

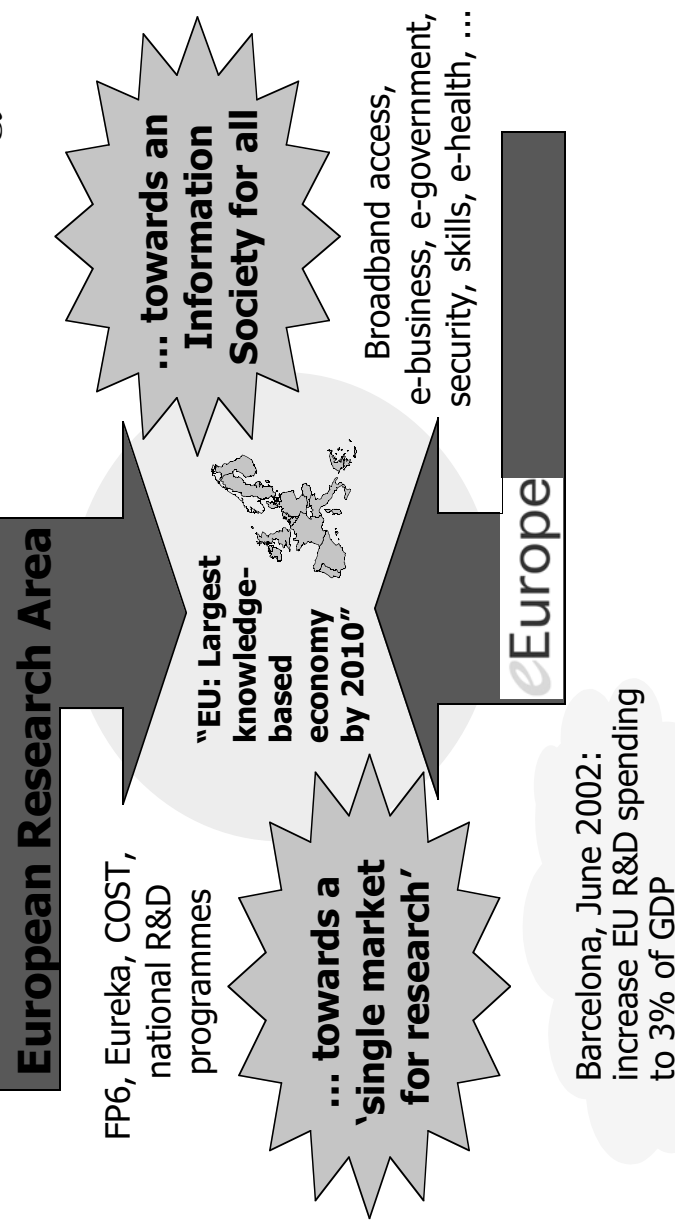
# *Embedded Systems in the 6th Framework Programme*

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## Research Policy: gaining momentum

### *Lisbon Strategy 2010*



# FP6 is Not Business as Usual!

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- A policy tool and catalyst
  - 25+1 = ?
  - not just a funding machine
- More “strategic” thinking
  - New instruments, focused objectives
  - Technology platforms
- Strong focus on International Co-operation
  - 285 M€ in Priority Areas, 315 M€ for specific activities, additional funding under Human Resources & Mobility
- Overhaul of R&D management



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# FP6 Indicative Breakdown of Amounts

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- Focussing and Integrating
    - Genomics 2255 M€
    - Information Society Technologies **3625 M€** → ~100M€ for GEANT/GRID
    - Nanotechnologies, int.. 1300 M€
    - Aeronautics and space 1075 M€
    - Food quality and safety 685 M€
    - Sustainable development 2120 M€
    - Citizens and governance .. 225 M€
    - Anticipation of S&T needs
      - Anticipating needs 555 M€
      - SMEs 430 M€
      - Specific INCO 315 M€
  - Strengthening ERA foundations 320 M€
  - Structuring ERA
    - Research and Innovation 290 M€
    - Human resources 1580 M€
    - **Research Infrastructures** **655 M€** → ~200M€ for GEANT/GRID
    - Science/Society 80 M€
  - Joint Research Centre 760 M€
- 
- 16270 M€



