Telecom R&D in Finland
T-109.5410 Technology Management in the Telecommunications Industry
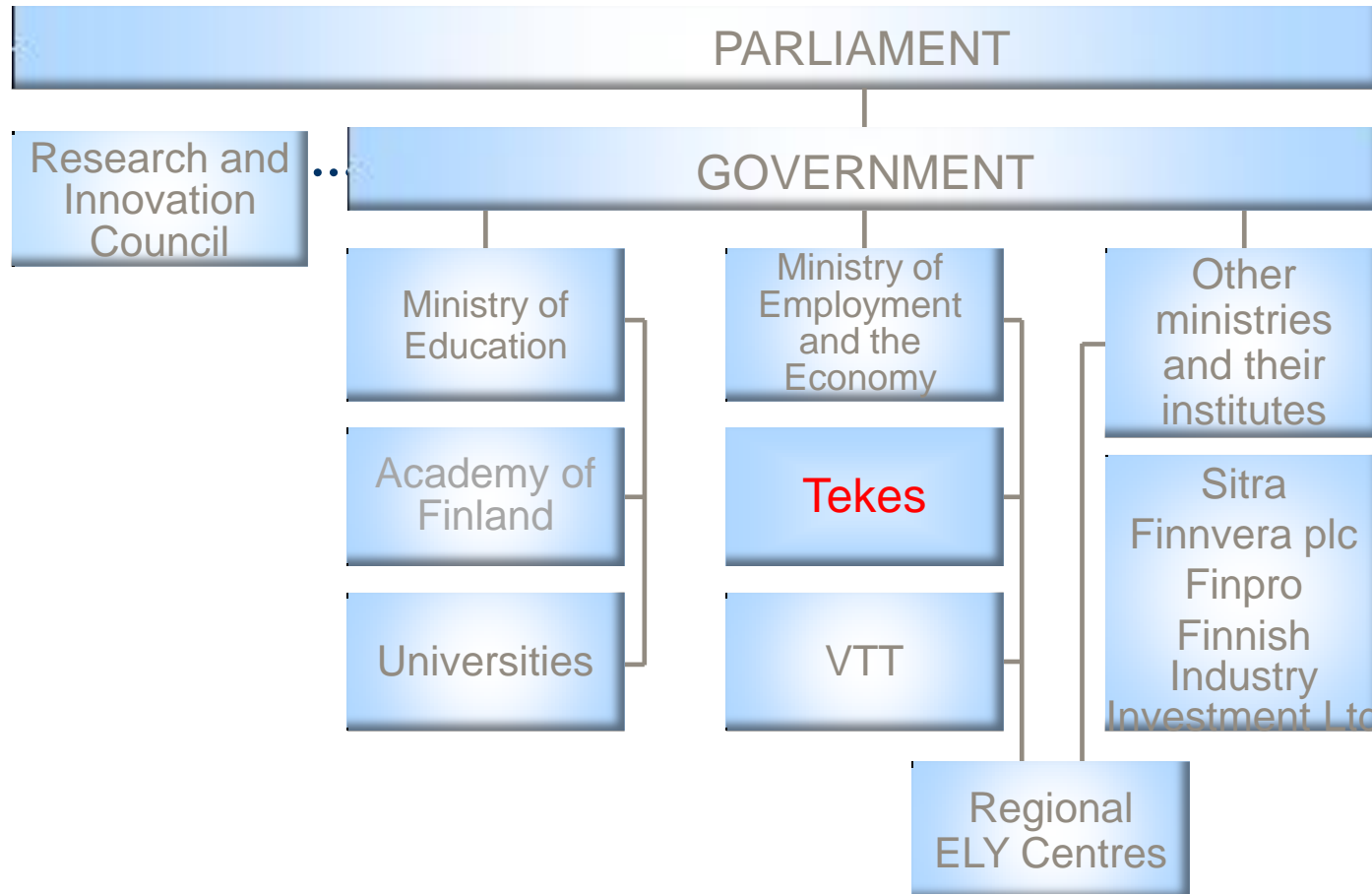
Antero Juntunen

Doctoral Student

Aalto University School of Science
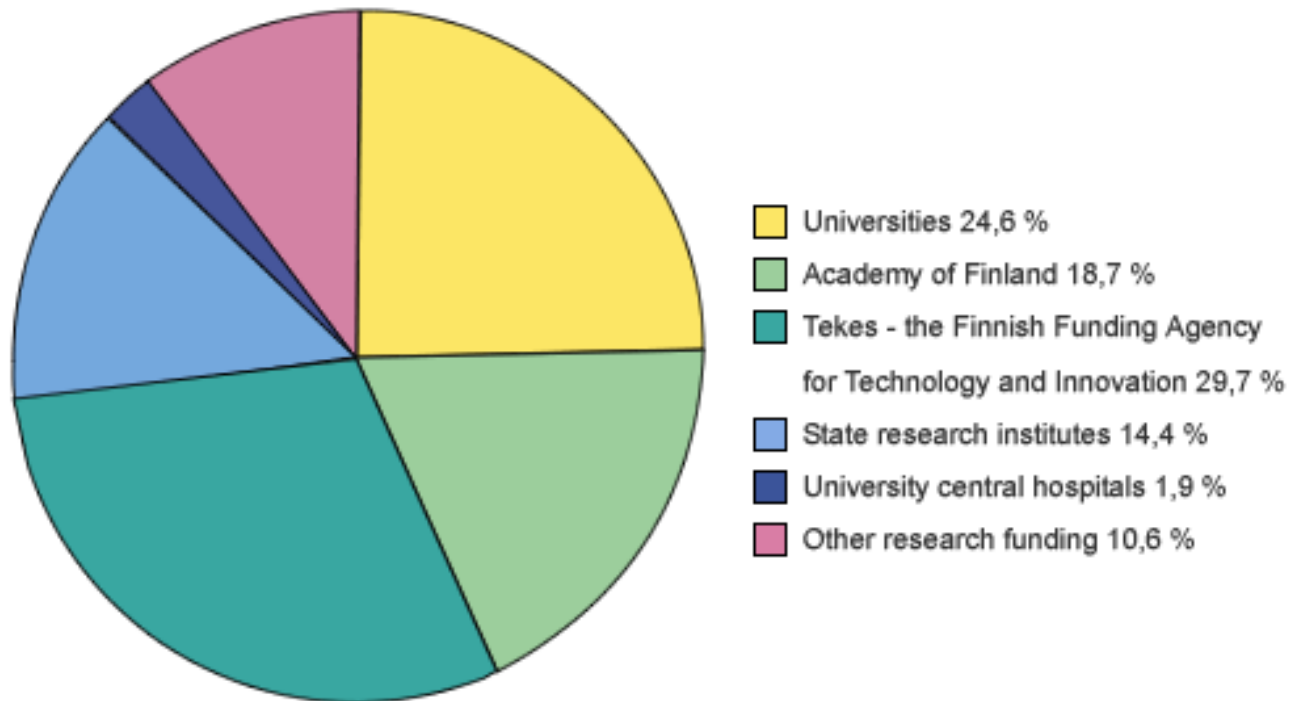
01.10.2013

Contents

- Finnish Innovation System
    - Tekes
    - Strategic Centres for Science, Technology, and Innovation
    - DIGILE

