

# Usability of end-user devices

In focus  
**ETNO**

Viewpoint  
**ICT in Europe**

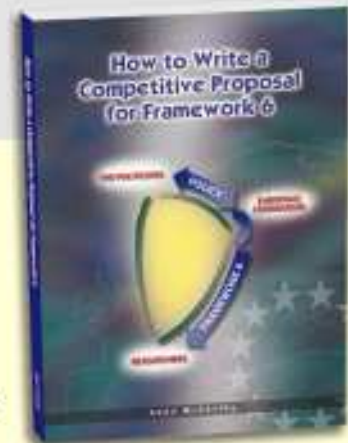
Tutorial  
**WIMAX**



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## Author of Handbooks and Course Presenter:

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# Dear readers,



Christmas is the time when many new communications devices lie as gifts under decorated firs. Sometimes the joy over the high-tech gift is clouded by the frustrated efforts of its new owner to make full use of it. This is why we thought that December is the right time to discuss the usability of communications devices in our magazine.

The functionality of communication devices for end-users has been vastly increased in recent years. But has usability kept pace with this development? This cover theme will provide answers. We feature articles by leading experts on what manufacturers do to improve the usability of mobile phones, how advances in speech recognition will make devices more usable, and on usability requirements from an industrial designer's point of view. In addition, we will have an exclusive interview on the topic with two usability experts from Dutch research organisation TNO.

Another influential organisation in the telecoms domain is ETNO. *Eurescom mess@ge* presents an exclusive inside view on the organisation and its role in European telecommunications.

We have two more articles that are related to European issues. *Eurescom mess@ge* editor Peter Stollenmayer presents the recently launched EU project 'New Media for a New Millennium' (NM2), which he himself coordinates. The other article, written by CELTIC office director Heinz Brüggemann, covers the latest developments of EUREKA cluster project CELTIC.

We hope you will find something interesting in this issue and would appreciate your feedback on any of the articles. If you would like to suggest a topic or offer a contribution for the next issue of *Eurescom mess@ge*, this is equally welcome.

Since Heraclitus it is well known that "Nothing endures but change". *Eurescom mess@ge* is no exception from this rule. As you will notice, we introduced two changes in this issue: firstly we introduced a new section called "Viewpoint" instead of the former introduction, which will present views by Eurescom staff members on current R&D topics. The second change is the introduction of a calendar of events on page 4. We think that these changes will increase the usability of *Eurescom mess@ge*.

Season's greetings,

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

# Events calendar

14 December 2004

## **First DAIDALOS Public Workshop**

Designing advanced network interfaces for the delivery and administration of location independent, optimised personal services  
Stuttgart, Germany  
[www.ist-daidalos.org/workshop.htm](http://www.ist-daidalos.org/workshop.htm)

27-29 April 2005

## **Eurescom Summit 2005 – Ubiquitous Services and Applications**

Heidelberg, Germany,  
[www.eurescom.de/summit2005](http://www.eurescom.de/summit2005)

23-26 May 2005

## **VON Europe 2005**

Stockholm, Sweden  
[www.pulver.com/europe2005](http://www.pulver.com/europe2005)

19-22 June 2005

## **IST Mobile & Wireless Communications Summit**

Dresden, Germany  
[www.mobilesummit2005.org](http://www.mobilesummit2005.org)

## Sn@pshot

# Looking at the future of IST

Peter Zangl, Deputy Director-General of the European Commission's Information Society DG, testing a new device at the exhibition of the IST 2004 event in The Hague on 15 November.



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## +++ News in brief +++ News in brief +++

**Interoperable electronic tolling**

Driving through Europe without stopping at toll booths might soon become reality. This is the vision of EU project PISTA, Pilot on Interoperable Systems for Tolling Applications. The project has validated a new European standard for interoperable electronic fee collection (EFC) systems.

Through trials in seven European countries, PISTA has proven the practicality of applying the CEN 278 interoperability standard to EFC systems. These systems allow drivers to pay tolls electronically through the use of tags in their vehicles that communicate with roadside antennas.

"EFC technologies are very mature, but the problem has been a lack of standardisation," explains PISTA's project manager, Rafael Fando. "Toll road operators in different countries have used different, incompatible technologies, meaning that an EFC user in one country cannot use their tag to pay tolls in another country."



PISTA conducted a 12-month trial with 17 toll road operators in Sweden, Denmark, Spain, France, Greece, Italy, and Portugal. The trial proved that through the incorporation of new EFC systems and the adaptation of existing ones full technological interoperability can be achieved.

There remains, however, a non-technical problem, as it is also necessary to ensure contractual interoperability between banks for accepting toll charges from other countries. First steps have been made. All EFC systems on Spanish toll roads are now interoperable at national level from a contractual viewpoint. Portugal and France are expected to implement contractual interoperability with Spain, creating a cluster

of compatible EFC systems on toll roads in the south-west of Europe. A similar cluster is being set up in Scandinavia.

Interoperability will allow toll roads to handle more traffic more efficiently while increasing the comfort of users and reducing congestion. According to PISTA, EFC systems can process 1,000 vehicles per hour, as opposed to 250 per hour with manual systems. It is estimated that there are currently five to six million tags in cars across the EU.

[www.pistaproject.com](http://www.pistaproject.com)

**Denmark is number 1 in Information Society Index**

For the first time in four years, Sweden is no longer the top ranking nation in IDC's Information Society Index (ISI), which measures the abilities of 53 nations to participate in the information revolution. This year, Denmark has displaced Sweden in



the number 1 position. Additionally, the U.S., Switzerland and Canada displaced the Netherlands, Norway, and Finland to round out the top 5.

The ISI combines 15 variables in four infrastructure "pillars" to calculate and rank each nation's ability to access and utilize information and information technology. In much the same way that gross domestic product (GDP) measures a country's economic wealth, the ISI measures its information capacity and wealth. The four pillars are:

**Computers** – This pillar looks at the basic building blocks of information society by measuring the number of PC households, IT spending as a percentage of GDP, software spending as a percentage of total IT spending, and IT services spending weighted against GDP.

**Internet** – The Internet is a key factor in the development of an advanced information society. This pillar factors in the number of Internet users within a country, the percentage of users with Internet access at home, the number of mobile Internet users, and e-commerce spending.

**Telecoms** – To better understand how each society accesses information, this pillar measures variables related to broadband adoption, wireless services, and mobile handset shipments.

**Social** – Social factors provide the glue that enables society to fix onto the advantages offered by innovation. This pillar evaluates a society's ability to utilize information technology by measuring education, civil liberties, and government corruption.

At the bottom of the rankings were the less-developed Information Societies – countries where there is far less ability to access and use information and information technology. Of the 53 countries pro-

**TOP 10****ISI Nations and Index Scores, 2003****Country ISI Score**

1. Denmark . . . . .	963
2. Sweden . . . . .	958
3. United States . . . . .	938
4. Switzerland . . . . .	929
5. Canada . . . . .	925
6. Netherlands . . . . .	919
7. Finland . . . . .	911
8. Korea . . . . .	904
9. Norway . . . . .	899
10. United Kingdom . . . . .	870

Source: IDC Information Society Index, 2004

filed in IDC's Information Society Index, Indonesia, Vietnam, India, and Turkey received the lowest overall scores. It should be noted, however, that these scores are based on a profile of each country as a whole. In addition, the study only examined those countries where IDC has a substantial local research presence, representing the 53 largest IT markets in the world. It is incorrect to interpret the Index as a statement that these countries have the world's least developed Information Societies or are among the world's least developed countries.

[www.idc.com](http://www.idc.com)

# Simplifying complexity

## The challenge of user-friendly telecom devices



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Some months ago, my neighbour had asked me to help her set time and date on her new mobile phone and store her favourite numbers and addresses. I looked into the manual, and after about an hour we managed to do the job. She would not have been able to succeed without help, although being a 55-year-old woman and representing quite a large user group. Modern telecom devices have become increasingly difficult to use. Customers not so familiar with new technology have trouble to operate them. Is this something we have to accept, or are there ways to make telecom devices more user-friendly?

There are several reasons for this problem. Modern telecommunication devices are becoming increasingly complex, yet most of them need to become smaller and smaller. Increasing competition forces companies to keep their development costs low, and to bring their devices on the market as early as possible.

### Many features make it complex

You may ask why we need all this complexity and all these features, which most of the users do not use anyhow. Firstly, there are the system requirements, such as

more efficient radio interface standards or improved communication protocols. Secondly there are the numerous gadgets and features, with a growing number every day. A modern mobile phone for example is close to a "digital me", providing all kinds of personal services to its owner, including camera, MP3 music player, PDA, navigation device and electronic purse. Latest surveys by Cap Gemini show that younger people want feature rich devices, whilst older customers would be happy with fewer features and simpler devices, of course at a lower price.

### Missing usability increases the digital divide

There is a growing concern that missing usability is increasing the digital divide. Whilst younger people have fewer problems with complicated terminals, and even accept services like SMS, where they have to type in letters through numerical keypads, older people often don't adopt such services because they feel unable to operate them. Surveys like Eurescom project P903, Cross-cultural attitude to ICT in everyday life, showed that elderly people are using ICT services much less. However, they are increasingly adopting the basic telephony function of mobile phones. They are not so much accessing the Internet, probably because of the high threshold of operating a PC.

The current research issues in usability and the economic value of usability are revealed in an interview with usability experts Dr. Nico Pals and Joke Kort from the Dutch research organisation TNO.