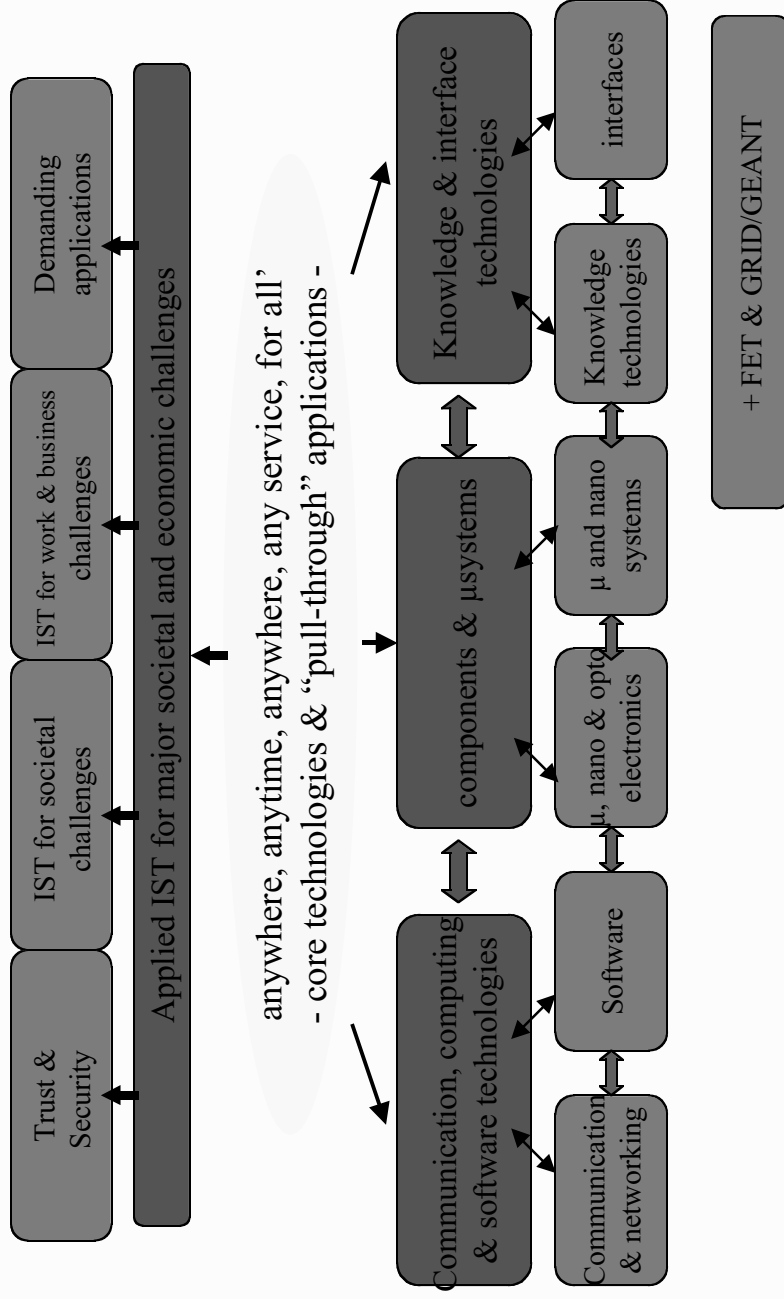
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# IST in FP6 : Research Priorities



## WP 2003-4 : the Approach

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- A two year WP to ensure concentration of effort and visibility
- More limited number of calls (three over two years)
- Concentration on a limited set of 'Strategic Objectives'
  - 23 Strategic Objectives for the two years
    - 12 in 2003, 11 in 2004 (one of which in common with Priority 3)
- Instruments
  - ~2/3 of budget targeted to new instruments
  - for each Objective: ~4 to 6 IP/NoEs and some STREPS,..
- Indications of effort expected to be devoted to each Strategic Objective

# IST Workprogramme 2003-2004

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## Preparing for post-CMOS

- Micro & nano systems
- Broadband access for all

Mobile & wireless systems beyond 3G  
Towards a global dependability & security framework

## Multimodal interfaces

Semantic-based knowledge systems  
**Call 1** Networked AV systems & home platforms

Networked businesses & governments  
eSafety of road & air transports  
eLearning & access to cultural heritage