- EU Research
    - Framework Programs
    - European Institute of Innovation and Technology

Public sector activities of R&D in Finland

PARLIAMENT

Research and Innovation Council

GOVERNMENT

Ministry of Education

Academy of Finland

Universities

Ministry of Employment and the Economy

Tekes

VTT

Other ministries and their institutes

Sitra
Finnvera plc
Finpro
Finnish Industry Investment Ltd

Regional ELY Centres

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State R&D Funding in Finland

Universities 24,6 %

Academy of Finland 18,7 %

Tekes - the Finnish Funding Agency for Technology and Innovation 29,7 %

State research institutes 14,4 %

University central hospitals 1,9 %
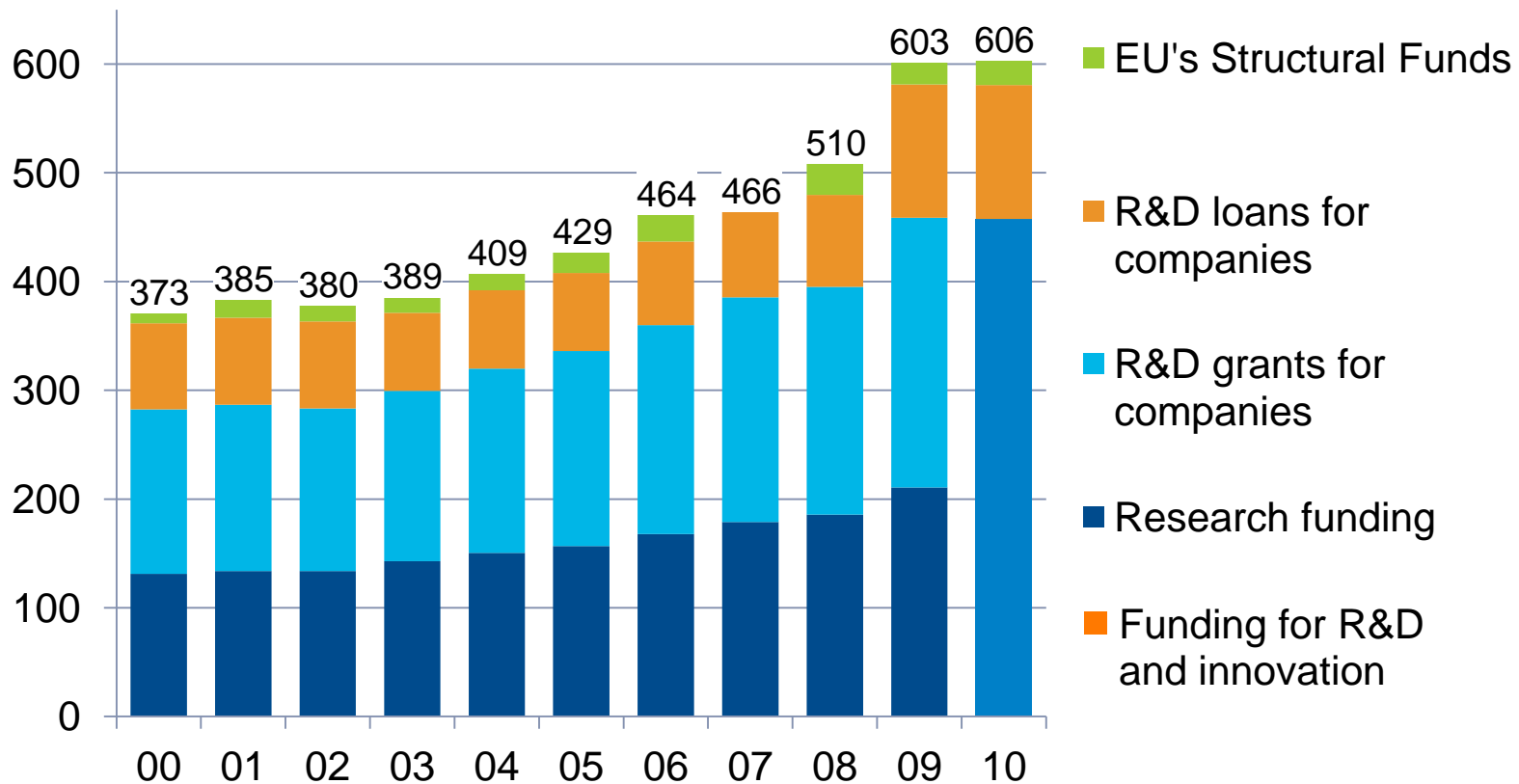
Other research funding 10,6 %

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Tekes – The Finnish Funding Agency for Technology and Innovation

- Tekes's services
  - Funding for innovative R&D and business
  - Networking Finnish and global companies and researchers
  - Tekes is non-profit and takes no equity or ownership on intellectual property.
- Customers
  - Finnish and international companies located in Finland
  - Universities, research institutes, hospitals etc.
- Resources
  - Budget: about € 600 million annually
  - Personnel: 400 in Finland and abroad
  - Public agency under the Ministry of Employment and the Economy

Tekes R&D funding in the state budget

Million euros

R&D grants for companies and public research funding were combined in 2010.
Funding from EU's Structural Funds come from outside of Tekes budget.

Half of the funded projects are internationally networked

Any international company located in Finland is eligible for Tekes's funding, regardless of ownership.

International activities in projects funded by Tekes in 2006 - 2008

Tekes funding impact

Tekes has partly funded

65%

of well-known Finnish innovations in 1985-2009

In SMEs, an investment of one euro by Tekes produces

21€

of turnover annually

Projects that were completed in 2012 produced

840

academic theses

For every

14,000€

of Tekes funding, one permanent job is created in the private sector

---

Projects that were completed in 2012 generated

1,260

products, services or processes

SMEs expect projects in 2012 to produce

6.2

billion euros in turnover during the target year

For every euro invested by Tekes, companies increase their own R&D expenditure by
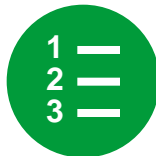
2 euros

Projects that were completed in 2012 resulted in

980

patents or patent applications

---

47 of the **50** fastest-growing technology companies in Finland are Tekes customers

---

over 80 %

of Tekes customers state that the Tekes funding was a significant factor in their success

---

Tekes Global Access Program (GAP) has increased GDP by more than

20 M€

In the GAP Program, one euro invested by Tekes has generated

17 €

Results of completed projects

Results of projects completed in 2012

- 520 new or improved products
- 400 new or improved services
- 340 new or improved production processes
- 980 patent applications
- 840 academic theses

Total 1,590 completed projects

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Tekes Programmes and Networks

- Tekes Programmes
  - Currently half of Tekes budget, is estimated to drop to 25% by 2012
  - Tekes finances about half of programme costs, the other half coming from participating businesses and research units
  - Last 4-6 years on average
  - Planned by Tekes based on initiatives of customers
- Strategic Centres for Science, Technology, and Innovation
- International networks
  - Cooperation of domestic companies with international companies
- Other Tekes initiatives
  - Targeted towards SMEs to increase their research, development, and innovation activites

Strategic Centres for Science, Technology and Innovation (CSTI, SHOK)

- The Centres are public-private partnerships meant to speed up innovation

- Companies and research units collaborate closely according to the research agenda of each Centre which is jointly defined by the shareholders