### There is light at the end of the tunnel

There is a hope that more sophisticated technical solutions help to overcome the problems of operating complex devices. In the ideal case the user would just speak to his/her terminal, and the terminal would answer in understandable sentences. An article by linguistics experts Els den Os from Max Planck Institute and Dr. Lou Boves from the University of Nijmegen on the state of the art in speech recognition and artificial speech technology reports what is possible in this area.

Another ideal way of operating devices would be to just control them through one's own thoughts. Although this sounds very futuristic, first achievements have been made in this area. An article from the Fraunhofer Institute for Computer Architecture and Software Technology about the latest research in controlling devices directly through brain waves takes a look in the future.

Until such sophisticated solutions will be reality, there is a lot of work by design experts necessary in order to make telecom devices as user-friendly as possible. A first-hand report from leading mobile phone manufacturer Nokia allows us a glance behind the curtain, showing in which direction the development of user-friendly mobile phones goes.

Usability  
of  
end-user devices

# Developing usable mobile phones



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The common goal of usability professionals working on Nokia mobile phones is to develop devices from the end-user needs' perspective, and not only based on technical possibilities. Our task is to ensure that the target user group of each model can operate the device fluently and with joy.

Nokia investigates all phases in the device lifecycle: taking the device into use, learning to use it, and daily use. The variety of different cultures and contexts of use make usability work especially interesting and challenging. Compared to PC application development or Web site authoring, mobile phone manufacturing requires a much wider range of usability investigation. Some examples of the topics, which usability experts at Nokia investigate, are presented in the table below.

## The benefits of personal devices

When it comes to device functionality, a small device does have its limitations, but

mobility brings also huge benefits. Compared to stationary devices, a mobile device that users carry with them almost all the time opens up new opportunities for applications and features. Personal area networks and location and context sensitivity are interesting and important topics also from the usability and human-factor point of view. To exploit these opportunities in a user-friendly way, we need to understand the nature of different mobile contexts and human behaviour outside laboratories.

Between usability and marketing, there is also emotions research, which aims at understanding what users feel and why when interacting with the device, and what brings about a joyful user experience. People have an emotional relationship with their personal mobile phones: the phone they carry with them expresses their personality in a similar way as their car does.

## An important success factor

Usability is certainly one of the success factors of mobile devices, but it is not the only one. Usability, industrial design, functionality, and performance all go hand in hand, together comprising the user experience. The usability profession has evolved to cover parts of each of these aspects. Consequently, the old usability teams are now called user experience teams, and the team members have a wider range of backgrounds. For example, usability experts carry out user trials to assess whether the perceived performance of an application is adequate, because it is not always clear what the acceptable performance level is. User experience specialists are also increasingly involved in defining the phone functionality and features, because they can anticipate the user needs with greater sensitivity than technologists.

Industrial design and functionality are the factors that affect a purchasing decision the most, in addition to the price. A customer often discovers only after having purchased a phone that the device is totally unusable or slow. Usability experts want to encourage buyers before the purchase to try out some basic tasks with the phone, like writing a text message or taking a picture. This prevents many post-purchase disappointments.

## User interface styles

The earlier usability activities are started in the product development process the better. By understanding the users' needs, desires, and current usage patterns, new concepts and inventions may emerge to be further developed, for example in Nokia Ventures Organization. There is a wide variety of usability verification methods available for the different phases of the product development cycle.

Input	Output	Software	Other
<ul style="list-style-type: none"> <li>■ Ergonomics of keys &amp; the whole device</li> <li>■ Key discovery</li> <li>■ Text input</li> <li>■ Touch screen input</li> <li>■ Speech input</li> <li>■ Motion gestures</li> </ul>	<ul style="list-style-type: none"> <li>■ Display quality</li> <li>■ Audio quality</li> <li>■ Haptic feedback</li> </ul>	<ul style="list-style-type: none"> <li>■ User interface consistency</li> <li>■ Information visualization</li> <li>■ Usability within single applications</li> <li>■ Application interworking</li> </ul>	<ul style="list-style-type: none"> <li>■ Mechanics (e.g. battery change)</li> <li>■ Cover material</li> <li>■ Graceful power saving</li> <li>■ Accessories</li> </ul>

Examples of research topics in mobile device usability



Conducting user studies out in the wild requires special equipment.



Nokia has dozens of phone models coming out each year, so it would be impossible to perform a complete usability test on each of them. The solution is consistency, which is gained by using well-defined user interface (UI) styles. A user interface style defines the screen resolution, set of keys, and application look and feel. The functionality and industrial design of each phone varies, of course, but the underlying UI rules are the same. Series 60 UI style by Nokia has been licensed also to several other phone manufacturers. Everyone benefits from the consistency: End-users do not have to learn a new user interface logic each time they purchase a new phone. Telecom operators need to have only one sort of settings for a series of phones. It is easier for Nokia to produce usable devices by ensuring feature usability once and apply it across many models. The consistent UI style also helps third party developers to build applications for various phone models easily. No wonder there is a bunch of Series 60 applications available that end-users can purchase as add-ons for their devices.



The look and functionality of Series 60 phones vary, but they all have a consistent display resolution, set of keys, and UI logic.

#### Reference

Lindholm, C., Keinonen, T., Kiljander, H.;  
Mobile Usability: How Nokia Changed

the Face of the Mobile Phone (2003)  
(<http://www.nokia.com/nokia/0,,49410,0.html?id=23>)

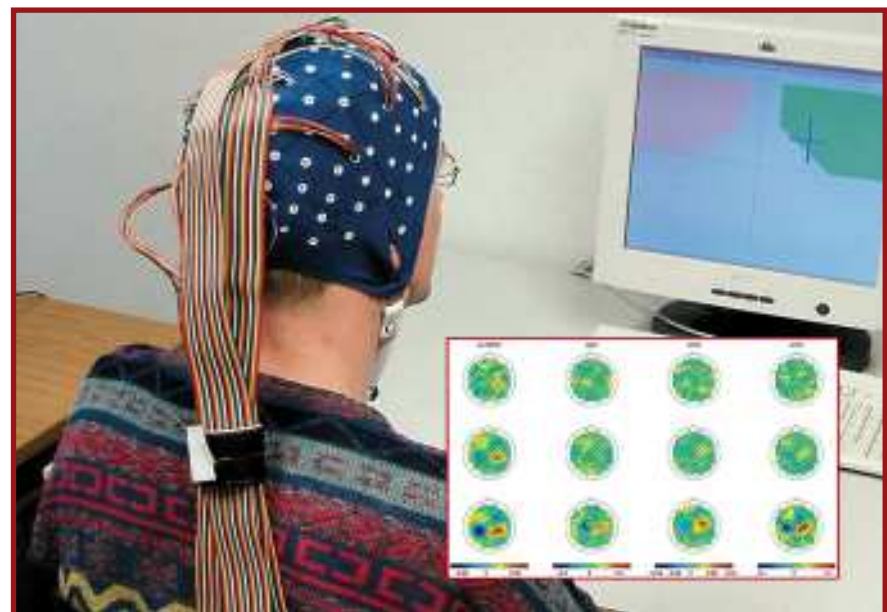
## The Berlin Brain-Computer Interface



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"If you could read my mind", Gordon Lightfoot had sung in the 1970s. Three decades later, computers are coming close to doing the job. Numerous research groups in Europe and America are working on concepts for brain-computer interfaces. These "mind-readers" include an interdisciplinary research team in Berlin. By analyzing neural signals, computer scientists from the Fraunhofer Institute for Computer Architecture and Software Technology FIRST and neurologists from the Benjamin Franklin university clinic can determine before the actual movement takes place, whether a person intends to move his/her right or left hand, for example.

The electrical activity in the brain is measured by 128 electrodes affixed to the person's scalp, as for an electroencephalogram (EEG). The Berlin Brain-Computer Interface (BBCI) volunteers have no need of lengthy training sessions to learn how to control their mental processes. Where most groups require 100-300 hours of subject training, the BBCI requires only 20 minutes of subject training and the computer then learns to correctly interpret the neurophysiological signals within 1-2 minutes given this training data. In fact,



the Fraunhofer experts have developed a software programme capable of picking out specific signals among the nebulous mass of information. The computer's self-learning capacity allows it to identify individual brain patterns and constantly improve its performance.

The BBCI offers a new channel to interact with computers in real-time. There are many possible applications for this human-machine interaction technology. For example, a sort of "mental typewriter" that trans-

lates thoughts into cursor movements on a computer screen, allowing paralyzed patients to write texts. The same technique may one day also enable them to control a prosthetic device. Brain-computer interfaces could also spread to the entertainment industry, creating a whole new class of video games. Or they could be integrated in active car safety systems, for instance braking the vehicle in response to the driver's thoughts.

# The utopia of intuitive services and products

## Interview with usability experts Dr. Nico Pals and Joke Kort from TNO



Joke Kort and Dr. Nico Pals

The importance of usability has increased. A number of usability laboratories have been established in Europe. *Eurescom mess@ge* wanted to know from TNO, one of the leading European institutions in user research, what the current research issues in usability are and what the economic value of usability is. Dr. Nico Pals is senior scientist in the field of customer behaviour and innovation forecasting at TNO's Knowledge Innovation Center, Department People, Market & Business. His colleague Joke Kort works as a scientist in the field of customer behaviour at the same department.