## eHealth

Products and Services engineering 2010  
FET Proactive Initiatives

General Accompanying Measures **FET-Open**

## Advanced displays

Optical, opto-electronic & photonic functional components

Open development platforms for software & services

## Cognitive systems

## Embedded systems

Applications & services for the mobile user & worker

Cross-media content for leisure & entertainment

GRID-based systems for solving complex problems

Improving risk management

## eInclusion

Research Networking test-beds

General Accompanying Measures

**FET-Open**

**Continuous Call**



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# WP 2003-4: Budget and Call Planning

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• Year	• 2003	• 2004	• 2005	• 2006
• Indicativ	• 835 M Euro	• 891 M Euro	• 935 M Euro	• 964 M Euro
• Budget Calls	Calls 1 & 2 drawing on 2003 and 2004 budgets	• Call 3 • drawing on 2005 budget	• TBD	• TBD

WP 2003-4

WP 2005-6



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# WP 2003-4: Budget and Call Planning

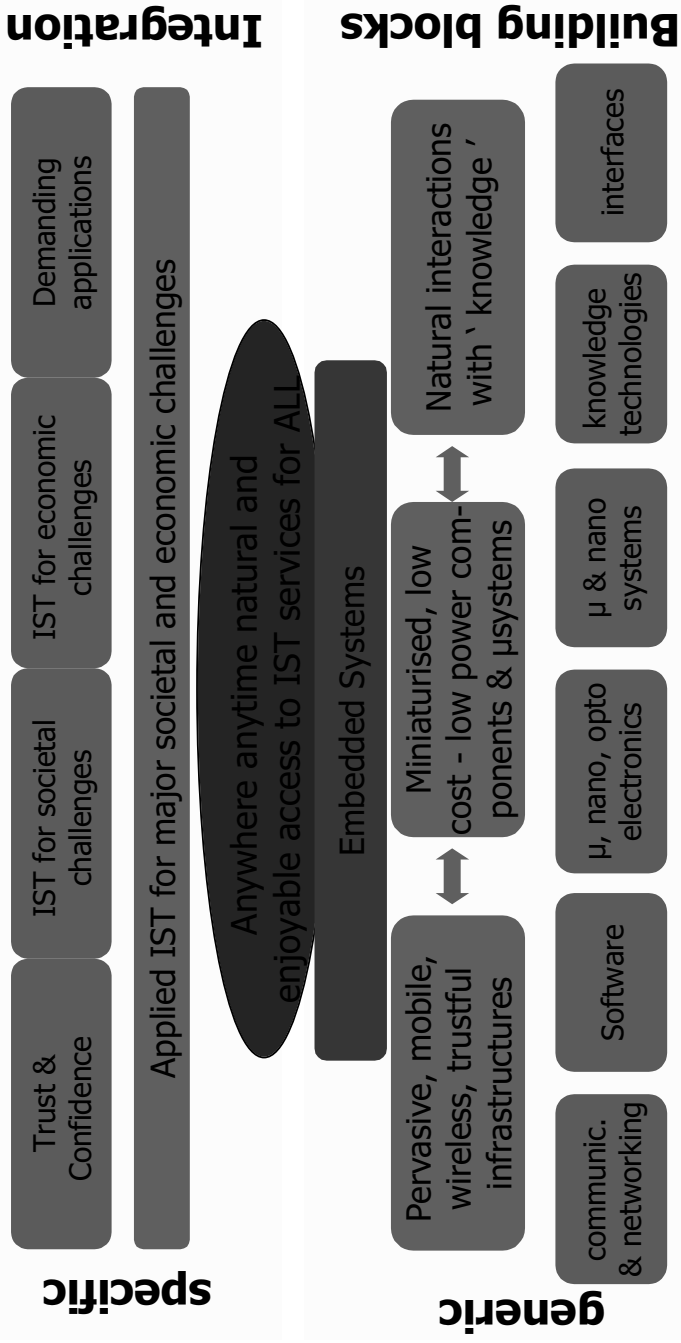
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- Call 1 open 17/12/2002, deadline 24/04/2003
- Call 2 open 17/06/2003, deadline 15/10
- Call 3 open ?, deadline ? '04
- Joint call with priority 3 on 'products and services engineering in 2010: still open for CA, SSA with deadline 16/09 '03
- FET Open scheme: open 17/12/2002 for continuous submissions until 31/12/2004

