

Objective 3.5

Engineering of Networked Monitoring & Control Systems

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Call 5: Launch 30 July, ~720 M€ + 70M€

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Challenge	Objectives
Challenge 1: Pervasive and Trusted Network and Service Infrastructures	ICT 2009.1.1 The Network of the Future (call 5) ICT 2009.1.2 Internet of Services, Software & virtualisation ICT 2009.1.3 Internet of Things and enterprise environments ICT 2009.1.4 Trustworthy ICT ICT 2009.1.6 Future Internet Experimental Facility and Experimentally-driven Research
Challenge 3: Components, systems, engineering	ICT 2009.3.1 Nanoelectronics Technology ICT 2009.3.5 Engineering of Networked Monitoring and Control Systems ICT 2009.3.7 Photonics ICT 2009.3.9 Microsystems and Smart Miniaturised Systems
Challenge 4: Digital Libraries and Content	ICT 2009.4.2 Technology-Enhanced Learning ICT 2009.4.3 Intelligent information management
Future and emerging technologies	ICT 2009.8.4,5,6,9,10 FET-Proactive
Horizontal support actions	ICT 2009.9.2 Supplements to support International Cooperation, ongoing projects
	additional PPP-related objectives

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Embedded Systems and Control Target Outcomes

3.4 Embedded Systems Design

Theory and novel methods for embedded system design

- heterogeneity, predictability of non-functional properties (performance, fault tolerance, life expectancy and power consumption)
- robustness validation
- adaptivity and self-awareness
- self-configuration

one IP: end-to-end design methodologies and associated tool chains
STREP: specific methods and tools

Modules and tools for embedded platform-based design

- integrated design environment for ES
- software, HW/SW and system design tools
- interoperability of tools primarily from SME vendors
- technology for efficient resource management

one IP: address design tool integration
STREP: specific issues or topics

Coordination of national, regional and EU-wide R&D strategies (CSA)

- align research agendas

3.6 Computing Systems (STREPs)

Parallelisation & programmability

- automatic parallelisation
- high-level parallel programming languages
- holistic approach: underlying hardware / operating system / system software
- exploiting dynamic (run-time) information
- testing, verification and debugging

Methodologies, techniques and tools

Continuous Adaptation
beyond strict separation between compiler, runtime and hardware

Virtualisation
portability, flexibility, optimised use of resources

Customisation
rapid extension and/or configuration of existing systems

System simulation and analysis

Simulation and analysis of complex multicore systems

Technology implications

System architectures, tools and compilers for next-generation semiconductor fabrication

Coordination (CSA)

3.5 Engineering of Networked Monitoring and Control Systems

Foundations of Complex Systems Engineering

Wireless Sensor Networks and Cooperating Objects

Control of Large-Scale Systems

International Cooperation

**No objectives
in Calls 2010**

Complementary to ARTEMIS JTI



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Additional **Call 5** Objectives

The European Economic Recovery Plan - PPPs

- Green Car
- Factory of the Future
- Energy Efficient Buildings

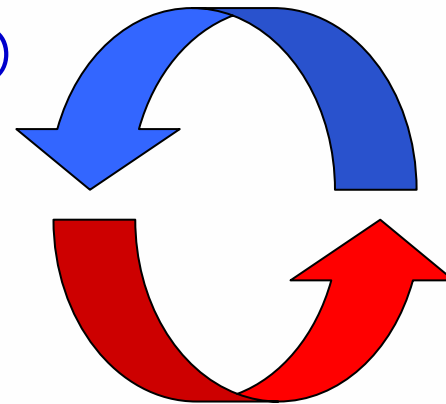


ICT programme contributions

Contributions of Monitoring
and Control

– New objectives in ICT

- Energy Efficient Buildings (EEB)
- Fully Electric Vehicle (FEV)
- Smart Manufacturing (FoF)



3.5 Engineering of Networked M&C Systems



Embedded Systems and Control Target Outcomes

3.4 Embedded Systems Design

Theory and novel methods for embedded system design

- heterogeneity, predictability of non-functional properties (e.g. reliability, tolerance, life expectancy and energy consumption)
- robustness validation
- adaptivity and self-awareness
- self-configuration

one IP: end-to-end design methodologies and associated tool chains
STREP: specific methods and tools

Modules and tools for embedded platform-based design

- integrated design environment for ES
- software, HW/SW and system design tools
- interoperability of tools primarily from SME vendors
- technology for efficient resource management

one IP: address design tool integration
STREP: specific issues or topics

Coordination of national, regional and EU-wide R&D strategies (CSA)

- align research agendas

3.6 Computing Systems (STREPs)

Parallelisation & programmability

- automatic parallelisation
- high-level parallel programming
- efficient compilation and linking (software)
- exploring dynamic (run-time) information
- testing, verification and debugging

Methodologies, techniques and tools

Continuous Adaptation
beyond strict separation between compiler, runtime and hardware

