THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

Robotics

Horizon 2020

Call for proposal:
ICT24 - Robotics

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Robotics
Directorate-General for Communication Networks, Content and Technology
European Commission
Outline of ICT24 - 2015

Introduction and background information
French Participation in FP7 – H2020: Robotics

Overview of the Call

ICT 24.a Research & Innovation Actions (RIAs)
ICT 24.b Innovation Actions (IAs): industry-academia cross fertilisation
ICT 24.c Innovation Actions: robotics use cases
ICT 24.d Pre-Commercial Procurement (PcP) in robotics
ICT 24.e Coordination Actions

Additional information
Robotics today – key issues

- Millions of robots in the world today – many more tomorrow
- Not just on the factory floor, but also in hospitals, transports, fairs, shops, farms...
- Robots becoming much more intelligent, cooperative, versatile, flexible...
  - R&D&I challenges
- Huge untapped potential
  - Economic and societal impact
Robotics in EU programme

• Dedicated unit created ten years ago (FP5-FP6-FP7-H2020)
  • More than 100 ongoing projects
    - over 700 partners
    - over €500m funding
  • €70m–€80m funding for new projects per year
  • 1 call per year, up to 200 proposals
  • About 20 new projects every year
  • Emphasis in FP6 and FP7 on perceiving, understanding, acting – cognitive, intelligent enabling technologies
• Additional robotics related activities in application areas: Health, Agriculture, Transport,…
• FET (Future and emerging technologies)
First H2020 Call – ICT23

Numbers

- 155 proposals, 127 RIA + 28 IA; 13 RIA + 4 IA selected

Success rate

- 1:9 of proposals

Selected proposals – industrial participation

- Partners: 34% (11% SMEs)
- Funding: 26% (10% SMEs)

N.B. multiple submission a questionable approach
    numbers indicate that success rate decreases rapidly with number of applications

-> focus your efforts – target excellence
First H2020 Call – ICT23

Coverage
- Manufacturing (1/3), Agriculture (1/5), Civil, Commercial, Healthcare

Increased industrial participation
- Most funded proposals involve at least one industrial partner
- Industrial coordinator: 29% of funded proposals

Presence of the whole value chain
- research & development + innovation
- 70% of funded proposals involve end-users
French Participation in FP7 & H2020 Call1: ICT23
FP7 Robotics – French participation

Percentage of Funding per country - FP7 - Robotics (ICT & FoF)
H2020: CALL1 - ICT23 Robotics
French participation

Percentage of Funding per Country

Country: DE IT UK SE FR NL AT ES EL BE PT CH IL CY
Percentage: 30.92% 16.35% 13.09% 10.11% 8.46% 5.17% 4.45% 3.88% 1.78% 1.69% 1.62% 1.03% 0.74% 0.72%
H2020: CALL1 - ICT23 Robotics – participation/funding trends

Requested funding per country (decreasing)

Percentage of Funding per Country (decreasing)

FR

€48M

16.35%

13.09%

10.11%

8.46%

5.17%

4.45%

3.88%

1.78%

1.69%

1.62%

1.03%

0.74%

0.72%
Success rate of French Participants in H2020-ICT23

<table>
<thead>
<tr>
<th>SUCCESS RATE - RIA</th>
<th>SUCCESS RATE - IA</th>
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<tr>
<td>Nº PARTICIPANTS</td>
<td>FR success rate</td>
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<tr>
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Journée Robotique – Paris – 16 January 2015

EUROPEAN COMMISSION

HORIZON 2020
FP7 Robotics – French participation: domains of expertise
Some illustrations of the French landscape in FP7
H2020: CALL1 - ICT23 Robotics
French participation: expertise
FP7 Robotics – French participation: type of organisations

