**Horizon 2020 - The EU Framework Programme for Research & Innovation (2014-2020)**

## *September 2014*

# H2020 – LEIT - ICT
# Robotics
# 2014 & 2015
# Questions & Answers

## Version 15/09/2014

*[Please note that this document updates and supersedes previous versions. Some references may still be draft, and readers might need to check for the latest official H2020 reference documents.]*

**H2020 – LEIT - Information and Communications Technologies**

**Workprogramme 2014 - 2015**

**Robotics topics ICT-23-2014 & ICT-24-2015**

*European Commission*

*DG CONNECT*

*Unit A2 – Robotics*

http://cordis.europa.eu/fp7/ict/robotics/
http://ec.europa.eu/digital-agenda/en/news/information-day-horizon-2020-call-1-and-2-objective-ict-23-and-ict-24-robotics

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# 1. Introduction

Horizon 2020 is the new EU framework programme for research and innovation and runs from 2014 to 2020 with a budget of just over €70 billion. There are far too many differences with FP7 to recap here, so you are encouraged to consult the official web sites e.g. *[http://ec.europa.eu/research/horizon2020/index_en.cfm]*. The main difference with FP7 is that

- H2020 covers now also some funding programmes which were previously outside the Framework programme, like the Competitiveness and Innovation Framework Programme (http://ec.europa.eu/cip/) and the European Institute of Innovation and Technology (http://eit.europa.eu/)
- H2020 provides a range of funding for the whole research-innovation cycle, under one set of rules.

It comprises three main pillars: Excellent Science, Industrial Leadership and Societal Challenges. Robotics / cognitive systems figure in each of these pillars. This document refers to the robotics topic under the ICT Workprogramme in the Industrial Leadership pillar, in the LEIT section "Leadership in Enabling and Industrial Technologies".

It provides additional background information on the Robotics topics labelled "ICT 23-2014" and "ICT 24-2015".

The main site for H2020 official Decisions is H2020 WP 2014-15 . The Horizon 2020 work programmes plus annexes adopted by the Commission on 10th December 2013 are available on the

Participant Portal:
http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html .

***Important note***: this Q&A is non-binding and does not supersede the official Call documentation. The contents apply to both robotics calls (ICT 23- 2014 and ICT-24- 2015) unless otherwise indicated. The Q&A will be updated as necessary, including for Call 2 ICT-24- 2015.

This version adds some questions asked at the January 2014 Info Day in Luxembourg (relating to the PPP, use of the SRA and MAR, basic research, ethics, literature surveys, and non-EU countries) and updates the list of robotics topics across different H2020 Work programmes.

# 2. Robotics in LEIT ICT – at a glance

This table gives an overview of the robotics topics listed in the ICT Workprogramme for 2014 / 2015.

The main difference between the two Robotics calls is in the priority domains targeted. Also an action aimed at industry – academia cross-fertilisation and a coordination action for community building / robotics competitions are called for in 2015.

| **ICT 23 – 2014: Robotics**<br><br>Publication: 11<sup>th</sup> December 2013<br>Deadline: 23<sup>rd</sup> April 2014 | **Funding Scheme / Funding rate** | **Budget (M€)** |
|---|---|---|
| a. Research & Innovation Actions<br><br>Priority domains: manufacturing, commercial, civil, agriculture<br><br>b. Innovation Actions: Technology transfer - Robotics use cases<br><br>Priority domains: none specified<br><br>c. Pre-commercial procurement in robotics<br><br>Priority: public safety and monitoring of environment and infrastructure | a. Small & Large EU contributions[1] / 100%<br><br>b. Small & Large contributions / 70%<br><br>c. Large contribution / 70% | a. 57<br><br>b. 12<br><br>c. 5 |
| **ICT 24 – 2015: Robotics**<br><br>Publication: 15<sup>th</sup> October 2014<br>Deadline: 21<sup>st</sup> April 2015 | **Funding Scheme** | |
| a. Research & Innovation Actions<br><br>Priority domains: healthcare, consumer, transport<br><br>b. Innovation Actions: Technology transfer - Industry-academia cross-fertilisation<br><br>Priority domains (see WP text)<br><br>c. Innovation Actions: Technology transfer - Robotics use cases | a. Small & Large contributions / 100%<br><br>b. Large contributions / 70%<br><br>c. Small & Large contributions / 70%<br><br>d. Large contribution / 70% | a. 50<br><br>b. 12<br><br>c. 12<br><br>d. 5<br><br>e. 4 |

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[1] *Small contribution*: contribution from the EU of between EUR 2 million and EUR 4 million
- *Large contribution*: contribution from the EU of between EUR 5 million and EUR 8 million

| | |
|---|---|
| Priority domains (see WP text)<br><br>d. Pre-commercial procurement in robotics<br><br>Priority domain: healthcare<br><br>e. Coordination Actions: Community building and Robotic competitions | e. Coordination & Support Actions / 100% |

# 3. Research and Innovation Actions

**Q:**     **What is the main research requirement in robotics?**

**A:**     The main aim is to advance abilities and key technologies relevant for industrial and service robotics. A list of abilities and key technologies is provided in the Workprogramme (WP). No single project is expected to target all of these, so proposers should seek a suitable focus for their proposal.

**Q:**     **What is the main difference with the previous robotics Call?**

A:     Research and Innovation now has to be advanced in the context of the market domains prioritized in the WP and progress has to be demonstrated in real-life setups relevant for these domains,

**Q:**     **What is the PPP in robotics?**

A:     The Robotics Public Private Partnership (PPP) between the European Commission and the robotics community (represented by euRobotics aisbl), provides the mechanism for jointly developing R&D&I strategy and priority goals within Europe. The PPP is open to new members but proposers do not need to join the PPP to submit a proposal. [http://www.eu-robotics.net/ppp] and the participation of EuRobotics members in a proposal is neither needed nor an advantage.

