

THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

# HORIZON 2020

## ***Robotics funding opportunities - ICT27c*** **Shared facilities for safety certification**

Cécile Huet, PhD  
Deputy Head of Unit  
Robotics & AI  
European Commission

# 4<sup>th</sup> Robotics Call in H2020 (closing: 25-4-2017)

## ICT 25-2017: Advanced robot capabilities research and take-up

<b>RIA</b>	<b>15M€</b>	a) Open, generic research
		b) Step changes in Technical capabilities
<b>IA</b>	<b>19M€</b>	c) End User driven: application development
		d) End User driven: Filling technology / regulatory gaps

## ICT 27-2017: System abilities, SME & benchmarking actions, safety certification

<b>RIA</b>	<b>28M€</b>	a) System Abilities: Perception ability, decisional autonomy, increasing dependability levels, self-verifying behaviour
		b) SME-based research and benchmarks
<b>IA</b>	<b>11M€</b>	c) Shared facilities for safety certification
<b>PcP</b>	<b>7M€</b>	d) Pre-commercial procurement: smart cities

## ICT 28-2017: Robotics competition, coordination and support

<b>CSA</b>	<b>5M€</b>	a) Non-technical barriers
		b) Standards & regulation
		c) Community support and outreach
		d) Competitions

# 4<sup>th</sup> Robotics Call in H2020 (closing: 25-4-2017)

## ICT 25-2017: Advanced robot capabilities research and take-up


## ICT 27-2017: System abilities, SME & benchmarking actions, safety certification

RIA

**IA 11M€ c) Shared facilities for safety certification**

PcP

## ICT 28-2017: Robotics competition, coordination and support


# What is an Innovation action (IA)

- Actions primarily consisting of activities directly aiming at producing plans and arrangements or designs for **new, altered or improved products, processes or services**
- May include **prototyping, testing, demonstrating, piloting**, large scale product validation and market replication
- May include **limited research** and development activities



# ICT-27-2017: System abilities, SME & benchmarking actions, **safety certification**

## Challenges:

- Ensure the **safety** and **security** of robotics developments
- Viable safety certification **standards** and **processes** (including testing protocols) are critical to the widespread deployment of robotic systems, but are not yet generally available.
- Such certification processes should **cut across** different domains and areas of application and need to be developed on a **pan-European** basis, but with **global impact**.

## c. Innovation Actions on shared facilities for safety certification:

- Development of **testing protocols** for shared space **cooperative and collaborative systems** leading to viable **safety certification standards**.
- Must cover a **range of domains** and **applications** where safety certification is a **market barrier**. Potential examples include healthcare and elderly or handicapped care applications, infrastructure maintenance, transport and logistics.
- The development of **common approaches** and **tools** is strongly encouraged.
- Not only devise protocols but to carry out **realistic trials** to validate them.
- Show how these protocols can match the requirements of **relevant standards** and regulations or inform the **creation of new standards and regulations**.

## c. Innovation Actions on shared facilities for safety certification:

- **Minimum 50%** of the EU funding requested by the proposal allocated to the purpose of **financial support to third parties**.
- Part K of the General Annexes.
- Define the **selection process** of additional users and suppliers for which financial support will be granted (typically in the order of **EUR 50.000 – 100.000 per party**).
  - If > 60k€ => **explain why this is necessary** to achieve the objectives of the action.
  - It is **recommended** to also use **established networks reaching out to SMEs** like the Enterprise Europe Network and the NCP network for calls publications and awareness raising towards SME's.

## c. Innovation Actions on shared facilities for safety certification:

- EU funding: 6 - 11 M€ -> Indicative!



# Expected impacts

- **Broad acceptance** of testing protocols and validation processes for a **wide range** of shared space **applications**
- **New validation** processes on which deployment regulations and standards can be based.

# SRA = Strategic Research Agenda

## MAR = Multi-Annual Roadmap



**VISION  
/GOALS**

**GUIDANCE  
"HOW TO"**



*Essential reading for proposers, providing detailed definitions of technologies and abilities and illustrative examples of the selected priorities.*

# How SRA/MAR help in preparing proposals?

## SRA/MAR PROVIDE FRAMEWORK/GUIDELINES

### My proposal vs. SRA

- Show how the proposal addresses the SRA high level goals and strategic objectives.

### My proposal vs. MAR:

- Capitalise on work done in the MAR:
  - Identified needs in terms of safety certification
  - Domains/application
  - Market barriers
  - Existing standards / relevant initiatives

# Excerpts from the MAR

## Healthcare

- **Assistive robotics** requires extensive field trials and collaborative design processes as well as **certification and testing protocols**

## Agriculture

- Safety: **Certification** of systems, including certification of **sensing** and **decision** systems
- Safety with humans/livestock

## Agriculture: Near Market Activities

**Manufacturer independent** evaluation of new machines.

Common **testing standards** and enabling national organisations to conduct standardised tests and providing reports and **certificates**

These tests will have different scopes.