REC: Research Organisations / PRC: Private for Profit (excluding Education)
HES: Higher or Secondary Education / PUB: Public body (excluding Research and Education)
H2020: CALL1 - ICT23 Robotics French participation: Type of organisations
French Participants in FP7 ICT Robotics and FoF
French Participants in ICT-23 Selected Projects
Success rate of French Participants in H2020-ICT23

SUCCESS RATE - RIA

SUCCESS RATE - IA
Next Call – ICT24 – Robotics
Background: PPP
PPP in Robotics – SPARC

EC (public)

SRA - STRATEGIC RESEARCH AGENDA

euRobotics (private)

Work Programme

Call implementation

Industry

Academia

End-Users

http://sparc-robotics.eu/about/
Essential reading for proposers, providing detailed definitions of technologies and abilities and illustrative examples of the selected priorities.
PPP and the constituency

- The call organisation and operations are run by the European Commission
- The evaluation and selection of proposals does not involve the private side of the PPP – done by the Commission with the help of independent experts
- Proposers need not be PPP members
- PPP membership gives no advantage or preferential treatment in evaluations
- But PPP membership gives an opportunity to be involved in shaping future funding directions
Overview of the Call
### Overview of ICT-24 Robotics

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Impact

• By coupling research and innovation, H2020 aims to drive economic growth and create jobs
• H2020 gives more weight to impact
• For Innovation Actions:
  • Impact criterion weighted by a factor of 1.5
  • Impact considered first when tied scores
• Make the robotics contribution to impact more direct and more explicit than in previous framework programmes.
Expected impact in the WP (1/2)

- Increase Europe's **market share in industrial robotics** to one third of the market and maintain and strengthen Europe's market share of 50% **in professional service robotics** by 2020.

- Increase Europe’s market share in **domestic service robots** to at least 20% by 2020.

- Improve the competitiveness of Europe's **manufacturing** sector, in particular **SMEs**, address pressing technological challenges and the effect of an aging workforce.

- Improve **Technology Readiness Levels** of robotics technologies.

- Increase **Industry-Academia cross-fertilisation** and tighter connection between industrial needs and academic research via technology transfer, common projects, scientific progress on industry-driven challenges.
Expected impact in the WP (2/2)

• **Deploy** robotics technologies in **new application** domains.
• Contribute to an **inclusive society** through robotic technologies (e.g. exoskeleton, advanced prosthesis).
• Address **ethical, legal and societal** issues and engage the wider **public**.
• Create and maintain **world class research** in Europe and achieve excellent standards of publications and research outputs.
• Ensure sufficient numbers of **well-trained professionals** required by the growth of the industry.
• Ensure **wide use of shared resources**.
• Contribute to the **community building** of the European robotics community.
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**ICT24.a – Research & Innovation Actions**

- **Priority market domains:** healthcare, consumer, transport
- **Advance key technologies for priority domains**

| RIA 100% Small/Large | €50m |

**ICT24.b - Technology transfer**

- **Industry-academia cross-fertilisation**

| IA 70% Large | €12m |

**ICT24.c - Technology transfer**

- **Robotics use cases**

| IA 70% Small/Large | €12m |

**ICT24.d - Pre-commercial procurement in robotics: healthcare**

| PcP 70% Large | €5m |

**ICT24.e - Community building and Robotics competitions**

| CSA | €4m |
ICT 24.a Research & Innovation Actions (RIA) to advance key technologies relevant for industrial and service robotics (1/2)

- Advance robotics abilities + key technologies and their combination

\[ \Rightarrow \text{market domains: healthcare, consumer, transport} \]

\[ \Rightarrow \text{and enabling robotics technologies for disabled people, esp. people with upper, lower-limb disabilities or amputees, allowing them to gain functionalities with exoskeletons or prostheses} \]

- Demonstrate increased TRL (Technology Readiness Level) relevant for the market domains
ICT 24.a **Research & Innovation Actions (RIA)** to advance key technologies relevant for industrial and service robotics (2/2)