### What is your definition of usability?

**Pals:** Usability of a product or service makes sure that a user can reach his goal in a given context. Context is important, because it determines the way you can reach your goals best. Take, for example, a goal like making a journey from Detroit to Chicago as comfortable as possible. In 1850, you took the stagecoach and carried a gun for your safety. Today, you take the airplane, and for your safety you would make sure to leave your gun at home. In short, usability makes sure that a product is easy and preferably also enjoyable to use.

### Why is it so difficult to design usable communication technologies?

**Kort:** It is not really difficult to design usable communication technologies. It just costs time and money. A problem is that you always have to find a compromise between the needs and abilities of the user and the possibilities of the technology. Even the needs of the user themselves can lead to compromises. For example: In general people want a nice and small mobile phone, but then it is very difficult to watch photographs or get information from a website. To optimize the design for both needs or desires careful analyses and the development of alternatives need to be considered, and this costs time and money.

### What is the cost and the business value of usability?

**Pals:** A rule of thumb is that you spend about 10 percent of your development budget for usability engineering. That may seem a lot of money, but the chance of success in the market is increased enormously by this investment. It has become more and more common to involve users in all stages of the development process. In those cases, even 10 percent is not enough. Time to market used to be the most important factor in product development, but being the first doesn't automatically mean being the best. Since customer loyalty has grown more important in staying ahead of the competition, the emphasis on usability has become more important in relation to time to market. There are many cases in which the first entrant lost his market share because of poor quality and the second or the third entrant succeeded because of high-quality services or products, thus binding his customers through appreciation and high-quality image.

### How do you measure the usability of communication technologies?

**Kort:** The most common method to measure usability is a test in a usability laboratory. Representatives of the target group use the product under controlled conditions and mostly under video observation. The results of such tests are used for adjustments to the concept or to the prototype. Usability measurement alone, however, is not enough anymore. Usability must be created during the development process. This is done best by involving users in the design cycle. Doing so reduces the need for explicit usability measurements. It also saves costs, because the complete redesign of a prototype costs a lot of time and effort compared to some small changes over time.

### What is done in research to increase the usability of communication devices?

**Pals:** Usability engineering and usage research is getting more attention, not only within TNO ICT but within all kinds of organizations, partially due to the fact that more and more attention is paid to customer loyalty. This means more resources are spent on usability engineering through-

out the design process, which is a good development.

Furthermore, in the near future products and services will become more complex. There will be service bundles consisting of multiple services, provided by different stakeholders, the use of multiple devices for the same services, multiple target groups, and more. This will make usability research with the current methods more difficult. We believe the solution lies in a combination of event logging and qualitative research. We are currently developing new methodologies for these kinds of measurements.

### By when will we have communication devices, which could be handled intuitively by anyone irrespective of their previous knowledge?

**Pals:** We already have these kinds of communication devices. Think of the panic buttons elderly people carry for alarming nurses or personnel when something is wrong. However, most of these products are not meant for mass markets and are therefore not well known. Furthermore, the questions remains, if all communication devices should be intuitive to use. Some goals, which should be realized with communication devices, are so complex that intuitive use without prior knowledge is not realizable. What I am saying is that depending on the product or service you are developing, you should pay special attention to the usability and, thus, intuitive use. This doesn't, however, mean that intuitive use is always a requirement to build a usable service. The goal is to design a service as intuitive as possible during first interaction. Later on, when the user got used to the basic levels of interaction, he or she will often be more prepared to go through some trouble to learn, for example, the extra features for extra functionality. We might never reach the utopia of intuitive services and products, but we can try to get as close as possible with good design.

*The interview was conducted by Milon Gupta.*

# Speech technology and usability



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For the 50-plus generation, HAL, the computer in Stanley Kubrick's movie "2001: a space odyssey", is the definitive hallmark of what speech technology and artificial intelligence can do. It would certainly eliminate most, if not all problems with using complex systems. The impact of the movie, released in 1968, has been so big that the year 2001 saw many serious publications assessing, which capabilities of HAL had become science instead of fiction. Unfortunately, it turned out that HAL's human-like speech and language skills are still more fiction than science.

This article explores the technical challenges of speech technology and assesses its potential for improving the usability of telecommunication devices.

## Language is difficult to handle for computers

Children acquire speech and language virtually without effort. On the other hand, the number of persons who play chess at world champion level is extremely small. Yet, already in May 1997 Deep Blue beat Gary Kasparov, then chess world champion. Today, we are still struggling to build speech technology that can match the skills of the average 10 year old. This raises the question why speech and language are so difficult for our computers to handle. Although we do not know the definitive answer to that question, it is evident that it has much to do with the fact that all forms of natural language are vague and ambiguous.

## Speech acoustics

People who have learned to read alphabetic script tend to believe that spoken words are separated by short pauses, much the same way as white spaces separate printed words. However, that is not the case. When spoken, the words "night rate" and "nitrate" are indistinguishable. Yet, we only hear "night rate" if we want to park our car, and "nitrate" if we are discussing artificial fertilizer. There is a long list of similar "confusibles" on the website <http://rec-puzzles.org/newsol.pl/language/english/pronunciation/oronym>.

The lack of clear boundaries between words is not the only cause of vagueness in speech acoustics. In conversational speech, expressions like "I don't know" can be shortened to just a few sounds (something like "dunuh") without causing problems to native speakers of English. However, if we would allow all occurrences of the sounds in a careful pronunciation of "I don't know" to reduce to the same extent, even in other words, communication will most probably break down completely. Last but not least, there is the issue of background noise that makes it difficult to understand speech.

## Syntax and semantics

It is not immediately obvious that the sentence "Time flies like an arrow" can be read as conveying the message that a special type of flies like some arrow. Nevertheless, it is the case. If it comes to the meaning of sentences, the ambiguity problem is even worse. Consider the example in the figure, where we have a blueprint of a rectangular room, with a door and a window. Intuitively, the command "Move the window to the opposite wall" is unambiguous. But it is not if we were just discussing the wall that contains the door. Then the opposite wall might as well be the one at the bottom of the picture.

## The good news ...

Fortunately, ambiguities can often be avoided. After all, there are few contexts where we want to park our car while talking about nitrate. Clever interaction design can create applications where speech recognition accuracy is high enough to deliver excellent services. Moreover, we have found that users find it easier to perform an unfamiliar task with the help of an artificial conversational agent than with a direct manipulation interface. Thus, there is obviously room for speech technology to solve problems in interaction with complex systems.

## ... and the bad news

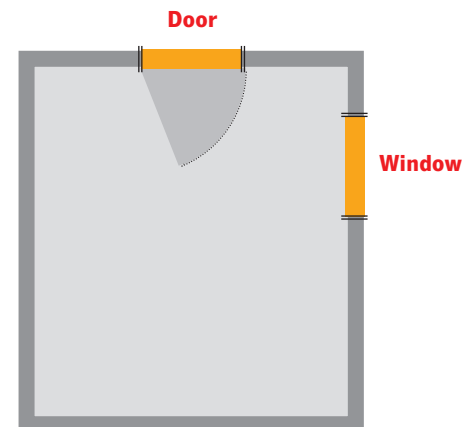
Speech recognition, whether human or machine, works by the virtue of knowing what to listen for. Unfortunately, non-expert users of a service often do not quite know what to say. This makes it difficult for our speech systems to know what to expect, and consequently recognition performance will drop, precisely in those situations where it is most important.

Moreover, speech is not always appropriate or comfortable. Sometimes we would rather not speak, if only to protect our privacy. Last but not least, it appears that users only prefer a conversational agent, if they do not quite know what to do. If they know, they prefer using graphical interaction, if that is available. This may explain why voice dialling never became popular. It seems as if speech technology will have its biggest

impact in applications for which it is not yet sufficiently powerful.

## Thin clients

Conversational agent interfaces can only be implemented as client-server systems. For obvious reasons, service providers prefer thin clients that defer heavy processing to powerful network-centric servers. However, smooth interaction requires very short latencies. Moreover, when speech and moving pictures (e.g. an on-screen avatar) must be combined, synchronization accuracy in the order of 20-50 milliseconds is necessary. This is very difficult to obtain in the present IP networks. At the same time, an artificial agent, whose communicative skills and artificial intelligence are sufficient to support non-expert users with a range of unfamiliar tasks, requires the computing power of a top-of-the-line PC.



"Move the window to the opposite wall."  
The meaning of this command depends on the wall that we were just talking about.

## Conclusion

Artificial conversational agents hold a promise for solving many of today's problems encountered by non-expert users of complex services and devices. However, for the promises to be fulfilled completely, we need more powerful handsets in networks that can guarantee response latencies of only a few milliseconds. Equally important is that we better understand when humans prefer a conversational agent interface.

In the next five years we will see an increasing number of network centric Customer Relation Management services that rely on speech technology. Using the experience with those services, speech technology and Artificial Intelligence will be improved. Combined with the increase of the computational power of handsets, this will enable conversational agent interfaces on mobile handsets by the end of the decade.

You can find more information on speech technology and conversational agents at [www.hcr.ed.ac.uk/comic/](http://www.hcr.ed.ac.uk/comic/).

# ETNO: EU key partner for telecom policy

When e-communications companies look for joint action and analysis regarding EU telecommunications policy, when EU decision makers need an insight into a key issue pertaining to the telecommunications industry, they turn to ETNO – the European Telecommunications Network Operators' Association in Brussels. At the forefront of all issues pertaining to the e-communications sector, ETNO has been a respected voice for the telecoms sector since 1992 and tracks the full range of public policy areas that shape Europe's Information Society.

