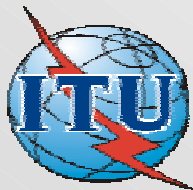


Opportunities for convergence

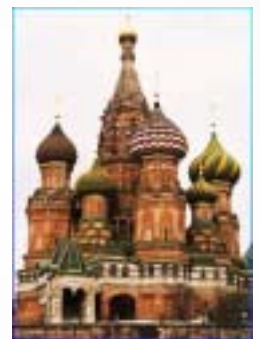
The co-operative approach

Uwe Herzog
Eurescom
herzog@eurescom.de



ITU/ITC Regional Seminar on Network Evolution to Next Generation Networks
and Fixed Mobile Convergence for CEE, CIS and Baltic States

Moscow (Russia), 27-30 April 2004



Outline

- ▶ Integration vs. convergence
- ▶ A look forward: Beyond converging networks
- ▶ Overview of selected research work on convergence topics
- ▶ Conclusions

Integration in 80's and 90's

- ▶ Integration as a means to
 - avoid too many parallel systems
 - reduce maintenance costs
 - more efficient use of resources
 - etc.
- ▶ Voice and data
 - Integrated Services Digital Network (ISDN)
- ▶ Emerging networks
 - Mobile networks, Internet

Eurescom activities on integration

- ▶ P360SI Integrated Multimedia Services at 1 Mbit/s (Demonstration Phase)
- ▶ P506 Harmonisation/Integration of B-ISDN and IN
- ▶ P507 Mobility Applications Integration in Intelligent Network
- ▶ P508 Evolution, migration paths and inter working with TINA
- ▶ S52 Fact-finding Study on World - Wide - Web and the Role of the PNOs
- ▶ P816 Implementation frameworks for integrated wireless - optical access networks
- ▶ P841 Strategic Study on the Impacts of a Multi-Network Infrastructure
- ▶ P909 Enabling technologies for IN evolution and IN-Internet integration
- ▶ P919 Evolution of integrated fixed and mobile networks

From integration to convergence

- ▶ A key issue at “ITU Telecom 99”
- ▶ Building a unique all-encompassing network or system is hard to achieve
 - complexity
 - economic issue
 - return on investment

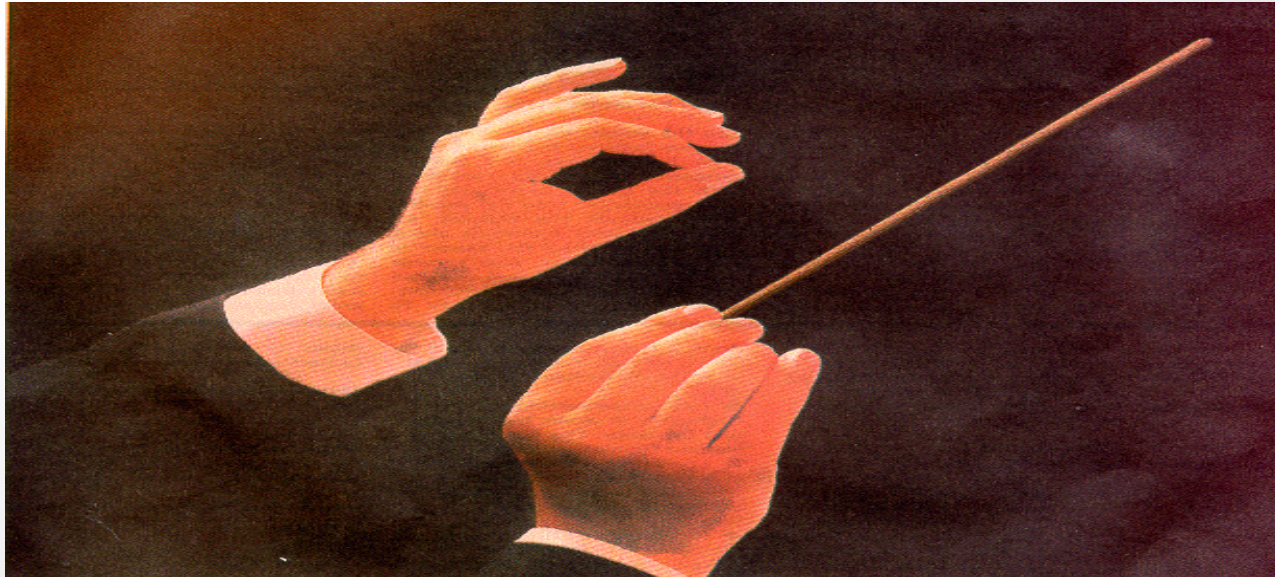
Eurescom



**European Institute for Research and
Strategic Studies in Telecommunications
Heidelberg, Germany**

„Innovation through Collaboration“

Eurescom



A Virtual Company for Collaborative R&D

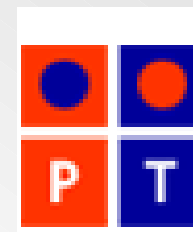


Eurescom

Consulting and Management services for collaborative innovation activities for Eurescom members and external customers

- ▶ Initiating, managing and supporting distributed collaborative research programmes (Eurescom projects and studies)
- ▶ Support for successful submission of European projects (EC Framework Programme 6)
- ▶ IT services (Webpace, email lists, budget management and electronic work reporting, audioconferencing etc)
- ▶ Hosting organisations (Eureka - CELTIC)
- ▶ Organisation's support (Digital Media Project – DMP, Wireless World Research Initiative – WWRF)

Eurescom - members



Eurescom – further information

EURESCOM Innovation through Collaboration

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Eurescom - advancing innovation through collaboration

Eurescom is the leading organisation for collaborative R&D in telecommunications. We provide efficient management of research projects and programmes for member companies and other clients. Companies who wish to collaborate on the key issues facing the telecoms industry are welcome to join the Eurescom community.

EVENTS

Eurescom Summit 2005
Heidelberg, 27-29 April 2005
[Further information](#)

NEWS

Personalisation of telecom services
Personalised services offer a large growth potential to telcos. The latest issue of the quarterly R&D magazine Eurescom mess@ge presents in its cover theme exclusive articles on different aspects of personalisation for telecom services.
[Eurescom_mess@ge 1/2004](#)

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Call 2 of Europe cluster project CELTIC issued

Search

Areas of convergence – A bit beyond

- ▶ Fixed mobile convergence
- ▶ Internet - PSTN
- ▶ Telecom – IT
- ▶ Wireless technologies
- ▶ Access technologies
- ▶ Home services
- ▶ Content / Digital rights management
- ▶ Smart Cards

Convergence of home services
(telco / IT / entertainment)

