



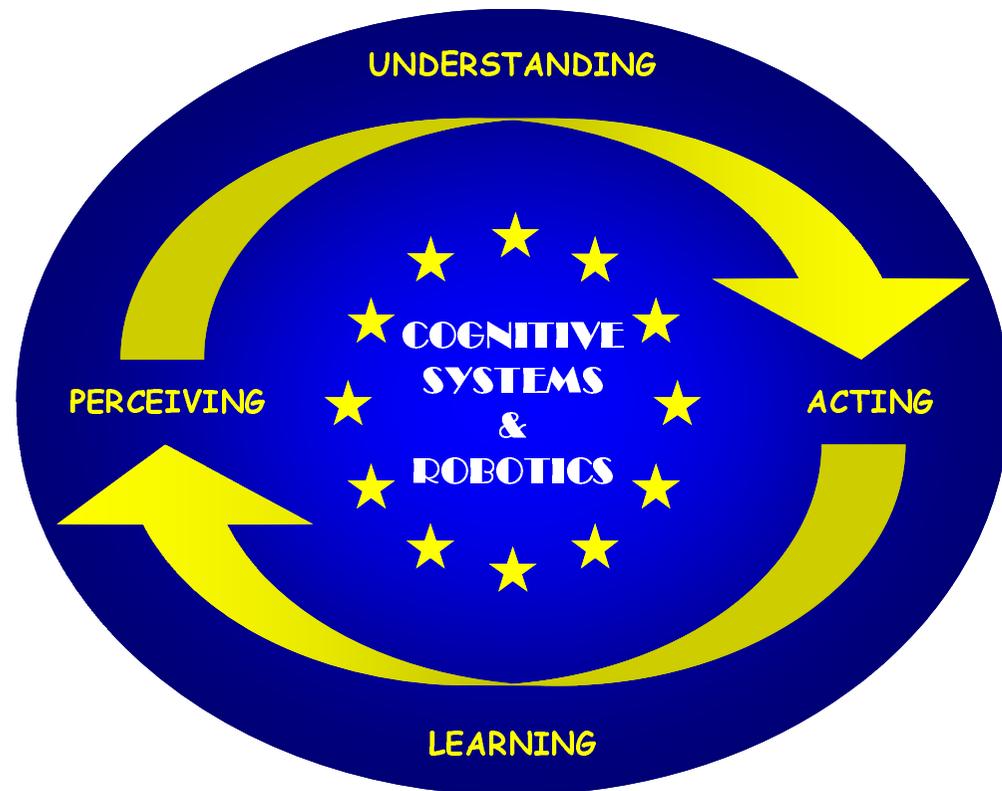
# European Robotics Research: Achievements and challenges

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

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

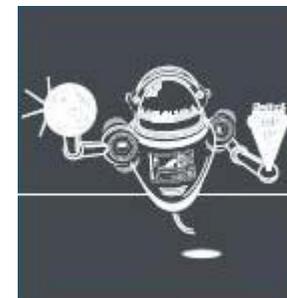
# European robotics research

- *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...*



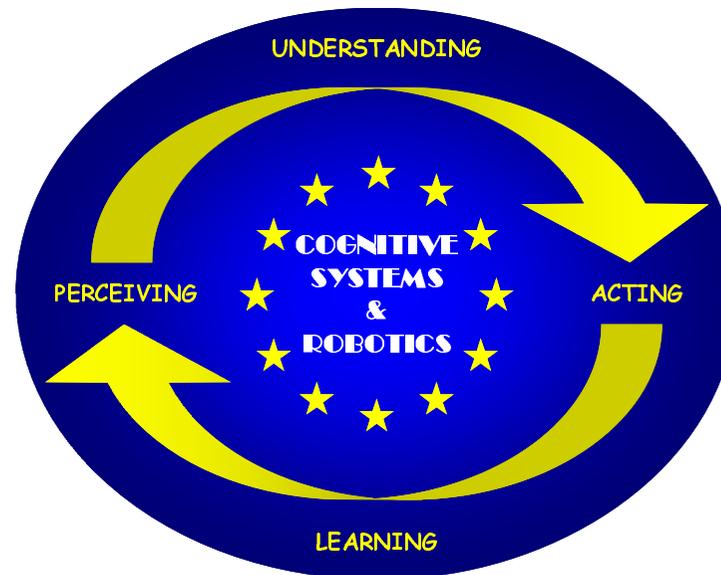
# Project Portfolio

## 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

<b>OBJECTIVE</b>	<b>ICT-2013.2.1</b> Robotics, Cognitive Systems & Smart Spaces, Symbiotic Interaction
<b>DEADLINE</b>	15 January 2013 at 17:00:00 (Brussels local time)
<b>BUDGET</b>	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

<b>OBJECTIVE</b>	ICT-2013.2.2 Robotics use cases & Accompanying measures
<b>DEADLINE</b>	15 January 2013 at 17:00:00 (Brussels local time)
<b>BUDGET</b>	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*

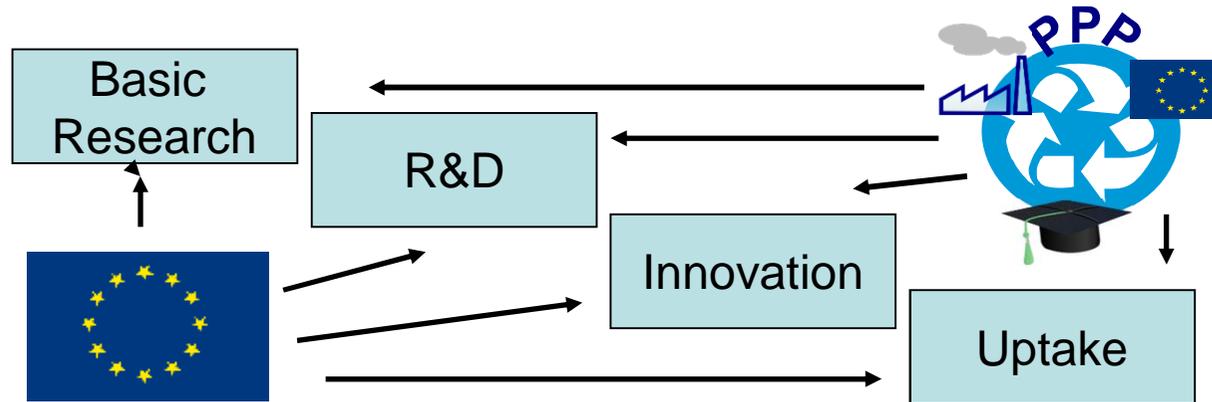
➤ From the legal text:

### ***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](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](http://cordis.europa.eu/fp7/ict/cognition/projects/areas-projects_en.html)

*News:*

<http://twitter.com/RoboticsEU>

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