The Association's members generate an aggregate turnover of 210 billion euros annually and include all of Europe's major telecom operators, within the EU and beyond. "ETNO welcomed the new telecom operators of Central and East Europe – and extended its membership to them – many years before the EU officially expanded in the same direction," said Michael Bartholomew, ETNO's Director. "It's just one example of how we stay ahead of the curve."



## Keeping track of it all

As major players in global markets and leaders in technological innovation, ETNO's member companies are pivotal to the achievement of eEurope and the roll-out of broadband. Their collective workforce of more than one million serves the majority of Europe's customers for fixed-line and mobile telephony, data communications and high-speed Internet access and services.

Not surprisingly, the breadth of e-communications operations covered by its 41 members in 34 countries requires the Association to anticipate as much as possible regulatory developments along a wide front before they solidify into law. A large part of this task rests on a careful monitoring of policy debate and advance knowledge of upcoming issues. This means staying in touch with experts and forward-policy analysts in both EU decision-making circles and industry. ETNO does this daily.



**Michael Bartholomew has more than 20 years' experience in EU affairs and has led ETNO as its Director since July 2000.**

Regulatory intelligence-gathering demands close and regular talks with key EU decision-makers within the European Commission, Council of Ministers and the European Parliament – institutions where ETNO has long-established contacts. Indeed, the Association organises regular one-on-one meetings with Commission and Parliament officials at the earliest stages of regulatory developments. It also brings together its membership with each new EU Presidency to maintain dialogue and an ear for industry to policy debate influencing the shape and health of Europe's all-important Information Society.

ETNO's Director cited a trenchant example. "A large number of member states have fallen behind the July 2003 deadline for implementing the EU's new telecoms regulatory framework," said Mr Bartholomew. "They will catch up eventually, but the more important task for us is to keep an eye on how their national regulatory authorities interpret and apply it. We are not convinced this will be applied in a consistent manner across the EU, which raises concerns in our industry that regulation in certain markets will continue, contrary to the spirit of the package itself."

## Expertise exchanges from A to Z

To help avert such obstacles, ETNO member companies carefully monitor regulatory developments in their home markets and the potential impact – in terms of harmonisation and the investment climate – that EU proposals will have on the marketplace. Similarly, EU officials often turn to industry, and ETNO in particular, to gather opinion and expertise prior to drafting legislation.

It can be a fruitful two-way exchange but it has to be methodically and meticu-

lously organised, which brings us to one of the key coordinating roles that ETNO plays vis-a-vis its member companies. The Association functions as a platform for the exchange of information at the expert level between its members on the entire gamut of strategic developments affecting the sector.

The focus of ETNO's 16 working groups ranges across horizontal policy, such as implementation of the EU's regulatory package and general investment conditions for the roll-out of broadband, down to more narrow but critical issues. These include fraud control, data protection, health and mobile phones, e-commerce, e-government services, numbering, Internet governance, frequencies and network security, not to mention socio-environmental topics such as sustainable growth, corporate social responsibility and guidelines on teleworking. Achieving consensus is not always easy, but once accomplished, an ETNO working group's common position carries weight with EU policymakers because they know it represents the majority opinion of Europe's e-communications industry. In a word, through its expert groups ETNO functions as a policy bridge between the bulk of Europe's telecommunications industry and EU decision-makers.

## Conclusion

While ETNO is the logical meeting place for the sector on policy issues and a natural forum for networking, it has never lost sight of its primary target: keeping EU policy and regulations balanced and proportional to the intended goal.

"Regulation at the EU level should be implemented coherently across the Union, in a non-discriminatory and technologically-neutral manner," said Mr Bartholomew. "That may be self-evident, but it is often too easy for policymakers to forget that the influence of Europe's telecoms policy extends far beyond its own sector and well beyond the EU's borders. Ours is a global industry whose information impact – as a pillar for all other industrial sectors – is crucial to economic growth in general."

He added: "As for any industry, if there has to be regulatory intervention, we want it to be predictable, fair and based on the level-playing-field idea which is the guiding rationale for the EU's whole internal market. Only this combination of principles will encourage investment and a rapid development of e-society and all the benefits it will bring to society at large."

*You can find more information on ETNO at [www.etno.be](http://www.etno.be)*

## The ETNO R&D working group



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EU-funded research programmes are evolving fast. The European Union's Sixth Framework Programme is on track, and the European Commission is already preparing priorities for the Seventh Framework budget. Europe's network operators must see that their interests and needs are taken into account as this is done.

The ETNO R&D working group oversees this task by helping to ensure there is coherence across the EU's research programmes, namely by:

- Working on policy, strategy and implementation of the Sixth Framework Programme, including technology, demon-

stration and experimentation. ETNO communicates its views to EU institutions, national authorities and sector players as required.

- Establishing an initial policy position on the development of a strategy to reinforce European research, with the goal to reinforce the results of FP6 through the subsequent implementation of FP7. The working group pays particular attention to the development of new network infrastructures and services – such as mobile and wireless systems beyond 3G, networked audiovisual systems and home services, identification and authentication management, software platforms – and aims to have them reflected in EU research policy. ETNO's positions are actively circulated within the European Parliament and the Commission.
- Co-operating with other sector players (e.g., EICTA) on the Seventh Framework Programme's IST-related issues and, where appropriate, promoting joint views.

In addition, the ETNO R&D working group maintains an operational document on the strategic approaches of network operators to various research initiatives. This document benchmarks the effort produced by network operators in various IST calls and reflects a massive participation close to 10,000 man months financed by the Commission.

The working group meets on a quarterly basis, coordinating its agenda via e-mail between meetings. Approximately 16 operators participate in the R&D working group, among which eight are particularly active.

As chairman of the R&D working group, I am sincerely convinced that the success of our group – its weight and influence – is due to the involvement of its team members.

Recently, new members have joined the working group (Matáv, Slovak Telecom), and I am convinced that their participation will contribute to new successes in the future.

## ICT in Europe: crisis or take-off?



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Europe is at the centre of attention: it has recently been expanded to 25 States; a new constitution has just been signed; and its industrial competitiveness is questioned again. What is happening to the ICT sector, or, more precisely, to the telecommunications industry?

“Rethinking the European ICT agenda” is the title of a recent “tentative and provocative” report commissioned by the Dutch Presidency, aiming to inspire and revitalize the ambitious objective set for Europe in Lisbon, in 2000, to become the “most competitive and dynamic knowledge-based economy by 2010”.

The report acknowledges that the Lisbon targets are still far away and identifies and analyses 10 potential breakthroughs to revitalize the Agenda and regain some progress.

I am not going to analyze the content of this report, but I would rather add some

personal viewpoints to complete the scene. And I would mainly comment on two major issues: the role of R&D and the role of collaboration.

The EU Council of Ministers agreed on a common goal to increase the R&D investment up to 3 % of GNP by 2010. Are we moving in that direction? This would imply a long-term strategy. But in the present time everybody seems much more oriented towards short-term visions, rather than looking to the future.

Let me summarize the situation with a simple consideration: Who is running the telecommunications sector? Up to twenty years ago it were the telecom engineers; ten years ago marketing experts; 5 years ago regulators; today finance. Who will be the next? Lawyers? And then, is the cycle complete?

Excess of finance and lack of R&D investment risk to hinder the mid and long term vision of the future and may, at the same time, slow down the necessary innovation.

Even if there is a common belief in the need to increase R&D investments, only very few companies are really moving in this direction. But the problem is even worse. R&D is not only an investment in



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financial resources, but mainly an investment in human resources; and this is going to be the real difficulty: to find high quality human resources, with enthusiasm, professional skill, managerial capacity and commitment, is more and more difficult in a scenario where students are much more eager for commercial success, rather than for scientific reputation!

And now I come to my second point, relevant to collaboration.

As Europeans we are all very proud of the GSM success. Digital technology was available worldwide, but Europe wanted to look forward, and its vision allowed to reach unexpected results and to conquer a strong leadership in the sector. The strong commitment of operators and manufacturers created the conditions for a winning solution.

Nowadays, a progressive disengagement of operators on collaboration issues, cer-

tainly also due to the strong competitive scenario, has again brought up the old problems of IPR issues, with the consequent slowdown of the opportunities offered by new developments such as UMTS, MMS and related services.

But in addition to that, a new challenge is arising; the widespread use of Internet and mobility, the broadband boom, the success of flat screens, together with the development of digital TV and video-games, re-focus the attention to the various aspects of "convergence", which played an important role, even if without success, around ten years ago.

The new convergence of TV, telecommunications and entertainment could definitely contribute to re-launch the European economy.

I am convinced that it is essential to restore a strong collaboration, involving operators and manufacturers, to avoid the

prevailing of short-term objectives, with "branded" solutions, aimed only at specific interests for single companies.

A new synergy is therefore necessary, and only this will, in a mid- to long-term perspective, guarantee the maximum benefit for the society as a whole, and an adequate return on investment for the ICT industry.

Europe will not necessarily be the technology leader, but could once more be the leader in a new "vision", and once again achieve a dominant position in the worldwide arena.