Eurescom project P1206

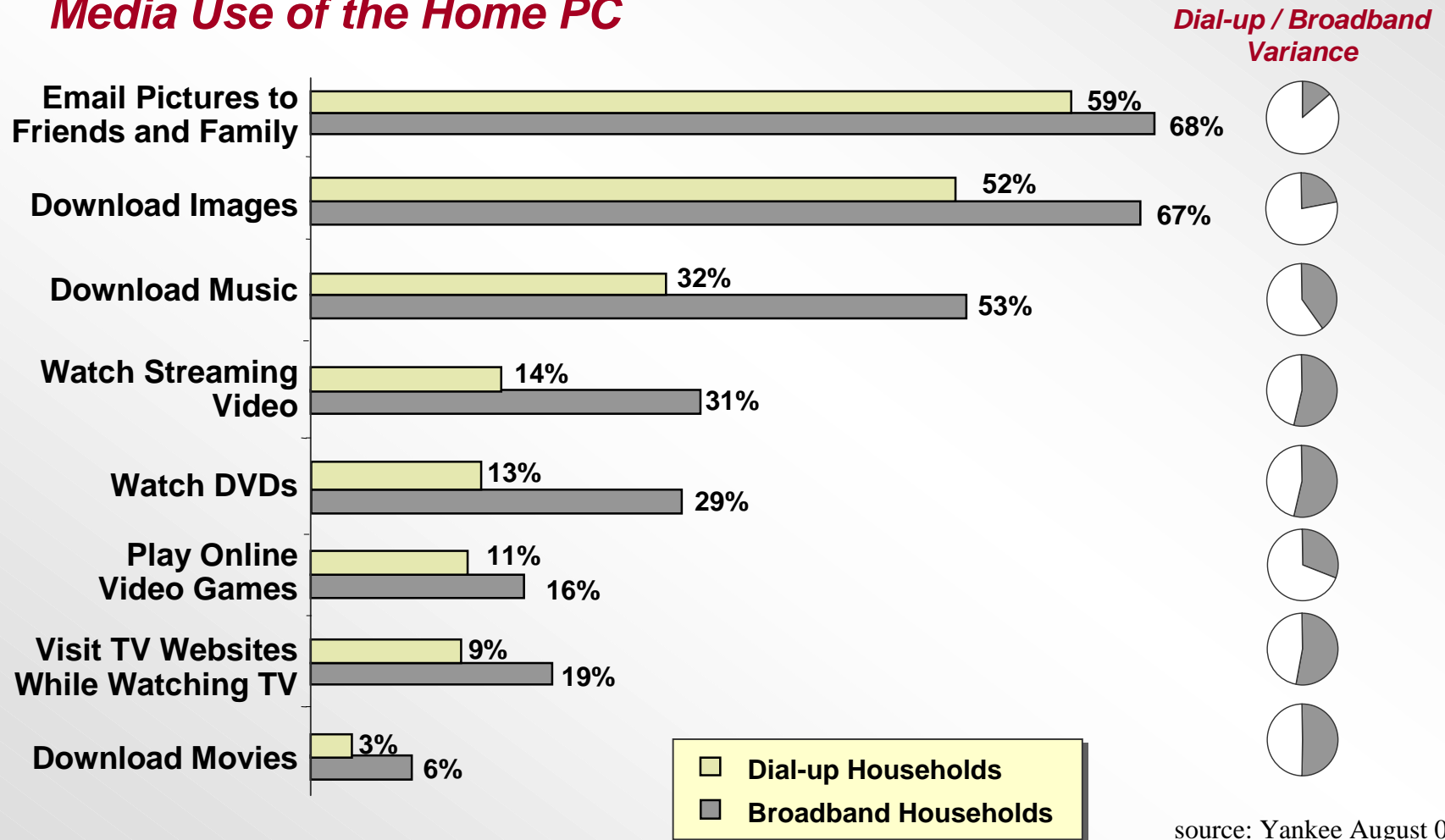
**Broadband Services in the Intelligent
Wireless Home**

Integrating User Requirements into home network systems design

- ▶ It is no longer advisable or feasible to design any system in a social vacuum and in particular a home network system
- ▶ Exposure to user needs at an early stage of system design is essential for system developers and architects.
- ▶ The challenge is in reconciling the objective with the subjective: the journey is difficult
- ▶ the work is usually done by two incompatible groups of people: technical and social scientists
- ▶ no common theoretical or methodological base
- ▶ General user acceptance does not necessarily guarantee adoption of a service

US Broadband households embrace digital entertainment applications ahead of dial-up households

Media Use of the Home PC

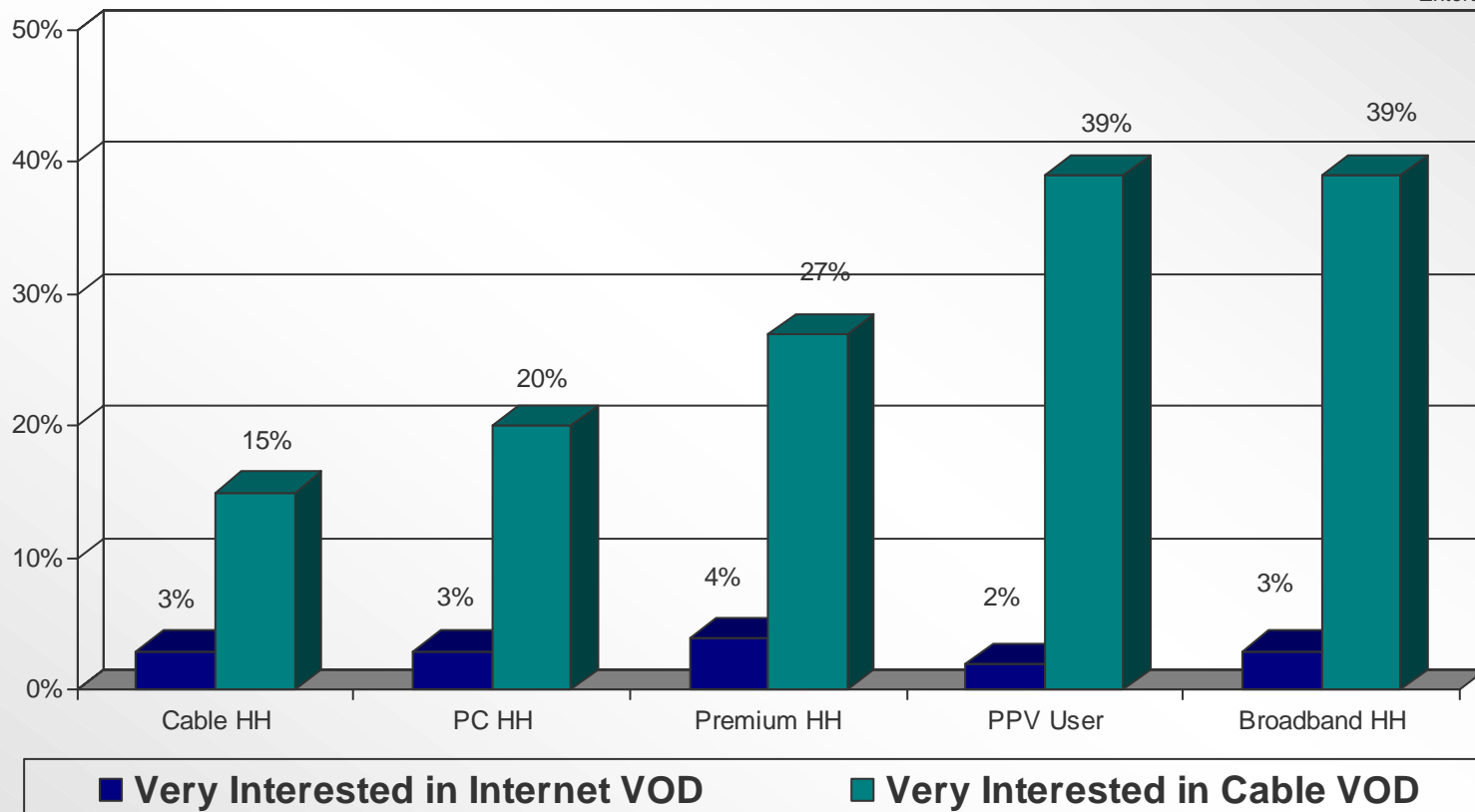


source: Yankee August 03

VoD over DSL / Cable

Interest in VOD by Platform (US)

Source: 2002 Digital Home Entertainment Survey




The rapid deployment of VOD on substitute platforms – Cable and DBS – will limit the potential for Internet and PC based VOD

source: Yankee August 03

Service Integration of wireless applications

“My Phone”@Home Email, ICQ, Web, Remote Control

Message Edit **Inbox** ▾

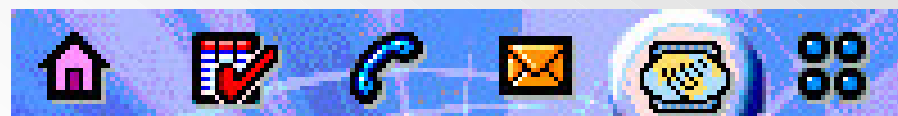
 @ Re: Notice of product purc
From: IM+ Support Team <imsup