Virtualisation
portability, flexibility, optimised use of resources

Customisation
rapid extension and/or configuration of existing systems

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3.5 Engineering of Networked Monitoring and Control Systems

Foundations of Complex Systems Engineering

Wireless Sensor Networks and Cooperating Objects

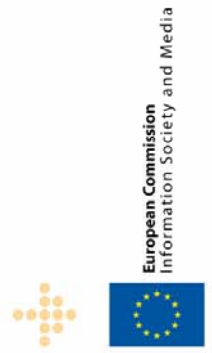
Control of Large Scale Systems

International Cooperation

Focused proposals in 3.5

non-EU
non-FEU
non-FOF

Complementary to ARTEMIS JTI



Objective ICT-2009.3.5 Engineering of Networked Monitoring and Control systems

The activities in this area address engineering technologies for large-scale, distributed and cooperating systems for monitoring and control

- a) Foundations of Complex Systems Engineering
- b) WSN and Cooperating Objects
- c) Control of Large-Scale Systems
- d) International Cooperation
 - USA, India, Western Balkans

Call 5
Deadline 26 Oct 2009
Indicative budget 32 M€

**It is fine to address only one of the above,
if sufficient for the purpose of your proposal**



Relevance of the Monitoring and Control

- **Monitoring and Control** is an important scientific and technological field and market sector
 - Europe has a 32% market share of a 188+ B€ world-wide market (See EC study, www.decision.eu, 2008)
- It is based on rigorous sensing/monitoring, modelling, decision making, control and actuation and optimisation
- Sensor/actuator networks and Wireless Sensor Networks constitute a critical enabling technology, and cooperation amongst smart objects an important extension thereof
- Large-scale/Complex deployments constitute the next major challenge, extending from instantiation to management and maintenance to updating



Foundations of complex systems engineering

- To develop *novel* scalable methods for sensing, control and decision-making. to achieve robust, predictable and self-adaptive behaviour for large-scale networked systems
- Scope : foundational multi-disciplinary research in modelling, sensing, monitoring and actuation, adaptive, cooperative control and decision making.

Note : Activities to encourage and enable multi-disciplinary education in the areas of systems engineering and monitoring and control are welcome.

Instruments: One NoE and STREPs



Wireless Sensor Networks & Cooperating Objects

- To develop architectures, hardware/software integration platforms and engineering methods for distributed systems composed of heterogeneous networked smart objects
- Scope : Research challenges include e.g :
 - **methods and algorithms to support spontaneous ad-hoc cooperation between objects;**
 - **network-centric computing with dynamic resource discovery**
 - **semantics that allow object/service definition/instantiation;**
 - **lightweight operating systems and kernels;**

Instruments: One IP and STREPs



Control of large-scale systems

- To enable optimal operation of large-scale dynamic systems through proactive process automation systems applicable across several sectors, going far beyond what current SCADA and DCS/PLC can deliver today.
- Scope : The architectures should facilitate re-use, enable QoS, reduce the reconfiguration effort. Standardisation of monitoring and control systems in industrial environments is encouraged in all projects.

Note: Pro-activeness requires e.g. novel predictive models for higher performance and fault adaptation and recovery.

Instruments: One IP and STREPs

International cooperation

- Facilitation and promotion of cooperation with the
 - Western Balkan Countries
 - U.S.A
 - India(separately) where mutual benefits accrue.

Instruments : CSAs



Expected Impact of proposed R&D

**To be clearly addressed in the proposal
On top of (one of) a, b, c, d !**

- Strengthened competitiveness of the industry supplying monitoring and control systems through next generation process automation products that are superior in terms of functionality, accuracy, dynamic range, autonomy, reliability and resilience.
- Higher energy efficiency and reduction of waste and of resource use in manufacturing and processing plants; **improved ease-of-use and simplified operation and maintenance of monitoring and control systems, also for non-experts**; and more effective management systems for natural resources and the environment.
- Reinforced European inter-disciplinary excellence in control and systems engineering and associated **modelling and simulation tools** as well as in **real-time computing, communications, wireless sensor (and actuator) networks and cooperating objects**.



Objective 3.5

Instruments and Budget

- a) Foundations of complex systems engineering: One NoE and STREPs
- b) Wireless Sensor Nets and Cooperating Objects: One IP and STREPs
- c) Control of large-scale systems : One IP and STREPs
- d) Int. cooperation: CSAs
 - NoE : up to 4 M€
 - CSA: up to 1 M€

Total 32 M€: at least 27 M€ are for IPs + STREPs

!!! IPs: up to 5 M€; STREPS: up to 2 M€ !!!



More Information

FP7

<http://ec.europa.eu/fp7/ict>

Embedded Systems and Control

- Networked Embedded and Control Systems

<http://cordis.europa.eu/fp7/ict/necs>

- Ongoing FP7 projects

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/necs/booklet-necs_en.pdf

Contacts

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