- Non-shareholders may participate in the Centres' research programmes and projects

- The non-profit Centres coordinate research and are owned jointly by the contributing parties

- Tekes finances and supports the research programmes of the Centres and participates in the coordination of the Centres
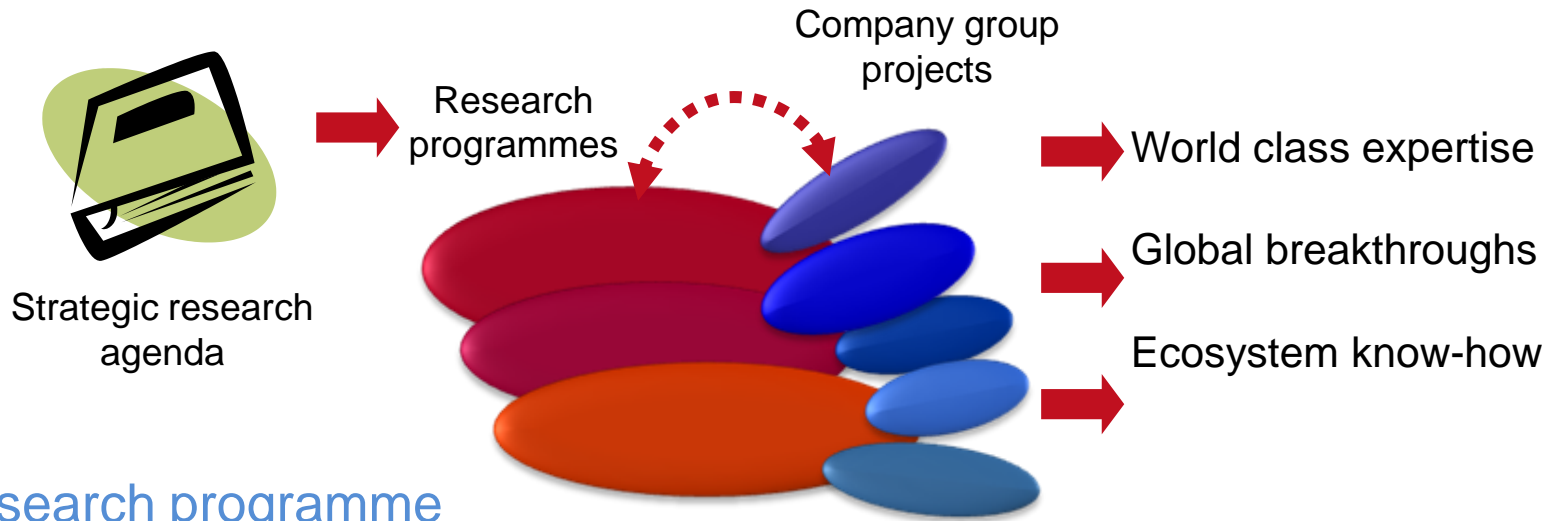
Goals of SHOKs

- Develop and apply new cooperation, co-creation and interaction methods that enable speeding up of the innovation process
- Establish creative and innovative research and development environments where different competences can be combined in an application-driven way
- Aim at close cooperation where the personnel of different parties involved in the centre's research programmes carry out work in the same physical premises
- Promote comprehensive utilization of the information and know-how created in the centre in companies and research organizations outside the centre
- Promote the establishment of new companies

Differences between SHOK Programmes and Tekes Programmes

SHOK programme	Tekes programme
The participants (companies and research institutes) prepare a joint programme plan.	Tekes sets the programme guidelines. The programme includes separate projects of companies and research institutes.
Close and wide-ranging cooperation based on work packages.	Cooperation within projects. In addition, the programme offers seminars and other services.
The participants in the research programme gain a worldwide right to use all the results of the programme for free.	The company retains the rights of the results of its own projects. The results of the projects organized by research institutes can be purchased by companies by a separate agreement.
The funding is long-span and provided at the programme level.	The funding decisions are made on a per-project basis.
55-75% public funding of the expenditures incurred in the programme.	The company typically receives 25-50% public funding of its expenses in a project.

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The strategic centres' operating principle

Company group projects

Research programmes

Strategic research agenda

World class expertise

Global breakthroughs

Ecosystem know-how

Research programme

- Creates a strategic competence base and a foundation for applications
- Aims to
  - strengthen core competences
  - develop joint research tools and environments

Company group project

- Utilizes and/or supports the research carried out in the research programme
- Establishes structures and channels for utilising research results
- Generates ecosystem know-how

Research Programmes in SHOKs

- SHOK research programmes strive for world-class expertise and global breakthroughs, facilitate long-term research, and speed up the innovation process
  - Thus, the programmes should have a sufficient critical mass and committed participants
- Timeframe for programmes is 5-10 years
- All participants of a SHOK research programme may use the results equally
- The programmes can be organized by two models: wide publicity model or limited publicity models
  - The models differ by their levels of publicity, IPR conditions, and levels of public funding
- At least 50% of the expenses of the programme have to be allocated to companies
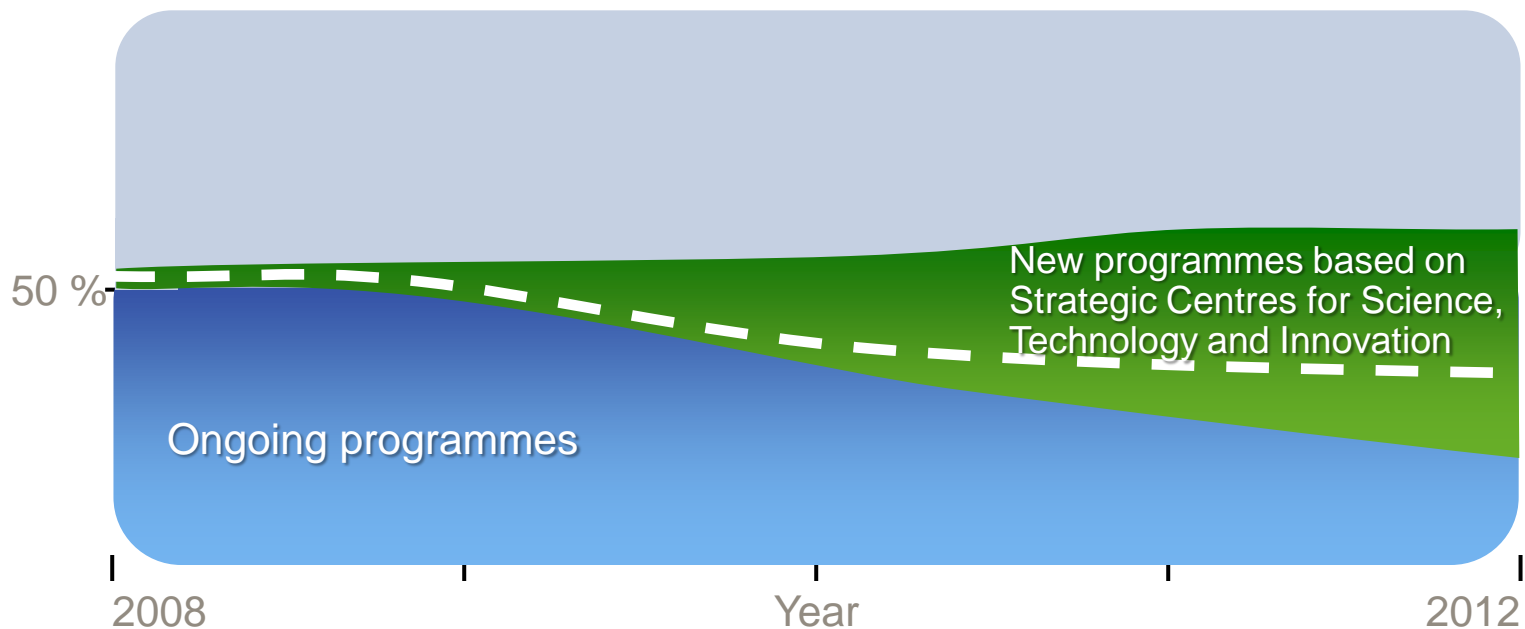
Source: Tekes