Dear Mr. Noll,

Thank you for buying IM+:
MSN/ICQ/AOL/Yahoo! Mobile
Instant Messenger for Sony

Services Status **Roster**

-  **May Krosby**
-  **Chris**
-  **LisaHenden**
-  **Matti1404**
-  **Widerstand zwecklos!**



Web Edit

IMPORTANT LEGAL NOTICE: The information



[Europa](#) > [European Commission](#) >
[Information Society](#) > [Programmes](#) >

[IST 2003](#)





[participate](#)

Music MP3-streaming

- Remote control of home equipment
- Streaming of my music to the home stereo




Bluetooth



In co-operation with Bang & Olufsen and DTU

Home Control

▶ Controlling temperature, light, etc from your mobile phone

Room	Min	Max	Set Temperature
Living room	14	28	22
Kitchen	14	28	22
Entrance	14	28	20
sleeping room	14	28	14

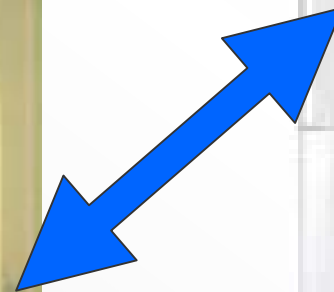
Model train control



- ▶ Camera for world-wide remote monitoring
- ▶ Model train steering from “everywhere”

Personalised information: My personal programme guide

- ▶ Identify yourself seamless to the TV
- ▶ Have the mobile phone as remote control
- ▶ Get a personal programme guide downloaded to the phone
- ▶ Get extra information about movie



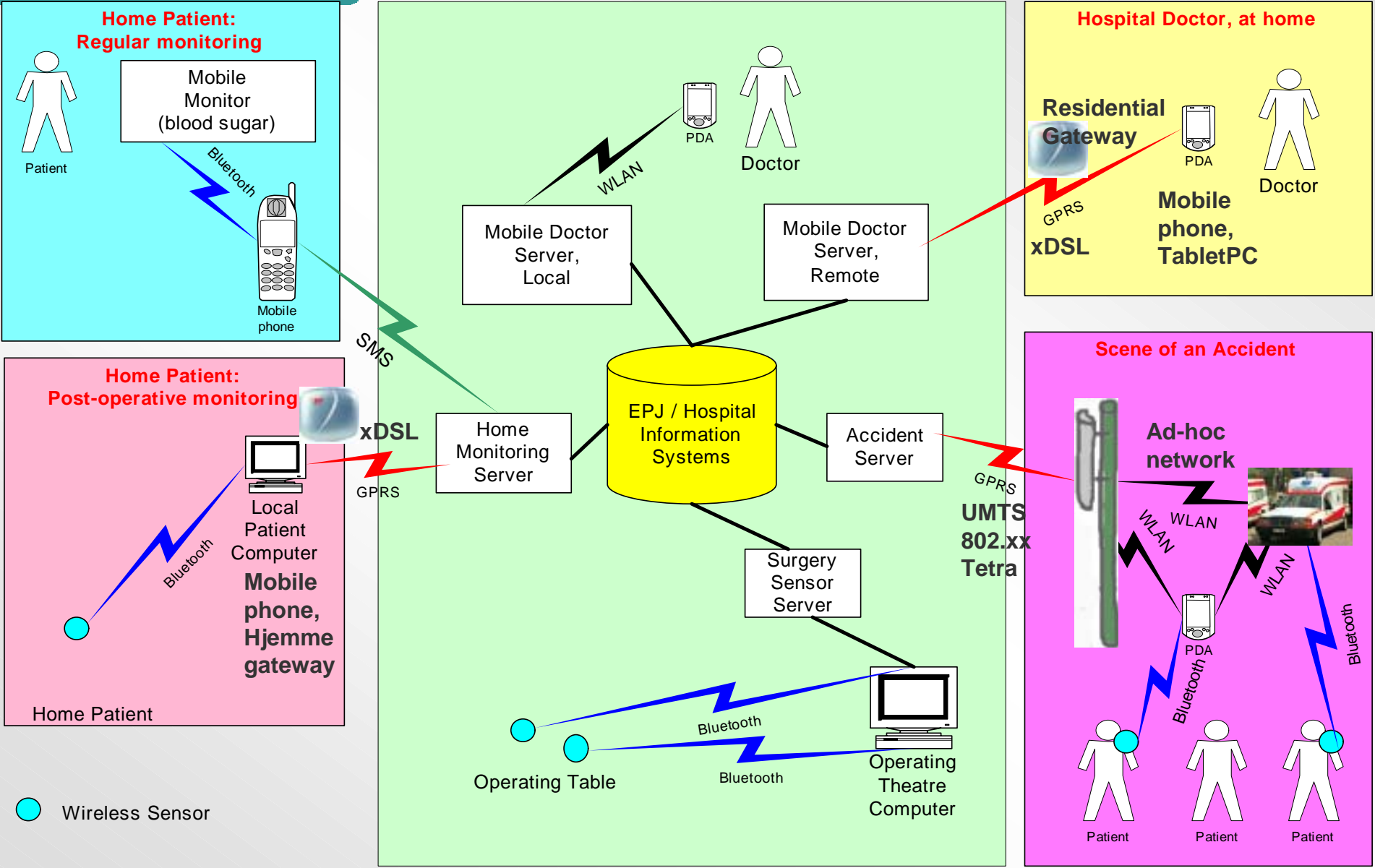
Personal Video Recorder

- ▶ Record exactly the TV stories you want on your PC
- ▶ Example tvtv.de: Select your favourite stations, and let the PC download them

ARD	Eurosport	TV Norge	3
 <p>20.15 Gnadenlose Bräute Krimi, D 2000</p> <p>ARD - Vormittag ARD - Nachmittag</p> <p>Abend</p> <p>18.25 Marienhof SERIE</p> <p>18.50 Berlin, Berlin SERIE Ich will Sandra Bullock massieren</p> <p>19.15 Das Quiz mit Tora</p>	 <p>21.00 WTA Tour 2003 LIVE Pacific Life Open in Indian Wells, CA (USA)</p> <p>Eurosport - Vormittag Eurosport - Nachmittag</p> <p>Abend</p> <p>18.15 Eurosportnews</p> <p>18.30 FIS Audi Weltcup-Finale 2002/2003</p> <p>19.00 SX Weltmeisterschaft</p>	 <p>21.30 Vennskap for livet FILM De Forente Stater 1998</p> <p>TV Norge - Vormittag TV Norge - Nachmittag</p> <p>Abend</p> <p>18.00 Aktuelt og Været</p> <p>18.15 Bymagasinet</p> <p>18.30 TVNORGE-Oslo</p> <p>19.00 Big Brother Online</p> <p>19.30 Oliver's Twist</p>	 <p>00.00 FILM</p> <p>TV3 No TV3 No</p> <p>Abend</p> <p>18.05 Ricki Lake</p> <p>19.00 Nanny</p> <p>19.30 Alle elsker Raymond SERIE</p>

Sa	15. März 2003
09.45	Pippi außer Rand und Band
13.00	Pippi Langstrumpf
13.00	Pippi Langstrumpf
So	16. März 2003
12.00	Pippi Langstrumpf
Sa	22. März 2003
09.50	Meisterdetektiv Kalle Blomq
13.00	Pippi Langstrumpf
13.00	Pippi Langstrumpf
So	23. März 2003
12.00	Pippi Langstrumpf
Sa	29. März 2003
13.00	Pippi Langstrumpf
13.00	Pippi Langstrumpf

Wireless Health and Care: Scenarios



- ▶ Service integration is based on:
 - Seamless interworking between personal devices and home devices
 - Integration of “mobile” services into the home
 - Seamless service access from home and remote places
- ▶ Satisfy customer needs for: Early adaptors, families with children, non-technology freaks, or customers with special interests/needs
- ▶ Provide services on different infrastructures
 - OSGi based home gateways
 - MHP based home gateways (or combinations of both)
 - Mobile Phone based home gateways

