



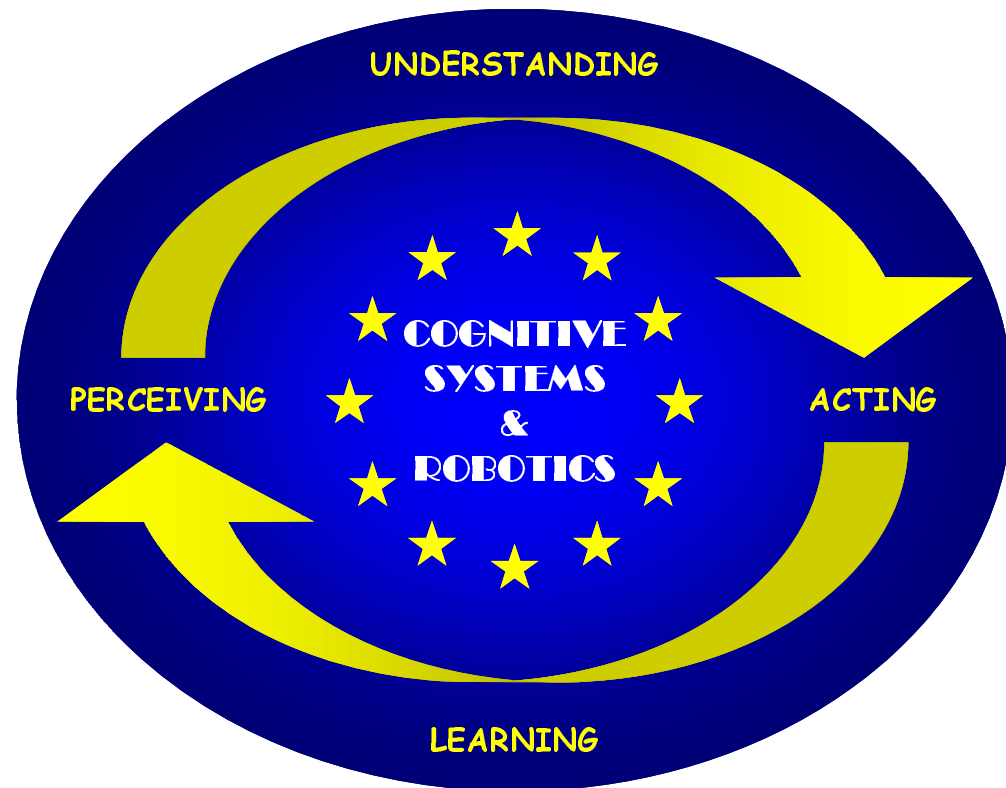
European Robotics Research: Achievements and challenges

**Libor Král, Head of Unit,
CONNECT A2 Robotics – European Commission**

**IROS 2012
Vila Moura, Algarve, Portugal
9 October 2012**

European robotics research

- *What are the key research challenges?*
- *How do we address them?*
- *What comes next for cognitive systems?*



Key issues – research challenges

- *Millions of robots in the world today – many more tomorrow*
- *Not just on the factory floor, but also in services sectors*
- *Can we afford to have a lot of dumb machines running around?*



Mind versus body

- *an ancient Greek philosopher is supposed to have said that man is the most intelligent of animals "because he has hands"*
- *This is a central issue behind our research into "systems which can make sense of the world around them"*
- *Grasping, manipulation etc are cornerstones of our project portfolio*



Robots vs. the real world

- *We also target "systems which operate autonomously in dynamic, real-life environments"*
- *This is a key constraint in our calls – it is a real challenge going beyond the state of the art*
- *Topics like scene and object recognition, learning, and adapting are the research pillars of many EU projects...*



Robots vs. humans

- *Another key research issue: "systems which assist people in everyday tasks"*
- *Human-robot interaction is essential at many levels:*
 - *Safety*
 - *Ease of use*
 - *Companionship etc*
- *Bio-inspiration – e.g. applying neuroscientific findings to new cognitive models which could then be tried out in robotics*

Role of cognitive systems

- *Where does cognition start and robotics stop?*
- *This is probably the wrong question!*
- *Intelligent navigation requires both. Dextrous manipulation is not solely reliant on new skin sensors*
- *Undeniable gap between the basic science and engineering implementations*
- *Part of our job to reduce the gap, in time and in distance...*



The economic dimension

- *Europe has a strong robotics industry with world-class research potential*
- *Fragmentation of research: effective use of resources*
- *Saturation of classical markets*
 - *Need to identify new application areas*
 - *Strategic Research Agenda for Europe*
- *Need closer link between research and innovation*





