CHALLENGE 2: COGNITIVE SYSTEMS, INTERACTION, ROBOTICS

ICT Call 4 Infoday

09.12.2008, Minsk

CHALLENGE 2: COGNITIVE SYSTEMS, INTERACTION, ROBOTICS

- Challenge 2 aims to extend systems engineering to the design of systems that can carry out useful tasks (e.g. manipulation and grasping, exploration and navigation, monitoring and control, situation assessment, communication and interaction), autonomously or in cooperation with people, in circumstances that were not planned for explicitly at design time.

CHALLENGE 2: COGNITIVE SYSTEMS, INTERACTION, ROBOTICS

- **Objective 2.1: Cognitive Systems and Robotics**
- **Objective 2.2: Language-Based Interaction**

- *Challenge 2*

Objective 2.1: Cognitive Systems and Robotics

Challenge 2

Objective 2.1: Cognitive Systems and Robotics

- Today's ICT systems cannot learn from experience and reason, cannot contextualise and adapt, and cannot (inter)act based on observation and learning
  - vision/sensing systems, service robots, health robots, industrial robots, multimodal and multilingual interactions … and many other ICT applications cannot be developed further if there are no new breakthroughs in machine intelligence and systems engineering …

- Europe has key assets to build on
  - world leadership in industrial robotics and systems engineering
  - mastering of multiple disciplines: neuroscience, microsystems …
  - excellent academic research in these fields

Challenge 2

Objective 2.1: Cognitive Systems and Robotics

Today

- Robots operating in ‘modelled’, ‘structured’ and ‘constrained’ environments
  - industrial robots
  - ‘programmed’ service robots
- Basic understanding of computational representations of cognitive processes
  - first applications in cognitive vision
- Human-robot interactions that are rather static / passive
  - unable to adapt to human behaviours, critical safety issues unresolved

5 – 15 years

- Robots, machines and systems exhibiting advanced behaviour
  - operating with gaps in knowledge
  - operating in dynamic / frequently changing environments
- Machines and systems that understand their users / context
  - learning from observation
  - adapting to context
- Robotic systems with rich interaction capabilities
  - all senses, gestures, natural language – for safe human-robot collaboration

Challenge 2

Objective 2.1: Cognitive Systems and Robotics

Calls

Call 4:

(STREP) New approaches towa
endowing robots with advanced per-
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together to understand cognitive systems and design useful new ones.

(CA) Co-ordinated co-operation and communication within a multidisciplinary robotics community in Europe.

understanding and solving key issues related to the engineering of artificial cognitive systems.

(IP) New ways of designing and implementing complete robotic systems that operate largely autonomously in loosely structured dynamic environments.

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within a multidisciplinary artificial cognitive systems research community in Europe.

- Sensing 3D everyday objects

- Motion perception

- Linking perception and action

-Interpretation objects, situations, events

-Memory and learning

-Anticipatory behaviour in incompletely specified environments

- Collective behaviour

- Autonomous action in real-world environments

Physical implementation / simulation

Challenge 2
Objective 2.1: Cognitive Systems and Robotics

Practical Information

Objective 2.1 – Cognitive Systems and Robotics

Budget: **73** (65, 6, 2) **Meuro under Call 4**,
80 (72, 6, 2) Meuro under Call 6

Managed by: Unit E5, Luxembourg

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EC contact: Mr Libor Kral

Backup: Mr Juha Heikkila

- ICT 2008, Lyon: Info session on 26 Nov, 9-10.30h
- Inquiries: from the call publication date
- **Pre-proposals:** until 3 weeks before the call closing date

- *Challenge 2*

Objective 2.2: Language-based interaction

Challenge 2
Objective 2.2: Language-based interaction

Why?

- EU comprises 27 nations & 23 official languages
- new online paradigms promote communication, collaboration, co-creation … but significant language barriers remain
- single European Information Space – one of the i2010 objectives

• Overall purpose:
support and enhance

- interpersonal & business communication
- information access & management

across languages

Challenge 2
Objective 2.2: Language-based interaction

a) Core research exploring new avenues for machine translation

- ground breaking, multidisciplinary, high risk – high promise research
- architectures & technologies that learn and adapt flexibly & effectively to different languages, domains & tasks
- catering for new forms of language & communication (e.g. online communities)

b) Problem oriented research for specific tasks & usage contexts

- online translation for the masses
- translation in distributed collaborative environments
- managing multilingual content & communication
- automatic acquisition & annotation of language resources

c) Community building & networking

- reinvigorate European machine translation (MT) community
- build bridges between MT and other relevant disciplines
- help develop & coordinate shared technical infrastructure, promote reusability & interoperability, foster evaluation

Outcome 1

a) Core research. Explore new research avenues (one IP, c 8 M)

- break new ground, foster a novel multi-disciplinary approach to machine translation
- architectures & technologies that can learn and adapt flexibly & effectively to different languages, domains & tasks
- catering for new forms of language & communication (eg online communities)
- high risk but high promise (accuracy, speed, scalability)
- language & translation models coupled with

Outcome 2

b) Problem oriented. Address selected challenges in a clearly defined usage context (~5 STR's, c 12 M)

- online translation for the masses
  - wide coverage (beyond GoogleTranslate); adequate quality, suitable at least for gisting/browsing; language embedded in documents, web pages, multimedia objects …
- translation in distributed collaborative environments
  - support interplay between authors, translators, editors/publishers & active users; innovative integration of automatic, interactive & human translation beyond current practices; technologies as well as processes & work/social interaction
- managing multilingual content & communication
  - a subset of the above focussing on the development & management of online content & services esp. their versioning & maintenance in multiple languages
- acquisition & annotation of language resources
  - (nearly-)automatic, high volume, high performance
  - mining the web as well available repositories (eg corpora) and public information sources

Outcome 3

c) Community building & networking (1 or 2 NoEs, up to 6 M)

- **reinvigorate Europe's machine translation (MT) community**
  - bring together key players from scientific, technical & commercial circles (esp. SMEs)
  - stimulate cross-border cooperation (teams, institutions, national initiatives)
  - assess skills, foster training & exchanges; support smaller teams & not well-served languages
  - identify gaps, establish strategic roadmap encompassing technologies, resources & applications
- **build bridges between MT community and other relevant disciplines**
  - stimulate dialogue between diverse communities; identify opportunities & bottlenecks
  - initiate integrative research, prepare the ground for further collaboration
  - explore medium to long term approaches, identify possible shifts in paradigm
- **promote and coordinate shared infrastructure, harmonisation & evaluation**
  - infrastructural support: portal services, inventories & repositories of general interest tools & raw/annotated datasets, their documentation
  - active promotion of reusability & open-source; metadata, harmonisation of representation & annotation schemes
  - foster widely recognized benchmarks ...

Practical info

Objective 2.2 – Language-based interaction

Budget: **26 Meuro** under Call 4

Managed by: Unit E1, Luxembourg

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- ICT 2008, Lyon: info session on day 2 p.m.
- Inquiries: from the call publication date
- **Pre-proposals:** from Dec 1st until 3 weeks before the call closing date

Thank you for your attention!

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