Convergence Internet - PSTN

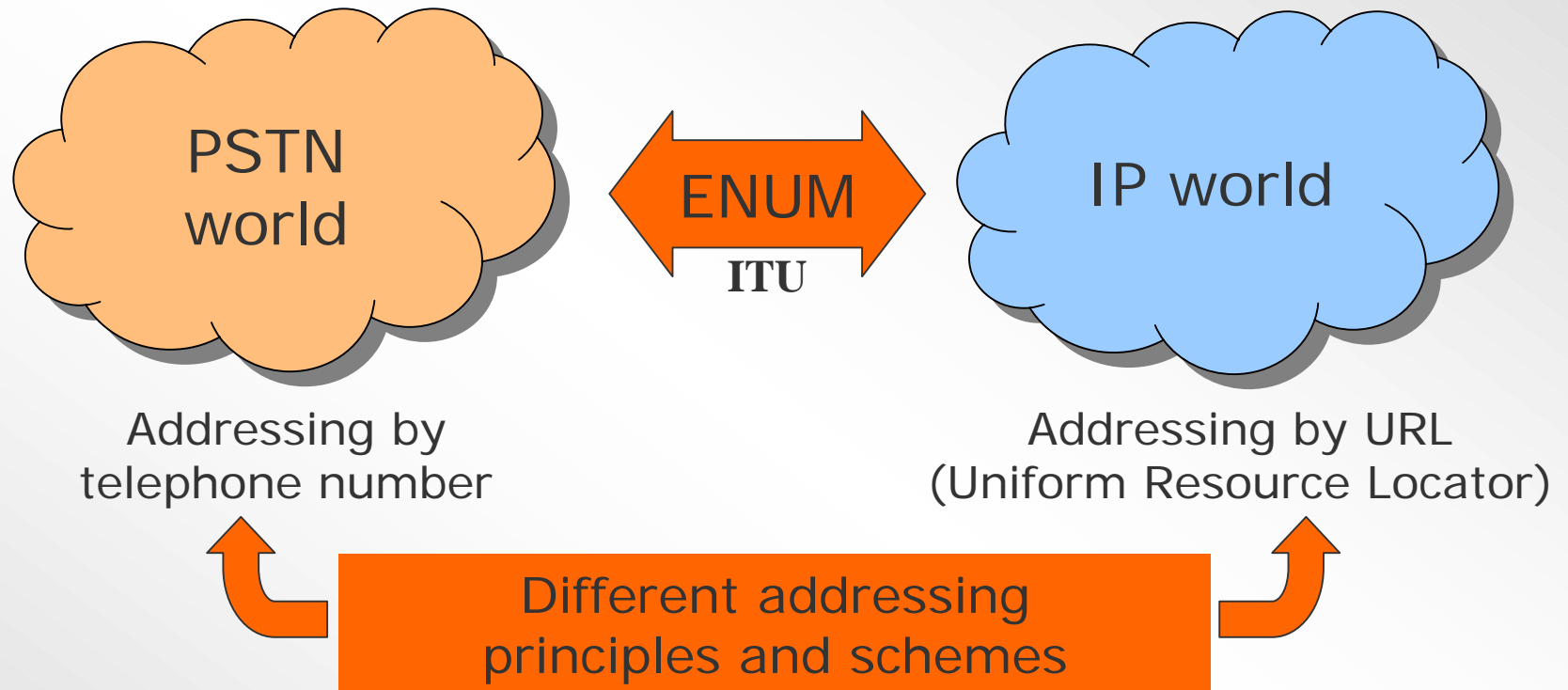
Eurescom project P1444

NGN signalling with ENUM

ENUM – Electronic numbers

- ▶ How to find services on the Internet using only a telephone number?
- ▶ How can telephones, which have an input mechanism limited to twelve keys on a keypad, can be used to access Internet services?

ENUM, the convergence enabler



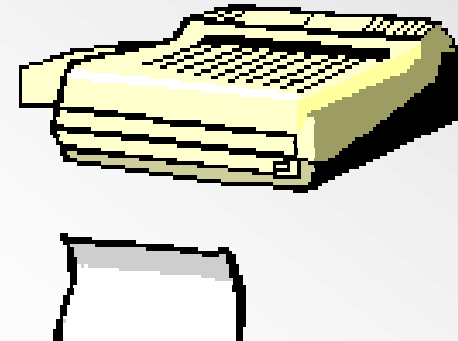
To facilitate convergence, i.e. initiate a call in one network and terminate it in the other, addressing conventions need to be agreed in between

That is ENUM

A telephone number can get you to a Web service...

- ▶ The ENUM protocol takes a complete international telephone number and “resolves” it to a Unified Resource Locator (URL) using a Domain Name System (DNS) architecture. (DNS what converts www.whatever.com into a numeric address that gets you to the whatever web site.)
- ▶ Access to a wide range of applications – based solely on a phone number.

Imagine

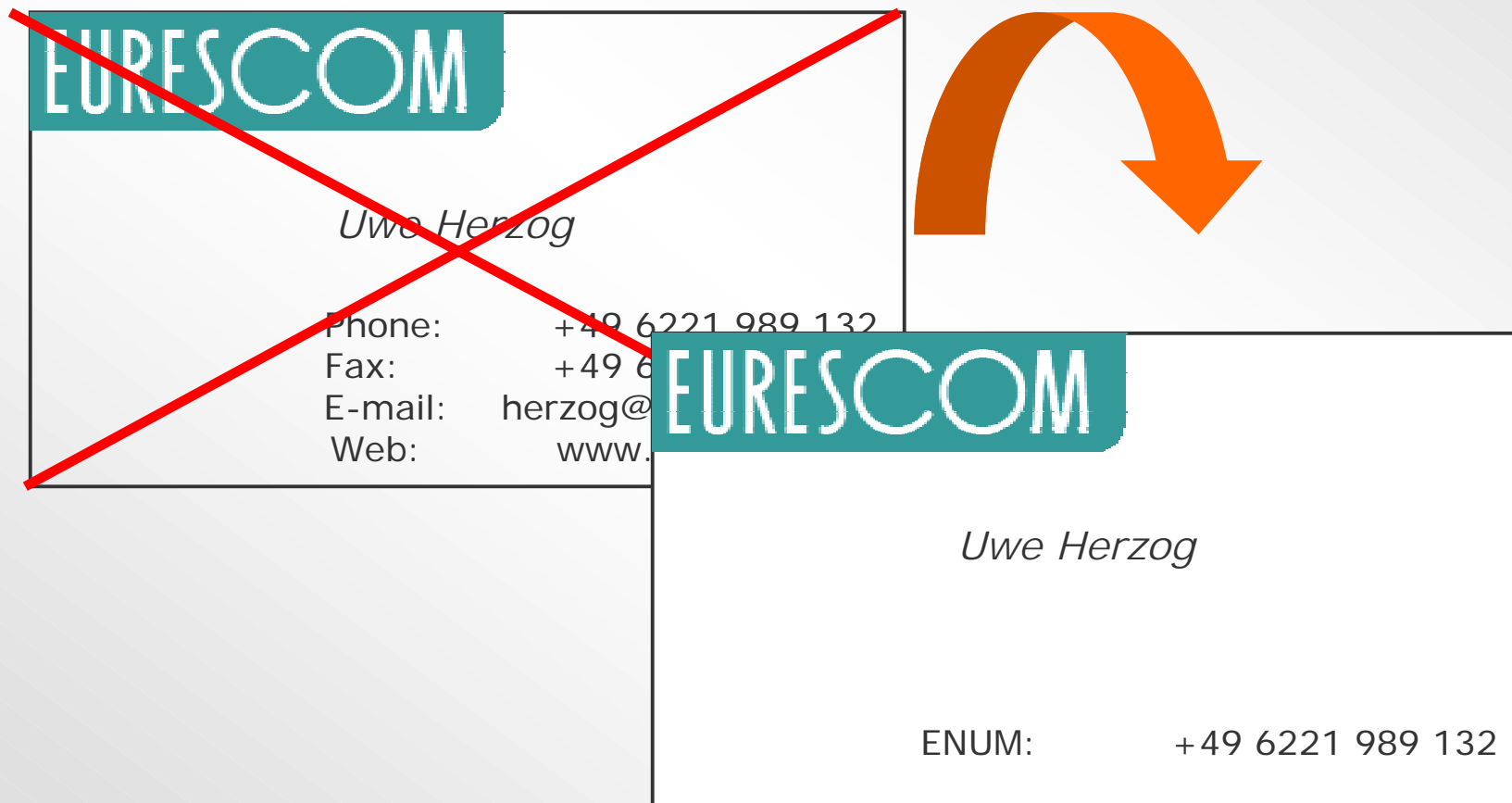


- ▶ For fax applications it is even more logical and much more efficient to use the IP network. Circuit networks were designed to carry voice, but fax machines do not send voice traffic – they send data.

and more!