## Call 2

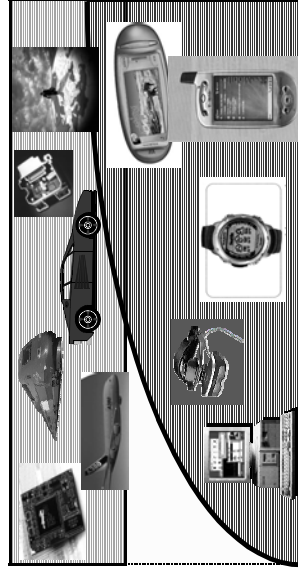
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<u>1- Strategic Objectives</u>	Budget
• <i>Advanced displays</i>	• 25
• <i>Optical, opto-electronic, photonic functional components</i>	• 45
• <b>Embedded systems</b>	• 50
• <i>Open development platforms for software and services</i>	• 55
• <i>Cognitive systems</i>	• 25
• <i>Applications and Services for the Mobile User and worker</i>	• 60
• <i>Cross-media content for leisure and entertainment</i>	• 55
• <i>GRID-based Systems and solving complex problems</i>	• 45
• <i>Improving Risk management</i>	• 30
• <i>eInclusion</i>	• 30
• <b>2- Research Networking</b>	
• <i>Research Networking test beds</i>	• 25
• <b>3- General accompanying actions</b>	8



## Embedded Systems - what they are

- **Embedded HW/SW systems**
  - ...and systems of systems
  - resource constrained
- **Reactive to their environment**
  - “real-world” systems
  - control, perception and cognition
- **Computationally intensive**



*Connecting the physical to the virtual world*

- **Miniaturisation**
  - size, cost, power reduction
- **Anywhere - anything connectivity**
  - 8 bn microcontrollers, 600 m DSPs,....
- **Convergence**
  - the most diverse technologies in the same system
  - added value shifting from hw to sw
- **Consumerisation**
  - shorter life-cycles vs. long life-times

## ↑ **complexity!**

- to design, to test, to maintain, to use....

in consumer electronics, automotive, avionics, telecoms, process industry, manufacturing automation,...



# Embedded Systems - technology challenges

- ## Closing the productivity gap
- Holistic design, high-level models, languages and tools
    - hw, sw and the environment
    - high-level perception & control
  - Composability & scalability
  - Dependability
  - QoS reasoning (e.g. trade off cost vs. quality)
  - Multidisciplinarity: hw, sw, control and networks

## Challenging research domains such as:

- unified computation and interaction model
  - resource constraints, trust, failure, location
- trust and security
  - systems correct by construction; reliability; safety; privacy
- adaptation, coordination, self-configuration of networked ES
  - physical embeddedness is the challenge



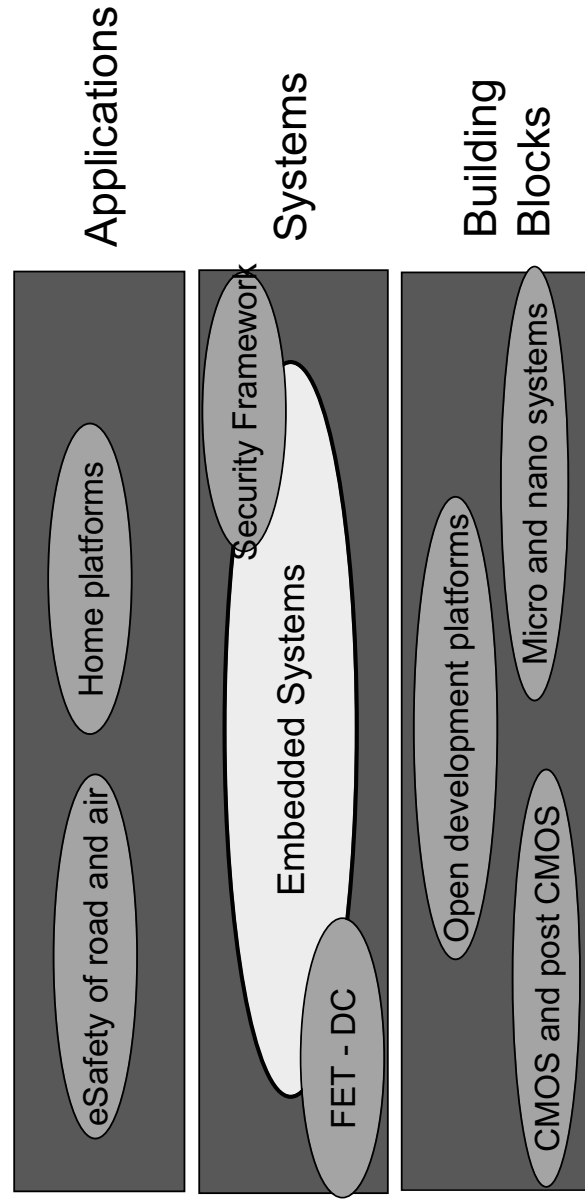
# Embedded systems in IST: future directions

