these building blocks. This is still the current method of how most of the value added services are created, both in fixed and mobile networks. Examples of such services are Freephone, Split Charging or Premium Rate services, Televoting, and also the Universal Personal Number.

### Parlay: API for new service providers

The Intelligent Networks technology does not allow external service providers to create and deploy services on their own through the network of a network operator. The main reason is the missing security features in IN – a Service Creation Environment has full access to the network operator's signalling network SS7. Moreover, the third party service provider would have to invest millions into the necessary equipment. To solve these issues, the Parlay group was founded in 1998 by BT,

DGM&S (today: Ultimec), Microsoft, Nortel Networks, and Siemens. The goal of Parlay is the specification and realisation of an open, technology-independent Application Programming Interface (API) in telecommunication networks. The Parlay API shall enable network operators, independent software manufacturers and service providers to offer products and services, which use the functionality of existing networks. This should not be restricted to one network type, but comprise various networks (see figure 1).

### Structure of the API

The OSA/Parlay API consists of two groups of interfaces: 'Framework Interfaces' and 'Service Interfaces' (see figure 2).

The **Framework Interfaces** provide basic mechanisms prior to the usage of actual network functions. They comprise, for instance, Authentication and Authorisation to identify the application that wants to access the API. After successful authentication, the Discovery function can be used to query information about availability of network functions. Further func-

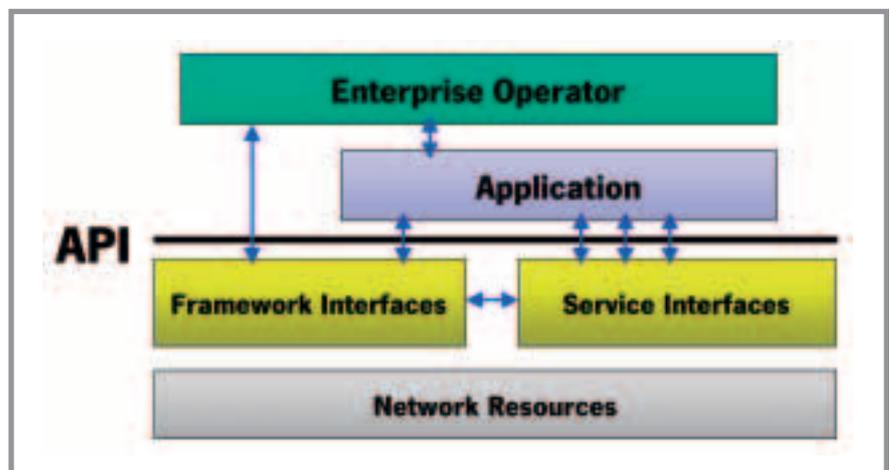


Figure 1: The Parlay API

### Standardisation of the API

The efforts of the Parlay group to bring the API specification into standardisation bodies succeeded already one year later. The 3rd Generation Partnership Project (3GPP), in charge of specifying 3G mobile networks, adapted Parlay as the method for creating services in UMTS. 3GPP introduced this API under the abbreviation OSA – Open Service Architecture – which recently was renamed to Open Service Access. The API thus is nowadays referred to as OSA/Parlay API (or vice versa). Meanwhile, the API has also been adapted by ETSI in order to cover the fixed network side. All three bodies jointly develop the standard. Although these bodies partly publish their own specifications, they are all aligned and compatible. In the second quarter of 2002, the most recent version was subject to approval: Parlay 3.1, and OSA 1.1/3GPP Rel. 4 in ETSI/3GPP respectively (1), (2), (3).

tions comprise Online Subscription of service features or network functions, and further contractual service usage agreements. The access to the Framework is always the first step for the use of the OSA/Parlay API. Following this, the Service Interfaces can be used, as far as the application is authorised.

The **Service Interfaces** enable client applications to access the so-called 'Service Capability Features' (SCF). They represent the available network functions that can be used to implement telecommunication services for the end-customer. The following list gives an overview of the components contained in Parlay version 3.0, approved in December 2001:

- Call Control: Setup and control of connections
- User Interaction: playing announcements, DTMF recognition, Sending of SMS etc.