Company Group Projects

- Company group projects can be used in cases when the research programme contains parts
  - which should not be publicized widely
  - in which the companies involved do not wish to share the IPR rights generated by their own work with the rest of the programme
  - in which the work does not fulfill the requirements made for the programme
- The parties in a company group project negotiate the rights for the results between themselves
- At most 25% (large companies) to 50% (SMEs) public funding

Future development of Tekes programme activity

Share of Tekes funding

50 %

New programmes based on Strategic Centres for Science, Technology and Innovation

Ongoing programmes

2008   Year   2012

Six Strategic Centres

- Bioeconomy: FIBIC Ltd

- Metal products and mechanical engineering: FIMECC Ltd

- Built environment innovations: RYM Ltd

- Information and communication industry and services: DIGILE Ltd (previously DIGILE)

- Energy and the environment: CLEEN Ltd

- Health and well-being: SalWe Ltd

DIGILE

- Strategic Centre (SHOK) in the field of ICT
- Founded in February 2008
- The purpose is to implement wide-reaching research programmes that are beyond the capabilities of any single organization
- Owned by 46 companies, universities, and public organizations

DIGILE Research Programmes

- Cloud Software
  - Increasing Finland's competitiveness in software development
- Devices and Interoperability Ecosystem (DIEM)
  - Smart environments and smart spaces
- Next Media
  - New media content concepts and services
- Internet of Things (IoT)
- Data to Intelligence (D2I)
  - Intelligent data processing technologies and services
- Digital Services
  - Pool service enablers and platforms to rapidly launch services

Flexible Services research programme

- The goal was to create a web of services based on a modular service infrastructure

- Started in 2008, ended in 2010

- Partly continued in future programmes

- 37 organizations involved at the start of the programme
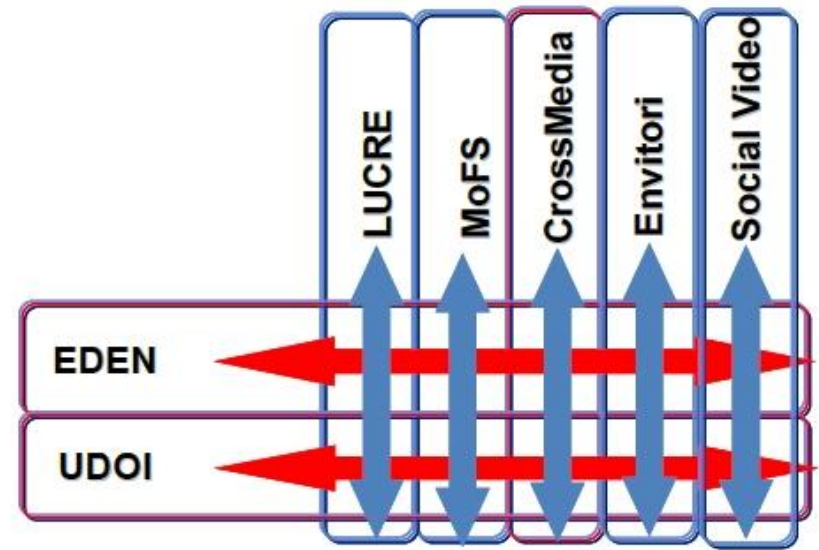
Experiences from Flexible Services research programme

- Cooperation with numerous companies: Tieto, Elisa, TeliaSonera, DNA, Nokia, HSL, etc.

- Collaboration between different projects in the same programme
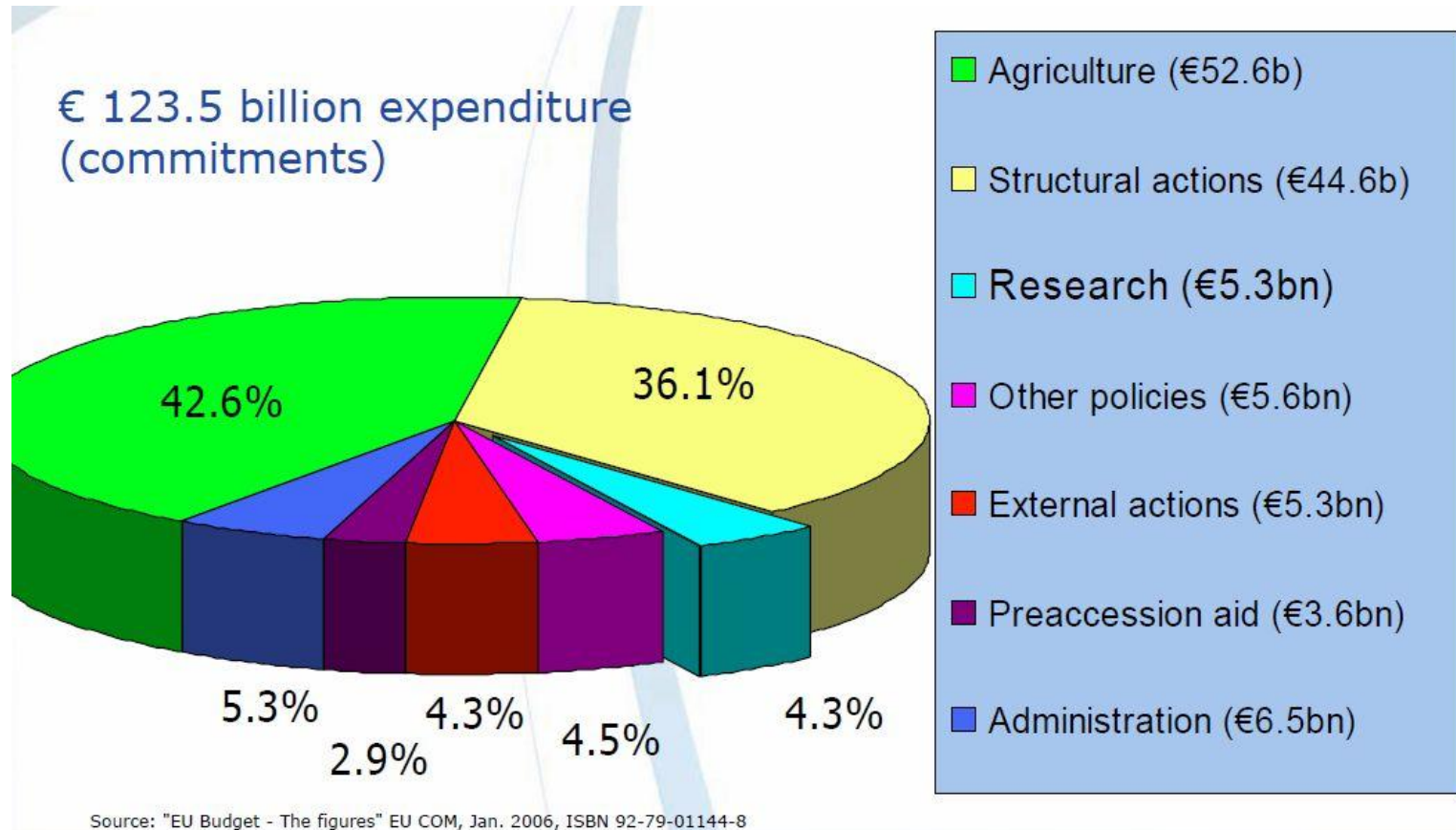
- Outputs: reports, prototypes, pilots, etc.