- ▶ Technologies in conjunction with ENUM will allow you to send an e-mail message using a telephone number, and a subscriber's e-mail, fax, instant messenger, and phone will all be reachable by using the same phone number.

The present and the future



Convergence of Smart Cards

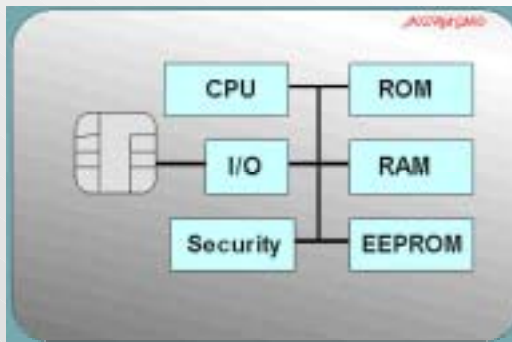
Eurescom project P1350

Multi-Application Smart Card Market Opportunities

Types of Smart Cards

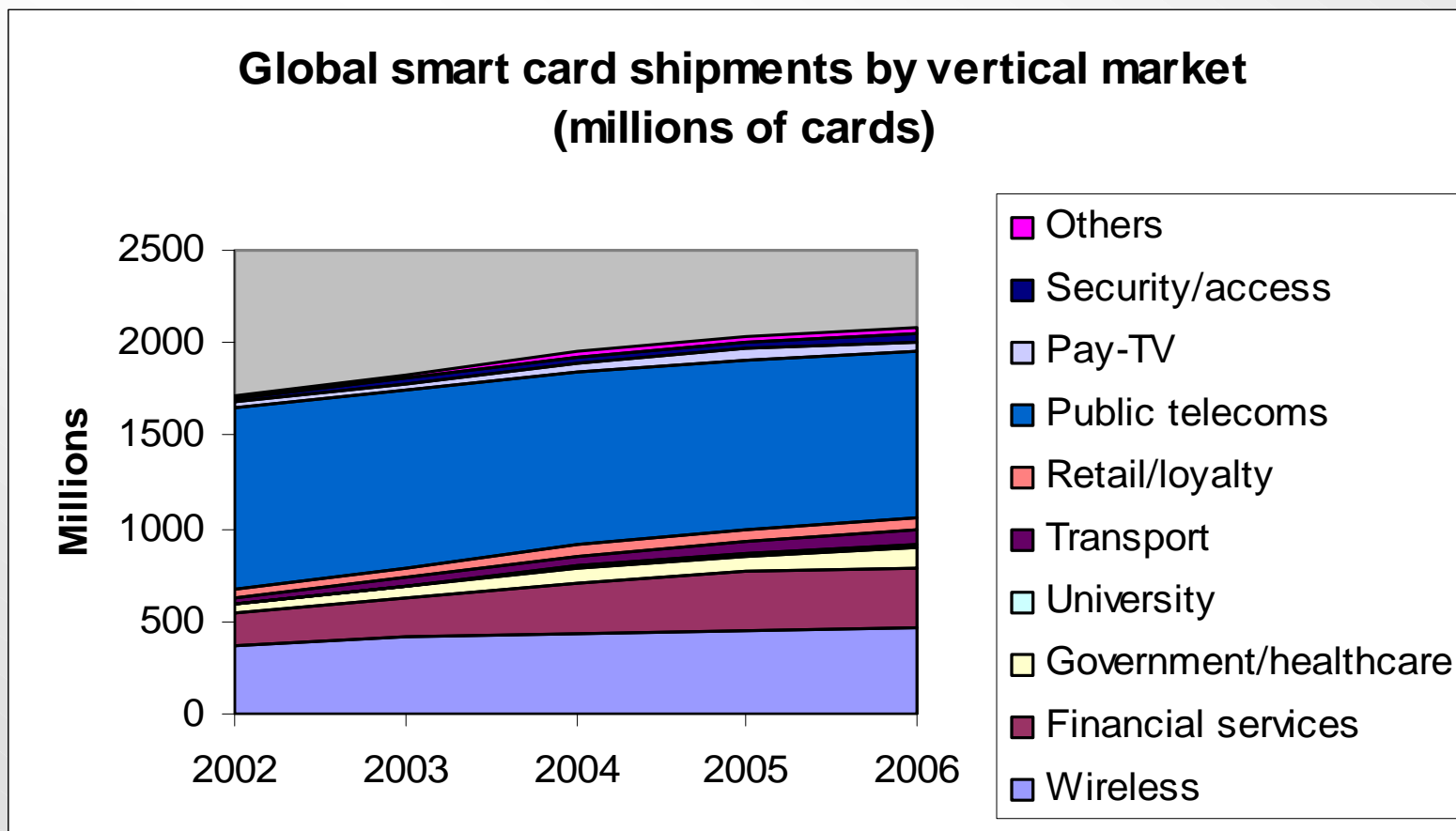


- ▶ Memory cards
- ▶ Microprocessor cards
 - Multi-functional or multi-application smart cards



- ▶ Contact smart cards
- ▶ Contactless smart cards

Market Forecast - Size



Source : Datamonitor, 2003

Market Drivers

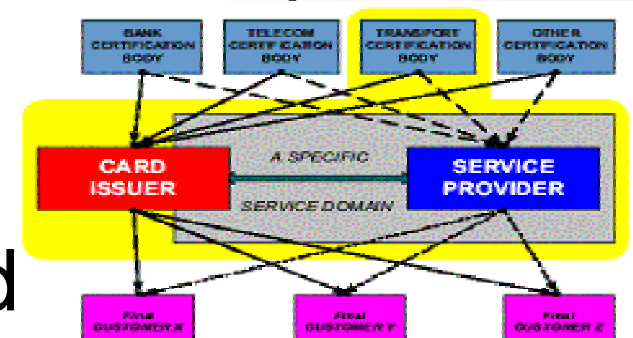
- Increase in Government ID projects towards employees and citizens
- Financial services migration from magnetic to chip cards, worldwide EMV migration and replacing cash payments with contactless chip transactions
- Emerging 3G and mobility opportunities
- Usage of Biometrics with smart cards
- Corporate endorsements for combined physical/logical access cards
- Growth in usage of contactless technology
- Integration of smart card readers into laptops and keyboards
- Increasing capability and decreasing price of smart cards

Market Barriers

- Investment in infrastructure
- High installed base of magnetic stripe cards
- Lack of strong business cases in some vertical markets
- Agreement on International standards
- Wait and watch approach of banks
- Lack of confidence in the multi-application business models. Risk considerations
- Interoperability
- Lack of standards outside banking
- Strong government regulations
- Political and social discussions
- Competition from alternative technologies (magnetic stripe cards)