*The report "Rethinking the European ICT agenda" is available for download at [www.minez.nl/content.jsp?objectid=24583](http://www.minez.nl/content.jsp?objectid=24583)*

## Second European Workshop on Model Driven Architecture Methodologies and transformations



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The Model Driven Architecture (MDA) has become a well known and accepted approach for the construction, deployment and operation of large and complex software systems such as those found in telecommunication networks. Still, many technology issues such as model transformations, development methodologies and artefact re-use remain subject to in-depth investigations.

These are some of the conclusions from the "Second European Workshop on Model Driven Architecture with Emphasis on Methodologies and Transformations" that took place in Canterbury, England, on 7-8 September 2004. The workshop was organised by the University of

Kent with the support of Eurescom and IST project MODA-TEL. The workshop participants discussed how the MDA approach affects or impacts methodologies for system development and explored techniques available for specifying transformations, in particular focusing on tools for supporting such specifications and methodologies.

In her keynote speech, Dr. Tracy Gardener, IBM, laid out the whole problem domain for model transformation and introduced a set of use cases for model transformation including model differencing, pattern expansion, model merging and weaving, alternate views and generation of platform specific artefacts from a platform independent model. Dr. Gardener also discussed where model transformation fits into the development process and whom we could expect to build and use on model transformations.

### Break-out discussion groups

This two-track, two-day workshop provided the opportunity for in-depth tech-

nical discussions regarding each topic whilst allowing interaction between experts in each area. The first day was dedicated to setting the scene, involving presentations on some of the accepted submissions. Based on the topics covered by the submissions, specific problems in the areas of transformations and methodologies were identified. The second day of the workshop was reserved for targeted in-depth elaboration on the selected topics. The goals of the discussion groups were clearly defined, and each group reported back on the results of the discussion.

The discussion group addressing the general questions raised by MDA, concluded that there is generally a lack of high-quality tools supporting MDA. Especially big vendors currently do not offer such tools. A further issue that was identified is that the required developer skills need to be better identified and that this should be reflected in the short term in education.

A further discussion group addressed the question of whether it would be useful and/or desirable to define meta-models for existing formal languages, such as the telecommunication languages SDL (Specification and

Description Language) and MSC (Message Sequence Charts) defined by ITU-T. This question holds also for languages used in other domains such as VHDL (Very High-level Design Language) used in integrated circuit design. The conclusion was that the availability of such meta-models would ease re-use of legacy applications as well as integration of high-quality tools available for such languages in an MDA-centred development process.

Another group identified a set of issues related to re-use such as the need to maintain and manage the lifecycle of artefacts subject to re-use. Implied organisational changes need to be taken into account as well as associated introduction costs for such changes.

### Conclusion

The participants of the workshop agreed that despite the technical issues raised and discussed during the workshop, the technology is becoming accessible. The potential of MDA is currently exploited in markets like telecommunications, military, finance, government, and real-time embedded systems. Common characteristics of these markets are typically the high quality required for the adopted solutions as well as the requirement that these solutions must provide long-term maintainability and legacy integration capabilities. It was recognised that some domains may expect too much from MDA and that there is a high need for support services, such as training, consultancy, standards, and high-quality tools. Education at all levels,

including the executive level, should also be a high priority for all stakeholders involved in the market of development, deployment and operation of large and complex software systems.

### Follow-on

Recognising the increased critical mass around MDA in the European industry, it was agreed to start the preparations for a follow-on event in Europe in the form of a potentially larger conference in autumn 2005.

*More information about the workshop as well as the proceedings are available at <http://www.cs.kent.ac.uk/projects/kmf/mdaworkshop/>*

# Operations Support Systems for NGN

## Co-ordinating actions for telecoms



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The telecommunications industry is currently under pressure arising from deregulation, competition and rapid technology change. These factors together with the vision of next generation networks pose significant challenges to an appropriate architecture for operation, administration and maintenance of future networks and services.

The Eurescom study P1445, titled "OSS for NGN – Co-ordination of telecom activities", aims at improving the non-competitive cooperation of telecom operators and service providers in standardization bodies, initiatives, projects, or towards vendors in the context of network and service management systems. In this large area clearly identified major issues will help to advance the work in a co-ordinated and therefore cost-effective way. The work builds the basis for achieving a consensus view on the main issues.

### Business challenges

The operations support system (OSS) is critical to the success of three fundamental business challenges:

(1) Development of a flexible service integration framework, supporting issues such as personalisation and customer self-serv-

ice, mass customisation of services, and flexible value network chains.

(2) Introduction of new technologies coping with issues such as accommodation of a wider range of resource types from a wider range of suppliers, and capabilities to introduce new technologies replacing or supplementing existing technologies especially at a faster pace and lower cost.

(3) Substantial reduction in the cost base, taking advantage of recent trends to provide web-based customer care and customer self-service channels, and to exploit the potential of process automation.

In addition, other industry trends have to be considered, such as the trend for disaggregation of traditional services towards horizontally layered structures, the trend towards commercial off-the-shelf (COTS) components and systems promising seamless integration (plug-and-play) as well as the role of open source software. Finally, the emergence of service-on-demand, which essentially describes a concept for delivering computing services and network infrastructure as a utility, will bring about additional requirements for the operations support systems.

A fundamental concern for future management architecture for NGN is the introduction of service oriented architectures. A Service oriented Architecture (SoA) is an architectural style whose goal is to achieve loose coupling among interacting software components, and in which component behaviours are defined completely by contracts and APIs. This architectural

style will have a significant impact for OSS systems that are largely working in real time.

### Current standards landscape

In view of the emerging need for solid operations support systems for next generation networks a careful analysis of the current relevant activities in the industry is essential. In general, these activities are undertaken in standardisation bodies, industry forums as well as by management related research projects. A large number of technical trends can be observed in the industry, which can be categorised in:

- Management frameworks and architectures, such as NGOSS (TeleManagement Forum), OSS through Java (OSS/J), OSA/Parlay (Parlay Consortium, ETSI, 3GPP), TMN (ITU-T)
- Information models, such as Shared Information/Data model (TeleManagement Forum), Core Business Entities (OSS/J Initiative), Common Information Model – CIM (Distributed Management Task Force), MDA (Object Management Group)
- Management Protocols, such as SNMP (IETF), CMIP (ITU-T), Common Open Policy Service Protocol (IETF), LDAP (IETF), Internet Protocol Detail Record (IPDR), as well as a number of security protocols used for secure transport of data over IP.

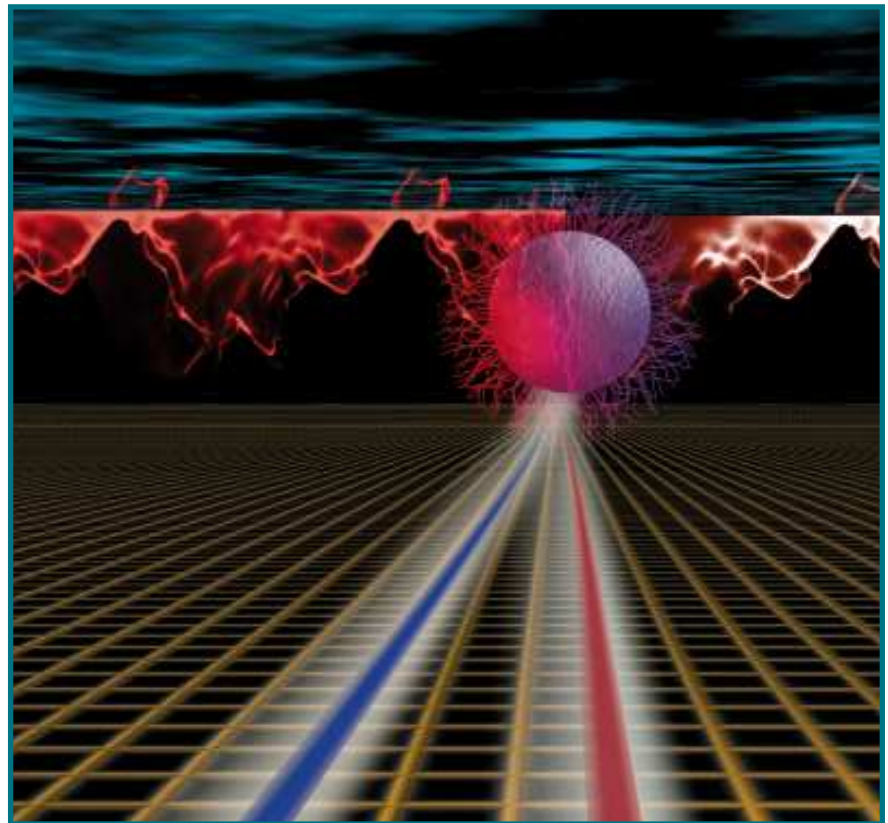
Concerning the partitioning of the problem domain into functional areas, currently there exist only two major activities. Perhaps the most well known functional architecture is the TMN architecture of the ITU-T. The work is emphasising the separation of physical entities from logical entities and proposes an organisation around business management, service management, network management and element management. However, currently no further decomposition of the proposed layers into specific functions is proposed. The second work, worth mentioning in this area, is the enhanced Telecom Operations Map (eTOM) by the TeleManagement Forum (TMF). In many ways the eTOM is really a functional model, and many people use it in that way. eTOM is in fact more widely known and more used than TMN.

One of the main reasons for this large diversity of activities is perhaps the lack of a universally agreed set of management requirements for NGN. To date only a few very high-level requirements have been expressed, e.g., in the newly established ITU-T NGN focus group. The structuring of the general management requirements will eventually be done on the basis of the management functional areas of the eTOM FABs (Fullfilment, Assurance and Billing) instead of the TMN FCAPS (Fault, Configuration, Accounting, Performance, Security), which were superseded in practice by the eTOM FABs.