EU Research

Why research at European level?

- Pooling and leveraging resources
  - Resources are pooled to achieve critical mass
  - Leverage effect on private investments
  - Interoperability and complementarity of big science
- Fostering human capacity and excellence in S&T
  - Stimulate training, mobility and career development of researchers
  - Improve S&T capabilities
  - Stimulate competition in research
- Better integration of European R&D
  - Create scientific base for pan-European policy challenges
  - Encourage coordination of national policies
  - Effective comparative research at EU-level
 - Efficient dissemination of research results

Source: European
Commission Research

Research in EU budget 2006

€ 123.5 billion expenditure (commitments)

42.6%
36.1%
5.3%
2.9%
4.3%
4.5%
4.3%

- ☐ Agriculture (€52.6b)
- ☐ Structural actions (€44.6b)
- ☐ Research (€5.3bn)
- ☐ Other policies (€5.6bn)
- ☐ External actions (€5.3bn)
- ☐ Preaccession aid (€3.6bn)
- ☐ Administration (€6.5bn)

Source: "EU Budget - The figures" EU COM, Jan. 2006, ISBN 92-79-01144-8

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Source: European
Commission Research

EU Framework programmes

- Framework programmes are instruments of the European commission to fund research and technology development in Europe

- The first FP in 1984, FP 7 in 2007-2013

- FP 8 starting after 2013, already being planned

- In principle open to all countries but mainly the European countries receive funding and outside from Europe participation possible with own funding

- Aligned with the Lisbon strategy (2000)

Lisbon Strategy
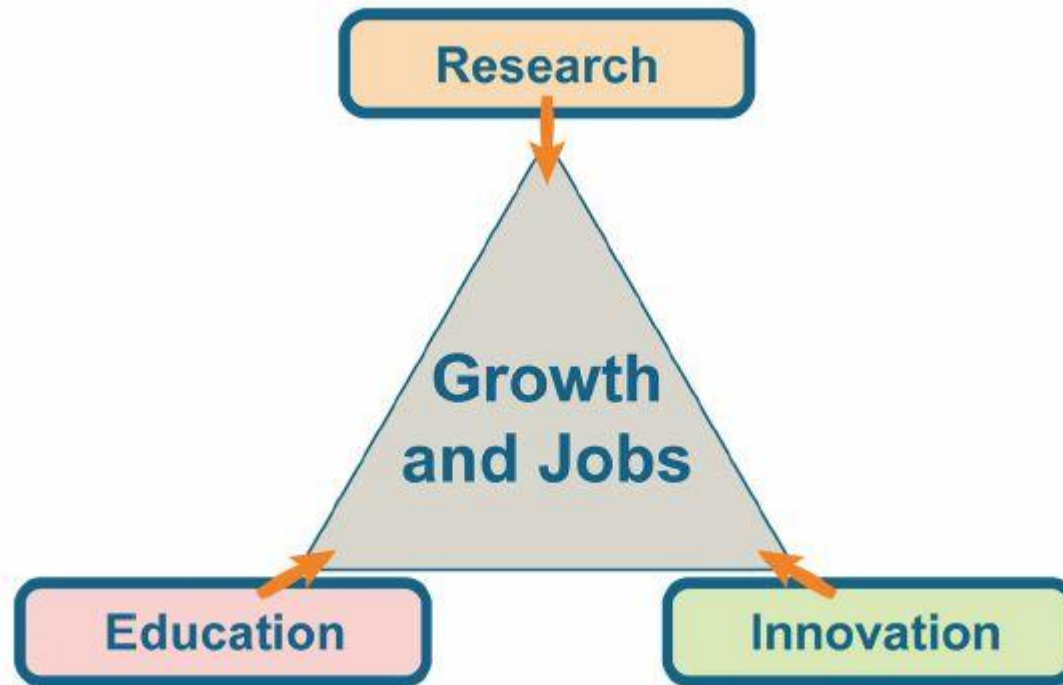
- S&T contribute to the Lisbon objectives: economic growth, jobs, quality of life (GSM, remote working, safe roads, etc.)

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Source: European
Commission Research

EU Research Framework Programs annual budgets 1984-2013
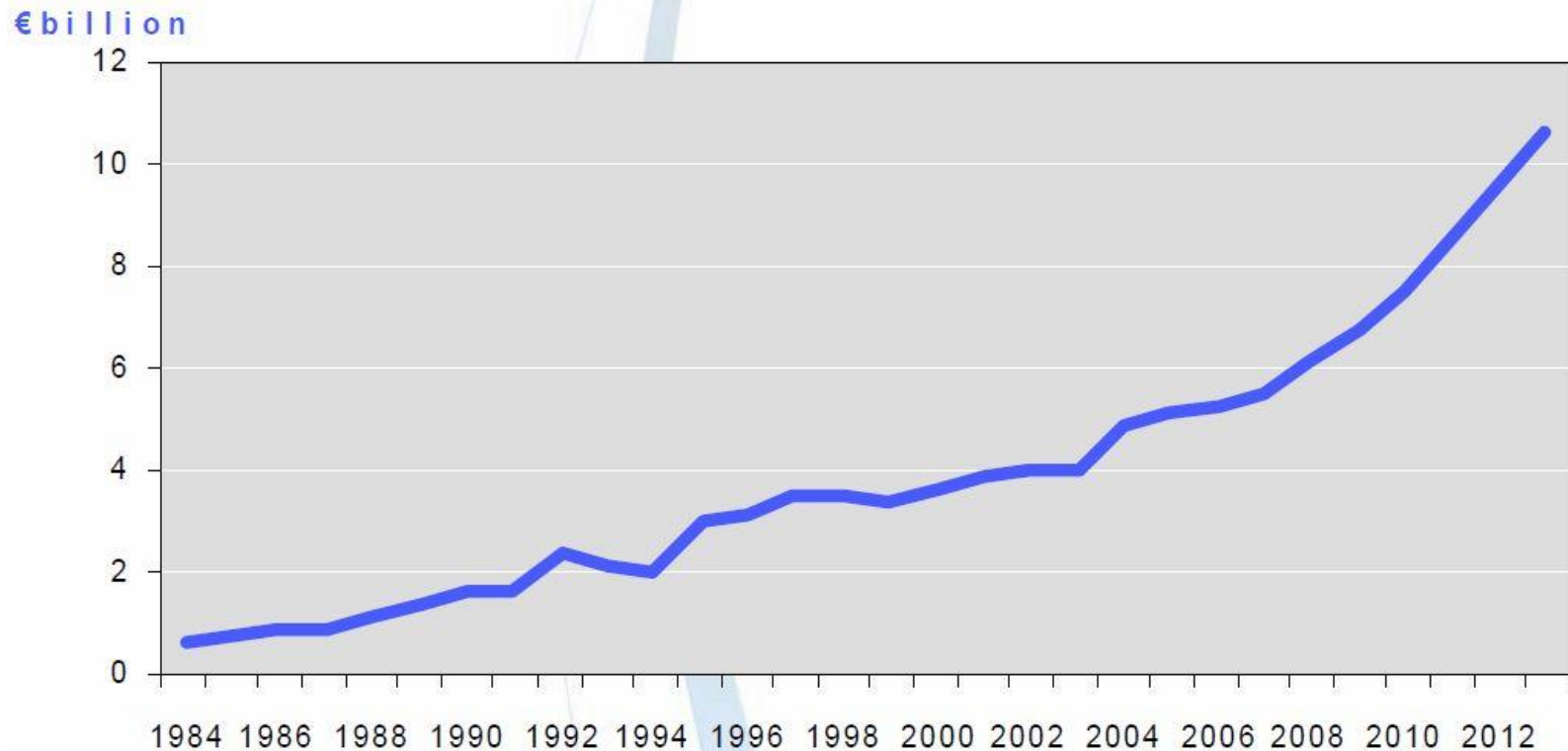
NB: budgets in current prices. Source: Annual Report 2003, plus FP7 revised proposal