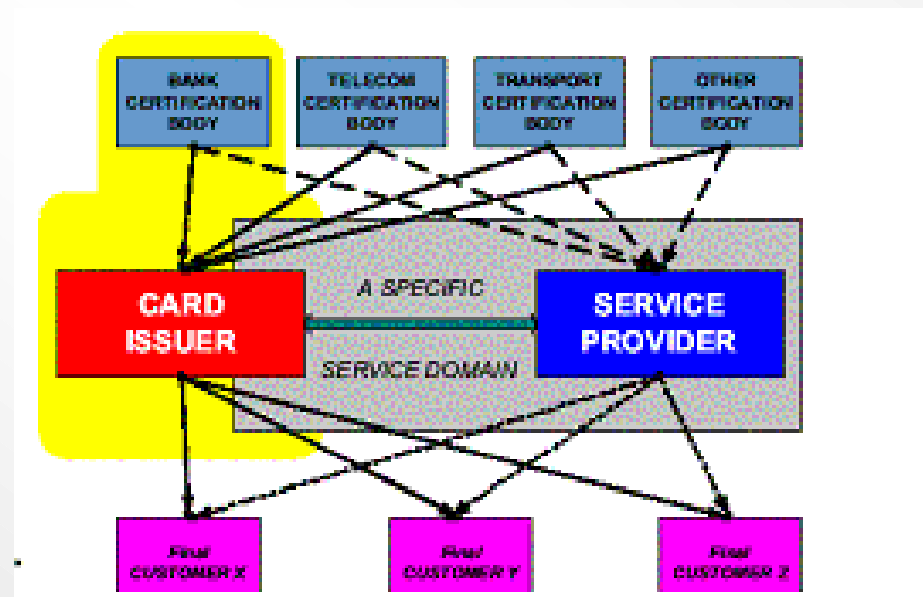
Multi-application card issued by non-financial organisation

- ▶ Card issuer allows loading of applications by other SP
- ▶ Card issuer and primary service provider are the same body
- ▶ revenues generated by renting space on the card



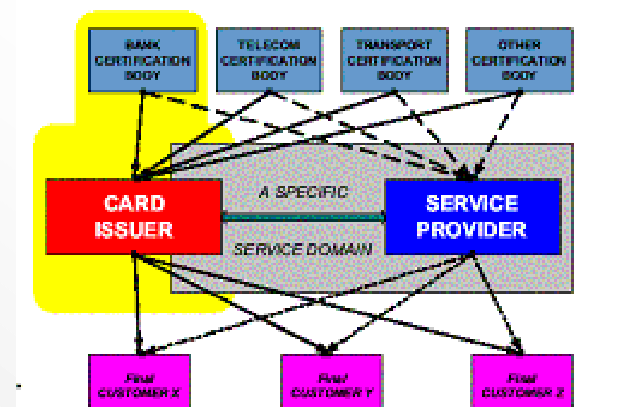
Bank issued Multi-application card

- ▶ Bank is issuer
- ▶ Bank controls the selection of the hosted applications



White card

- ▶ Cardholder buys the empty card from a card distributor
- ▶ Certified by a certification authority
- ▶ User has full control on services hosted on the card



Convergence of Content

Eurescom project OPERA (P1207)

Interoperability of Digital Rights Management
(DRM) technologies

OPERA Mission

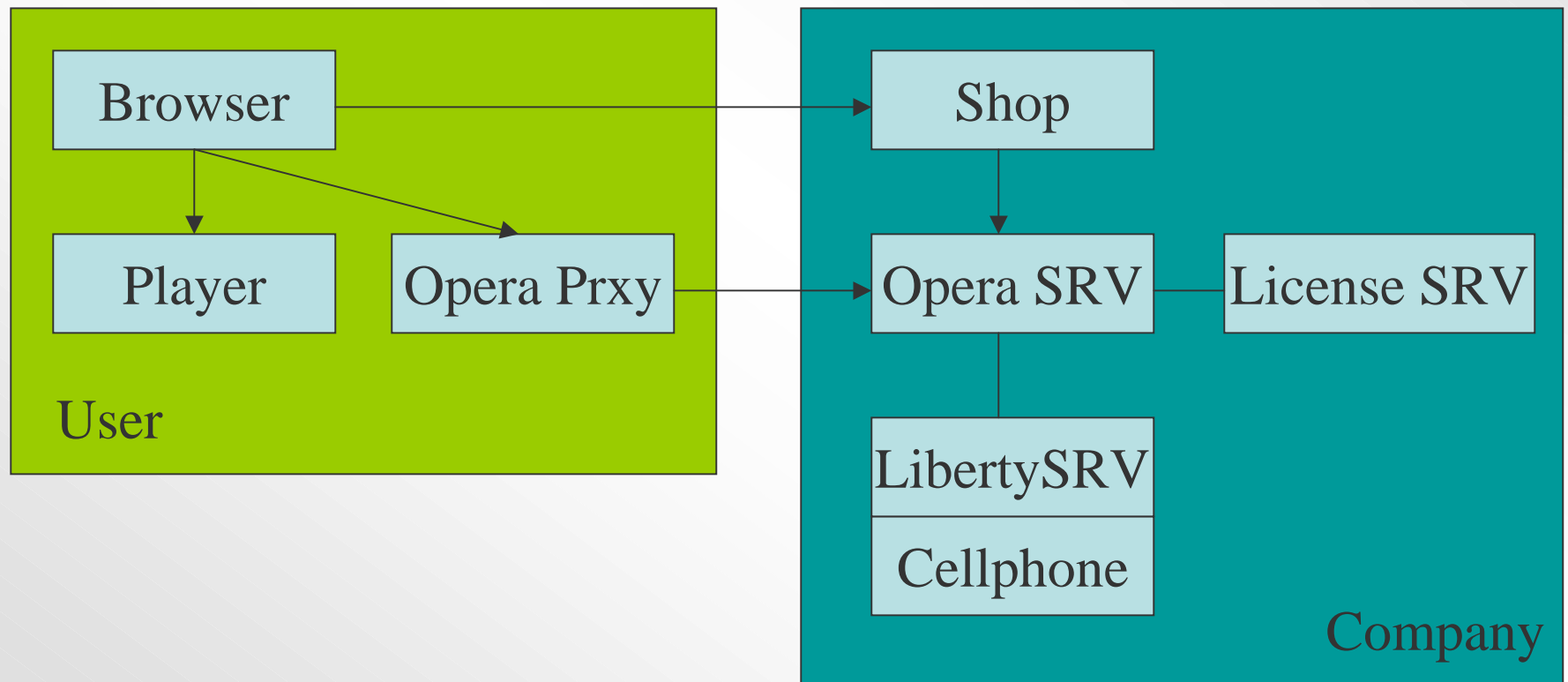
- ▶ The mission of the OPERA project was derived based on the requirements from the content value chain – content providers, operators/service providers and content users
- ▶ The objective of the project was the specification of an open DRM architecture that addresses the needs of:
 - Content Providers: Addresses the needs of content providers to get a powerful and independent platform
 - Operators: Able to handle content of different media types, rights models and business models
 - Users: Addresses the needs of customers, to get an easy to handle, device and location independent service

