

FP6: IST priority: IST 2002- 2.3.2.4

Cognitive Systems scope and objectives

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Part 1

Cognitive Systems scope & objectives



Some history (1)

2000:

Cognitive Vision Systems - *towards machines that 'see'*

emphasis on: robust and versatile systems

from application-specific to generalised solutions

from constrained to real world environments

approach:

from low-level processing & robustness of individual components to a systems approach where *all* components - including high-level cognitive functionalities - have a role to play in assuring robustness

working across areas, combining biological vision, AI, computer vision,...



Some history (2)

2002:

Where to take the field?

Developments in AI and cognitive neuroscience

+

Hardware development

- 1980s: cheap, small processors \Rightarrow ubiquitous computing
- 1990s: cheap, small lasers \Rightarrow ubiquitous communications
- 2000s: cheap, small sensors \Rightarrow **ubiquitous perception ??**

-link interconnected computational world with real physical world

-if these perceptually-enabled systems could understand and act?



Some history (3)

2002:

Cognitive Systems - towards machines that 'understand'

- not just vision, but perception
- systems that can act/interact
- real world environments
- maintain emphasis on interpretation (exclude complex mechanical manipulation, control etc.)
- need for embodiment?
- work across areas - computer vision, linguistics, AI, robotics, neuroscience, psychology, philosophy,..



June 17, 2003 Call for proposals

2003: IST Work Programme 2003/2004 (extracts from Strategic Objective IST-2002 2.3.2.4 Cognitive Systems)

- **Objective:** To construct physically instantiated or embodied systems that can perceive, understand ... and interact with their environment, and evolve in order to achieve human-like performance in activities requiring context-(situation and task) specific knowledge.
- **Focus** is on: methodologies and construction of robust and adaptive cognitive systems integrating perception, reasoning, representation and learning, that are capable of interpretation, physical interaction and communication in real-world environments for the purpose of performing goal-directed tasks.
- A main target of this research is interdisciplinarity, *i.e.*, to carefully consider the integration of different disciplines including computer vision, natural language understanding, robotics, artificial intelligence, mathematics and cognitive neuroscience and its impact on overall system design.



What are we talking about?

Cognitive systems - artificial systems combining perception, action, reasoning, learning and communication

- may derive inspiration from biological intelligence
- exhibit generalisation - cover diverse set of tasks and domains.
- need for a scientific foundation - new concepts & methods, experimental validation, theoretical contributions,
- provide an enabling technology for robotics & automation, natural language understanding, man-machine interaction, etc
- emphasis is on systems and on *interrelation* between functions and not component methods for specialised tasks



Features of cognitive systems

Will require convergence of action, perception and reasoning

- **Action:** control, communication/interaction, change of internal system state
- **Perception:** may provide models, lead to selection of behaviours, execution of actions
- **Reasoning** - often required for coordinating perception and action: for selecting transformations, behaviours, plans; adapting plans, generating new plans

And to be general, a cognitive system must learn

- Many types of reasoning & learning; many forms of representation.



Research on Cognitive Systems

should lead to fundamental insights on:

The nature of cognition - requirements, properties,..

Architectures for cognition - what to model, representations, concurrent processes, memory, integration, autonomy,..

Perception - need to distinguish top-down & bottom-up processes

Learning - what modes of learning; learning categories, competences, concepts, affordances; integrating new & old knowledge/skills coherently

Autonomous Systems - varieties, mechanisms, requirements

Social Interaction - communication, cooperation, competition

Goals - specification, learning



Role of Applications

Not about application development!

Applications serve to:

- provide research questions
- demonstrate impact of conceptual/technical innovation

Domains include:

adaptive intelligent environments, robotic assistants, visual surveillance, control of complex processes, non- disruptive personalisation of software, ..



Part 2

Submitting a Proposal



The timetable

- call for proposals published: 17 June 2003
- closing date for submission: 15 October 2003
- evaluation in November 2003
- hearings in December 2003
- negotiations from January 2004 onward
- contract awarding in May/June 2004
- projects due to start in June/July 2004



Instruments

Instruments refer to the different types of project funded in FP6.

- Integrated project (IP) - 'new' - objective driven research programmes whose primary deliverable is new knowledge
- Network of excellence (NoE) - 'new' - programmes of joint research & resource sharing which contribute to reinforcing & sustaining scientific excellence
- Specific targeted research project (STReP) - well defined and precisely focused research aimed at generating new knowledge
- Coordination action (CA) - support networking and co-ordination of research
- Specific support action (SSA) - preparatory activities, dissemination,...



Using the new instruments

- do not artificially create an IP from a STReP!
- an IP should be THE project in the target area
 - an ambitious & progressive endeavor
 - with clearly defined milestones & checkpoints across the whole project lifetime
 - clear management structure
- NoE should be interdisciplinary & integrate critical mass of expertise from the leading research centres
 - act as a “Virtual Centre of Excellence”
 - spread excellence beyond the consortium



Ideal IP

- the “ideal” IP should encompass
 - genuine research work, clearly specifying innovation vs state-of-art and justifying methods proposed
 - “engineering” tasks
 - system integration & validation (“total system” approach)
- along with
 - demonstration & comparative performance evaluation
 - dissemination of results
 - training & awareness
 - cooperation & exchanges with related national and international efforts



Indicative Figures

Room for both old & new instruments ~ 30% of budget earmarked for old instruments

- IPs
 - up to 4 years, 5-15 M€ (EU funding)
- NoEs
 - up to 5 years, 3-6 M€
- STRePs
 - up to 3 years, 1-3 M€
- CAs and SSAs
 - up to 3 years, 0,5-1,5 M€



Outcome of call

- fewer, bigger projects wrt. FP5
- 25+ M€ available
 - 2-4 IPs
 - 1-2 NoEs
 - 4-5 STRPs
 - 0-2 CAs and SSAs
- some 9-10 proposals likely to be retained for funding ... highly selective process!



Partnerships

- consortium
 - **IPs** 6-12 partners, from 3+ countries
 - **NoEs** 4-6 “core” partners min., from 3+ countries
 - **STRPs** 4-6 partners, from 3+ countries
- cohesive agenda: competent, committed & reliable partners
- complementarity: cover all areas you need
- focus: avoid irrelevant or marginal topics
- duplication of competence
 - necessary for NoEs
 - acceptable for IPs where dictated by project needs
- industry/SME/academia/NAS participation: as dictated by project needs



Financial

- project funding commensurate with expected results & impact
- funding of partners depends on individual role & input
- partners' input: labour, know-how, facilities
- choose reliable (i.e. financially sound) partners
- provide all key data on resources and costs
 - sound costing adds to credibility



Coordination

- project leader(s)
 - proven management skills
 - international project experience
- coordinator's functions
 - interface consortium-EC
 - financial administration
 - contract signatory
- coordinator & partners
 - reporting, against schedule [7-10% of project effort]



Some lessons

from first Call evaluation:

- do not artificially adapt a proposal to a strategic objective theme
- respond to *all* the evaluation criteria, paying good attention to non-research issues e.g. demonstration, dissemination ...
- pay attention to using the full range of activities allowable for the new instruments, e.g. training
- pay extra attention to co-ordination of large projects; ensure that enough project management expertise is available



Also

- ensure that the proposal brings out key innovations in a concrete way
- depth of participation rather than long list of organisation names
- check relevance of your ideas with EC staff, at an early stage



More info

Call-related Documents:

- http://fp6.cordis.lu/fp6/call_details.cfm?CALL_ID=74#

ECVision Web site:

- www.ecvision.info

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