- Research results must be validated in real-world setting, demonstrating progress in abilities and technologies **relevant** to these market domains
- 100% funding → main focus on RTD, not innovation
- From basic research to more applied research (depending on TRL)
ROBOTICS ABILITIES
KEY TECHNOLOGIES AND THEIR COMBINATION
Robotics abilities

- adaptability, cognitive ability, configurability, decisional autonomy, dependability, flexibility, interaction capability, manipulation ability, motion capability, perception ability

Key robotics technologies

- cognition, human-robot interaction, mechatronics, navigation, perception

Technology combinations - NOT EXHAUSTIVE

- such as grasping and dexterous manipulation, physical HRI, mobile manipulation, reactive planning and other combinations (more examples in the SRA)

FOR MORE DETAILS SRA/MAR
MARKET DOMAINS
Market domains: ICT 24.a

- Healthcare
  - Surgical Therapy & rehabilitation
  - Training
  - Assistive robotics

- Consumer (B2C)
  - Domestic appliances
  - Entertainment
  - Education
  - Assistive living
  - Personal monitoring and security

- Transport
  - Goods Transport
  - People Transport
  - Logistics
  - Warehousing
  - …

For more details: SRA/MAR
Market domains: ICT 24.a

- Healthcare
  - Surgical Therapy & rehabilitation
  - Training
  - Assistive robotics
  - …

- Consumer (B2C)
  - Domestic appliances
  - Assistive living
  - Personal monitoring and security
  - …

- Transport
  - Goods Transport
  - Warehousing
  - …

• Enabling robotics technologies for disabled people

For more details: SRA/MAR
Market Domains

set

Requirements

Capability

provide

Technologies

Not in isolation but in the context of …
Not in isolation but in the context of …

Market Domains

set

Requirements

Capability

provide

Technologies

STEP CHANGES

TRL
What do I find in the Strategic Research Agenda (SRA) and the Multi-Annual Roadmap (MAR)?

- Detailed definition of Market domains, Technologies and Technology Combinations
- Mapping: application domains vs. abilities vs. technologies
  - Technology/ability gaps for specific application domains
  - Prioritised necessary step changes in technologies/abilities
- Use SRA/MAR information to situate your project contribution
Recipe for a good proposal

MARKET DOMAIN

ABILITY

• Step change: current vs. target

TECHNOLOGY/TECHNOLOGY COMBINATION

• Step change: current vs. target
• How? Methodology

VALIDATION

• Plans to demonstrate progress/step changes in abilities/technologies RELEVANT to the selected market domain(s)
• Targeted improvements (TRLs), metrics, validation plans

IMPACT

• Specific Objective(s)
• Concrete plans to reach the objective(s)
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ICT 24.b Innovation Actions (IA)
Technology transfer – industry-academia cross-fertilisation

- Define **joint** industrially relevant scenarios, **share research infrastructure**, cluster activities
- Not limited to a particular market domain
- 1 or 2 Large project(s)

arrow left May include open calls for small scale Industry-Academia experiments with industrial platforms

arrow right Support to third parties can be given (cf. Echord/EuRoc – but different administrative mechanism)
ICT 24.b Innovation Actions (IA)

Technology transfer – industry-academia cross-fertilisation

- Financial support to third parties – conditions in Annex K
  - Proposals using this mechanism are to detail the objectives and results to be obtained and include the following:
    - a closed list of the different types of activities that qualify for financial support
    - the persons or categories of persons which may receive financial support
    - the criteria for awarding financial support
    - the criteria for calculating the exact amount of the financial support
    - the maximum amount to be granted to each third party (may not exceed €60,000 for each third party, unless it is necessary to achieve the objectives of the action)
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ICT 24.c Innovation Actions (IA)

Technology transfer – Robotics use cases

- Proposals focusing on transferring latest research results from the laboratory to the industry/users
- The expertise covering the complete lifecycle must be present in proposal (from research to integration to users)
- Concrete plan to reach impact carefully explained
- Business case made
- User driven proposals and not technology push – users needed in the consortium
- All market domains
Typical consortium