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Source: European
Commission Research

The EU's Seventh Research Framework Programme (FP7, 2007-2013)

- FP7 is short for Seventh Framework Programme for Research and Technological Development

- It is the European Union's main instrument for funding research in Europe between 2007 and 2013

- FP7 supports research in selected priority areas

- It represents a 41% budget increase from FP6 at 2004 prices

- FP 7 budget for the whole 7 years is € 53.2 billion

FP7 Structure

- Four main blocks of activities forming four programmes:
  - Cooperation
    - The core of the FP7, international cooperation projects
  - Ideas
    - High-level, autonomic research
    - Implemented through the European Research Council (ERC)
  - People
    - Supports the careers and mobility of researchers
  - Capacities
    - Optimizes the use and development of research infrastructures
- In addition:
  - Euratom (nuclear research)
  - JRC (non-nuclear actions by the Joint Research Centre)

EU FP7 budget breakdown

The indicative breakdown (€ million) of FP7

Ideas: €7460
Cooperation €32 365
JRC: €1751
Euratom: €2751
Capacities: €4217
People: €4728
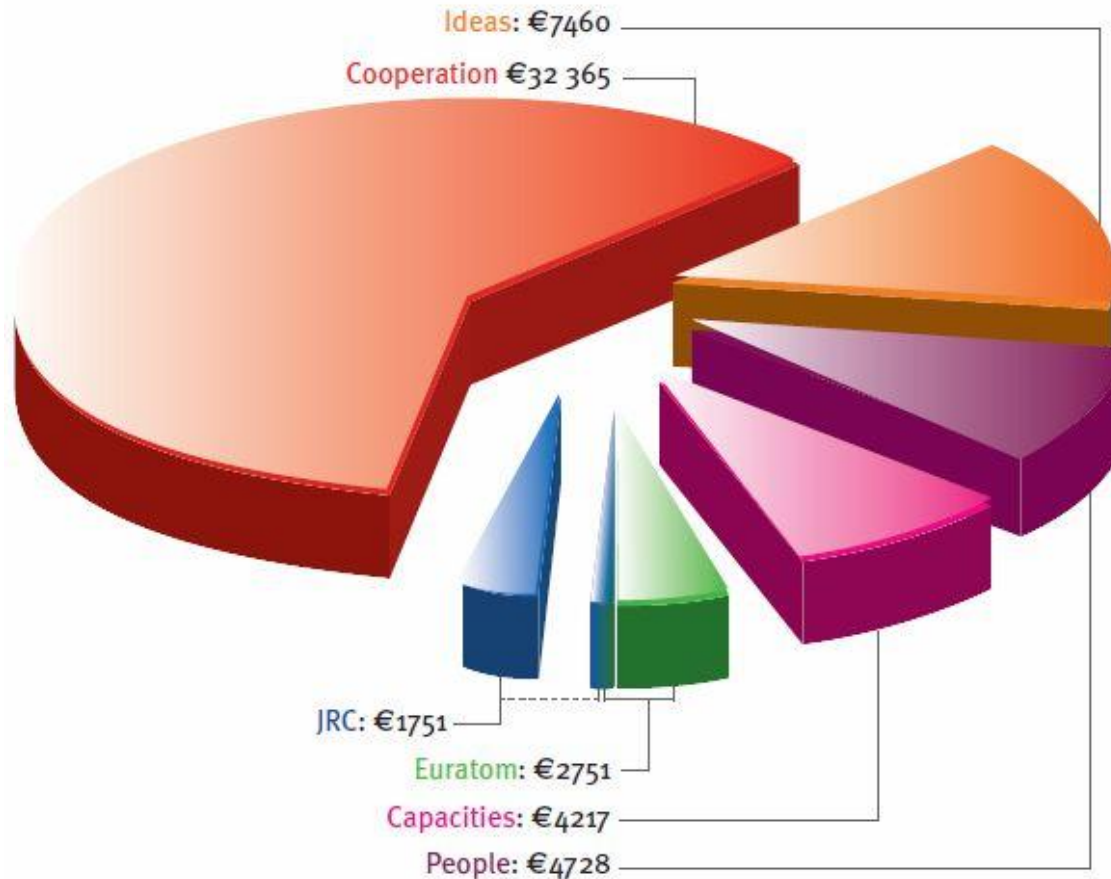
FP7 - Cooperation

- Cooperation between researchers, industry, and SMEs in the following areas:
    - Health
    - Food, Agriculture and Biotechnology
    - Information and Communication Technologies
    - Nano-sciences, Nano-technologies, Materials and new Production Technologies
    - Energy
    - Environment (including Climate Change)
    - Transport (including Aeronautics)
    - Socio-economic Sciences and Humanities
    - Space
    - Security

Cooperation programme - thematic areas

The Cooperation Programme breakdown (€ million)