An ongoing activity in ETSI TISPAN (Telecommunications and Internet converged Services and Protocols for Advanced Networking) for defining NGN OSS high level requirements proposes an OSS architecture reference model, which identifies several management domains: Utility management, Service management, Service Platform management, Connectivity management, Network management, and Security support.

### Summary of recommendations

Although the Eurescom study has not concluded yet, the following contains a set of emerging recommendations for actions given by the telecoms industry and Eurescom to resolve some of the main NGN OSS issues identified in this study. The recommendations are based on a synthesis of the identified issues and are presented as a concise list. Many of these recommendations are envisaging that Eurescom as an organisation should take a role in actively co-ordinating contributions by the industry to resolve the issues at stake. In general, the issues can be categorised in relation to four major areas: (1) *Standardisation in telecoms standards bodies*. It should be considered to develop a process for consistent tracking of the work of key standardisation bodies as a basis to co-ordinate necessary and sufficient contributions to the developing standards. Furthermore, the active participa-



tion in the focus group on NGN management (sponsored by the ITU-T study group 4) with the objective of establishing potential work areas for contributions should be a priority.

(2) *Other Standards Defining Organisations (SDOs)*. The establishment of joint initiatives with other Standards Defining Organisations (SDOs) should be investigated, which addresses service classification framework and content for use in a Service oriented Architecture (SoA) for NGN management. The work of the Object Management Group (OMG) in the area of Model Driven Architecture (MDA) will have a significant impact on future NGN management. It should be considered to launch a joint activity with the OMG on the extension of the MDA to provide a virtual software factory for NGN software oriented architecture components, including the consideration of legacy applications. Concretely, this would address MDA concepts, the tools needed to develop and manage NGN management components, and the exchange formats needed between the tools supporting the full component lifecycle.

(3) *Joint initiatives, such as collaborative projects*. A number of joint collaborative research and technological development projects should be considered that validate emerging frameworks and concepts, such as NGN SoA frameworks envisaged by ITU-T and TMF, MDA development environments considering legacy applications, or the feasibility of an enhanced product lifecycle management, linking product specifications by product managers to their implementations in an SoA engineering environment.

(4) *Other business considerations*. Open source software offers disruptive business and technical models for addressing the reduction of the integration tax when linking COTS and legacy OSS applications. The industry should consider establishing a programme that facilitates the development of open source solutions for OSS. There are a number of additional organisational and business challenges in moving to an SoA approach for developing OSS applications. A set of best practices for NGN development is missing. The industry should consider a multidisciplinary project to develop best organisation and business practices by establishing SoA development programmes.

### Conclusions

Standardisation in the area of operations support systems for next generation networks is currently fragmented at many different standards bodies and fora. Nevertheless, the ITU-T focus group on NGN management sponsored by study group 4 is emerging as the focal point for the necessary standards in this area. The Eurescom study P1445 has analysed the major NG-OSS topics, players and their activities and is proposing mechanisms for co-ordinated activities of telecom operators in order to influence the standards process in a concerted way to minimise effort and cost. The conclusions of the study will be available shortly to the subscribers of the Eurescom study programme.

*More information about the study is available at*  
[www.eurescom.de/public/projects/P1400-series/P1445/](http://www.eurescom.de/public/projects/P1400-series/P1445/)



# WiMAX

## A new alternative for wireless broadband access



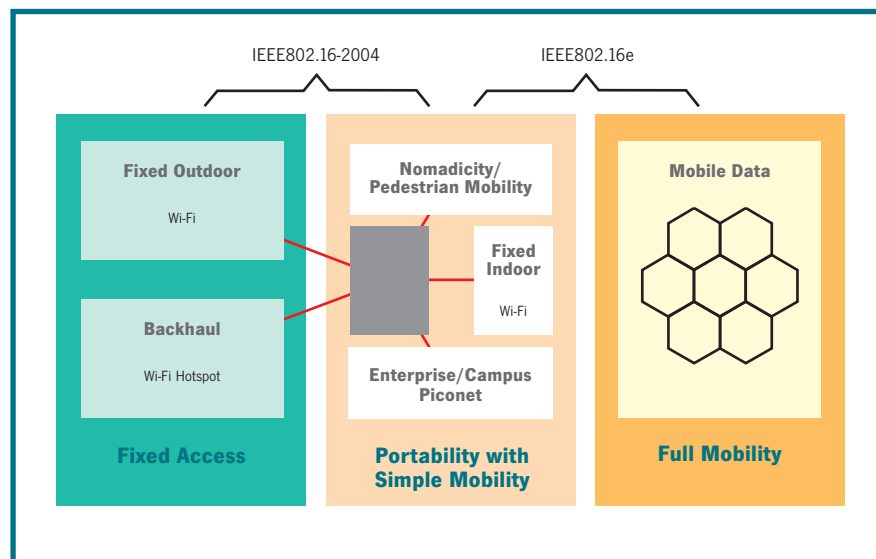
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WiMAX is a new suite of air interface standards for combined fixed, portable and mobile broadband wireless access (MBWA). It offers very interesting features like a bandwidth of up to 75 Mbps, Quality of Service (QoS) establishment on a per-connection basis, strong security, and support for multicast and mobility. WiMAX uses licensed as well as license-exempt frequency bands between 2 and 66 GHz with channel widths between 1.25 and 20 MHz.

The upcoming WiMAX (Worldwide Interoperability for Microwave Access) products will allow carriers to wirelessly backhaul traffic, i.e. to carry cellular as well as hotspot traffic to the core network. WiMAX will also allow high-speed enterprise connectivity and reaching individual users in the drop segment, using an indoor Customer Premises Equipment (CPE) with non-line-of-sight (NLOS). With the revision of IEEE standard document 802.16e upcoming in 2005, also some mobility support will be provided. Revision 802.16f is intended to improve multi-hop functionality, and 802.16g is supposed to deal with efficient handover and improved QoS.

### Evolution

IEEE 802.16 was originally design to be a radio standard for cost-effective last-mile broadband connectivity to users not served by wired broadband such as DSL or cable. By now, this WMAN (Wireless Metropolitan Area Network) standard is addressing a broader market for mobile, low-cost, high-speed broadband connections. It is optimized for high, bursty data-rates, but can simultaneously support real-time multimedia and isochronous applications such as Voice over IP (VoIP).



**802.16 standards and deployment evolution.**  
(Source: Intel Technology Journal, Volume 8, Issue 3, 20 August 2004)

The frequency band between 10 and 66 GHz is provided for line-of-sight (LOS) solutions for a variety of licensed frequencies (10.5, 25, 26, 31, 38 and 39 GHz), the 2 to 11 GHz frequency band for non-line of sight (NLOS) solutions over both licensed and license-exempt frequencies. The minimum channel bandwidth for WiMAX is 1.75 MHz per channel, 10 MHz being considered as optimum. It remains to be seen what impact potential interference may have, especially on QoS commitments.

The current 802.16-2004 standard is the base standard and will be amended in 2005 by 802.16e, adding primarily some mobility support.

Different kinds of WiMAX products will be offered, likely covering the following areas:

- Fixed wireless solutions using outdoor antennas (based on 802.16-2004), which can be used for cellular and hotspot backhaul, high-speed enterprise connectivity, and premium residential Internet services (e.g. high-speed Internet access, VoIP); available by mid 2005.

- Smaller indoor antennas for fixed connections (based on 802.16-2004), for a broader residential high-speed Internet coverage, allowing for installation by the consumer; available by end of 2005.
- Products for mobile terminals, supporting mobility and movement between different WiMAX service areas (based on 802.16e); available in the course of 2006.
- Meshed networking or multi-hop (based on 802.16f), where every Subscriber Station (SS) can also function as Base Station (BS), forwarding traffic from one SS to the next until it arrives finally at the BS.

Intel is already giving beta versions of its WiMAX chip "Rosedale", which is based on 802.16-2004, to its development partners for first tests. Rosedale is a low-cost system-on-a-chip for WiMAX base stations.

### Conclusion

WiMAX is a very interesting new development in the area of wireless broadband access. It is expected to be deployed by different kinds of network operators (wireless Internet service providers, cellular operators, DSL (Digital Subscriber Line) operators), using different business models.

Currently, Eurescom study P1446, "WiMAX in Backhaul and Access Networks", is exploring IEEE 802.16 topics. The results will be available to the subscribers of the Eurescom study programme by end of January 2005.

Further information on Eurescom study P1446 is available at [www.eurescom.de/public/projects/P1400-series/P1446/](http://www.eurescom.de/public/projects/P1400-series/P1446/)

Environment	Typical cell size	Sector throughput
Urban indoor (NLOS)	1 km	21 Mbit/s with 10 MHz channel
Suburban indoor (NLOS)	2.5 km	22 Mbit/s with 10 MHz channel
Suburban outdoor (LOS)	7 km	22 Mbit/s with 10 MHz channel
Rural indoor (NLOS)	5.1 km	4.5 Mbit/s with 3.5 MHz channel
Rural outdoor (LOS)	15 km	4.5 Mbit/s with 3.5 MHz channel

**Relationship between channel bandwidth, cell size, LOS/NLOS, and throughput.**  
(Source: Laine, Boettle, Boscher, Feijt: Alcatel Strategy White Paper – WiMAX, making ubiquitous high-speed data services a reality, 28 June 2004)

# New Eurescom studies

Two more Eurescom studies on hot issues in the telecommunication area have been kicked off.

