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Future Internet –

Strategies and research activities in Germany

FIA – Meeting, Madrid, Dec. 9th, 2008

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Scope of future internet activities in Germany

1. Research policy and background of Future Internet activities in Germany

2. Examples of ongoing projects / initiatives in Germany:

New technologies for transport networks
Future internet: Test facilities and concept studies
Mobile networks beyond LTE
Internet of Services, semantic technologies
(Sensor networks)
(Internet of things: „Digital product memory“, RFID)
(Next generation media: home networks, life cycle management etc.)
(3-D visualisation)
(car to car and car to infrastructure communication)
(grid computing)

3. Examples for future plans:
Ambient assisted living
ICT-Security
Basic research on quantum communication
(IP-networks in cars)
(Optical access networks)

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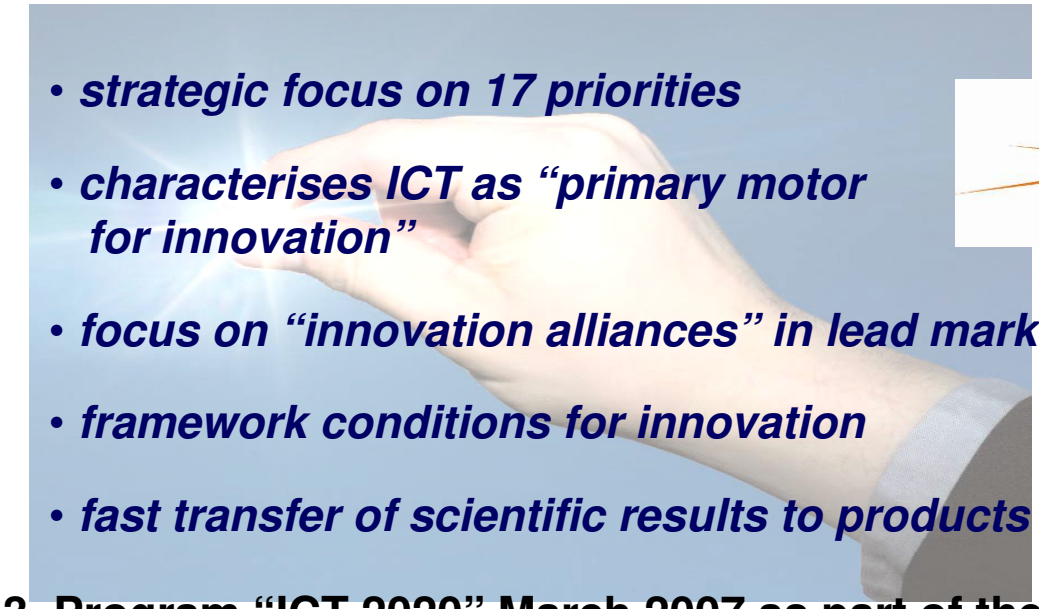
Research policy and background of Future Internet activities in Germany

1. Europe´s 3 % aim:

Federal government increases budget for research and development:
„6 billion € - programme“ 2006
Further increase of BMBF-budget 2009 by 9 %, total of 10.2 b€

2. Hightech Strategy of German Federal Government 2006



IGNITING IDEAS!
The High-Tech Strategy for Germany

3. Program “ICT 2020” March 2007 as part of the Hightech Strategy

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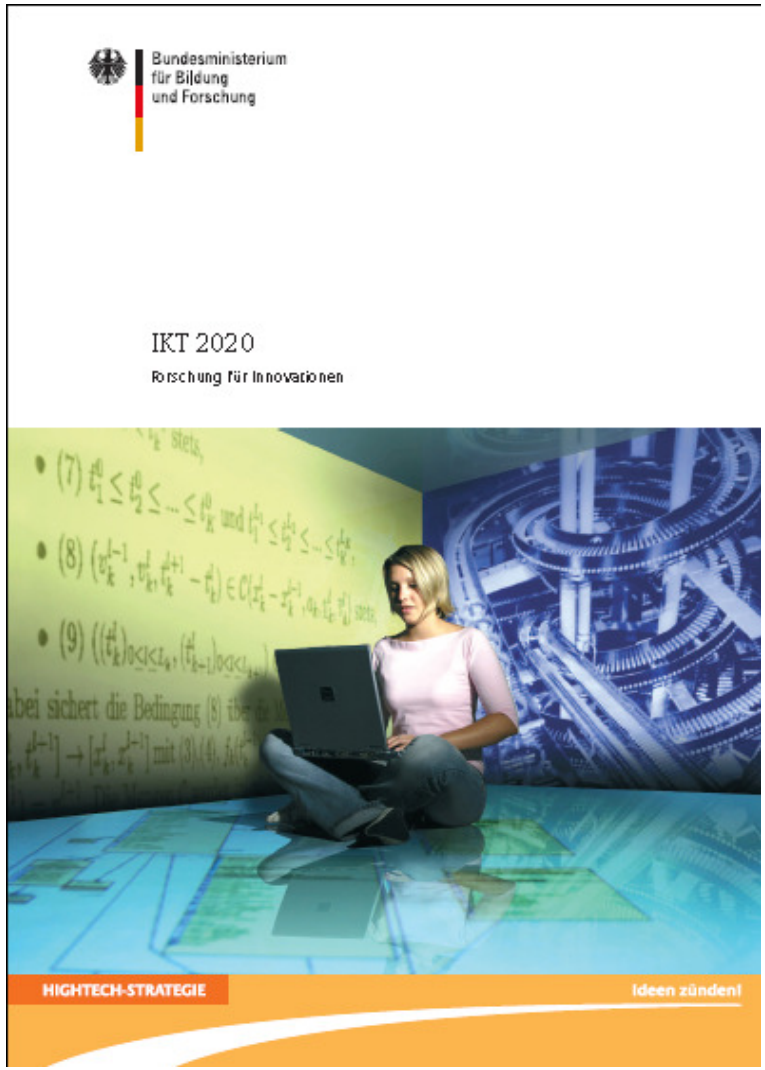
Research policy and background of Future Internet activities in Germany