Opera Requirements

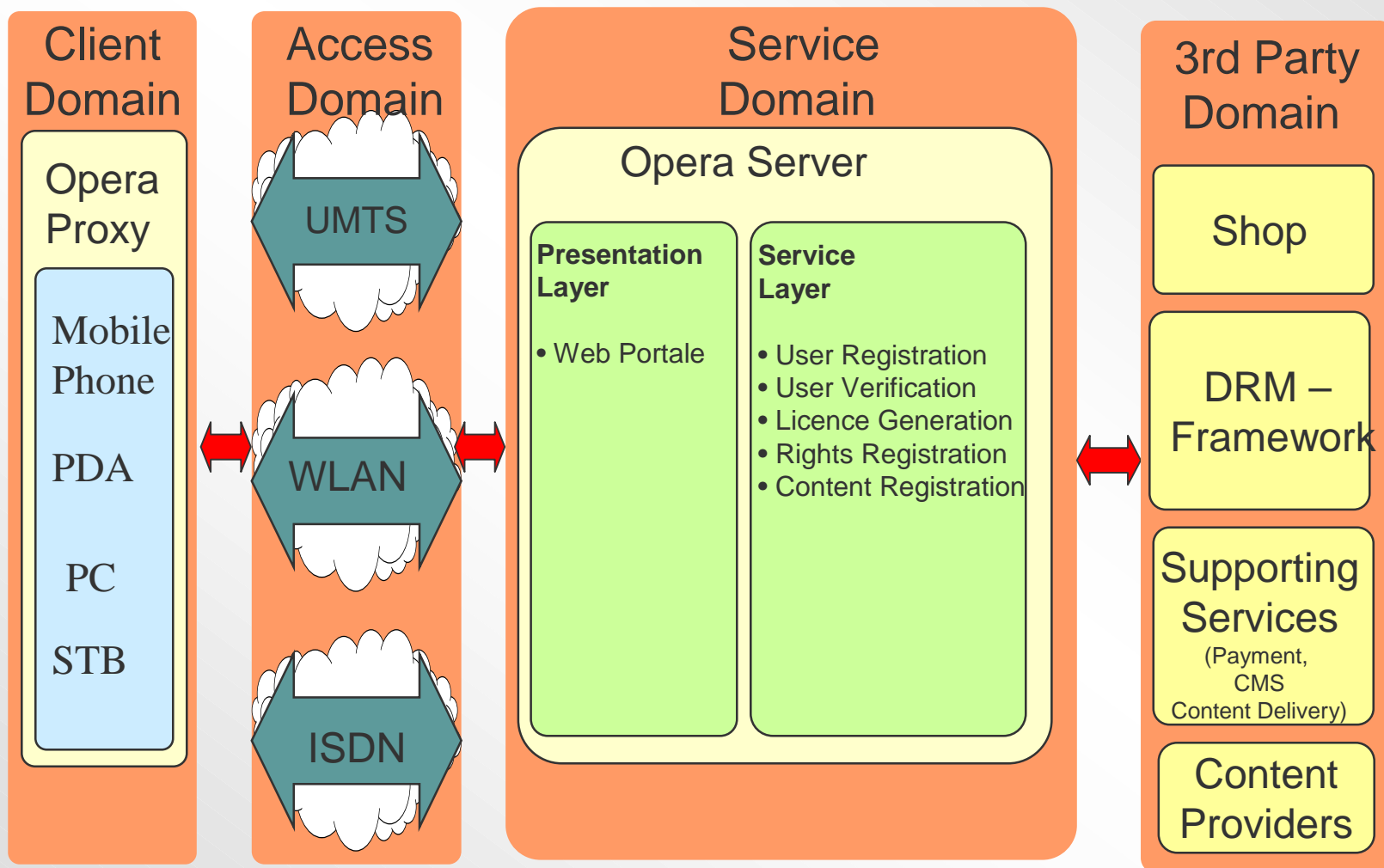
- ▶ Basic DRM requirements:
 - Reliable, simple, compositional and ubiquitous DRM infrastructure
 - Available on every system, independent of platform, operating system and hardware
- ▶ Current situation:
 - Several different, proprietary DRM systems
 - Strongly altering market
 - Different approaches to solve that problems

OPERA Architecture Overview

(View on DRM Layer - Buy license and get content)



Opera General Framework



European Union Framework Programme 6

- ▶ 2002-2006
- ▶ Information Society (IST) part: 3.625 Billion Euro
- ▶ Eurescom
 - offers support for its members and external clients for preparing and submitting project proposals
 - participates in FP6 projects (Management support, Dissemination of results, Provision of IT services supporting project work e.g. email lists, work and budget reporting, audioconference system, webserver etc.)

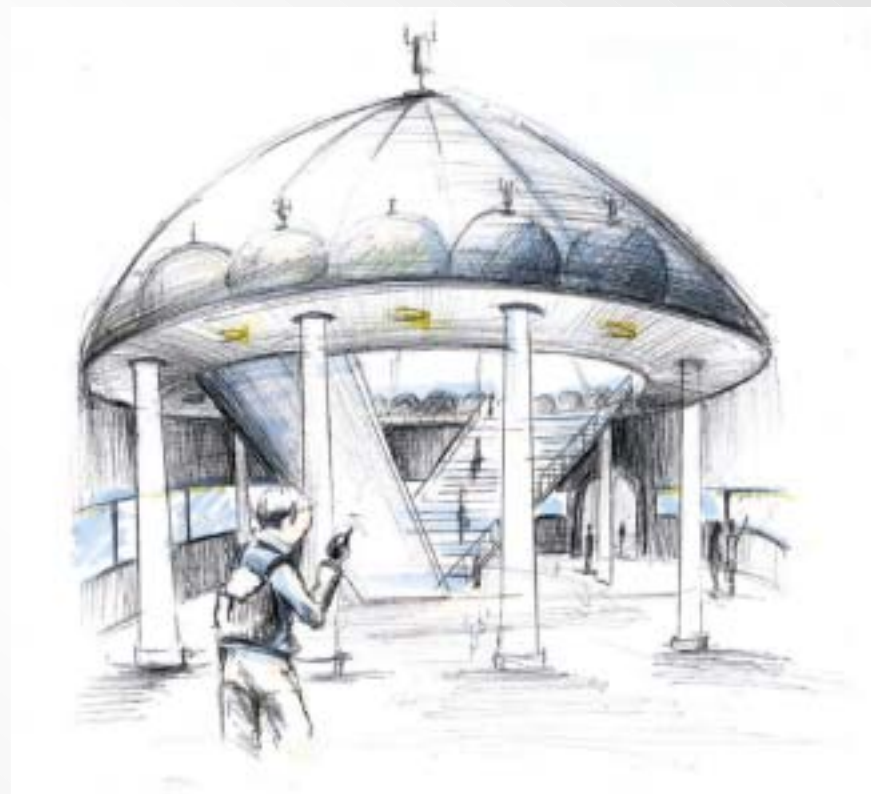
Designing Advanced network Interfaces for the Delivery and Admistration of Location independent, Optimised personal Services

- ▶ Mobility Beyond 3G
 - Heterogeneity: multi-access, multi-operator
 - Mobility: terminal, person, session
 - Separation: transport, service infrastructure
 - Integration: handover, routing, A4C, Security, QoS, Service Creation & Provisioning
- ▶ Media Convergence
 - All-IPv6 network infrastructure
 - Teleservices, Broadcast Services, Sensor Services
- ▶ Pervasive Systems and Services
 - Pervasive Service Platform incl. Discovery, Privacy
 - Context-based adaptive reconfigurability, Personalization

DAIDALOS Scenarios Mobile University



Roles: students and teachers
End-user perspective



University

DAIDALOS Scenarios

Mobile University

▶ Key Vision

- Students studying abroad, having access to their personal set of services and dynamically discovering local services and devices.

▶ Key building blocks

- Organizing daily life at the university: friends, appointments and reservations, classes, projects, exams, entertainment.
- Locating people and devices, checking availability, discovering local services.
- Relying on best/cheapest available infrastructure.
- Moving sessions and content between devices.
- Working and playing while on and off campus.
- Personal broadcasting, e.g. classes and speeches.