## **BISSLA: Business models and Service Level Agreements in open value chains (P1447)**

Demand for new services is steadily increasing, and operators are under great pressure to open up access to their networks to third party providers. The emerging open value chains are expected to stimulate an increased diversity of content and services. It is essential that operators understand, which opportunities open value chains offer to them. They need to understand the service dependencies, roles and actors involved in the service delivery, the relevant business models and Service Level Agreements (SLAs) in open service platforms to gain a competitive edge in the market as open value chains are introduced.

This new study will assess alternative strategies and roles that operators can take in this new situation. The purpose of the study is to develop a model and a framework for addressing both business modelling and technical aspects regarding these alternatives. Furthermore, this study serves as a channel to exchange views and experience concerning the opening up of service platforms among major operators.

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## **Opportunities offered by Carrier Grade Multipoint Services (P1448)**

Multipoint Services allow each customer end point or node in the network to communicate directly and independently to all other nodes. This functionality is virtually identical to a corporate LAN. With Multipoint Services a customer domain can be extended across an operator backbone, and

corporate users are able to benefit from the simplicity and familiarity of a LAN regardless of the physical location of their sites.

The currently provided VPN solutions, which are based on a point-to-point technology, have a number of limitations. Using a Multipoint Service instead is attractive, because fewer physical connections are required to achieve full connectivity between multiple points. In addition, packet forwarding can be optimised.

The study will analyse Multipoint Services from the operator's perspective. It will assess existing solutions and new technologies. The study focuses on IP-Multicast as one service on top of different Multipoint solutions and will analyse the pros and cons. It will also propose a roadmap for the deployment of Multipoint Services.

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# Movies to become unique to each viewer

## EU project 'New Media for a New Millennium' (NM2) launched



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The recently launched EU project 'New Media for a New Millennium' (NM2) will personalise our viewing and create a new media genre. NM2 is developing a set of



software tools to enable viewers to watch a personalised production from a larger pool of original content. Viewers will be able to interact directly with the medium and influence what they see and hear according to their personal tastes and wishes. This new media genre has the potential to create a new mass market.

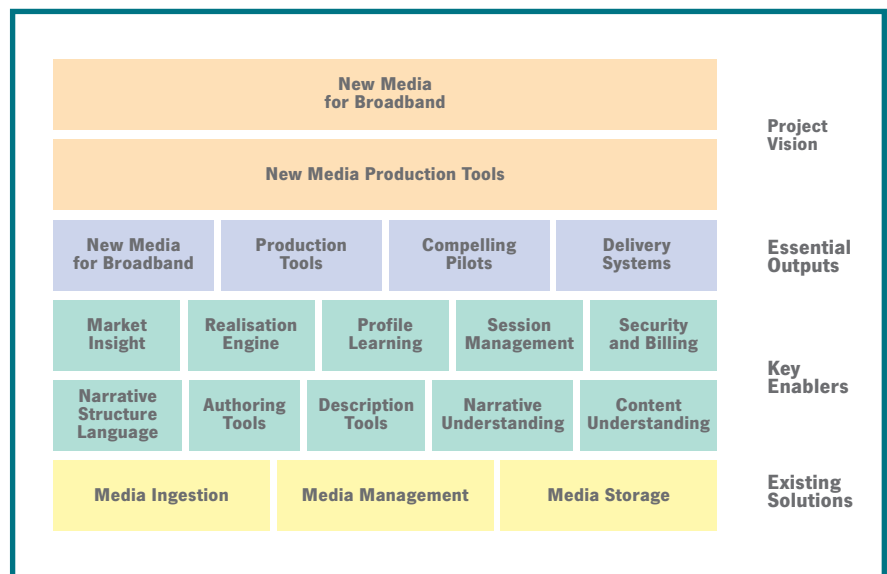


Figure 1: The NM2 components

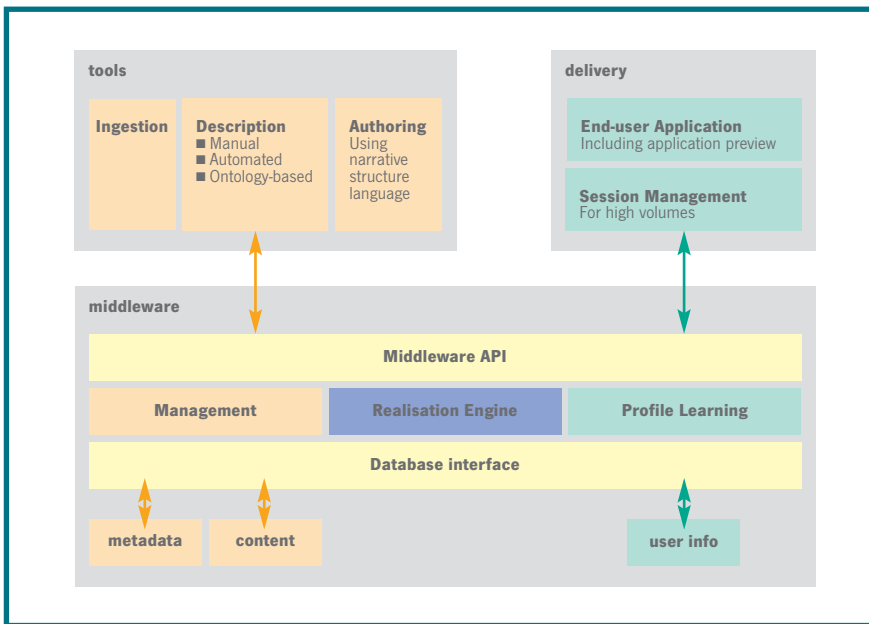


Figure 2: NM2 systems architecture

### Tools for personalised stories

To enable this new media genre, NM2 will create innovative production tools, which will ensure that all personalised versions of the media are attractive and engaging. In addition, NM2 will create a new mechanism for retrieving media content and creating the personalised stories.

NM2's technical project manager, Dr. Doug Williams from BT, said at the kick-off meeting in Heidelberg: "The three-year project has an ambitious aim: to identify a new mass market media genre. The new media genre will allow stories to be adapted, on the fly, for an individual viewer. We think this will be immensely attractive for viewers and for advertisers, but it means we have to think about the whole production process from concept to credits."

John Wyver from Illuminations Television Limited, producer of 'A Golden Age' and 'Elisabeth' added: "The software tool that we produce will be extremely sophisticated. It's not just a matter of stringing together the romantic or action portions of a production. The tool has to know which bits fit together both visually, by

observing the time-honoured rules that go into editing, and in terms of the story. Only then will the personalised version both make sense and be aesthetically pleasing."

Figure 1 shows the different components of NM2, and figure 2 illustrates the systems architecture of NM2.

### Compelling new applications for broadband

The enabling technologies behind this new form of multimedia storytelling include broadband connectivity, cheap mass storage, intelligence at the edge of data networks, and object-based media techniques. Broadband connections are a key condition for the type of interactive media, which the NM2 tools enable. NM2 will provide the basis for making such interactive productions economically feasible for a mass market. Thus, NM2 will give a strong push to the demand for broadband connections. The new digital media genre might become one of the most compelling applications for broadband.

### Integrated approach

NM2 is an Integrated Project under the 6th Framework Programme of the European Union, running from September 2004 to August 2007. The inter-disciplinary project

## The NM2 consortium partners

The NM2 partners for the technical issues are:

- BT, UK (technical project manager)
- Joanneum Research, Austria
- Goldsmiths College, UK
- Telefónica I+D, Spain
- Sony Netservices, Austria
- Aristotle University of Thessaloniki, Greece

For the seven media productions, NM2 has the following partners:

- Cambridge University Moving Image Studio (CUMIS), UK
- Illuminations Television Limited, UK
- University of Art & Design Helsinki, Finland
- University of Ulster, School of Art & Design, UK
- Malmö University, Arts and Communication (Sweden)

Consumer behaviour & business analysis will be done by Netherlands Organisation For Applied Scientific Research – TNO, Netherlands.

Eurescom has the role of overall administrative and financial project co-ordinator.

brings together media creators, scholars, and producers with communications engineers, software developers, and social scientists in order to advance media development. The 13 partners from 8 different European countries cover a wide range of skills and cultural backgrounds. Seven different media productions will provide the test cases for the NM2 production tools. These range from news reporting and documentaries through a quality drama serial to an experimental television production about love.

You can find more information on the NM2 website:  
[www.ist-nm2.org](http://www.ist-nm2.org)



# CELTIC

## Successful result of second call for proposals



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CELTIC, the European R&D programme designed to strengthen Europe's competitiveness in telecommunications, has been continuously expanding its portfolio of short and medium term collaborative R&D projects. After only one year, the CELTIC cluster project is now well established. Together with the expected Call 2 projects, the total budget will soon amount to more than 250 million euro.

19 CELTIC projects are ongoing, launched from the first Call of this new EUREKA cluster. Another 20 projects were proposed by the submission deadline 6 October. From these 20 full project proposals, a total of 17 projects have been selected by the Public Authorities and the CELTIC Core Group after they passed a technical review. The selected projects received the CELTIC label, which indicates that they are officially recommended by CELTIC.



The labelled proposals cover, for example, security-related issues like the development of a 'System Security Cockpit' based on a defined security framework to control the security assurance level of telecommunications systems.