Part of Hightech-strategy:

New programme ICT 2020
published in March 2007:
Funding 1.5 b € in 5 years

- Nanoelectronics
- Communication technologies
- Software
- Microsystem technologies



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Research policy and background of Future Internet activities in Germany

Research programm ICT 2020

- Focus on new applications in ***branches of special economical importance*** for Germany (automotive, medical technologies, logistics)
- Focus on fields of ***special societal relevance*** (security, energy efficiency, health, efficiency in traffic)
- Intensifying ***cooperation with European partners*** (especially in communication technologies isolated national research is not efficient, f.e. standardisation)
- Strengthening ***SME´s in ICT***

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Strategic projects:
1. Transport networks for future internet (100GET)

European Innovation Alliance 100 Gigabit Ethernet Transport Technologies

Participating countries: Finnland, France, Germany, Spain, Sweden
Funded in part by BMBF (Germany), MEFI (France), VINNOVA (Sweden), TEKES (Finland), and MITT(Spain)

Background: „Position paper“ 2007 by leading European companies addressing European governments for a common strategic initiative

Duration:	Oktober 2007 – September 2010
Total Budget (3 years):	~66 M€
General Objective:	Development of 100GbE-based Carrier Grade Transport Networks

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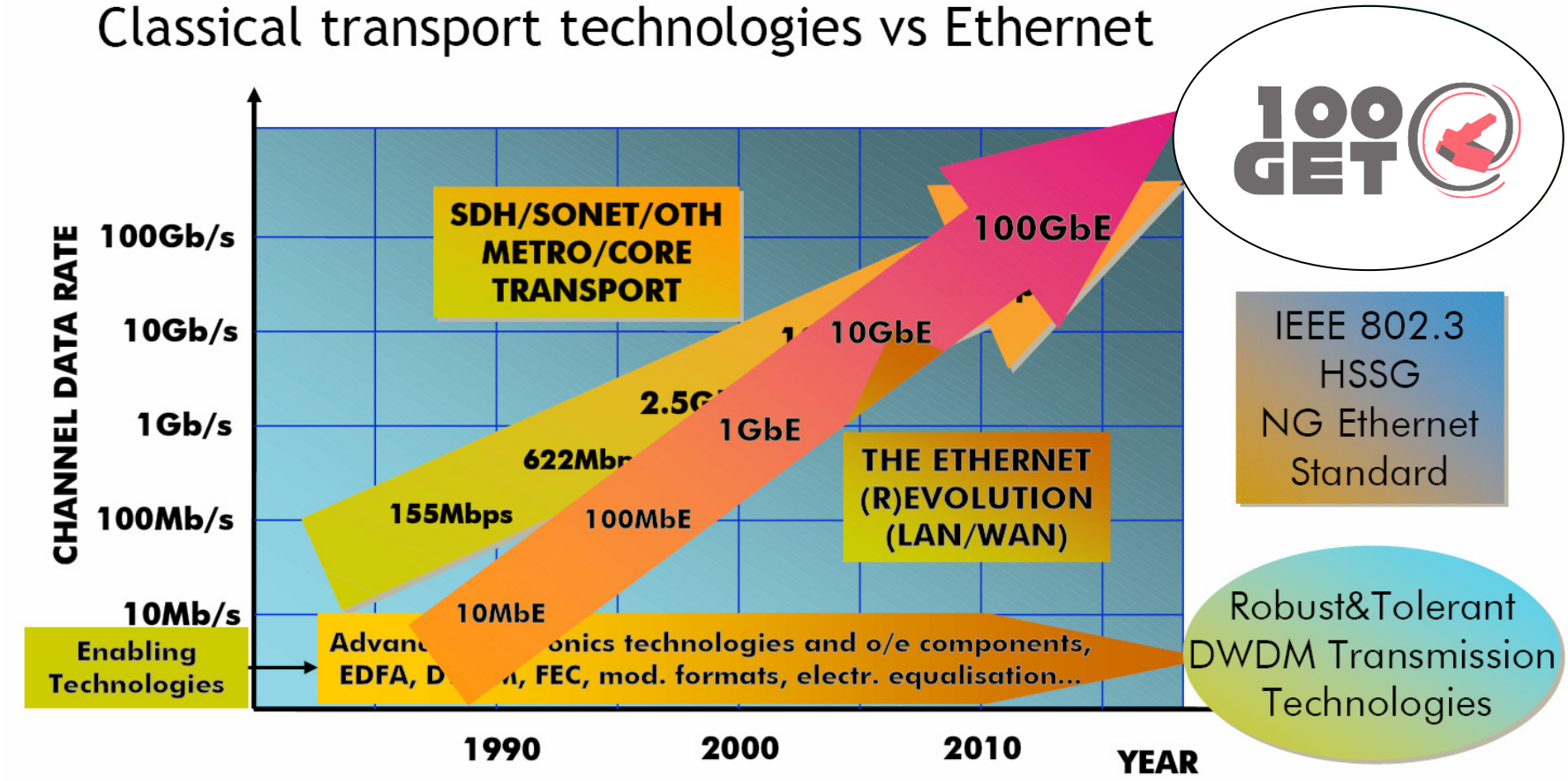
Strategic projects:
1. Transport networks for future internet (100GET)