DAIDALOS Scenarios

Mobile University



ON CAMP

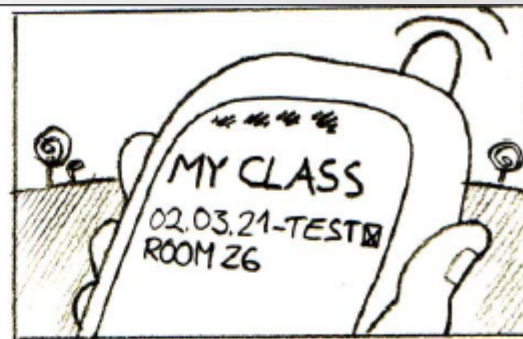
U-100

Close friends



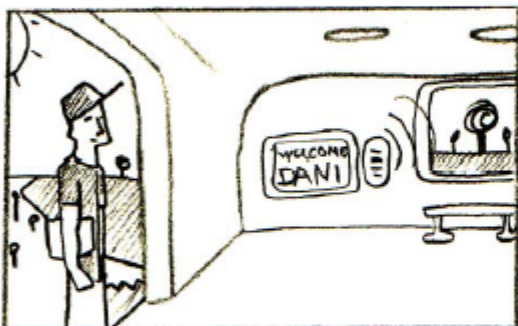
U-200

Access to campus network



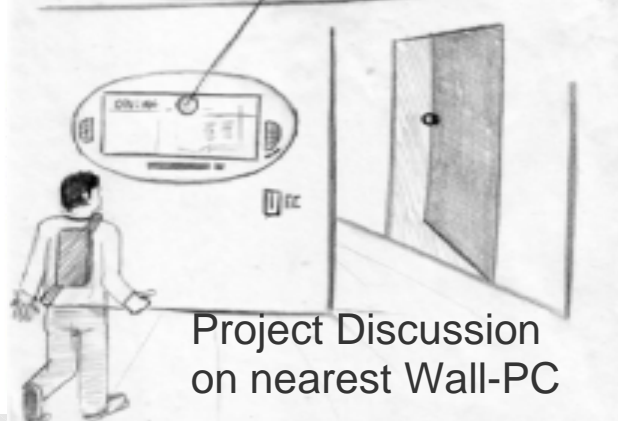
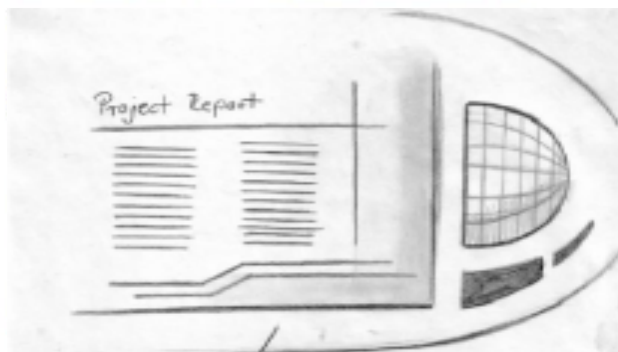
U-300

Personal information



U-400

Presence informations



Project Discussion
on nearest Wall-PC

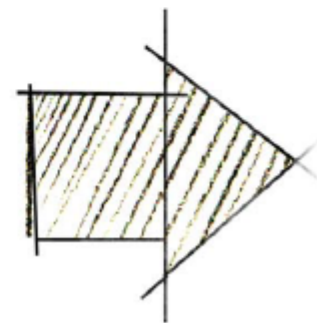


U-600

Dani meets professor



U-700



DAIDALOS Scenarios

Automobile Mobility

▶ Key Vision

- ➔ Mobility supporting services in and around the vehicle with aspects of personal multimedia, ad-hoc mobile networking and session mobility.

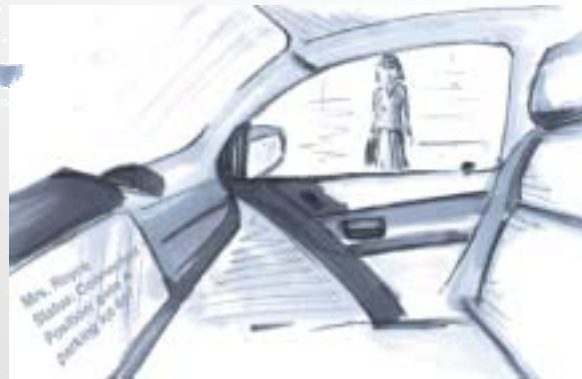
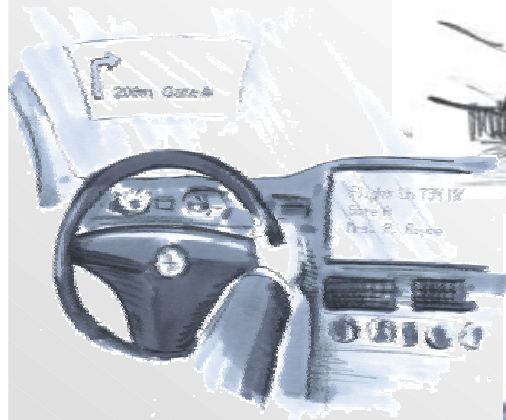
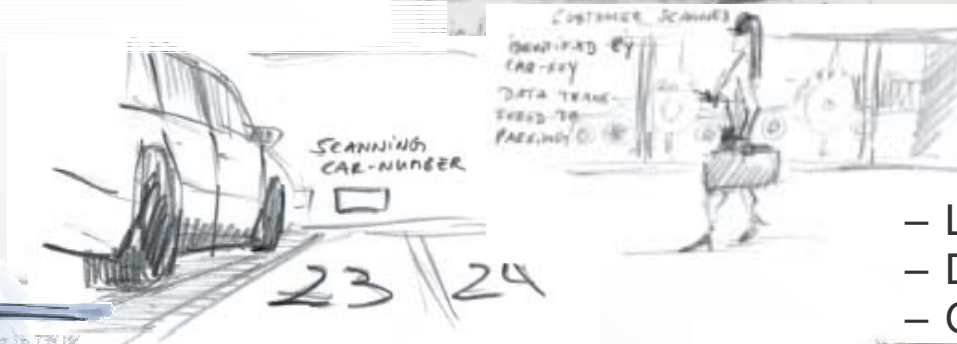
▶ Key building blocks

- ➔ Access to personal information and services
- ➔ Locating and detecting presence.
- ➔ Service and content adaptation base on QoS
- ➔ Session mobility between terminals (incl. vehicles)
- ➔ Broadcast services for entertainment, inter-vehicle safety, and regional traffic information services.



DAIDALOS Scenarios Automobile Mobility

- Bart M. Watson to pick up customer from airport
- Navigation according to latest gate information and free parking lot
- Automatic flight delay information
- Resuming personal newsfeed while waiting



- Locating Mrs. R. Royce
- Detecting her presence
- Guiding her to vehicle
- Activating presentation on the rear seat



Organisations hosted by Eurescom





The CELTIC Initiative

- ▶ Cooperation for a European sustained Leadership in Telecommunications
- ▶ A EUREKA cluster R&D programme dedicated to communication techniques, systems and services
- ▶ Complement existing national and European R&D programmes, FP6/IST
- ▶ Five years time frame initiative
- ▶ Total budget ~1 B€ (national funding up to 50%)
- ▶ CELTIC Office run by Eurescom



CELTIC – Eureka member countries



 Chair	 members
 NIPs	 Associate country

33 countries are full Eureka member countries, amongst them

- Baltic States
- Croatia
- Poland
- Romania
- Russian Federation
- Serbia and Montenegro
- Slovenia

Convergence related projects



- ▶ **EnComPAs:** Enabling Community Communications - Platforms and Applications
 - Distributing converged services throughout the home (Internet access, multimedia, remote control and access, home automation, security/safety)



- ▶ **ECOSYS:** Techno-ECONomics of integrated communication SYSTEMS and services
 - Analyse the economic feasibility of migration paths towards convergent systems
 - Fixed network solutions based on copper/fibre/wireless technologies. Also business cases of 3G+ and WLAN networks and emerging alternative access technologies will be analysed



- ▶ **MaCS:** Multimedia Communication Service
 - Experiment a new Broadband Telephony Service for the residential market (Videotelephony, Multimedia Messaging, Presence Management)
 - rely on emerging Next Generation Network infrastructures for converging network solutions

Conclusions

- ▶ Convergence as the path to bring technologies, systems or services closer
- ▶ Integration often a “dream” which is hard to realise
- ▶ Economic aspects most often the ultimate criteria for direction of convergence