Socio-economic Sciences and Humanities €610

Transport (including Aeronautics) €4180

Space €1430

Security €1350

Health €6050

Food, Agriculture and Biotechnology €1935

Energy €2300

Environment (including Climate Change) €1800

Nano production €3500

Information and Communication Technologies €9110

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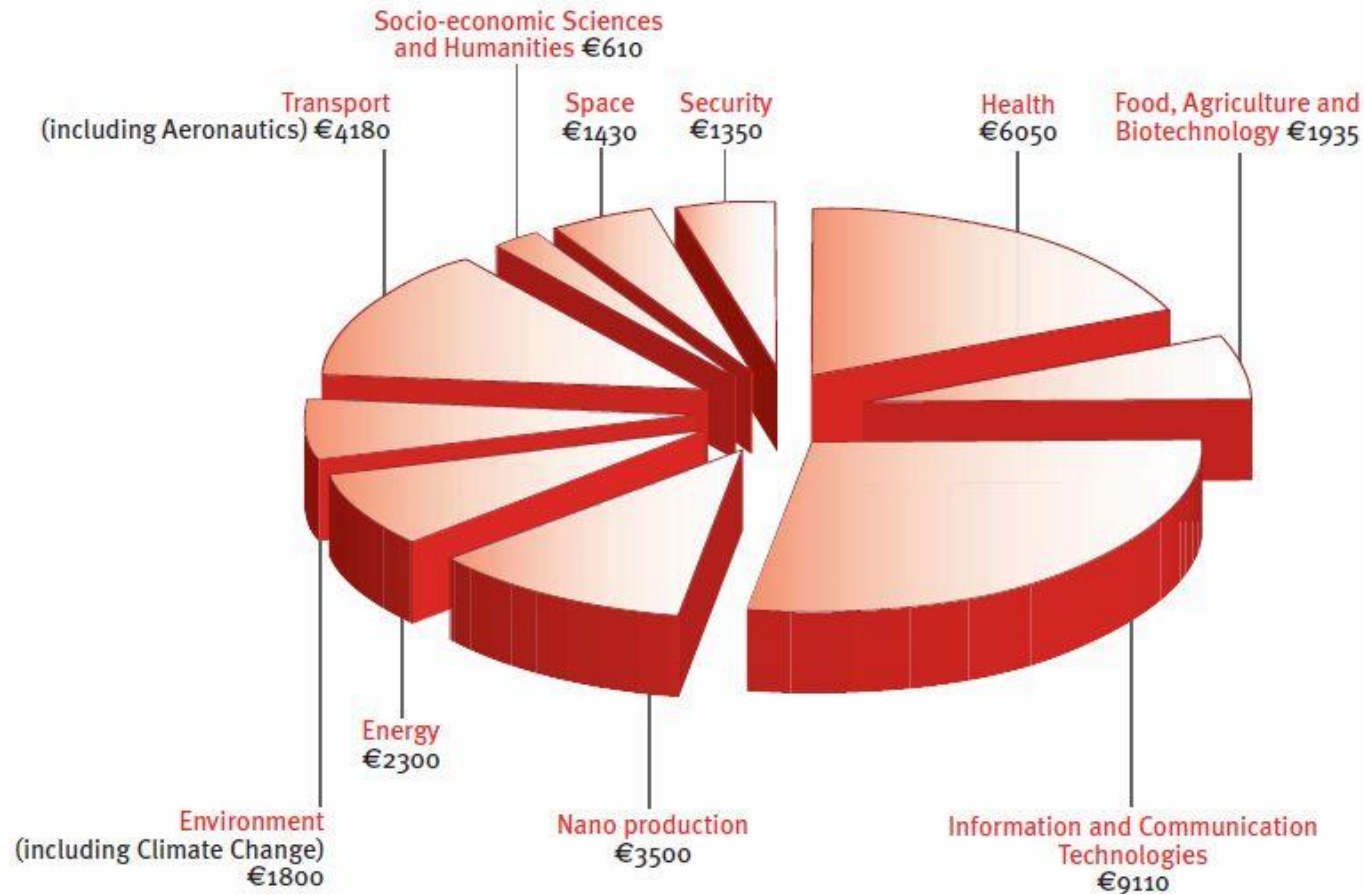
ICT thematic area

- Budget € 9.1 billion for 2007-2013

- Eight subcategories called challenges, defined for each year

- Current work programme for 2011-12 includes Challenge 1: Pervasive and Trusted Network and Service Infrastructures

  – Largest budget of all challenges: € 400M for 2011-2012 or 26% of the whole ICT budget

  – Focus areas include Future Internet, Cloud Computing, Trustworthy ICT, Internet of Things, etc.

EU FP7 ICT Calls 2011-2012

	Budget	GC, EEB, FoF PPP 2011	Future Internet PPP 2011	EU-Russia coord. Call	EU-Brazil coord. Call	FET Flags. Initiat.	Call 7	SME Initiat.	Call 8	GC, EEB, FoF PPP 2012	Call 9	Future Internet PPP 2012	FET Open
Date of publication		20/7/10	20/7/10	20/7/10	28/9/10	20/7/10	28/9/10	1/2/11	26/7/11	30/7/11	18/1/12	18/5/12	20/7/10
Call deadline		2/12/10	2/12/10	14/9/10	18/1/11	2/12/10	18/1/11	28/4/11 (short) 28/9/11 (full)	17/1/12	2/12/11	17/4/12	29/10/12	Cont. to 31/12/12
1. Pervasive and Trusted Network and Service Infrastructure	**625**												
1.1 Future Networks	160								160				
1.2 Cloud Computing, Internet of Services and Advanced Software Engineering	70								70				
1.3 Internet-connected Objects	30						30						
1.4 Trustworthy ICT	80								80				
1.5 Networked Media & Search Systems	70						70						
1.6 Future Internet Research and Experimentation (FIRE)	45						20		25				
1.7 PPP FI: Technology foundation - Future Internet Core Platform	41		41										
1.8 PPP FI: Use Case scenarios and early trials	107.5		40									67.5	
1.9 PPP FI: Capacity Building and Infrastructure Support	15.5		3									12.5	
1.10 PPP FI: Programme Facilitation and Support	6		6										
2. Cognitive Systems and Robotics	**155**												
2.1 Cognitive Systems and Robotics	155						73				82		
3. Alternative Paths to Components and Systems	**402**												
3.1 Very advanced nanoelectronic components: design, engineering, technology and manufacturability	60								60				

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Applying for FP7

- Determine the appropriate programme / thematic area / challenge / focus area

- Determine the correct call with the right timing

- International cooperation required
  - Build your own project or join an existing one

- The novelty of the research proposal is important

- The research should provide solutions to European problems

Statistics on EU FP7 Applications
(from Aalto)

Applications	Column1	Column2	Column3	Column4	Column5
Work Program	Applications	Funded Projects	Success Rate	Applied	Received
HEALTH	4	2	50 %	1 867 104	1 592 773
KBBE	1	1	100 %	131 873	131 873
ICT	98	19	19 %	41 498 619	7 715 254
NMP	30	8	27 %	15 708 823	2 216 356
ENERGY	7	0	0 %	1 958 315	0
ENVIRONMENT	4	0	0 %	617 943	0
TRANSPORT	17	4	24 %	4 774 952	2 137 513
SSH	12	0	0 %	3 096 483	0
SECURITY	6	1	17 %	1 489 129	176 280
SPACE	2	0	0 %	341 773	0
ERC	49	5	10 %	66 927 310	8 049 698
PEOPLE	49	5	10 %	0	0
INFRASTRUCTURES	4	2	50 %	1 745 049	1 494 603
SME	3	0	0 %	46 320	0
REGIONS	1	1	100 %	51 641	51 641
SCIENCE IN SOCIETY	2	0	0 %	138 924	0
INCO	1	0	0 %	50 400	0
FISSION	1	1	100 %	56 000	56 000
TOTAL	**291***	**49**	**17 %**	**140 500 658**	**23 621 991**