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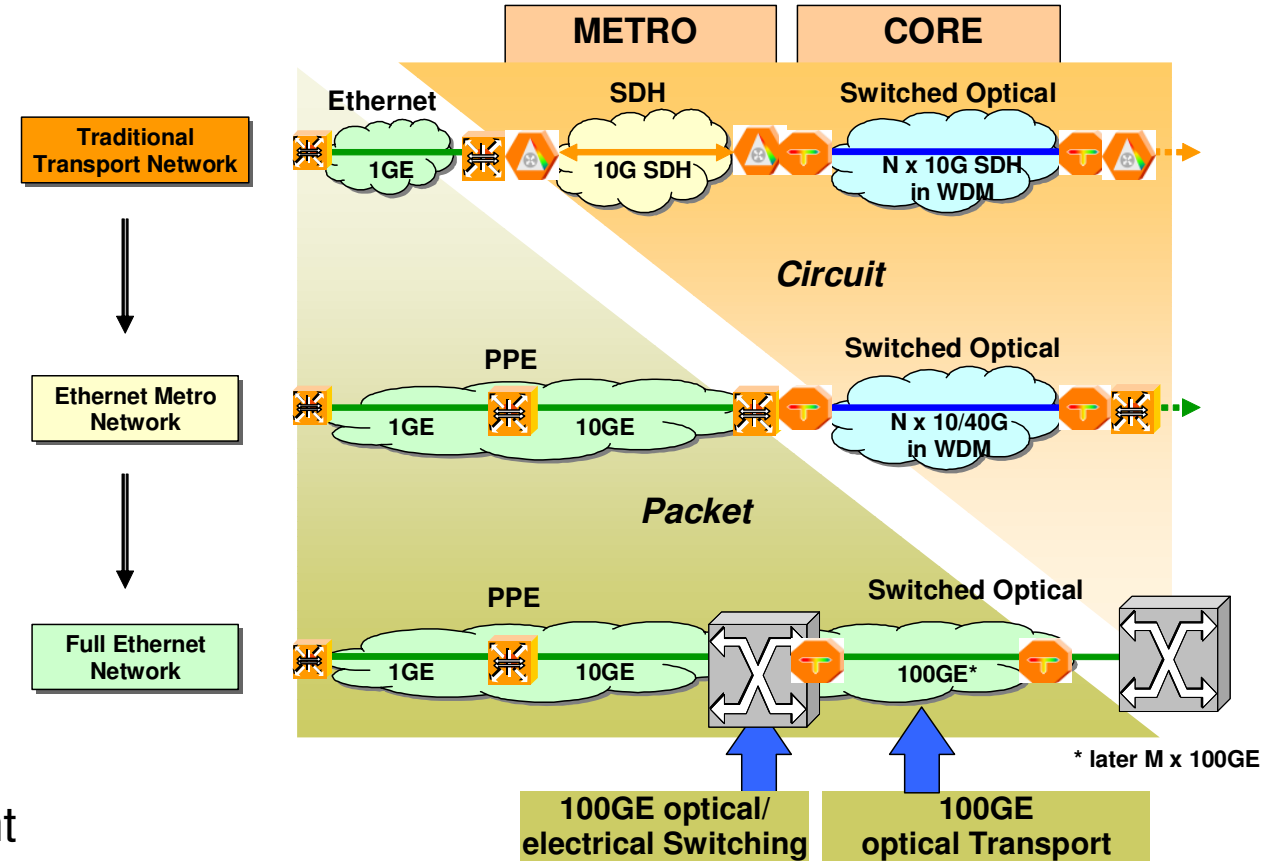
Strategic projects:
1. Transport networks for future internet (100GET)