**Q:**     **What is meant by "roadmap-based" research?**

**A:**     The key technology priorities in this sub-topic are based on the multi-annual roadmap (MAR), of the Robotics PPP's Strategic Research Agenda (SRA). Whilst the ICT Workprogramme is self-contained, proposers are invited also to consult the SRA to gain additional insights and to identify, for different application domains, technology research requirements and options. [http://www.eu-robotics.net/ppp/downloads/]

**Q:**     **How do I use the SRA and the Multi-annual roadmap?**

**A:**     In the Strategic Research Agenda (SRA), the proposers will find a definition and examples of Market Domains, Applications, Technologies, Goals and Targets. The Multi-Annual Roadmap (MAR) is a companion to the SRA, providing a greater level of technical and market detail. For a given market domain, the targets in terms of technology/system ability are identified, the proposal should situate its contribution with respect to these targets. These targets might not be exhaustive, but give some indicative examples. In parallel, the current levels of robotics systems abilities and targets are identified, as well as the expected step changes in technologies the metrics and benchmarks to measure corresponding progress and their impact on domains and products. The proposal should specify its objectives in terms of such step changes in abilities and technologies, and in terms of increased TRL (Technology readiness Level) , for which the MAR also provides some indicative examples and guidelines.

By making direct reference to the MAR, proposals should:
- Identify the priority market domain(s) being targeted.
- Identify the desired requirements in that priority market domain.

- Identify the system abilities that are required to satisfy those requirements.
- For each ability, say what step change in system ability levels is needed to satisfy those requirements (identify current state-of-the-art ability level and the expected ability level).
- For each ability, say what step change in system parameters is needed to satisfy those requirements (identify the current state-of-the-art parameter value and the expected parameter value).
- Identify one or more technology or technology cluster.
- For each technology, identify the technology capability step change needed to achieve the ability step change (identify the current state of the art capability and the expected capability).
- Provide a set of metrics or benchmarks to be used to assess the achievement of the technology step change(s).
- Identify the impact of the technology step change(s).
- Identify the Technology Readiness Level(s).

**Q:**    **How do I interpret the Market domains mentioned in Call 2?**

**A:**    Call 2 (RIA section) cites "healthcare, consumer and transport" as targeted market domains. These are to be taken in a broad sense, as they refer in the SRA to (a) high-level categories e.g. consumer robots and transportation robots (which would for example include robots which transport goods e.g. for logistics as well as people) and (b) to a specific market (healthcare). The same approach applies to market domains cited in the IA – Innovation Actions) section of the call.

**Q:**    **What kind of research is encouraged in this section – basic or applied?**

**A:**    Several types of research actions are open to proposers, ranging from basic research to more application-driven projects. In each case, going beyond the state of the art is the key element. Fundamental research is not excluded, it is however important to justify this research in the context of the application needs and technology research gaps and bottlenecks - see the Workprogramme and the Robotics SRA for further indications. More basic-research oriented proposals should at least describe how this could be useful for a market domain indicated in the WP.

**Q:     Should a project under this topic aim at ready-to-market products?**

**A:**     Not in the project lifetime but projects under this topic are expected to improve the "Technology Readiness Level" (TRL) of robotics systems – see Q&A on TRL below.

**Q:     What kind of measures of progress do you expect in proposals?**

**A:**     Typical factors to assess progress and success in robotics systems are measured for instance in terms of improved functionality, behaviour, performance, precision, robustness, scalability or for more downstream projects, prospective cost-effectiveness and user acceptance. Proposals should put forward concrete, achievable targets which can be measured in such terms.

An essential component of these measures of success comprises metrics, benchmarks, and performance indicators which allow the evaluation of key system properties objectively. This depends of course on the particular R&D issues and application scenarios addressed. Particular attention should be given to these aspects by proposers. If necessary the project will develop new methods for evaluations, but should avoid at all costs "reinventing the wheel".

Benchmarking activities in individual projects should aim to link into the "Shared Resources and Assessment" action which is addressed also in this Call.

The overall project result should contribute to the progression of a particular technology or system from one Technology Readiness Level to another. .

**Q:     What is meant by "Technology Readiness Level" (TRL)?**

A:     Technology Readiness Levels (TRLs) describe the progression of a technology, product or service in terms of its proven availability and suitability to a particular application or market. TRL is measured on a scale of 1-9 with high numbers indicating close to market maturity and low numbers indicating a status further from market realisation. A technology, product or service will typically progress sequentially through the levels, prior to market entry. TRLs originate in the space technology sector, and are used by US and European public authorities, in the oil and gas industry and now in some parts of H2020.

**Q:     Which Technology Readiness Level scheme does ICT Robotics use?**

A:     The H2020 Workprogramme sets out a general TRL scheme[2] (see extract below). The detailed interpretations of each level can differ, depending on the technology and on the field e.g. manufacturing, space, micro/nano technology etc. For LEIT-ICT-Robotics, this scheme is to be taken as an overall guide only and proposers are invited to consult the Robotics PPP Strategic Research Agenda and the Multi Annual Roadmap for further information and examples

| TRL | H2020 description |
|---|---|
| 1 | *Basic principles observed* |
| 2 | *Technology concept formulated* |
| 3 | *Experimental proof of concept* |
| 4 | *Technology validated in lab* |
| 5 | *Technology validated in relevant environment* |
| 6 | *Technology demonstrated in relevant environment* |
| 7 | *System prototype demonstration in operational environment* |
| 8 | *System complete and qualified* |
| 9 | *Actual system proven in operational environment* |

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[2] H2020 Workprogramme General Annexes
http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html

*Important note: The LEIT-ICT-Robotics Call does **not** specify which TRLs should be targeted. This is up to the proposer. However proposers should indicate the TRL they were starting from and the TRL they are aiming at.*

**Q:** **What is the role of systems development processes in the Call? (ICT 23 only)**

**A:** The aim of this sub-topic is to develop best practices in systems development and design which can benefit the whole robotics community. Research and innovation will focus on the processes, techniques and technologies, which will help to reduce systems development time and effort.

**Q:** **What is meant by "shared resources and assessment"? (ICT 23 only)**

**A:** The aim is to develop hardware test bed facilities plus software resources which would be made available to the robotics research community, thus saving costs and promoting common robotics metrics and benchmarks.

One large project, covering this whole topic, is encouraged. Proposals should ideally show the added value and the interest of the research community in such a facility. The project should ideally also provide engineering support to help researchers to develop their respective demonstrators, and to test the robustness of their research results. Open Source is encouraged here and should be described in the proposal.

Such shared facilities should also offer a good showcase for potential users.

**Q:** **What does the benchmarking action specifically aim for? (ICT 23 only)**

**A:** The goal is to develop, gather and validate robotics metrics and benchmarks. Tasks could include: survey of available initiatives in the field, networking at a European level and involvement of all relevant stakeholders (academics, industries, end-users), research activities linked to the definition of suitable metrics at sub-system and systems levels, creation of data sets of benchmarks, definition and setting of common platforms (simulators and real-world test-beds), software libraries (and if necessary mechanisms for sharing such infrastructure in Europe), contribution to standardisation in robotics and any other activities necessary to the emergence of a critical size effort. Cooperation will in particular be sought with running EU-funded competitions and other EU-funded projects, and if relevant international initiatives.