- Define user needs
- Provide real-world test environments
- Validate results
- Integrate solutions for real-world problems
  - Generalise results
  - Market outreach

End users

- Supply state-of-the-art technology
- Conduct experiments

Research

Technology transfer

Robotics industry

Validation
## Overview of ICT-24 Robotics

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ICT 24.d Pre-Commercial procurement (PcP)

- Demand driven innovation led by public procurers in areas of public interest, including pre-commercial procurement of innovative robotics solutions for the healthcare sector

- Gathering public procurers with common needs

- One large project (up to €5m) including 2 major components
  - Refining requirements; selection of suppliers and evaluation of progress
  - RTD work to be procured

- End-user integration absolutely essential

- Concept of PcP Pilots exists in ECHORD++

- Examples: SMART@FIRE, SILVER

How does PCP/PPI work?

- **PCP** to steer the development of solutions towards concrete public sector needs, whilst comparing/validating alternative approaches from various vendors.

- **PPI** to act as launching customer / early adopter / first buyer of innovative commercial end-solutions newly arriving on the market.

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**Applied R&D / Pre-commercial Procurement (PCP)**

**Public Procurement of Innovative Solutions (PPI)**

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**PCP:** specific approach to procure R&D services enabling:

- price/quality products that better fit public sector needs
- earlier customer feedback for companies developing solutions
- better take-up/wider commercialisation of R&D results

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**Applied R&D / Pre-commercial Procurement (PCP):**

- **Phase 0** Curiosity driven research
  - Supplier A
  - Supplier B
  - Supplier C
  - Supplier D

- **Phase 1** Solution design
  - Supplier B
  - Supplier C
  - Supplier D

- **Phase 2** Prototype development
  - Supplier B
  - Supplier C
  - Supplier D

- **Phase 3** First test products / services
  - Supplier B
  - Supplier D

- **Phase 4** Deployment of commercial end-products
  - Supplier(s) A, B, C, D and/or X
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<td></td>
<td>CSA</td>
<td></td>
<td></td>
<td><strong>4m</strong></td>
</tr>
</tbody>
</table>
ICT 24.e Coordination Actions (CSA)
Community building and Robotic competitions

- Supporting the European robotics community
  - Networking, education, outreach, public awareness, technology watch, standardisation, and industry-academia collaboration, links to national programmes and initiatives.
  - Ethical, legal, societal and economical aspects
- International cooperation (intra or extra-EU)
  - Impact to be demonstrated, matching resources expected
- Coordinating work on the next generation of cognitive systems and robotics
- Robotic competitions: towards smarter robots
  - Budget for one competition

Proposals are not meant to cover all the points
Additional information
Background documents

1. SRA / MAR
   http://sparc-robotics.eu/about/

2. Q&A document (continually updated)

3. Infoday Presentations, January 2014

4. ICT proposers day Firenze, 9–10 October, Robotics

5. Brokerage event, Brussels, 9 December 9
   http://sparc-robotics.eu/brokerage-day-for-ict24-2015-robotics-2/
Current project portfolio
(project factsheets - Robotics)