European Innovation Alliance 100 Gigabit Ethernet Transport Technologies

Main focus:

Architectures and technologies for a flexible, cost efficient, reliable and service independent transport network



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Strategic projects:
2. G-Lab

"**G**ermany-**Lab** (G-Lab)": Experimental Facilities towards Next Generation Internet

BMBF-funding for G-Lab

2 Phases planned:

1st Phase: In Oct. 2008 a consortium of 6 Universities started G-Lab
Total funding: 3.8 Mio. € (3 years)
Main goal: To establish the experimental platform

2nd Phase: Call for proposals to be published in December 2008
„G – Lab Case Study and Experimental Platform for the Future Internet",
Start of projects: September 2009
Participants: SMEs, industry, research centers, universities
Total funding: 7 Mio. €

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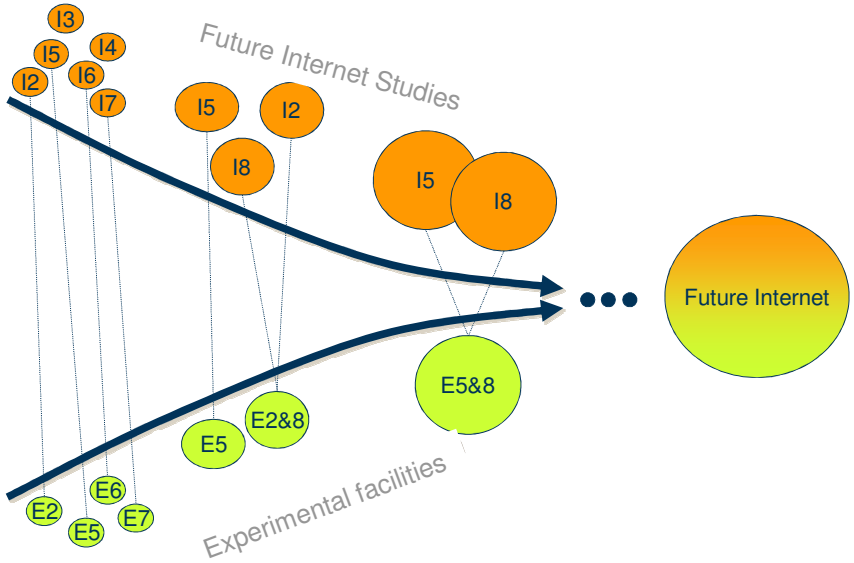
Strategic projects: 2. G-Lab

G-Lab is Architecture Oriented and …

… consists of two major fields of activities:

- Research projects and studies of future Internet components
- Design and setup of Germany-wide experimental facilities



… aims:

- Provide an experimental platform for studies on mechanisms, protocols and applications towards Future Internet
- Investigate interdependency of theoretical studies and prototype development

… and cooperates with other NGI Platforms

For more informations about G-Lab: See talk of Phuoc Tran-Gia, session „experimental facilities“

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Strategic projects:
3. EASY-C: Next Generation Mobile Networks: Beyond LTE

BMBF project EASY-C

16 Project partners: network operators, infrastructure equipment makers, chipset makers, SMEs, universities, research institutes and the Federal Network Agency

Duration:	April 2007 – March 2010
Total Budget (3 years):	47 M€, funding 25 Mio. €
General Objective:	testbeds to develop and test innovative radio transmission techniques for cellular networks beyond LTE

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Strategic projects:
3. EASY-C: Next Generation Mobile Networks: Beyond LTE

Two large-scale testbeds (real sites) in Dresden and Berlin.