**Q:** **Where can I find funding for cognitive systems?**

**A:** Cognition is included in the list of targeted robotic technologies in the ICT Robotics Workprogramme. A further initiative on cognitive systems research is included in the FET proactive Workprogramme – a separate Call [FETPROACT 2 - 2014 "Knowing, doing, being: cognition beyond problem solving"][3].

**Q:** **Do neuro- and behavioural sciences fit in here?**

**A:** As an inspiration but <u>not</u> as a research topic per se and less than in previous Robotics Calls. Proposals focussing on these topics should consult other parts of H2020 (including the FET Proactive item relating to cognitive systems referred to above).

**Q:** **What about ethical issues in the conduct of research?**

**A:** Careful attention needs to be paid to ethics issues in the conduct of research actions in H2020. Proposers should submit "ethics-ready" proposals supplying all relevant background needed for the evaluation of this aspect. Proposals contravening ethical rules "may be excluded from the evaluation, selection and award procedures at any time" [H2020 Rules for Participation]

Hint for Robotics: there should be no need for animal experimentation in any project in this field and this is highly discouraged.

# 4. Innovation Actions: Technology transfer - Robotics use cases

**Q:** **What are "Robotics use cases"?**

**A:** The principal aim is to encourage take-up of new robotics systems by <u>end users in real-life environments</u>. The ideal project will showcase one or several real-life scenarios where robots can fit in and make a concrete difference in everyday conditions. Proposals will be user-driven – not technology push - but should also clearly define from which technology baseline they are starting.

Use-cases will NOT include major research work, but will aim to exploit existing research results and implement them to demonstrate improved system performance (in terms of e.g. productivity, quality of life etc.). Any research work should be strictly limited to e.g. component integration.

The proposal should directly involve all the expertise needed in the lifecycle from research to innovation as well as one or several <u>real-life end-users</u> who can provide solid feedback on the project results.

**Q:** **How should I exploit the results of a Use - Case?**

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[3] http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-fet_en.pdf

**A:**     The project focus should be on technology transfer. A clear economic / competitive position analysis or exploitation plan / business case is desirable in the proposal. Describe if and how this would be an investment opportunity. Will it achieve return on investment? Can the consortia members exploit the results themselves?

**Q:     Is this a repeat of the previous Robotics Use Case call?**

**A:**     Yes, but proposers should understand the focus on technology transfer rather than R&D.

**Q:     Are there any on-going examples of use-case projects in this domain?**

**A:**     Several use case projects resulted from ICT Call 10 Robotics e.g. REMEDI, PETROBOT or VINEROBOT [http://cordis.europa.eu/fp7/ict/robotics/docs/call10projects.pdf]. See also on-going projects in Factory of the Future like Robofoot (http://www.robofoot.eu/ ) or Hephestos [www.hephestosproject.eu], which aim at trialling and validation of robotics.

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TIP: Including too much research work and paying insufficient attention to real world applications or to business cases were major causes of Use Case proposal failure in the past.

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# 5. Innovation Actions: Technology transfer – Industry-academia cross-fertilisation (ICT 24 only)

**Q:     What is the strategic aim of industry-academia cross-fertilisation?**

**A:**     It aims specifically at helping to close the research-innovation gap by encouraging industry (mainly robotic manufacturers, but also users) and research institutions to work together more closely on an operational level, developing small research projects and to support technology transfer with tangible results. The broader aim is to have a systematic bidirectional exchange of views and opinions about robotic research trends, needs and technology developments.

**Q:     What kind of project is sought here?**

**A:**     Preferably a large-scale R&I project which assembles both industrial and academic research expertise and makes use of a shared research infrastructure to host small to medium-sized experiments. The experimenters may be drawn from the initial coordinating consortium or may be funded as third parties to the consortium. See for example ECHORD Plus Plus and EuRoc for illustrations of this approach[4] but the call is not restricted to these types of mechanism.

**Q:     Where can I find the reference document on third party financial support?**

**A:**     Part K of the General Annexes to the H2020 2014-2015 Workprogramme[5] outlines the main conditions for projects to fund third parties which were not originally named as consortium members. Where this possibility is indicated under the relevant topic, proposals which foresee a financial support to third parties, shall clearly detail the objectives and the results to be obtained and include at least the following elements:
- 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 EUR 60 000 for each third party <u>unless</u> it is necessary to achieve the objectives of the action).

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[4] European Clearing House for Open Robotics Development  http://www.echord.eu/ ; EuRoc too (http://www.euroc-project.eu/ )
[5] http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html#h2020-work-programmes-2014-15-annexes

# 6. Pre-commercial Procurement

**Q:** **What is pre-commercial procurement in the research domain?**

**A:** PcP refers to procurement of research and development services involving risk-benefit sharing under market conditions, and competitive development in phases, where there is a separation of the research & development phase from the deployment of commercial volumes of end-products. A PcP project is co-financed by the EC up to 70% of its overall eligible costs but the RTD services are to be subcontracted at 100% [http://cordis.europa.eu/fp7/ict/pcp/].

**Q:** **What should a PcP project do in practice, in Robotics?**

A: Bring together public procurement authorities with common needs, ideally in one large project (up to 5 M€EU funding) - to develop and refine their requirements and objectives in respect to the robots they wish to acquire, organise the selection of RTD service suppliers , monitor the selection progress and procure the actual RTD work. Existing examples of PcP projects in other domains include SMART@FIRE [http://www.smartatfire.eu/] and SILVER [http://www.silverpcp.eu/].

# 7. Coordination Actions: Community building and Robotic competitions (ICT 24 only)

**Q:** **How many coordination actions do you intend to fund under this topic?**

A: There is no pre-set number, but taking the topics into consideration, and to avoid sub-critical projects, one on community building / international cooperation aspects and another on competitions could be envisaged.

**Q:** **What is the aim behind Community building here?**

A: In this field there is a risk of fragmentation of knowledge-sharing and of research communities. This action aims to foster communication, co-ordination and co-operation among relevant communities, projects and programmes, linking European, national and international activities. Its agenda may cover: organising and supporting workshops, conferences, courses, exchanges of staff and researchers, development & dissemination of training material, access to development platforms, planning and sharing research agendas, and the creation of a web-based resource to facilitate research, education, and outreach to relevant industries and general audiences. It will build on and further extend the successes achieved by previous co-ordination actions.