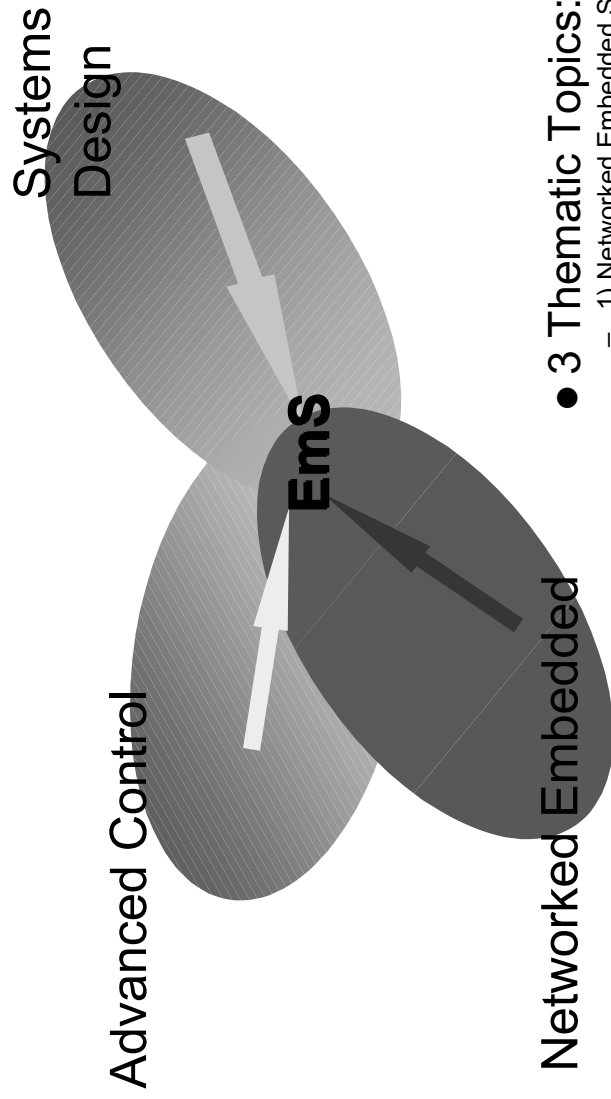
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- Ambient intelligence & embedded systems
- ERA & the new instruments
  - Technology platforms
- Two key areas (very tentative):
  - Embedded system design
  - “Cooperating objects”
    - What long term objectives? Who should be involved? How to organise the activities? How to leverage funding? Are the players committed?
- Be one step ahead

# Embedded Systems - relation to other areas

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- 3 Thematic Topics:
  - 1) Networked Embedded Systems
  - 2) Embedded System Design
  - 3) Advanced controls



## 1. - Networked Embedded Systems

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- **Middleware and platforms**
  - hiding the underlying complexity
  - providing efficient distribution of resources at low cost
- **Focus on:**
  - middleware for small wireless devices
  - scalable and self-organizing platforms
    - adhoc networking of very small devices
    - mastering complexity...
- Work is expected to crystallise around **Integrated Projects**
- **STREPs** could explore emerging technologies



## 2. - System Design

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- Design concepts, methods and tools, development of warrantable SW components and system integration
- Emphasis on:
  - handling of complex real-time constraints
  - design of ultra-stable and dependable systems
- Work is expected to crystallise around **integrated projects**
- **STREPs** could explore emerging technologies



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Innovation Policy



## 3. - Advanced Control

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- Advanced controls for real-time systems with emphasis on hybrid systems
- Advanced controls for networked embedded systems with emphasis on networked autonomous and fault adaptive control and management
- Work is expected to crystallize around networks of excellence
- Relevant parts could be integrated in the two previous areas



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Innovation Policy



*At first sight:*

- No obvious gaps in coverage of priorities
- Balance between new and traditional instruments
- Significant concentration of effort
- No surprises in participation balance; good SME participation
- Good participation of organisations from associated candidate countries
- Oversubscription depending on area