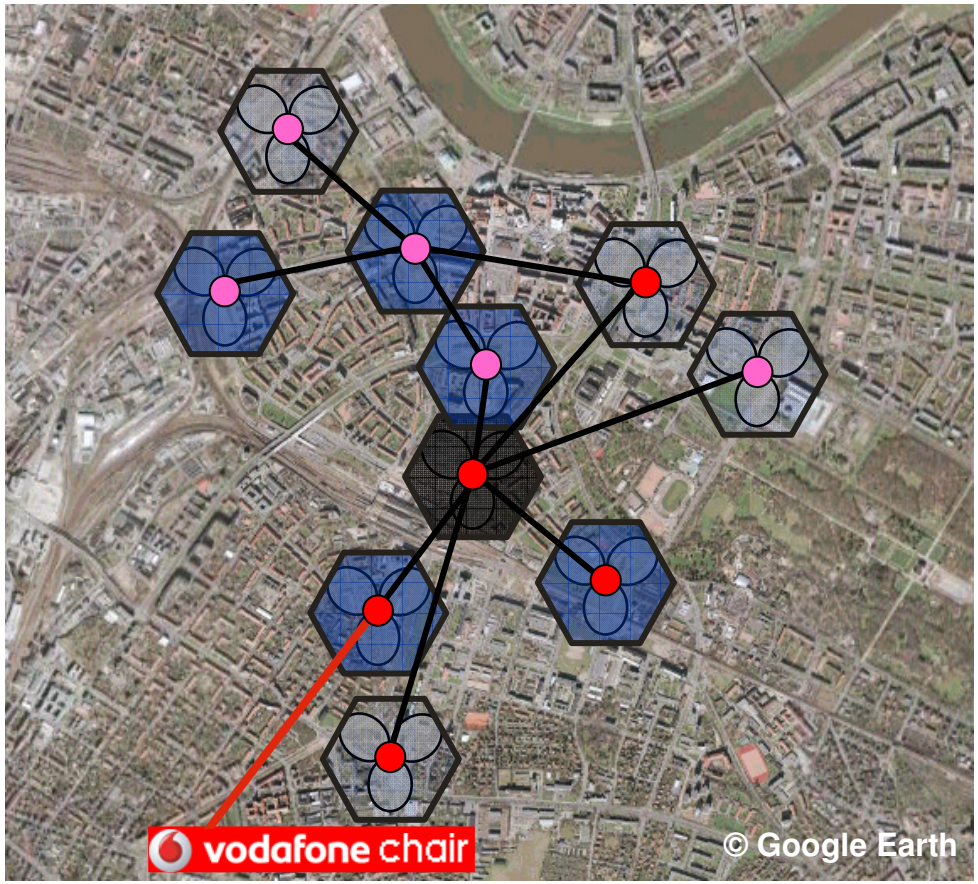
Objectives:
EASY-C will increase

- fairness at cell-edge (compared to cell-center) w.r.t. data rates / availability
- spectral efficiency, i.e. aim is testbed demonstration of 1.5 bit/s/Hz/sector in uplink

Technologies under investigation:

- Distributed MIMO-technologies
- co-operative base stations

Technology Testbed Dresden



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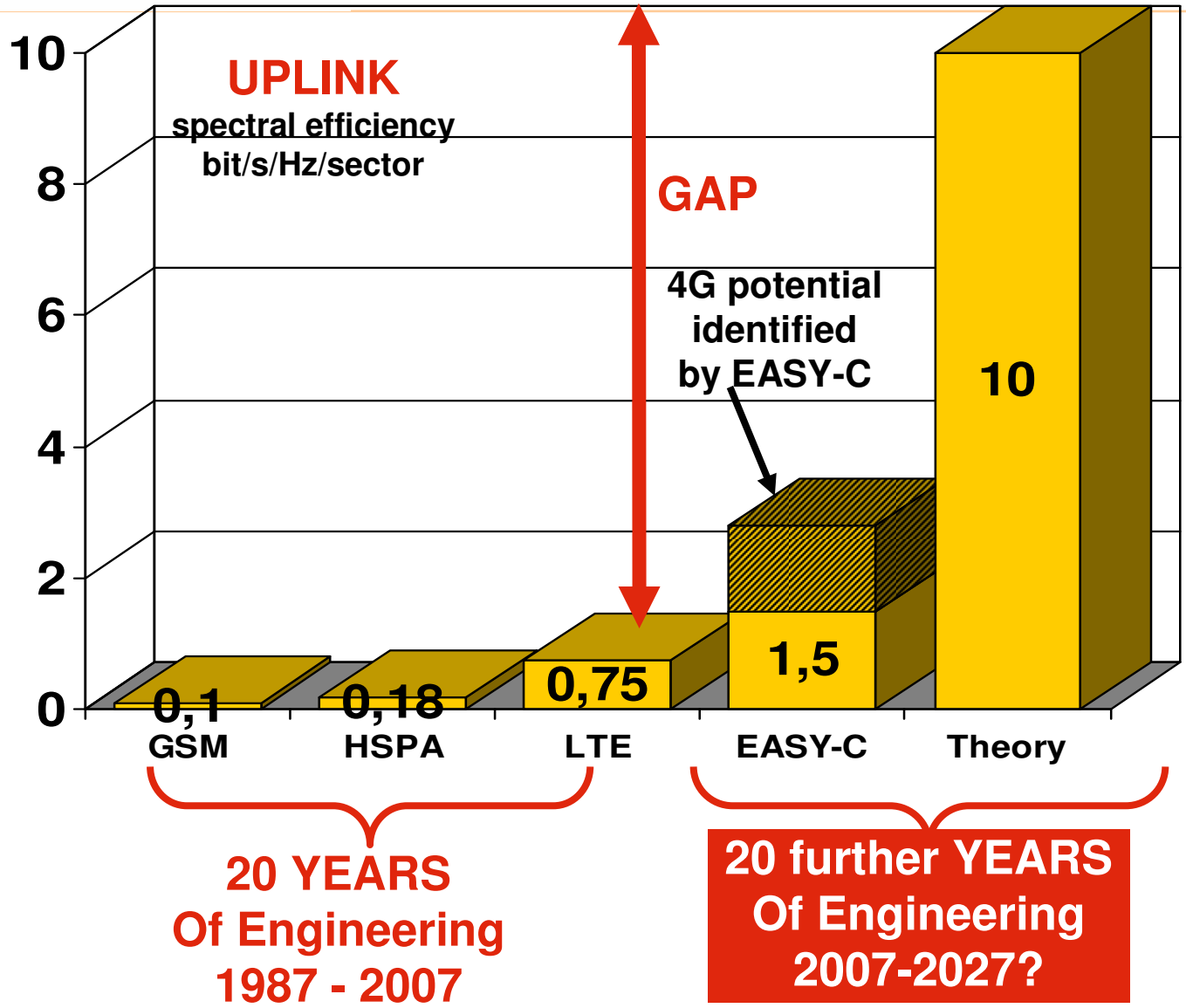
Strategic projects:
3. EASY-C: Next Generation Mobile Networks: Beyond LTE