How do we address today's issues

- *A unit created eight years ago within the EU's FP7 research framework programme, ICT theme*
- *Approx 100 ongoing projects today with over 700 partners*
- *70-80 M€ funding of new projects per year*
- *Usually 1 Call/year with up to 200 proposals*
- *20 new projects launched every year*
- *Not the only robotics activity...*



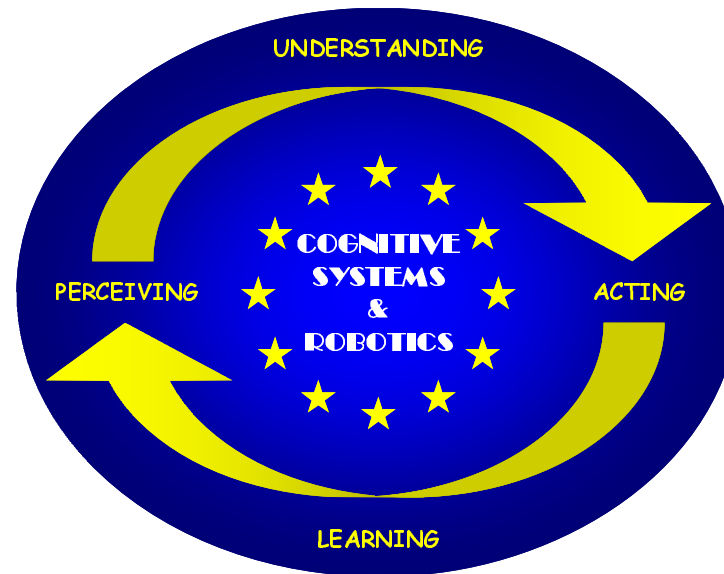
Project Portfolio

PERCEIVING

- Touching
- Seeing
- Hearing
- Advanced sensing

UNDERSTANDING

- Recognising
- Interpreting
- Adapting
- Modelling
- Cognitive architectures



ACTING

- Manipulating
- Navigating
- Interacting
- Collaborating
- Monitoring

APPLICATION AREAS

- Aerial
- Underwater
- Industry and manufacturing
- Professional & domestic
- Medical and rehabilitation
- Monitoring and surveillance



Community - building

- **EUROP** - *European Robotics Technology Platform*
- **EURON** - *EUropean RObotics research Network*
 - *Network formerly funded by EC – now self-sustaining*
- **euRobotics** - *European Robotics Coordination Action*
- **EUCogIII** - *Advancement of Artificial Cognitive Systems, Interaction and Robotics*
- **Echord** - *European Clearing House for Open Robotics Development*





Impact of the EU effort

- *Largest public funded programme in the world (civil)*
- *Substantial addition to the body of knowledge (hundreds if not thousands of publications, papers, presentations etc)*
- *Catching public imagination (e.g. London Science Museum, European robotics weeks)*
- *Uses can be envisaged in serious areas e.g. search & rescue*
- *Progressing towards socio-economic aspects*





What comes next

- *ICT Call 10 immediately*
- *Horizon 2020 entering serious preparation phase*
- *Robotics PPP under preparation*





Challenge 2 in ICT Call 10

- *Work Programme 2013 transition to next FP*
- *Several potential RTD challenges*
 - *Robotics*
 - *Cognitive systems*
 - *Smart Spaces*
 - *Human-machine interaction*
- *New dimensions*
 - *Innovation and take-up*
 - *Socio-economic aspects*





FP7 ICT Call 10: Objective 2.1

OBJECTIVE	ICT-2013.2.1 Robotics, Cognitive Systems & Smart Spaces, Symbiotic Interaction
DEADLINE	15 January 2013 at 17:00:00 (Brussels local time)
BUDGET	67 M€ - Min. 52M€ for a) and b) – Min. 10M€ for c) - Min. 40% IPs - Min 25% STREPs

- *Target (a) **Intelligent robotics systems** (IP, STREP)*
- *Target (b) **Cognitive systems and smart spaces** (IP, STREP)*
- *Target (c) **Symbiotic human-machine interaction** (IP, STREP)*





FP7 ICT Call 10: Objective 2.2

OBJECTIVE	ICT-2013.2.2 Robotics use cases & Accompanying measures
DEADLINE	15 January 2013 at 17:00:00 (Brussels local time)
BUDGET	STREPS: 20M€ / CSAs: 3M€

- **Robotics use-cases (STREP):**
 - *Target (a) Use-cases in service robots*
- **Accompanying measures (CSA):**
 - *Target (b) Robotics research roadmap coordination and socio-economic aspects*
 - *Target (c) Robotics networking*
 - *Target (d) Dissemination and Outreach*

Dedicated workshop on Thursday afternoon!