R&D&I activity needs to focus on developing new, or extend existing, methods towards evaluating autonomous systems.

Subjects of evaluation could be:

- **Safety certification** and **operating procedures**
- **Confirmation of adherence to standards**



# Civil

May be operating in **hazardous, contaminated or extreme environments** where people may be at risk.

**Certification and validation of operation** will be important elements in the deployment of this type of robot system.

# Transport

Critical to opening up public spaces to autonomous vehicles will be the execution of large scale demonstrators able to show real world deployment of robotics technology, firstly to prove compliance and secondly to show capability. It will also be important to ensure that common legislation is enacted widely across Europe to maximise the potential market, and to ensure that **the cost of certification is not prohibitive** as many early operators are SMEs.

With the development of **certification programmes**, particularly in the **Aerial sector**, regulatory authorities are becoming key stakeholders and gate keepers for the growing industry.

**Safety by design:** The need to provide **safety certification** for systems operating in the Civil domain will be driven by advances in systems design methods that integrate safety into the design cycle such that **safety performance can be guaranteed** by design rather than proof of operation post design. Establishing acceptable levels of safety for each type of application and application area will also be a key part of design capture

# Inspection and Maintenance: Technology safety conformance

Limited number of robot solutions deployed in real-life inspection and maintenance scenarios (other than subsea)

→ **Lack of safety performance certification** due to

- Lack of demonstrated **reliability** of the robotic solutions: Broken down robots may become a safety hazard themselves as they may block equipment or prompt rescue activities.
- The need for demonstrated **collision avoidance**.
- Education gap** between the developers of the technology and asset owners regarding safe operations and regulations for equipment in the industry (safety standards, regulations, operating procedures)

# Mining & Minerals

**Dependability Safety guarantee** under all operating conditions  
Fails Safe, **Certification** and Classification for critical systems  
highly desirable



# Logistics and Transport

## Safe Human Robot Interaction

These needs should be addressed both at a **low level** (e.g. guaranteed reliable sensors for people detection), and at a **systems level** (e.g., new algorithms for people tracking, new human-robot interfaces) and through systems for validation and certification.

Safety certification and **in-farm transportation** will also draw on common technology in Logistics and Transport.

# Assisted Living

- Co-workers and companions able to provide an identified benefit to Users.

The primary abilities: **safe** and intuitive interaction and configurability to each User's needs.

- **Certification and testing** to provide guarantees of performance in everyday environments.
- At the core of user acceptance are good and well-founded **standards and regulatory systems** that drive the process of certification. Developing these **in conjunction with care providers and non-robotics experts** will be a **critical** part of the development process.

# Types of robots

Robots designed to operating in these different environments are shaped by them such that it is possible to characterise aspects of such a robot without categorising their function.

Operation in a **particular environment** leads to common requirements for technologies, to **common certification and regulation**, common **standards** and **benchmarks**. These common elements create the potential for robotics organisations to focus on particular environments, producing products, systems technology and services that address the needs of a particular environment while working horizontally across the different market domains.

# Wearable Robotics

The emerging Wearable Robotics technology poses potential specific safety threats that are currently not clearly addressed by existing regulation and certification frameworks.

Recently several efforts have started in standardization, especially:

- ISO 13482, a recently published standard on safety for personal care robots, including WRs, developed under ISO TC184/SC2/WG7 “Personal care robot safety”, related to non-medical, non-industrial application of WRs.
- IEC SC62A & ISO TC184/SC2 – JWG 9 “Medical electrical equipment and systems using robotic technology”, related to medical robotics (medical applications of WRs)
- IEC/SC 62D & ISO/TC 184/SC 2 – JWG36 “Medical robots for rehabilitation”, also related to medical applications of WRs

Concerning certification, the FDA has for example recently started to classify exoskeletons for use outside of the clinic, a first occurrence of WRs being deployed in common environments. See FDA publication 2015-03692, 24-02-2015 on “Medical Devices; Physical Medicine Devices; Classification of the Powered Exoskeleton”.

# Ability targets

Certiability: To develop a system of certification that can provide guarantees about dependability sufficient for deployment in high risk or safety critical tasks.

Notably this is **most critical in physical human interaction tasks in Healthcare, Manufacturing, Agriculture and Civil tasks.**



Safety certification will become an important aspect of the development and deployment of close coupled human robot interaction systems **especially when these systems are deployed in everyday environments** and in systems that are **reconfigurable**.

February 2014, ISO 13482 was published as a harmonised **safety standard for personal care** robots aimed at applications involving close human-robot interaction as well as human-robot contact to provide a variety of services to humans for improving the quality of life.