**Q:** **What is expected in addressing ethical, legal, societal and economic aspects of robotics?**

A: Above all, a roadmap is expected to result which can help the robotics community and the public at large keep track of this complex and evolving topic, and help developers and businesses to anticipate or to evaluate ELSE barriers to technology development and deployment of emerging technologies, like driverless cars, civil drones or social robots, taking into account the equally important social and economic aspects. Proposals should address topics such as:

- potential ethical & legal issues surrounding future robotics deployment regarding e.g. data privacy, dealing with the public or vulnerable sections of society, legal rights and liability, potential dual use etc.
- societal concerns such as public attitudes to and acceptance of robots designed to perform social tasks in close contact with citizens,
- economic opportunities and barriers to widespread take up; the scale and effects of automation and robotics on the economy (labour market, wage polarization) etc.

Each of these topics and sub-topics has its own import, and individual proposals do not necessarily need to address them all. Proposals should concentrate on tractable issues related to autonomous robots and suggest concrete measures to tackle them at EC level. Proposals should situate themselves carefully with regards to past or ongoing related initiatives in the public and private domain, in particular SPARC (Robotics PPP), and avoid reinventing the wheel.

Useful consultation documents include SPARC Multiannual roadmap  http://www.eu-robotics.net/cms/upload/PDF/Multi-Annual_Roadmap_2020_Call_1_Initial_Release.pdf ; 2012 Eurobarometer survey on Public Attitudes to Robots http://ec.europa.eu/public_opinion/archives/ebs/ebs_382_en.pdf ; European Robotics Forum March 2014 Presentations http://www.eu-robotics.net/cms/index.php?idart=3008 (in particular on ELS and on Economic Aspects of Robots and Automation)..


**Q:**      **Which countries are targeted in the international cooperation action?**

A:      This is up to the proposer, keeping in mind that the idea is to encourage non-EU partners with requisite and complementary needs and skills, and with matching funding programmes or resources available to them, to cooperate on an equal footing with EU partners in research-related coordination actions and initiatives.

**Q:**      **What do you mean by "smarter" robots in the competitions?**

A:      This is a key issue. The competitions are not aimed at a 'nuts-and-bolts' engineering contest but at demonstrating scientific progress.

**Q:**      **Which competition topic is aimed at?**

A:      No specific topic is aimed for; indeed we would welcome an integrated effort, gathering different communities and topics. Proposals should ideally delineate the competition domain as concretely as possible, where meaningful reference scenarios or benchmarks can be developed and applied and where comparable results can be obtained from competing approaches and systems.

**Q:**      **What are the key features sought after in a competition proposal?**

A:      Competitions primarily target researchers, but having an industrial take-up dimension would be a plus. Private sponsorship is welcome. Open participation and transparent governance are essential. Evaluation mechanisms / criteria should be clearly spelt out in the proposal, in order to demonstrate the openness and fairness of the process. Proposals should clarify on which basis the competition will select the benchmarking scenarios, e.g. in the context of any internationally recognised and / or reproducible benchmarking scenarios. Competitions should be highly visible and include marketing activities. The European added-value needs to be clearly demonstrated. The proposal should describe what impact is expected from the project (support to the community, demonstration of scientific advance, reaching out to the general public, increasing the competitiveness of European industries, etc.).

# 8. Practical hints for proposals

**Q:**   **What makes for a good proposal, generally?**

**A:**   It is essential to understand that a good proposal is **a finished project plan ready to be implemented**, not a sales brochure. Therefore, make it concrete and specific, favouring substance over style and specifics over hype. It will be evaluated by your peers, who can only be convinced by knowledge of issues, understanding of problems, insight into solutions and feasibility of plans – all this demonstrated by substantiated statements. Having a great idea is not enough – it has to be backed up by a well thought-out and sufficiently detailed workplan.

## 8.1. Proposal concept and objectives

**Q:**   **What kind of added-value are you looking for in proposals?**

**A:**   R&I projects should aim at work that is highly innovative, which cannot be carried out at national or regional level and possibly can bring together different disciplines which have not worked closely together before.

**Q:**   **What key hints can you give for writing a proposal?**

**A:**   Explain **why** the research is needed, **what** it will do, **how** it will be done, **who** will do the work and **for whom** (who is the target audience). Proposals should make the case for the soundness of the approach to achieve its goal. The proposal should clearly describe (a) what the state of the art is – not only in the consortium but in the community at large, (b) what the contribution of the project will be to going beyond the state of the art, (c) what problems will have to be solved, (d) how this will be achieved, and (e) how this will be measured. Where appropriate e.g. with regard to scientific / academic research, please reference the relevant literature.

**Q:**   **How should the objectives be laid out?**

**A:**   The proposals should present both its more general, overall goals and the more concrete scientific and technical objectives. It is important to make the objectives challenging but realistic. They should be achievable within the project lifetime (not through subsequent developments), specific, timed (e.g. by which date/milestone the objectives will be reached), and verifiable.

**Q:**   **How important is system integration?**

**A:**   Integration is a major challenge, in particular for projects with different disciplines, different types of hardware, cooperating systems, novel combinations of components etc. Especially if your proposal addresses more downstream robotic systems prototypes, ensure that you describe concretely how you will achieve systems integration. Specify the S&T integration methodology, but also include concrete management mechanisms. The interdependencies between work-packages and tasks need to be carefully explained (including timing when results are transferred between them).

**Q:**   **What about literature survey and system requirement definition?**

**A:**   Avoid proposing an extensive literature survey or patent search as a new task within the proposed project, unless to investigate a completely new research topic. Likewise, proposals should be able to convince that they will not need open-ended or heavy investment in developing system specifications and requirements. In the topic "Robotics Research & Innovation", high level requirements and specifications should be defined in the proposal, whilst for "Robotics Use Cases" such requirements and specifications should already be detailed enough for a real-world operational prototype.

**Q:**     **Do I need to include demonstrations?**

**A:**     Definitely, and more so than in previous Robotics Calls. Demonstrations are a key way to validate research work. Demonstrations will be done in market domain-relevant settings (see the WP Call text), whether in actual or potential end user settings and will aim to prove an increased Technology Readiness Level.

Simulations are <u>not</u> encouraged, except as an early intermediate step for the preparation of real-world demos.