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Strategic projects:
4. Autonomous sensor networks

Cooperation between BMBF-divisions
communication technologies an microsystem technologies

Projects in microsystem technologies to be started 1. quarter 2009

4 cooperative projects in communication technologies:
12 enterprises, 4 research institutes, 5 universities, 1 public authority

Duration: 4. quarter 2007 – 4. quarter 2010
Total Budget (3 years): 15 M€, funding 8.3 Mio. €

Main research topics:

- Reliability of the individual nodes as well as the whole system and robustness (plug and produce)
- Energy management, energy efficiency
- Real time capacity
- Self configuration and ad hoc capacity
- New radio systems and network architectures
- Connection to communication networks

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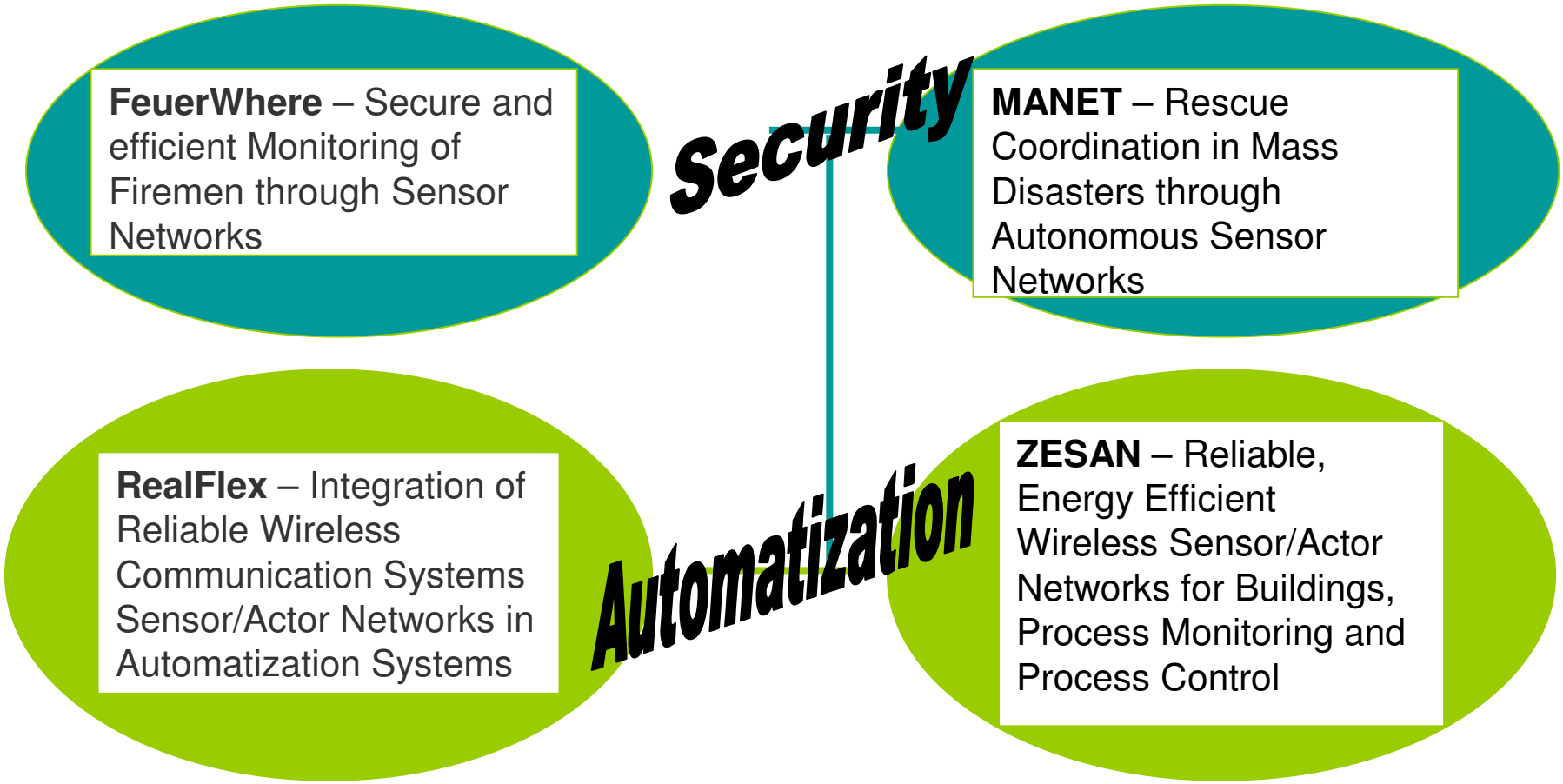
Strategic projects:
4. Autonomous Sensor networks