- User Status/User Location: e.g. phone switched on/off?, Localisation of the phone
- Data Session Control: e.g. for volume-based tariffing in GPRS
- Terminal Capabilities: to query on terminal capabilities
- Generic Messaging: converting messages, connection to mailbox etc.
- Connectivity Management: Realising QoS etc.
- Content based charging: tariffing based on the content of the transmitted data
- Account Management: Management of prepaid cards in mobile networks

### Business ideas

There is one main goal that the OSA/Parlay API is aiming at: The convergence of the telecommunications and the IT world. The capabilities of modern telecommunication networks have been off-limits to developers in the IT world by now. What is missing are the access capabilities to the telecom networks: Instead of programming language APIs there are complex and heavy transmission protocols like SS7 and INAP. Moreover, detailed knowledge of the functioning of telecom networks is required. In fact, opening the telecom networks to the large number of developers and applications in the IT world would push the development of a large variety of new telecommunication services.

“There are world-wide 3 million of Visual Basic programmers, 2 million for Cobol and 1.5 million for C++ and Java respectively. These are the ones we must reach, and provide them with the capabilities to develop telecommunication services”, explained the chairman of the Parlay group, Zygmunt Lozinski, at the EURESCOM workshop “OSA and Parlay” in February this year (4). As the OSA/Parlay API targets, besides fixed and mobile networks, also towards IP networks, new types of services could be created that would clearly differ from the existing Intelligent Network type of services.

From the regulatory bodies no requests to deploy and provide the OSA/Parlay API are planned at the moment. This might, however, not be necessary, even, as both network operators and third party service providers could profit from the deployment of the API. For network operators there would be new sources of revenues, for example, from fees for the provision of the API or from additional network usage. Independent service providers would in return get the opportunity to develop and market services on their own. The Internet has already given a good example of how a variety of new services can emerge within a few years by the capabilities of free and independent service development.

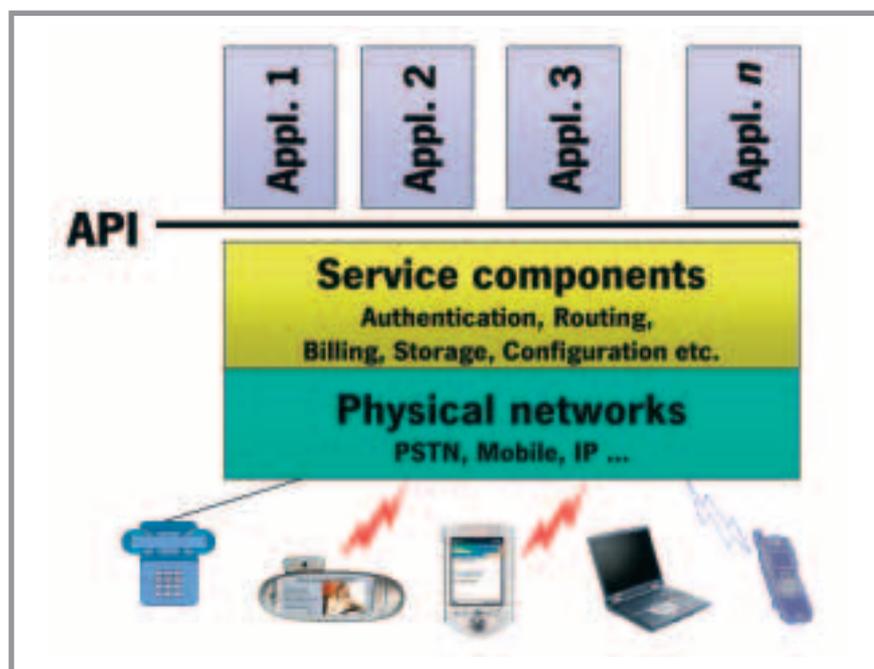


Figure 2: OSA/Parlay API: Components and Interactions

### OSA/Parlay products

OSA/Parlay products are available only since the second half of 2001, meanwhile from more than a dozen of vendors. They are compliant with Parlay 2.1 and thus don't provide all the capabilities of Parlay version 3.0, described above. This affects most of the service interfaces, as only the components Call Control and User Interaction are available in all products. Several support User Location and User Status, and a few also provide capabilities like Messaging or Data Session Control. All products consist of two main components: The application server, where the applications run, and a Gateway towards the telecommunication network. Standard hardware and operating systems (Unix, Windows) are used. For the internal communication CORBA 2.0 or 2.3 is used to a large extent, which allows the use of most widely used programming languages.