This is a new standard and manufacturers and certification bodies need to become familiar with it so as to allow new products to enter the market

It is important that any benchmarks **cut across** the different **domains**, where this is practical, and that **best practice for testing and certification** is applied.

Create universal benchmarks that enable companies to test a wide range of products using standard processes, both to provide design cycle validation of performance and end product conformance.

Require the **broad engagement** of both **end users** and **product and systems developers including SMEs and innovators**.

## 6.1.4.5 Standardising Human-Robot Interaction

One of the most important areas where standardisation is needed in order to drive both regulation and certification is in **physical human robot interaction (pHRI)**.

Relevant standards in this context for pHRI ISO 9241-920:2009 and ISO 9241-910:2011 for tactile and haptic interaction.

## 6.1.4.5 Standardising Human-Robot Interaction

In case of Human Robot Safe Interaction (HRSI), spatial constraints such as human-robot distance, velocity, direction, etc. need to be taken into account, both for mobile platforms and static bases with movable extensions (e.g. robotic arms).

In general, the use of spaces shared by the robot and the user should be regulated by a sets of expected **motion behaviours that guarantee safety** and effectiveness of the intended interaction.



# Some Ingredients for a good proposal for ICT27c

## EXCELLENCE

- Certification protocols & processes + implementation
- Useful → efficient, easy to implement, replicate, wide acceptance & ACCEPTED by relevant authorities/users.

## IMPACT -> DEMONSTRATE THE ADDED VALUE AND HOW TO REACH IMPACT

- Specific Objective(s):
  - Broad acceptance and use of protocols
  - Within application + in wide range of applications
  - If new validation processes -> path to new regulation/standard
- Concrete plans to reach impact – dissemination/Exploitation

## CONSORTIUM

- Right mix in expertise (topics: HRI + function: S&T provider/integrators/users + certification/standardisation bodies? )
- Expertise in relevant standards
- Expertise in relevant certification protocols
- Expertise in running certification processes

# THANK YOU!

# Financial support to third parties (FSTP – Annex K)

Detail the objectives and the results to be obtained:

- List types of activities persons or categories of persons which may receive financial support,
- Criteria for awarding financial support
- Criteria for calculating the exact amount of the financial support
- Maximum amount to be granted to each third party and the criteria for determining it

# Financial support to third parties (FSTP – Annex K)

- Must publish widely open calls
- Transparency, equal treatment, conflict of interest and confidentiality
- Call -> clear European dimension – cross border experimentation or expanding the impact of local experiments to European scale.

# [ECGA] 15.1 Rules for providing financial support to third parties

*15.1.1 The beneficiaries must provide financial support in accordance with the conditions set out in Annex 1.*

*At a minimum, these **conditions** must include:*

*(a) the maximum amount of financial support for each third party.*

*The maximum amount may not exceed EUR 60 000 for each third party, unless it is necessary to achieve the objectives of the action as described in Annex 1;*

*(b) the criteria for calculating the exact amount of the financial support;*

*(c) the different types of activity that qualify for financial support, on the basis of a closed list;*

*(d) the persons or categories of persons that may receive financial support, and*

*(e) the criteria for giving financial support.*

*The beneficiaries must ensure that the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can **exercise their rights** under Articles 22 and 23 also towards the third parties receiving financial support.*

*15.1.2 The beneficiaries must ensure that their obligations under Articles 35, 36, 38 and 46 **also apply** to the third parties receiving financial support.*



# Additional cost eligibility condition:

## Conditions for support set out in Annex 1 – Maximum amount of the financial support – Types of activities – Categories of persons – Criteria for financial support

The beneficiaries must comply with the conditions for the support that are set out in Annex 1, and in particular:

the maximum amount per third party

If > 60 000 per recipient → justify why this is necessary for the objectives of the action.

the criteria for determining the exact amount of financial support (e.g. EUR 2 000 per hectare; EUR 30 000 per student for a two-year scholarship)

The financial support provided by the beneficiaries may take any form (e.g. a lump sum or the reimbursement of the costs incurred by the recipients when implementing the supported activities).

a clear and exhaustive list of the types of activities that qualify for financial support for third parties (e.g. financial support for third parties allowed for technology-testing activities)

These activities should benefit, primarily, the recipients (NOT the beneficiaries).

The financial support is NOT the same as subcontracting (see Article 13) or purchase of goods, works or services (see Article 10).

# Additional cost eligibility condition:

**Conditions for support set out in Annex 1 – Maximum amount of the financial support  
– Types of activities – Categories of persons – Criteria for financial support**

- the persons or **category(ies)** of persons that may receive it (*e.g. farmers; PhD students*)

**Beneficiaries should describe in Annex 1 the procedures for selecting the recipients.**

- the **criteria** for giving financial support (*e.g. physical characteristics of the agricultural plots which make them suitable for the purpose of the action*).

These criteria should respond to the **objectives** set out in the **work programme/call**.