01.10.2013

*82 coordinated application, 15 funded
13 ICT coordinated application, 4 funded
EIT 2 Applications in 2009, 1 funded

Service Team of Faculty of Information and Natural Sciences

Research Liason Officer

vuokko.lepisto-kirsila@aalto.fi

tel. 050-381 6396

- Info about the research funding possibilities
- Guidelines and support for the research groups in preparation of the proposal
- Proposal and budget check

Grant Advisor

elise.kovanen@aalto.fi

tel. 050-567 1628

- Grant Agreements and advicing in negotiation stage in EU FP projects
- Amendments to Grant Agreements
- Assisting rearch groups with the administrational implementation of research projects
- Checking funding applications

Legal Counsel

anna.markkanen@aalto.fi

tel. 050-576 8369

- Contract negotiations and advice: research contracts, consortium agreements, out-license and technology transfer agreements
- IPR issues
- Legal support for research projects

CORDIS

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EIT – European Institute of Innovation and Technology

- New EU instrument for promoting innovation in Europe

- Aims to facilitate knowledge sharing and innovation processes in a fragmented research environment

- Legally established in 2008 as an independent agency within the EU

- € 300 million funding from EU for 2009-2013

- EIT operates on a strategic, longer-term horizon

- Knowledge and Innovation Communities (KICs) in different fields with a life-span of 7-15 years

EIT ICT Labs

- EIT Knowledge and Innovation Community in the field of ICT
- Operational at end of 2010
- 5 initial nodes, which feature:
    - Strong research institute
    - Major university
    - European-based multinational company
    - Active regional network of SMEs
    - Full national and regional support

EIT ICT Labs Thematic Areas
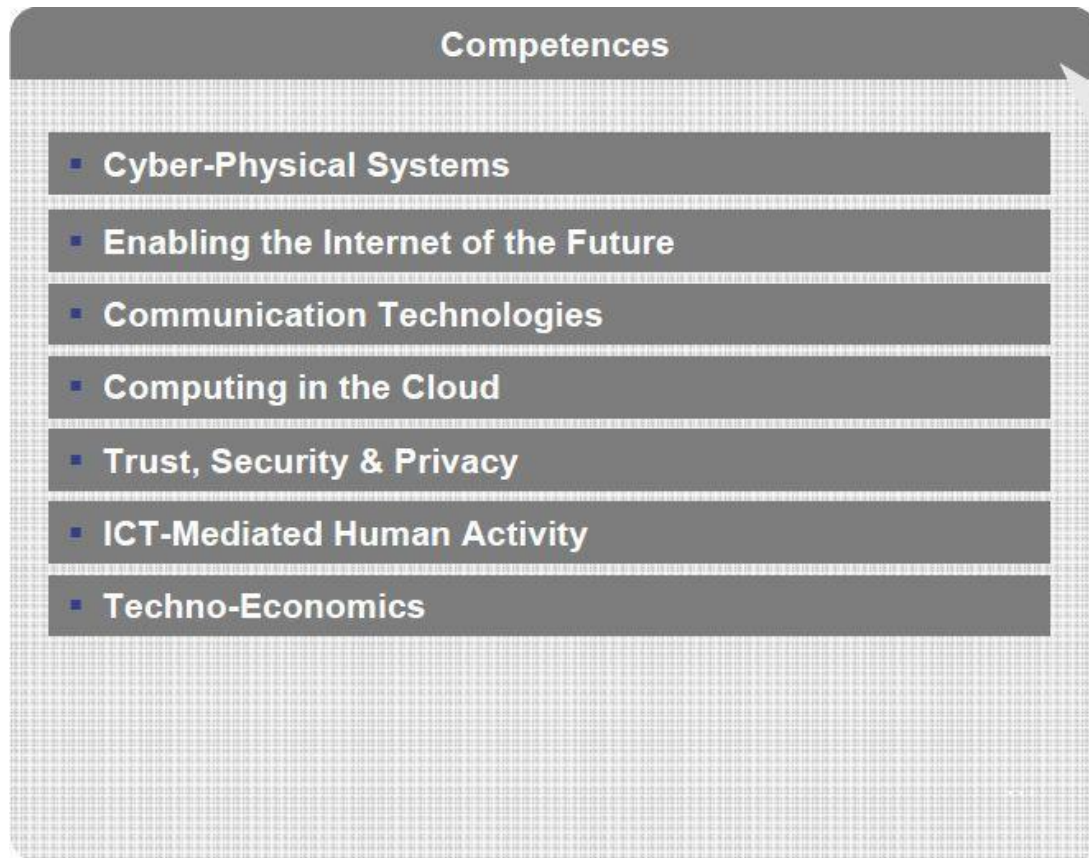
Thematic areas

- **Smart Spaces**
  including service-centered home

- **Smart Energy Systems**
  smart energy management, Green ICT

- **Health & well-being** including ambient assisted living, digital medicine

- **Intelligent Transportation Systems** novel forms of safer & sustainable traffic and transportation systems

- **Future Media and Content Delivery**
  entertainment, education, accessing media

- **Digital Cities**
  towards intelligent and sustainable digital cities

A Thematic Area ...

- Has an application area with a long-term business objective

- Integrates research, innovation and education

- Has clear leadership

- Must be European-wide

- Integrates relevant technological *competences*

- Has a Strategic Ambition which includes a clear vision and a measurable objective

EIT ICT Labs Competences

Competences

- **Cyber-Physical Systems**
- **Enabling the Internet of the Future**
- **Communication Technologies**
- **Computing in the Cloud**
- **Trust, Security & Privacy**
- **ICT-Mediated Human Activity**
- **Techno-Economics**

Competences…

- include people, knowhow, research infrastructure and networks
- can be defined in all related disciplines (e.g. social sciences, business, etc.)
- are used to create networks and jointly attract R&D funding (from all possible sources: EU FP, national)
- Identifying and exploiting synergies between thematic areas
- Build on Europe's world-class strength

EIT ICT Labs Instruments

Education Instrument	Research Instrument	Innovation Instrument
Graduate School with specialization matching the areas of excellence of nodes and inter-node mobility	**Thematic workshops** Consolidate goals and create networks	**Entrepreneurship Support Systems** mentoring, coaching, incubation, …
Master School which has an emphasis on hands-on entrepreneurship & mobility across nodes	**Thematic area coordination** To facilitate creating added value to chosen thematic areas	**EIT Innovation Radar** including cross-node virtual expert panel
Schools and Camps such as code camp (SW developm.), design camp (product design) and business camps (venturing)	**Common testbeds, Labs & simulation tools** incl. experience, design & mobile labs	**Best-Practice Benchmarking** for designing KIC management
	Research dissemination & networking incl. books, technical reports, DB	
	Mobility program including academia & industry crossover program	**Business and Entrepreneurs Club** including Unconferences
Outreach Program, Continuous Training and Embedded Learning both for stake holders & non-stake holders incl. professional doctorate	**Top talent playing field creation** for designing KIC management	**Access to finance** ensure capital availability for all stages
	Core research target thematic innov. in chosen areas	
Mobility Program teacher and student mobility	**Big Joint Idea Projects** drive risky ideas with high innovation potential (start 2012)	**Preventure grants** to identify and polish innovation