### Services and applications

In an open services market, applications are no longer constrained by what manufacturers or network operators offer, but are fully accessible for the service providers. In this respect, it will be up to the service providers' creativity and the market demand to decide what the new applications will be. EURESCOM project P1110 has evaluated a number of OSA/Parlay products and has implemented several services for testing purposes (5). Services like 'Buddy List', 'Location based ads' and 'EROSA' are in the area of location-based services and mobility. 'Inquire & Buy Trip'

is on m-commerce, and 'Scheduler service using Outlook' tries to integrate IT and telco systems. Further services are 'Network based Call Centre' and 'In Touch'.

Although these services were selected rather from testing viewpoints, they still give an indication of future directions where services will emerge.

### Outlook

With the commercial availability of OSA/Parlay products it is now up to network operators and service providers to translate the technical possibilities into a variety of new services. To further increase the scope of potential service developers, Parlay has started with the definition of a 'light version' of the OSA/Parlay standard with the working title Parlay-X. Parlay-X will offer only limited capabilities, but this will be compensated by the fact that no telecommunications knowledge is required to develop applications with it. To make the Parlay interfaces even available via the Internet is the objective of another recently started working group on 'Parlay and Web services'.

### Links on OSA/Parlay:

- (1) <http://www.parlay.org/specs/index.asp>
- (2) [http://www.3gpp.org/ftp/TSG\\_CN/WG5\\_osa/Specs](http://www.3gpp.org/ftp/TSG_CN/WG5_osa/Specs)
- (3) <http://docbox.etsi.org/techorg/span/Open/Span12/osa.html>
- (4) <http://www.eurescom.de/osa-workshop>
- (5) <http://www.eurescom.de/public/projects/P1100-series/p1110>

## NEW EURESCOM PROJECTS KICKED OFF

### Broadband services in the intelligent Wireless Home (P1206)

If you ask the operators' customers for their wishes for future services at home, they would like to have wireless connectivity, use of the mobile phone at home, and remote control. Adding the vision of the "open network" provides a clear picture for research and development. This project will look at the ways wireless networking technologies, like Bluetooth, 802.11, Hiperlan and DVB, can be deployed to make full use of broadband connections to the home. Potential services are, for example, remote control, personal radio and video, and community services ("information for family members"). These services will be personalised in the 'intelligent wireless home', thanks to the service profiles of the users. The focus will be on how operators can offer new revenue generating packaged services to users combining broadband access and advanced wireless home networking for infotainment, security, remote home management and customer care applications.

**For more information contact:**  
Valerie Blavette, [blavette@eurescom.de](mailto:blavette@eurescom.de)

### Interoperability of Digital Rights Management Technologies (OPERA) (P1207)

Electronic content delivery is one of the future growth businesses in which network operators and service providers are especially interested. This interest is based on the available technical networks and the direct access to a high number of end-users. Standardisation bodies offer recommendations whose main output could be used in the security specification for copyright protection. One prerequisite for the success in this business is the availability of easy-to-use, protected content, for which users will be willing to pay for (so-called premium content). Today, many proprietary Digital Rights Management (DRM) technologies are already emerging, but are

not interoperable. Depending on the deployed DRM system, customers purchasing licenses from different service providers or content owners, who offer their content through different service providers, have to deal with the functionality and usage of different DRM systems. Within the OPERA project an open DRM architecture specifying standardised interfaces and processes for the interoperability of DRM systems will be developed.

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### Location Awareness (LOCAWA) (P1208)

Location Awareness denotes a group of services that can calculate the current position of mobile devices, which in return will present the location information of mobile users. This project will start with a short segmented market analysis to evaluate emerging location based services (LBS) and implement the most feasible ones in a trial phase. One of the key aspects of this project is to analyse how location-based information can be presented to the user and how the privacy of users can be assured. The results will be evaluated in the final phase of prototype development and testing. Available positioning technologies, such as CELL-ID, GPS and new emerging technologies, will be studied in order to consider their performance and Quality of Service (QoS) in the design of both user interface and LBS.

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### XML Web Services (P 1209)

There are a number of initiatives in the IT industry to standardise certain online services. Whichever of these initiatives succeeds, there will be a significant impact on services, which telecom operators currently plan to offer, from mobile Internet access and m-commerce to publishing of information. The goal of this project is to demonstrate how Telcos could increase their revenues by utilising the ideas and technologies behind these Web services initiatives, the majority of which are built on XML. The project will achieve its goals by (1) building a body of knowledge related to the design and implementation of XML Web services, (2) producing a study on commercially viable XML Web services and business models, and (3) developing key XML Web service prototypes.