http://cordis.europa.eu/fp7/ict/robotics/


H2020 ICT-23: summaries of selected projects:
Other Robotics-related calls & Opportunities
<table>
<thead>
<tr>
<th>H2020 Challenge and topic</th>
<th>M€</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICT (Information and Communication Technologies)</strong></td>
<td></td>
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<tr>
<td>• ICT 24 2015 Robotics</td>
<td>83</td>
</tr>
<tr>
<td>• ICT 30a 2015: Internet of Things and Platforms for Connected Smart Objects - covers multiple devices potentially including robots</td>
<td>50*</td>
</tr>
<tr>
<td>• ICT 34 2015 ICT contribution to pilot for co–investments by business angels in innovative ICT firms-including robotics #this is funded also by Access to Risk Finance section 3.1 Piloting Co-Investments by Business Angels in Innovative ICT Firms</td>
<td>15+15*</td>
</tr>
<tr>
<td>• ICT 37 – 2014-2015 Open Disruptive Innovation Scheme (implemented through the SME instrument) – open to any ICT-related topic</td>
<td>**</td>
</tr>
<tr>
<td><strong>FET (Future and Emerging Technologies)</strong></td>
<td></td>
</tr>
<tr>
<td>• FETOPEN 1 – 2014/2015: FET-Open research projects - open to any science &amp; technology topic</td>
<td>**</td>
</tr>
<tr>
<td>• FET Flagships: 2b Human Brain Project FET Flagship Core Project – includes neuro-robotics (membership of Framework Partnership Agreement and specific conditions apply)</td>
<td>89*</td>
</tr>
<tr>
<td><strong>NMP (Nanotechnologies, Advanced Materials, Biotechnology, Advanced Manufacturing &amp; Processing) DEADLINE – FEBRUARY 4th 2015</strong></td>
<td></td>
</tr>
<tr>
<td>• FoF 9a – 2015: ICT Innovation for Manufacturing SMEs (I4MS) - including &quot;Highly flexible and near-autonomous robotics systems (application experiments&quot;) (one of three areas of technologies which are targeted for the Innovation actions)</td>
<td>35*</td>
</tr>
<tr>
<td>• FoF 11 – 2015: Flexible production systems based on integrated tools for rapid reconfiguration of machinery and robots</td>
<td>77*</td>
</tr>
</tbody>
</table>

* Figures refer to the WP main topic, not to sub-topics on robotics. ** Funding schemes open to any topic
### H2020 Challenge and topic

<table>
<thead>
<tr>
<th>SC 2 Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy</th>
<th>M€</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Blue Growth BG-7-2015: Response capacities to oil spills and marine pollutions - including the use of specialised vessels and underwater (autonomous) vehicles</td>
<td>8*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SC 4 Smart, green and integrated transport</th>
<th>M€</th>
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</thead>
<tbody>
<tr>
<td>• MG.3.6-2015 Safe and connected automation in road transport - automated and progressively autonomous driving applications</td>
<td>23*</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>SC 5 Climate action, environment, resource efficiency and raw materials</th>
<th>M€</th>
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</thead>
</table>

<table>
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<tr>
<th>SC 7 Secure societies – Protecting freedom and security of Europe and its citizens</th>
<th>M€</th>
</tr>
</thead>
<tbody>
<tr>
<td>• FCT-3-2015: Forensics topic 3: Mobile, remotely controlled technologies to examine a crime scene in case of an accident or a terrorist attack involving CBRNE materials</td>
<td>44.26*</td>
</tr>
</tbody>
</table>

* Figures refer to the WP main topic, not to sub-topics on robotics.
** Funding schemes open to any topic
Projects Open to additional Participants or Offering shared facilities:

EuRoC  http://www.euroc-project.eu/
ECHORD ++  http://www.echord.eu/
SMERobotics  http://www.smerobotics.org/
FoF I4MS – European Robotics Challenges - EuRoC

- Three industry-relevant Challenges
  - Open call framework
  - Three stages of increasing complexity (incl. application experiments)
  - Benchmarking and performance evaluation on shared resources

Reconfigurable Interactive Manufacturing Cell (RIMC)
Shop Floor Logistics and Manipulation (SFLM)
Plant Servicing and Inspection (PSI)
ECHORD ++
http://www.echord.eu/

European Clearing House for Open Robotics Development Plus Plus

Experiments  Facilities (RIFs)  PDTI  News  Services  About Us

RIF = Robotics Innovation Facility -> CEA LIST
PDTI - Public end-user Driven Technological Innovation
THANK YOU