Basic research projects will also need some form of demonstration.

**Q:**     **What about follow ups to previous projects or proposals?**

**A:**     Follow-ups are allowed, but explain clearly the new added-value of the follow-up. It should not be a mere continuation of the previous project.

Proposal resubmissions are treated like all other proposals. Scores can vary from one Call to the next. You are strongly advised to take into account the (new) context and aims of the Call for Proposals and <u>if still relevant and applicable</u>, the comments from the previous ESR.

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**TIP** – not explaining sufficiently HOW a project will reach its goal is the No 1 reason for proposal failure. Don't forget to describe also how you will assess the project's progress (*including performance assessment and metrics*).

**TIP**: Lack of attention to project integration is a major cause for failure.

**TIP**: The proposal should clearly describe the specific goals of the previous project and to which extent these goals have been achieved.

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## 8.2.   Project implementation

**Q:**     **How do I demonstrate the project's "value for money"?**

**A:**     By spelling out the costs of and need for the proposed levels of personnel effort, equipment (durable and consumables), travel, subcontracting if any, and your own resources which will be provided to the project. The contribution of personnel involved, including principal investigators, should be spelt out.

**Q:**     **Should I propose a small or a large project?**

**A:**     The distinction between STRePs and I.P.s no longer exists, but the WPs refer to projects requesting either "Large" (5-8 Meuros) or "Small" (2-4 Meuros) contributions of EU funding. There is no pre-determined formula for this and the definition of small vs. large is by budget volume. However it is (still) important to match the size of the project to its research and innovation aims and methodology.

**Q:**     **How do I select consortium partners?**

**A:**     The selection and number of partners must be exclusively driven by the project's needs in order to achieve its goals. Selection is dictated by the job at hand, based on partners qualifications, scientific track record (reference their most relevant publications), and their ability to complement each other's roles, skills and levels of experience. Make sure you have enough partners to do the job - but not more than needed. Optimise the use of skills available.

**Q:**     **Does each proposal require the involvement of the entire robotics value chain?**

**A:**     No it depends on the nature of the project and the TRL level addressed.

**Q:     Are industrial partners always required?**

**A:**     Industry has a far greater role to play in H2020 than previous robotics programmes. Involvement from industry as manufacturers, system suppliers, integrators or users is welcome, as appropriate, depending on the needs of the project and on the technology readiness level addressed. They could e.g. carry out research, provide infrastructure/tools, provide challenging application scenarios, give access to their facilities to assess scientific progress. In all the cases, they have to show they are stakeholders in the work and its results, in particular through demonstrating a sound commitment and strategy to exploit the project results. Not every project is required to have industrial partners, especially if it focusses on basic s&t research.

**Q:     What about end users?**

**A:**     End user participation, particularly in more downstream systems integration projects or use cases, is very welcome and in some instances **essential** i.e. in "Robotics Use cases" and "Pre-commercial Procurement". As for any partner, the role of end users should be clear in the proposal.

**Q:     What about geographical balance and non-EU countries?**

**A:**     Geographical balance is definitely NOT an evaluation criterion in this topic. Select your partners based on the needs of the project. Also H2020 is far more open to non-EU (sometimes called "third country") participation than before. Applicants from non-EU countries are generally **free to *take part*** in Horizon 2020 programmes (as long as their participation is justified within the project context) but they are **not always automatically entitled to *funding***. Check the H2020 portal[6] for country lists. Note that countries which were associated with FP7 have to renew their association agreement for H2020. **Important**: check carefully the situation with regards to specific countries with the H2020 portal and / or with the national research authority.

**Q:     Is there a "standard" management structure?**

**A:**     Make sure that the proposed management structure fits your project needs. It is not encouraged to adopt typical structures blindly. Keep the management as lean as possible. Specify how the integration of partners is achieved. Clearly define the interactions between teams/tasks.

**Q:     Is risk assessment important?**

**A:**     Definitely! Explain **both** the typical project management risks **and** specific risks due to the technology approach, in a realistic and concrete way. In all cases, provide a credible contingency plan. A proper contingency plan does **not** simply amount a set of assertions that the risk will not materialise.

**Q:     How should the Workplan and work packages be described?**

**A:**     The work package descriptions are a key part of the proposal, detailing the activities, the measurable objectives and the methodologies to achieve them and to assess progress and results. The work package objectives are to be consistently reflected in the individual task descriptions and deliverables. Be concrete and specific – vagueness is a definite shortcoming. Indicate where the individual tasks take input from and what they feed into.

For each task, the partners contributing to it should be listed and their involvement in terms of person months should be indicated.

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[6] http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html

**Q:** **How many deliverables and milestones and how should they be specified?**

**A:** Keep the list compact. Specify major milestones and corresponding measurable objectives and the methodology to assess them, as means of verification. This could be expressed, for example, as the expected advance in functionalities, behaviours, performance, sophistication, etc. It is not sufficient to simply state, e.g., "software available" or "subsystem operational".

The deliverables list should be well balanced and represent concrete steps. Re-use as much as possible possible existing material (from publications, or document you write but avoid giving consortium internal details). Reports which are stipulated specifically by the Grant Agreement (e.g. period technical and financial reports) do not need to be listed as deliverables. The descriptions of the deliverables should be detailed and informative enough to allow a proper understanding of what can be expected to be delivered and (together with the milestones) give a clear picture of the project and its major steps, including the progress to be made from one phase or review period to the next.

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**TIP** – In the H2020 new Model Grant Agreement legal terminology, the term "Project" is replaced by the term "Action".

**TIP:** Projects with a longer-term, scientific or academic bias are expected to have a high number of public deliverables and public-domain results (including sharing of databases, software, tools, if possible via open-source). Projects with more industrial dimensions do not necessarily need to make all deliverables public. The proposal should make this clear and describe its plans to protect or exploit such results – e.g. through patents, licensing or technology transfer. This should be clearly justified (e.g.: explain the IPR policy, whether the restriction might be removed after the corresponding paper has been published…)

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**Q:**      **What kind of legal and financial checks occur for retained proposals?**

**A:**      Refer here to the Call documentation and to the Workprogrammes and Annexes on the participant's portal.

In short, all participants should check already at the proposal stage what they might need to provide if the proposal is retained. In H2020, there will be less time than before to progress through the grant preparation stage.