Telcos are in a great position to be winners, as the XML Web services technology will allow them to sell resources, like mobile location information and mobile instant messaging, to third party service providers, who in return will be able to rapidly deploy novel end-user services utilising Telcos' networks.

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## WE HAVE TO CONCENTRATE CREATIVITY

INTERVIEW WITH PROF. DR. JO GROEBEL,  
DIRECTOR-GENERAL OF THE EUROPEAN INSTITUTE FOR THE MEDIA

New information and communication technologies will fundamentally change our society and economy. One of the major think tanks that has been analysing the challenges and suggesting new ways to the information society is the European Institute for the Media. It was founded in 1983 and is led by professor Jo Groebel, one of the most influential thinkers in Europe. EURESCOM mess@ge interviewed him at the media conference 'Hamburger Dialog' in April.

**How will the relationships between network operators/service providers and content providers develop over the coming years?**

I see content providers in the better position. It is content that sells. But neither the network operators nor the content providers alone can be successful. One doesn't work without the other. This means either to concentrate contents and networks in one hand through mergers and acquisitions, or to join forces with allies. A high percentage of mergers and takeovers have not succeeded. To open up the markets we need alliances. So it made sense, for example, that the German antitrust authority allowed the alliance between Bild.de and Deutsche Telekom, which was controversially discussed by the public.

**How do you estimate the prospects for the convergence of media, telecommunications and IT?**

Convergence was centred too long around multimedia putting all kind of media capabilities in one device. This was the wrong way. What we need is polymedia. This means that I can link myself with one central device to all kinds of other peripheral devices depending on the need of the situation. To make this kind of convergence happen we need to further develop suitable hardware.

**What is your vision for the information society of the future?**

My personal dream scenario is that I will own a small, simple device that will connect me to everything I need. Peripheral devices will be integrated in the most suitable way. Rather than seeing a video on the small screen of a mobile device, I would, in a hotel, for instance, connect my device to the plasma screen in the hotel room. I would only have one number and one subscription for all the communica-

tions services. This would mean a perfect co-ordination not only between network operators, service providers and content providers, but would also include architects.

From a global perspective, my vision is that we will overcome the analogue divide in the world through digital technologies. We don't have to be afraid of a digital divide. The analogue divide is much worse, and digital technologies have the potential to solve this problem. Just think, for example, of the explosive growth of mobile telephony in Kenya, a country that has never had an advanced communications infrastructure before.

**How will the global position of Europe in telecommunications develop in the future?**

Major parts of Europe are already leading in telecommunications technology. However, Europe has to be extremely attentive not to lose the game against the US in the long run. New communications technologies may have been developed in Europe, but the business models for exploiting these technologies are still coming from the US. For everything beyond pure technology I have doubts, if Europe will be able to match the attractiveness of products and services designed in the United States. The first explanation for this is the sheer political and economic power of the US economy, with massive investment in the field of technology. We shouldn't forget that large parts of technological development are financed by the military sector.

But there is another explanation. Over the past 200 years US companies had to press the right button in offering the right services to a culturally diverse market. The US companies are therefore experienced in bringing different cultures together and in hitting the cross-cultural nerve of their consumers. This is different in Europe, where companies have been concentrating on culturally segmented markets. The different ability to integrate various cultural influences in the designing and marketing of products explains, why a Hollywood movie, for instance, is so much more attractive than a European movie.

**How should R&D in Europe develop to meet the future technological challenges?**

It is important to centralise R&D in Europe. We have to concentrate creativity, knowledge and investment. Like in the Silicon Valley, you have to get people local together. For this purpose, we have just

started a co-operation with the London School of Economics and three other European partners to figure out how to concentrate creativity and investment in Europe. This has to be done in a public private partnership. A top-bottom approach with the European Commission in the centre would not be sufficient. It is true that the European Commission has improved and is going for more flexibility now. But the European Commission is inhibited by political considerations; they have to balance the interests of all member countries. National jealousy is still a major factor. As soon as you wanted to establish a European centre for innovation in one country, the other countries would start to yell, why they didn't get it. Therefore we have to find ways based on a bottom-up approach to centralise knowledge and innovation in Europe.