Another nine projects in micro systems division to be started

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Strategic projects:
4. Theseus – New Technologies for the Internet of Services

THESEUS
Forschungsprogramm für eine
neue Internetbasierte Wissensinfrastruktur

Different cooperative projects (clusters) with partners from science and industry

Structure of Theseus: 1 technology cluster and 6 application clusters

Duration:	July 2007 – June 2012
Total Budget (5 years):	200 M€, funding 100 M€
Fields of innovation:	machine construction, medicine, new media, software for enterprises
Objectives:	demonstrators, reference models, best-practice

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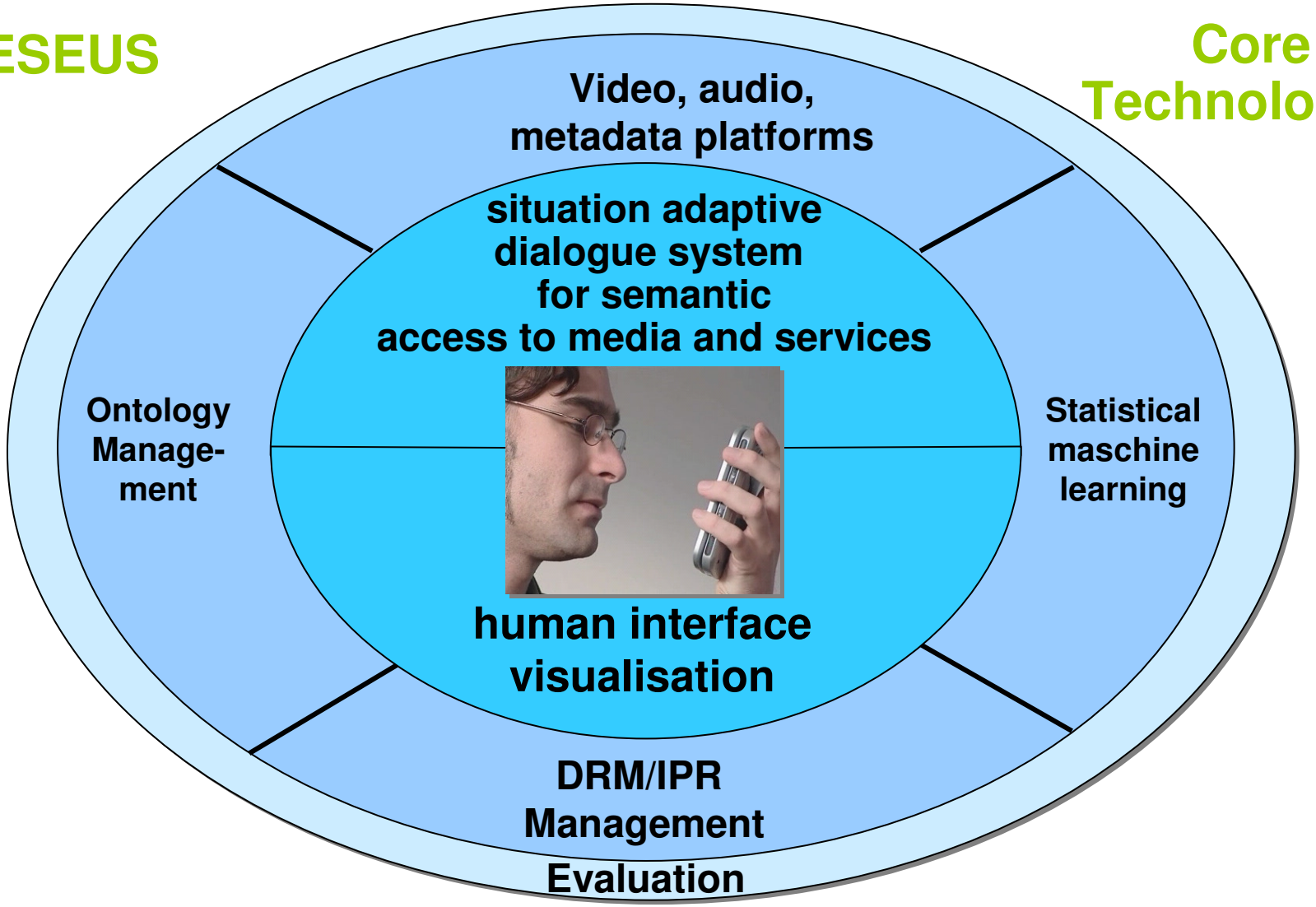
Strategic projects:
4. Theseus – New Technologies for the Internet of Services