Note that the Commission shall verify the financial capacity in advance only for coordinators when the requested funding from the Union for the action is equal or superior to EUR 500 000. The financial capacity shall not be verified for legal entities whose viability is guaranteed by a Member State or an associated country and for higher and secondary education establishments.

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**TIP:** Lack of substantiation of the relevant expertise and experience of key personnel is a common cause for proposal failure. Present the Consortium through a short description of the institution, short biographies with the relevant experience and selected publications of the key personnel, plus their expected level of involvement in the project.

**TIP:** keep the number of deliverables manageable and make the deliverables and milestones definitions concrete and measurable. Keep the review schedule in mind.

**TIP**: Look at the grant preparation process well in advance, and if need be do some self-checks e.g. on your financial viability.

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## 8.3. Impact

**Q:**      **What kind of impact are you looking for?**

**A:**      H2020, by linking Research and Innovation, puts much greater emphasis on achieving impact than before. For Robotics, the Workprogramme text plus - in a more general way - the Robotics SRA describes the expected impacts sought. Any individual proposal is not expected to address the whole list, so spell out what can realistically be expected from the project in terms of: scientific / technical impacts; more directly industrially relevant impacts, reinforcing Europe industrial competitiveness; and/or socioeconomic and societal aspects.

In short it is important to think about the impact *before the start of the project*, allocate proper resources and implement actions to improve it.

**Q:**      **Are the expected impacts for ICT 23 and ICT 24 the same?**

**A:**      The main expected impacts referring to increase of Europe's competitive position and scientific standing are the same. Some specific action lines differ between the two calls, however, and so do the associated expected impact, so check the Workprogramme text carefully.

**Q:**      **What kind of dissemination do you expect?**

**A:**      Prepare a suitable dissemination plan with a coherent vision, not just a shopping list of conferences and journals. Target events in line with the timeline of the project and plan for it all. Describe the main target audiences, venues and channels for dissemination / exploitation. It is essential to describe the concrete steps planned to achieve dissemination goals. Make a proper plan for social media, like YouTube or Facebook. Involve the right persons (communication experts, journalists, science communication departments, etc.).

Keep in mind that you are an EU-funded project and as such you promote the visibility of the H2020 Robotics programme (including by making systematic reference to it and to the funding received in your public documents).

Important note: specific dissemination rules apply to PcP – please check the general FAQs available on this topic (http://cordis.europa.eu/fp7/ict/pcp/policy_en.html) and updates as and when these appear.

**Q:      How important is the exploitation plan in this domain?**

**A:**      For R&I projects and especially for Use cases, a well thought-out exploitation plan which includes where relevant a credible business case and describes the involvement of people with the right expertise (for technology transfer, patents etc.) is highly encouraged if not essential. The plan should explain what the right target audience is and how it will reach them. The plan should make explicit which conferences or fairs it will target, which industries it will aim at, whether end users are targeted or intermediaries like technology transfer agents, venture capitalists etc.

Projects with a more industrial approach should concretely describe the path towards exploitation (including joint exploitation by the partners) of transferable results from the work. A strategic business case is appreciated and even necessary in Innovation use case activities. Developing an actual business plan is however beyond the scope of this RTD funding programme.

Projects with a more scientific approach should still make clear what the eventual exploitation outcomes and impact on the scientific community will be, including re-use of scientific results in further research. Proposing concrete mechanisms to ensure such re-use would be a plus. In either case, exploitation strategy should include identifying potential exploitable results and target users, as well as a mechanism for attracting them.

TIP: Be concrete about what the project results would actually achieve in the areas described in the Workprogramme section "Expected Impact", and which concrete actions will be carried out during the project to achieve such impact.

# 9. Workprogramme extract: 2014 -2015 "Robotics"[7].

*The importance of robotics lies in its wide-ranging impact on Europe's capacity to maintain and grow a competitive manufacturing sector with millions of related jobs. But at least equally important, robotics also offers new solutions to societal challenges from ageing to health, security, energy and environment.*

*Smart automation and robotics are simply vital for maintaining manufacturing and associated services in higher-wage regions of the world. Today, large and core business sectors including automotive, aerospace, agro-food or microelectronics, representing more than 20% of our GDP would quite simply disappear from Europe without intensive use of advanced robotics.*

*By freeing workers from hard, repetitive jobs, robots help us meet the expectations of an increasingly skilled labour force and offer jobs in line with the aspirations for higher quality work conditions.*

*The potential of robotics expands far beyond the factory though. Service robots for professional or domestic use represent an emerging market with strong growth perspectives as robots become mainstream appliances and systems in many walks of life (work, home appliances, security, leisure, assistive technologies for physically disabled, medical equipment, etc). Robots are increasingly endowed with learning and adaptive capabilities that will have a broad impact on all future ICT systems in a wide range of products and services.*

*The potential economic and societal impact brought by robotics technology is therefore immense. Building on its strengths in industrial and professional service robotics and on the academic knowhow, Europe can play a leading role in future development of the sector.*

*To conquer new markets and enable large scale deployment of robots, it is essential to advance the current robot capabilities in terms of robustness, flexibility and autonomy to make them achieving useful tasks in an efficient manner while operating in real-world environments.*

### ICT 23 – 2014: Robotics

Specific Challenge: Research implementing the Strategic Research Agenda established by the euRobotics AISBL (the private partner in the future Public-Private partnership in Robotics [8] will be essential to attain a world-leading position in the robotics market. Driven by the applications needs identified in this Strategic Research Agenda (SRA), challenging R&D problems will have to be addressed, to make substantial progress in robots capabilities and improve the Technology Readiness Levels (TRL) of robotics R&D. In addition, a dedicated effort is necessary to close the innovation gap, allow large scale deployment of robots and foster market take-up. Robotics is very broad, both in terms of technologies and disciplines it involves, but also in terms of markets and stakeholders. It is therefore essential to address the inherent fragmentation.

Scope: The aim is to develop a new generation of industrial and service robots and underpinning technologies, in particular enabling robotic systems to operate in dynamic real-

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[7] http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html#-.

[8] This Strategic Research Agenda is publicly available on the euRobotics AISBL website (http://www.eu-robotics.net/ppp/downloads/); its content results from continuous consultation of the whole European robotics community. The prioritisation of the topics follows a formal procedure established by the euRobotics AISBL, whose membership is open to all European stakeholders in Robotics – http://www.eu-robotics.net/ppp

world environments, reaching measurable improvements of abilities such as autonomy and adaptability and interacting in safe ways with humans.