**What is your opinion about collaborative R&D as done by EURESCOM?**

EURESCOM is a major player in the field of R&D. Collaboration in R&D is important, and we need to develop it further. What we have to do is cross-disciplinary, cross-national research work. This is necessary, because we tend to neglect some areas of research that are relevant.

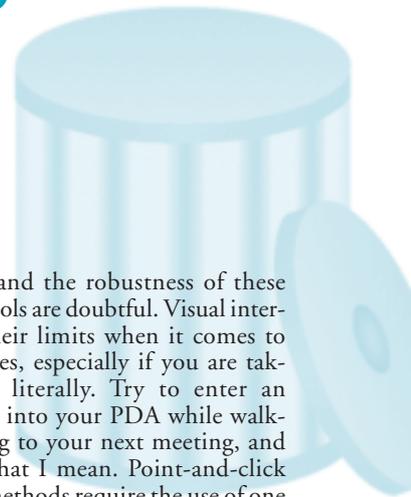
*The interview was conducted by  
Milon Gupta.*

Professor Dr. Jo Groebel, born on 11 November 1950 in Jülich/Germany, has been Director-General of the European Institute for the Media in Düsseldorf/Paris since 1999. He holds the chair for media psychology at the University of Utrecht and is a visiting professor at the University of California in Los Angeles and the University St. Gallen as well as president of the Dutch organisation for Scientific Communication. Prof. Groebel is also advisor to the Dutch government, the president of Germany, the United Nations and several Fortune 500 companies. He was head of the media monitoring missions for the European Commission in Russia during the 1999 Duma election and the presidential election in 2000 and presented his vision on the Future Digital Society during a government conference in Berlin in June 2000.

Further information: [www.eim.org](http://www.eim.org)

# IS THE DESKTOP BOUND TO DIE?

## APPROACHES TO IMPROVING THE USER INTERFACE



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For years researchers have been busy working on further improvements of user interfaces to ICT devices. But since the introduction of the Windows PC desktop in the eighties the life of users hasn't become easier. Currently, new attempts are being made to change this.

One of the most fervent opponents of the ruling desktop metaphor with its hierarchy of files and folders is professor David Gelernter from Yale University, one of today's leading computer scientists. He developed a new concept for the graphical interface based on chronology.

### A stream of index cards

Last year he has set up the company Mirror Worlds to develop and promote his Scopeware software. This software generates a horizontal stream of index cards representing different kinds of files in chronological order. Even without file name, Scopeware is able to assemble connected documents via a keyword. Hovering over an index card with the mouse makes a window pop up, which shows a summary of the underlying document.

### Trees, lenses and tubes

However, there are more attempts to overcome the limits of today's graphical PC interface. At Parc Xerox, researchers have been generating a plethora of alternatives over the last years. They created all kinds of new interactive visualisations for hierarchical, linear and matrix information using trees, lenses and tubes as new graphical metaphors. Through their affiliate Inxight, Xerox is offering products based on these alternative concepts, but without convincing a high number of users so far.

### Microsoft's task gallery

Even Microsoft itself is exploring new graphical interfaces. On the Microsoft Research Web site a 3D prototype called TaskGallery can be admired, which is

designed as a virtual environment similar to an art gallery. But it is not yet sure, if Microsoft will integrate any radically new graphical interface in its Windows XP successor Longhorn, which is scheduled for 2004.

Beyond the graphical interface, IBM has been doing considerable research on improving the interfacing of human and machine by improving the ergonomics and by adding sensorial functionality to the PC.

### PCs are too complex

For Donald A. Norman, former head of Apple research laboratories and now consultant and professor of computer science in Chicago, the problem is the computer itself rather than its interface: "I think the computer is too complex". This ever-increasing complexity, says professor Norman, is unavoidable, because PCs are designed for everyone and for all kinds of different tasks. "We spend far too much time learning how to use it," he complains. Instead of improving the interface to the PC, he wants to replace the PC by widely distributed devices, each of which is focussed on a single activity. He compares this to the development of the electric motor. In its early phase, the motor was a single device installed at a central location. But that was not convenient enough, and electric motors are now in-built in a large number of devices, mostly invisible to the user. Professor Norman predicts the same trend for digital technology.