Beyond 2013: Horizon 2020

- **Commission proposes 80 B€ for R&D&I in 2014-20**
- **A core support to Europe 2020 and Innovation Union**
 - *Responding to the crisis, investing in future jobs and growth*
 - *Addressing people's concern: wellbeing, safety, env,..*
 - *Strengthening EU's global position in R&D&I and technology*
- **More info: <http://ec.europa.eu/research/horizon2020>**





What's new in Horizon 2020?

- **A single programme** bringing together three separate programmes/initiatives*
- **Coupling research to innovation** – from research to commercialisation, all forms of innovation
- **Simplified access**, for all companies, universities, institutes in all EU countries and beyond.

*The 7th Research Framework Programme (FP7), innovation aspects of Competitiveness and Innovation Framework Programme (CIP), EU contribution to the European Institute of Innovation and Technology (EIT)



Horizon 2020: Three priorities

➤ **Excellent science**

- *raising the level of excellence in Europe's science base and ensuring a steady stream of world-class research to secure Europe's long-term competitiveness*

➤ **Industrial leadership**

- *making Europe a more attractive location for R&I by promoting activities where businesses set the agenda.*

➤ **Societal challenges**

- *reflecting the policy priorities of the Europe 2020 strategy and addressing major concerns shared by European citizens*





Simplification in Horizon 2020

- **Single set of** simpler & more coherent participation **rules**
- New **balance between trust and control**
- Moving from several **funding rates** to just two:
 - *Maximum of 100% of the total eligible costs for R&D*
 - *Maximum 70 % for actions close to market*
- Indirect costs: a **single flat rate, 20% of eligible costs**
- Major simplification under the **forthcoming financial regulation**
- **Successful applicants to get working more quickly:**
 - *reduction of average time to grant by 100 days (~350 in FP7)*





Next steps

- **Ongoing:** Parliament and Council negotiations on the basis of the Commission proposals
- **Ongoing:** Parliament and Council negotiations on EU budget 2014-2020 (including overall budget for H2020)
- **Ongoing:** Final calls under 7th Framework Programme for research to bridge gap towards Horizon 2020
- **Mid 2013:** Adoption of legislative acts by Parliament and Council on Horizon 2020
- **1/1/2014: Horizon 2020 starts, launch of first calls**





Robotics part of ICT LEIT

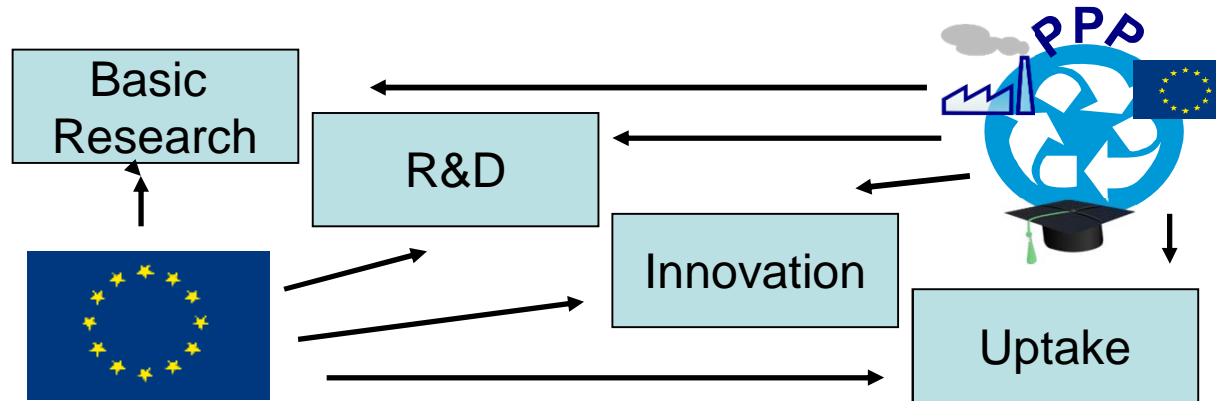
➤ From the legal text:

Robotics and smart spaces

Goal: Reinforce European scientific and industrial leadership in industrial and service robotics, cognitive systems, advanced interfaces and smart spaces, and sentient machines.



Horizon 2020: Possible scheme for robotics



STANDARDISATION
REGULATION/ LEGAL ISSUES /POLICY

COMPETITIONS

ETHICAL & SOCIETAL ISSUES

CROSS-BORDER MOBILITY OF RESEARCHERS

INTERNATIONAL COOPERATION

Robotics PPP: MoU signed on 18 September





THANK YOU!

Call info including Q&A document:

http://cordis.europa.eu/fp7/ict/cognition/calls-ict-call10_en.html

Information about existing project portfolio:

http://cordis.europa.eu/fp7/ict/cognition/projects/areas-projects_en.html

News:

<http://twitter.com/RoboticsEU>

<http://www.facebook.com/RoboticsEU>