Collaborative projects will cover multi-disciplinary R&D and innovation activities like technology transfer via use-cases and industry-academia cross fertilisation mechanisms. Pre- Commercial Procurement (PCP) will further enable prototype development and stimulate deployment of industrial and service robotics.

Projects are strongly encouraged to optimise synergies (e.g: use of shared resources for PCP of R&D&I projects or use cases, collaboration with on-going initiatives). Priority is given to projects driven by industrial or market needs and that are expected to produce step changes in abilities.

### a. Research & Innovation Actions

- RTD to advance abilities and key technologies relevant for industrial and service robotics

  *-* In terms of market domains, the priorities are: manufacturing, commercial, civil, agriculture
  *-* The primary goal is to significantly improve the level of industrial and service robotics abilities in the context of the above mentioned market domains by addressing: adaptability, cognitive ability, configurability, decisional autonomy, dependability, flexibility, interaction capability, manipulation ability, motion capability, perception ability*.*
  *-* To reach this ambitious goal, key robotics technologies need to be advanced in the particular fields of cognition, human-robot interaction, mechatronics, navigation, perception. This includes technology combinations such as grasping and dexterous manipulation, physical HRI, mobile manipulation, reactive planning and other combinations, in particular those that connect the key technologies above*.*
  *-* To prove the exploitation potential of the results the project outcome is to be shown in market domain-relevant demonstrations proving an increased TRL*.*

- It will be essential for the deployment of robots to establish systems development processes (from requirement analysis to testing and validation) and to develop techniques and technologies for system design, engineering, architecture, integration, system of systems, modelling and knowledge engineering which are applicable across market domains.

- *Shared resources and assessment*
  *-* One goal will be to define common hardware and software platforms (e.g.: real world test-beds, software libraries and simulators) taking advantage of existing initiatives and facilities. This will require: (a) mechanisms for sharing; (b) harmonisation of system design practice; (c) the definition of standards; and (d) high quality validation, maintenance and documentation.
  *-* Furthermore, activities will be supported by a benchmarking initiative to provide means for technology assessment and transfer, performance evaluation as well as of paving the way to certification of new robotics systems*.*

### b. Innovation Actions: Technology transfer - Robotics use cases

Using leading edge science and technology, including results from EU-funded projects, a targeted effort will aim at introducing, testing and validating promising and innovative robotics solutions in real-world conditions. The focus will be on the robust operational deployment of these robotic solutions, based on performance objectives, metrics, and user needs. The strong involvement of stakeholders such as robotics industry, system integrators and end-users is essential*.*

### c. *Pre-commercial procurement in robotics*

In addition, demand-driven innovation actions will be pursued in areas of public interest, including pre-commercial procurement of innovative robotics solutions for public safety and monitoring of environment and infrastructures.

*Expected impact:*

- 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 including with new companies and start-ups in the field.
- Improve the competitiveness of Europe's manufacturing sector, in particular SMEs, and address pressing technological challenges and the effect of an aging workforce.
- 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.
- Deploy robotics technologies in new application domains.
- Improve Technology Readiness Levels of robotics technologies.
- Improve performance evaluation and certification of new robotic systems.
- 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.

*Types of action:*

**a.** Research & Innovation Actions – A mix of proposals requesting *Small* and *Large contributions* are expected
**b.** Innovation Actions – A mix of proposals requesting *Small* and *Large contributions* are expected
**c.** Pre-Commercial Procurement (PCP) Cofund actions – Proposals requesting a *Large contributions* are expected

*The conditions related to this topic are provided <u>at the end of the official call text and in the General Annexes to the Workprogramme.</u>*

*ICT23 - Budget*

**ICT23.a:** *57 Meuros*
**ICT23.b***: 12 Meuros*
**ICT23.c***: 5 Meuros*

## ICT 24 – 2015: Robotics

Specific Challenge: Continuous and consistent support to roadmap-based research will be essential to attain a world-leading position in the robotics market. The priorities in this

specific challenge are based on input from the Public-Private partnership in Robotics[9], also building on the results of previous calls.
Collaborative projects will cover multi-disciplinary R&D and innovation activities like technology transfer via use-cases and industry-academia cross fertilisation mechanisms. PCP will further enable prototype development and stimulate deployment of industrial and service robotics.

Scope:

### a. Research & Innovation Actions to advance key technologies relevant for industrial and service robotics

In terms of market domains, the priorities are: healthcare, consumer, transport.
The primary goal is to significantly improve the level of industrial and service robotics abilities in the context of the above mentioned market domains by addressing: adaptability, cognitive ability, configurability, decisional autonomy, dependability, flexibility, interaction capability, manipulation ability, motion capability, perception ability.
To reach this ambitious goal, key robotics technologies need to be advanced in the particular fields of cognition, human-robot interaction, mechatronics, navigation, perception. This includes technology combinations such as grasping and dexterous manipulation, physical HRI, mobile manipulation, reactive planning and other combinations, in particular those that connect the key technologies above. The priority market domains cover also enabling robotics technologies for disabled people; this applies in particular for people with upper, lower limb disabilities and/or amputees allowing them to gain functionalities with exoskeletons or prostheses.
To prove the exploitation potential of the results the project outcome is to be shown in market domain-relevant demonstrations proving an increased TRL.

### b. Innovation Actions: Technology transfer - Industry-academia cross-fertilisation

The aim is to gear up and accelerate cross-fertilisation between academic and industrial robotics research to strengthen synergies between their respective research agendas through joint industrially-relevant scenarios, shared research infrastructures and joint small-to medium-scale experiments with industrial platforms. Proposals are expected to demonstrate technology transfer in professional or service robotics, in application areas such as manufacturing, commercial, civil, agriculture, healthcare, consumer or transport.
Activities are expected to be clustered to facilitate a sectorial structured dialogue and to substantially improve overall impact. The action may involve financial support to third parties in line with the conditions set out in Part K of the General Annexes. In such case, the consortium will define the selection process for additional academic/research organisations, industry or end-users as appropriate to carry out the experiments in order to reach the objectives defined in the proposals.

### c. Innovation Actions: Technology transfer - Robotics use cases

Using leading edge science and technology, a targeted effort will aim at introducing, testing and validating promising and innovative robotics solutions in industrial and service sectors. The focus will be on the robust operational deployment of these robotic solutions, based on

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[9] The input comes from the Strategic research agenda of the PPP that is publicly available on the euRobotics AISBL website (http://www.eu-robotics.net/ppp/downloads/ ); its content results from continuous consultation of the whole European robotics community. The prioritisation of the topics follows a formal procedure established by the euRobotics AISBL, whose membership is open to all European stakeholders in Robotics – http://www.eu-robotics.net/ppp

performance objectives, metrics, and user needs. The strong involvement of all relevant stakeholders in the value chain is essential.