### Mobile interfaces

However, the trend to small and mobile devices doesn't solve the problem of a user-friendly interface. In contrary, mobile devices pose new problems. Small displays and buttons don't necessarily make the life of users easier. Nonetheless, designers more or less kept the traditional interface elements from PCs, which are known under the acronym WIMP (windows, icons, mouse, pointer). The advantage is that users are familiar with this kind of interface, which makes it easier to adopt to mobile interfaces. Sure, a lot of simplified interface and input devices, like trackballs and PDA pens, have been created, to solve the problems of small size. But the

ergonomics and the robustness of these interfacing tools are doubtful. Visual interfaces have their limits when it comes to mobile devices, especially if you are taking 'mobile' literally. Try to enter an appointment into your PDA while walking or driving to your next meeting, and you know what I mean. Point-and-click interaction methods require the use of one but more often two hands, which limits their practical use in real-life mobile situations.

### Speech interfaces

This is where speech interfaces come in. With the advance of speech-recognition and noise-cancellation, speech interfaces will certainly become more important for mobile devices. Christine Thero-Slocumb, marketing director at the software development company Tangis, has formulated four central requirements for mobile interfaces: "1. The interface must make minimal demands on the user's attention. 2. The interface must support a wide range of interaction devices. 3. Switching from one interaction method to another must be seamless. 4. The interface and interaction methods must be easy to learn."

The easiest way for the users would be, if the machine could read his wishes from his eyes. This may sound like a far-away vision from a fairy-tale, but actually, IBM's Almaden computer science laboratory has explored this direction already since 2000. Their premise is that emotion is important for interaction between humans. In their 'Blue Eyes' project, IBM's researchers are trying to teach PCs to sense the emotions of their user. This is done via affect detection using a camera and software for analysing the facial expressions of users. In addition, the so-called Emotion Mouse measures temperature and blood pressure to find out the emotional state of the user.

Lots of promising ideas are explored in the research laboratories. But it will certainly take some time until user interfaces become so user-friendly that users will stop cursing their devices for their cumbersome methods of understanding what the user wants.

References on this topic are available in the Web version of this article at [www.eurescom.de/message](http://www.eurescom.de/message).

# WORKSHOP

## OSA and Parlay @ Work Moving towards deployment

**EURESCOM workshop,  
13-14 November 2002**

Venue: EURESCOM, Heidelberg, Germany  
[www.eurescom.de/osa-workshop2](http://www.eurescom.de/osa-workshop2)

The objective of the EURESCOM workshop OSA and Parlay @ Work is to present experience from trials and early deployment of OSA and Parlay technology, and to discuss benefits and business opportunities that eventually will lead to a wide deployment of OSA and Parlay in the Open Services Market. This workshop is planned as the meeting place for telecom operators, service providers, manufacturers, regulatory bodies and others interested in the provisioning of services and applications in the Open Services Market.

### Topical highlights include:

- The "state of the art" of Parlay/OSA technology
- An overview of the status of standardisation work
- Experiences and results from trials and deployment of Parlay/OSA products
- Live Parlay/OSA demos
- Discussion of operational issues from mobile and fixed network operator on deployment of Parlay/OSA
- Presentation of business opportunities in the Parlay/OSA market
- Results from EURESCOM projects

### Speakers include:

- Zygmunt Lozinski, President of Parlay Group, Senior Technical Staff Member, IBM
- Ard-Jan Moerdijk, Chairman of 3GPP OSA Working Group, and Strategic Product Manager, Ericsson
- John Strand, Strand Consulting
- Oddvar Risnes, Project Leader EURESCOM Project P1110, Director of Research, Telenor R&D

### Workshop programme outline

- Session 1 "State of the art of OSA/Parlay products and standards"
- Session 2 "Experience from trials and early deployments"
- Session 3 "Benefits and business opportunities"
- Panel Session "Is Parlay/OSA ready for deployment?"
- Session 4 "Services and operational issues of Parlay/OSA"
- Session 5 "Complementary technologies"

### Who should attend?

- Operators and Service providers that have deployed or are planning to deploy Parlay/OSA solutions,
- Managers and Decision makers within operators and service providers,
- Service and application developers,
- Network engineers,
- Equipment and software vendors,
- standardisation experts

### Registration and further information:

[www.eurescom.de/OsaAtWork](http://www.eurescom.de/OsaAtWork)  
Early bird registration deadline: 30 September 2002

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