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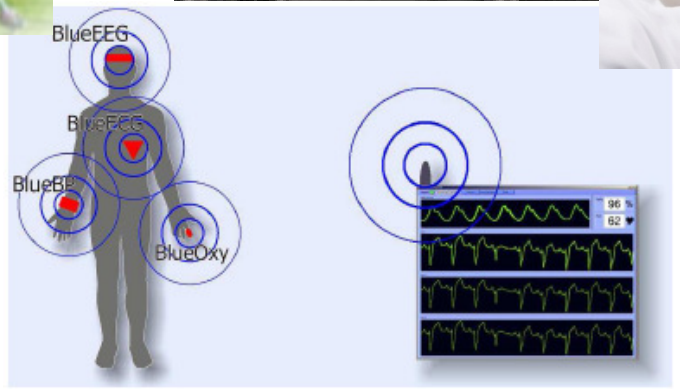
Future plans:
1. Ambient assisted living

- Motivation for initiative:
  Extending the time elderly people can live in their preferred home environment by increasing their autonomy and assisting them in carrying out activities of daily living
- European challenge and European initiative AAL
  Coping with ageing population and cost increases in health systems and social care

social interaction

mobility



home care,
supply with goods

health
and wellness

information
and learning

security, safety, privacy

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Future plans:
1. Ambient assisted living

- Comprises innovative products, services and systems for ageing well at home, in the community and at work

- Cooperation of BMBF-divisions “microsystem technologies”, “communication technologies”, “Development of services”

- BMBF Funding Programme: Call for proposals ending September 2008
  projects to be started 2. quarter 2009
  About **35M€** for application oriented R&D in ICT, micro technology and new services

- Role of Future Internet:
  Provides basic technology for Ambient Assisted Living by “Internet of Services”
  (Applications: emergency call systems, telemedicine,…)

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Future plans:
2. ICT - security

Federal Ministry of Education and Research (BMBF)
and Federal Ministry of the Interior (BMI):
Joint collaboration in the field of ICT security research

Duration:	2009-2013,
Total funding (5 years):	30 M€
Call for proposals:	1. quarter 2009

Research topics:

- Security of and by ICT systems/infrastructure (e.g. analysis of vulnerabilities, secure components, processes and services, secure mobile platforms)
- Secure basic technologies (e.g. cryptography, identification/authentication, components for secure internet of things, security under restriction of ressources)
- Protection from cyber attacks (e.g. early intrusion detection, protection against denial of service attacks etc.)

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Future plans:
3. Quantum communication technology

Quantum communications

Why?

quantum states protect information by law of nature

→ candidate for **inherent** secure transmission of information

Proof-of-principle shown (e.g. SECOQC), but still strong need for basic research for a scenario of 500 km secure quantum transmission over real networks!

Quantum-repeater essential

Scalable technology required

Room-temperature operation of components desirable

Increase of bitrates and bandwidths necessary

Process to identify research topics for funding started

Expert discussion (11.06.08)

Position paper of the scientific community defining scientific tasks (expected December 2008)

Decision of national authority about public funding (January 2009)

In case of positive decision: Call for Proposals (early 2009)

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Summary

Future Internet funding by **BMBF:** **60 M€ per year**
BMWi: **35 M€ per year**

Innovation alliances and lighthouse projects:

100 GET, G-Lab, EASY C, Sensor networks, Theseus, internet of things for logistics, car2car communication, next generation media and others

Intensifying topics of public (societal) interest next year, especially:

- Ambient assisted living

- ICT-security

Thank you very much for your attention!