## d. Pre-commercial procurement in robotics

Demand-driven innovation actions will be pursued in areas of public interest, including pre-commercial procurement of innovative robotics solutions for the healthcare sector.

## e. Coordination Actions: Community building and Robotic competitions

- Supporting the European robotics community with respect to networking, education, outreach, public awareness, technology watch, standardisation, and industry-academia collaboration as well as building links to national programmes and initiatives. Also, ethical, legal, societal and economical aspects of robotics will be addressed to ensure wider take up of the technology by citizens and businesses.
- Support International cooperation, where the impact of the action is demonstrated and matching resources are provided from cooperating parties.
- Coordinating work on the next generation of cognitive systems and robotics to reinforce the links between the different research disciplines ensuring transfer of knowledge and community building.
- Coordination and support actions for organising robotic competitions will be called for to speed up progress towards smarter robots.

Expected impact:

- 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.
- 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.

Types of action:

a. Research & Innovation Actions – A mix of proposals requesting *Small* and *Large contributions* are expected

b. Innovation Actions – Proposals requesting a *Large contribution* are expected

c. Innovation Actions – A mix of proposals requesting *Small* and *Large contributions* are expected

d. Pre-Commercial Procurement (PCP) Cofund actions – Proposals requesting a *Large contribution* are expected

e. Coordination and Support Actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

## ICT 24 Budget

**ICT24.a:** *50 Meuros*
**ICT24.b:** *12 Meuros*
**ICT24.c:** *12 Meuros*
**ICT24.d:** *5 Meuros*
**ICT24.e:** *4 Meuros*

# 10.  Robotics across the various H2020 Workprogrammes

*Funding opportunities for robotics appear in several sections of H2020. This table is provided for information. Proposers are invited to check whether the calls mentioned below are relevant to their field of research. The table and figures are not binding - please check the final versions of the various Workprogrammes at the H2020 Web site.[10]*

| H2020 Challenge and topic | M€ |
|---|---|
| **ICT (*Information and Communication Technologies*)** | |
| • ICT 23 2014 Robotics | 74 |
| • ICT 24 2015 Robotics | 83 |
| • ICT 30a 2015: Internet of Things and Platforms for Connected Smart Objects - *covers multiple devices potentially including robots* | 50* |
| • ICT 34 2015 ICT contribution to pilot for co–investments by business angels in innovative ICT firms- *including robotics* <br> • #this is funded also by Access to Risk Finance section 3.1 Piloting Co-Investments by Business Angels in Innovative ICT Firms | 15+15* |
| • ICT 37 – 2014-2015 Open Disruptive Innovation Scheme (implemented through the SME instrument) – *open to any ICT-related topic* | ** |
| • EUJ 1 2014: Technologies combining big data, internet of things in the cloud – *joint EU-Japan research to cater for requirements of application, including robotics* | 1.5* |
| **FET (*Future and Emerging Technologies*)** | |
| • FETOPEN 1 – 2014/2015: FET-Open research projects - *open to any science & technology topic* | **. |
| • FETPROACT 2 2014 "Knowing, doing, being: cognition beyond problem solving" - *incl. "New concepts & new generic paradigms in cognitive systems and robots; new morphological designs such as nano- micro- robots, multi-robot systems or unconventional robot shapes"* | 15* |

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[10]  *http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=h2020-documents and http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html*

| | |
|---|---|
| • FET Flagships: 2b Human Brain Project FET Flagship Core Project – *includes neuro-robotics (membership of Framework Partnership Agreement and specific conditions apply)* | 89* |
| **NMP (*Nanotechnologies, Advanced Materials, Biotechnology, Advanced Manufacturing & Processing)*** | |
| • FoF 6 – 2014: Symbiotic human-robot collaborations for safe and dynamic multimodal manufacturing systems | 82* |
| • FoF 9a – 2015: ICT Innovation for Manufacturing SMEs (I4MS) - *including "Highly flexible and near-autonomous robotics systems (application experiments")* (one of three areas of technologies which are targeted for the Innovation actions)* | 35* |
| • FoF 11 – 2015: Flexible production systems based on integrated tools for rapid reconfiguration of machinery and robots | *77** |
| **SPACE** | |
| • COMPET 4 – 2014: Space Robotics Technologies | *4* |
| • COMPET 6 – 2014: Bottom up space technologies at low Technology Readiness Level (incl. robotics) | *5** |
| • COMPET 9 – 2014 Technology Demonstrator projects for exploration (incl. robotics) | *3** |
| **SC 1 Health, demographic change and wellbeing** | |
| • PHC 10 – 2014 : Development of new diagnostic tool and technologies: in vitro devices, assays and platforms | 48* |
| • PHC 19 – 2014: Advancing active and healthy ageing with ICT: Service robotics within assisted living environments | 24,6 |
| **SC 2 Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy** | |
| • Blue Growth BG-5-2014: Preparing for the future innovative offshore economy- *including robotics / ROVs* | 2* |
| • Blue Growth BG-6-2014: Delivering sub-sea technologies for new services at sea - *including robotics / ROVs / AUVs* | 16* |
| • Blue Growth BG-7-2015: Response capacities to oil spills and marine pollutions  - *including the use of specialised vessels and underwater (autonomous) vehicles* | 8* |
| • Blue Growth BG-9-2014: Acoustic and imaging technologies – *including mobile platforms* | 10* |
| **SC 3  Secure, clean and efficient energy** | |
| • EE 1 – 2014: Manufacturing of prefabricated modules for renovation of building - *including automated/robotised tools for construction* | *8** |
| **SC 4 Smart, green and integrated transport** | |
| • MG.3.6-2015 Safe and connected automation in road transport  - *automated and progressively autonomous driving applications* | 23* |
| **SC 5 Climate action, environment, resource efficiency and raw materials** | |
| • SC5-11-2014/2015: New solutions for sustainable production of raw materials c) Deep mining on continent and in sea-bed [2015]- *new highly-automated technological sustainable solutions* | *48** |
| **SC 7    Secure societies – Protecting freedom and security of Europe and its citizens** | |
| • 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 | *44.26** |

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