There are also proposals looking at secure multimedia content management, a federated identity management system, and at secure networking of mobile and wireless networks.

Other proposals focus on Quality of Service and multimedia-related issues, for example on the provision of an end-to-end, dynamic and tailored QoS IP service in broadband

networks, and for delivering QoS multimedia transmission over error-prone networks.

Other proposals are concerned with mobile and wireless services and technologies. Topics are, e.g., enhancements of context-aware services over a multitude of different terminals or wireless intelligent hospital facility services using next-generation, context-aware multi-modal devices.

In addition, there are also proposals addressing optical networks.

### Next steps

The labelled projects have now to assure the national funding through their individual country representatives. The first projects should start beginning of 2005.

For projects to be started in 2006, CELTIC will issue Call 3 on 24 January. This call will be organised in two phases, a proposal outline phase for the submission of project ideas (deadline: 22 April 2005) and a full project proposal phase, to which the most promising proposal outlines will be invited. Further details are available on the CELTIC website at [www.celtic-initiative.org](http://www.celtic-initiative.org).

On 16 February, CELTIC will organise an information day, where interested partners and consortia can meet and present their project ideas.



# new project results

## EURESCOM STUDIES

- P1443**    **TRAWIS – Traffic models for the new Wireless Services**  
**Deliverable 1 · Traffic models and open issues for wireless services**  
**Eurescom Study Programme confidential**
- P1443**    **TRAWIS – Traffic models for the new Wireless Services**  
**Deliverable 2 · Traffic Models for wireless services (presentation)**  
**Eurescom Study Programme confidential**
- P1443**    **TRAWIS – Traffic models for the new Wireless Services**  
**Deliverable 3 (TI) · Detailed report on traffic models for new wireless services**  
**Eurescom Study Programme confidential**
- P1444**    **Next Generation Network addressing using ENUM**  
**Deliverable 1 · Eurescom Study Programme confidential**
- P1444**    **Next Generation Network addressing using ENUM**  
**Deliverable 2 · How ENUM influences the Next Generation Network (presentation)**  
**Eurescom Study Programme confidential**

## EC PROJECTS WITH EURESCOM PARTICIPATION

- MOCCA**    **The Mobile Cooperation and Coordination Action**  
**Deliverable 1.1 · Identified Issues of Common Interest**
- MOCCA**    **The Mobile Cooperation and Coordination Action**  
**Deliverable 3.1 · Standards and Regulatory Bodies – How to Approach Them**
- MOCCA**    **The Mobile Cooperation and Coordination Action**  
**Deliverable 4.2 · Dissemination Plan**
- MODA-TEL**    **Model Driven Methodology**  
**Deliverable 3.3 · MDA modelling and application principles**
- MODA-TEL**    **Model Driven Methodology**  
**Deliverable 3.4 · MDA Foundations and Key Technologies**
- MODA-TEL**    **Model Driven Methodology**  
**Deliverable 3.5 · MODA-TEL Methodology and Guidelines**
- SOCQUIT**    **Social Capital, Quality of Life and Information Society Technologies:**  
**Evidence-based dynamic modelling support for the IST Priority**  
**Deliverable 6 · Literature and data review, including conceptual framework and implications for IST**

# Material girl calling Virtual Girlfriend on the mobile phone



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She is 20 years young, slim, dark-haired, and likes to talk with romantic men on the mobile phone. In fact, you can only communicate with her on the mobile, because she is a virtual creature. Under the name Virtual Girlfriend she works for Artificial Life, the Hongkong-based company of her father, Arthur Schoeneburg.

Virtual Girlfriend is a new multimedia game for the mobile phone. In order to win the young lady's heart, adorners have to continuously sweet talk to her and coddle her with expensive gifts. She is quite a material girl.

## Flowers and diamonds

If you want to keep the relationship with her going, you have to invest in virtual flowers and diamonds, for which you have to pay in real money, in addition to the basic fee for the service. In return for the plentiful advertencies, you can talk to Miss VG and watch her three-dimensionally on your third-generation mobile phone in a number of everyday situations: in a café, on her way to work, in her living room, and – if you have reached a higher level of intimacy – even sparsely apparelled in the bathroom. In the course of the game, you have the chance to follow her life and unveil her secrets. However, if you neglect her communicative and material needs, the young romance may end before it has begun: “She'll be unhappy, and she won't talk to you,” Artificial Life's spokeswoman Ada Fong explained.

## Proud father

Artificial Life plans to launch the service in English, Japanese and Korean by December. It is not yet clear, which 3G network operators will offer Virtual Girlfriend and at what price. Nevertheless, Eberhard Schoeneburg, the German CEO of Artificial Life, is very proud of his virtual daughter and believes in her economic success. “The Virtual Girlfriend is a lot of fun to play, and the game sets new and high standards for future 3G mobile games,” he said. According to Mr Schoeneburg, Virtual Girlfriend combines in a unique way the company's mobile platform and artificial intelligence technology with natural language processing in several languages. He pointed out the human-like behaviour of the game characters, the high quality and realism of 3-D animations, and the sophisticated and innovative game logic with a continuously evolving and always progressing story.

## Love by Mail

The basic idea of Virtual Girlfriend is not new. Four years ago, NTT Docomo already offered a similar service to its I-mode subscribers. More than 30,000 Japanese subscribed to “Love by Mail”. The suitors could choose from a line-up of women that includes a bartender, a flight attendant, an office worker, and a teacher. Once they made a selection, they could start dating the woman via e-mail.

These women required equal consideration as Virtual Girlfriend. Those men who promised too much or didn't act fast enough fell from grace with the woman and received bitter e-mails from her. Likewise, those who attempted to talk about sports or offer excuses about needing to work too often also got rejected



by their new love. Successful seducers, however, were rewarded by increasingly romantic e-mails from their sweetheart, in which she gradually revealed her “most intimate secrets.”

“Love by Mail” was developed by Bandai, the Japanese toy company that also manufactured the famous Tamagotchi, which kept girls worldwide mothering squalling electronic pets in the 1990s.

## Skills versus money

Apart from the advanced 3D graphics of Artificial Life's product, the main difference between the two games seems to be that success in “Love by Mail” was more based on skill, while the heart of the Virtual Girlfriend can rather be won with money in the form of expensive gifts. Whatever the winning strategy is, the hearts of 3G network operators would leap, if Mr Schoeneburg's virtual daughter would become everybody's darling.

After the success of “Love by Mail” in Japan, chances are that Virtual Girlfriend could also become a success in the Far East. For the European and the American market, mass success seems to be rather doubtful due to cultural differences.

Artificial Life isn't bothered by this and has already announced the launch of Virtual Boyfriend in February 2005. Up to now, it is Mr Schoeneburg's secret, how romantic ladies could win prince charming's heart. If I had to guess, the choice of gifts would reach from beer crates to sports cars.





**Eurescom Summit 2005**  
**27-29 April 2005**  
**Heidelberg, Germany**

## **Ubiquitous Services and Applications Exploiting the Potential**

### **SCOPE**

The continuing evolution of telecommunications and information services is delivering the technology to fulfil the promise of omnipresent services and applications. Pervasive computing and ubiquitous services, which facilitate the users' everyday activities, have been an intense research issue over the last years. Today, many technologies are available that can be combined to exploit the business potentials of services and applications which work anytime and anywhere in a seamless and intuitive way.

The fourth Eurescom Summit focuses on 'Ubiquitous Services and Applications'. The conference aims at investigating technical issues of ubiquitous services, showing how the advances in enabling technologies can support the exploitation of ubiquity. The conference will also consider the exploitation opportunities, usability and user acceptance, and will evaluate their business relevance.

Authors are invited to submit papers addressing, but not limited to, the following topics:

- Evolution of ubiquitous services and applications
- Service platforms, systems & architecture aspects
- Business aspects, opportunities and threats
- User aspects, acceptance, privacy
- Technology aspects, devices
- Content related aspects
- Self-organisation/self-configuration of networks
- Security aspects

A more comprehensive list of topics is available on the conference website.

### **CONFERENCE WEBSITE AND FURTHER INFORMATION**

Further information can be found on the Eurescom Summit 2005 website <http://www.eurescom.de/summit2005> or through the following contacts:

**E-mail:** [summit2005@eurescom.de](mailto:summit2005@eurescom.de)

**Tel:** +49 6221 989-0, **Fax:** +49 6221 989 209

### **POSTAL ADDRESS**

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69118 Heidelberg  
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[www.eurescom.de/summit2005](http://www.eurescom.de/summit2005)

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Riccardo Pascotto, Deutsche Telekom  
Project coordinator of EU Integrated  
Project DAIDALOS

EU project reporting can be so fast and easy – with Eurescom Project Reporter. Forget about cumbersome, self-made spreadsheet files that have to be uploaded on some server in some directory you always forget. Eurescom Project Reporter offers you an easy-to-use web interface tailored to every partner, which makes entering work and financial data as well as getting a quick overview on the current budget status for EU FP6 Integrated Projects and other EU projects a matter of minutes.

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## Innovation through collaboration

Eurescom is the leading organisation for collaborative R&D in telecommunications. Our mission is to provide efficient management of research projects and programmes for member companies and other clients. We offer more than ten years of experience in managing large-scale distributed R&D using a dynamic network of experts. Companies who wish to collaborate on the key issues facing the telecoms industry are welcome to join the Eurescom community.