THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZON 2020

Robotics funding opportunities in 2017

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European Commission

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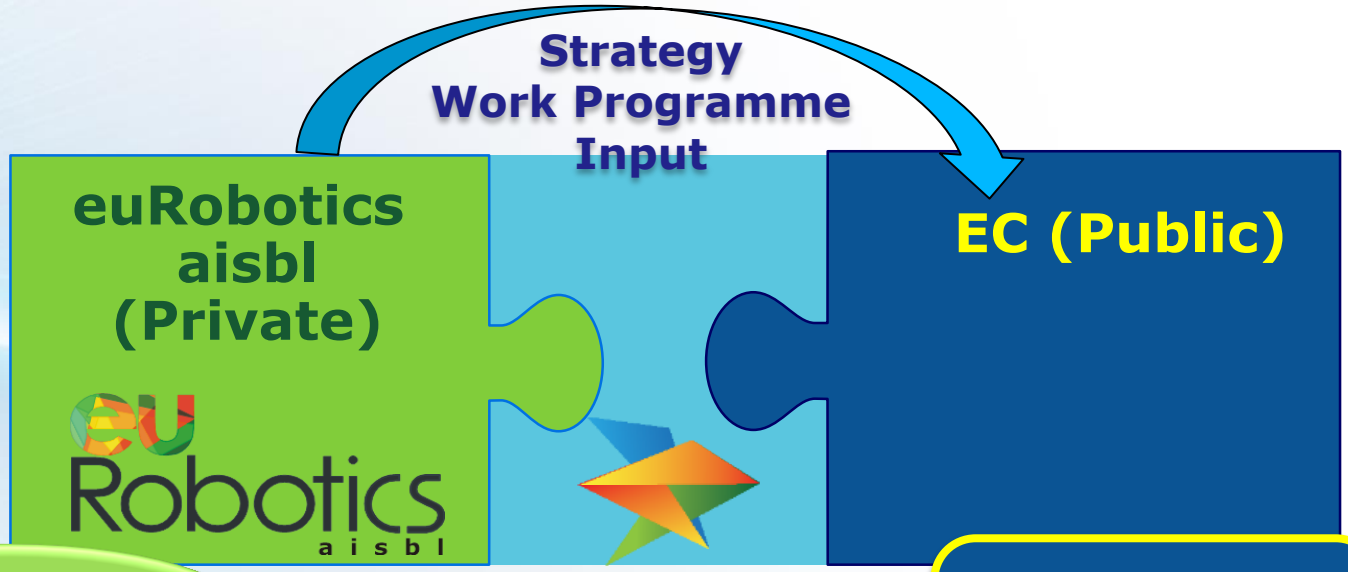
Robotics & AI

European Commission

Agenda of the session: Robotics and Autonomous Systems, Robotics PPP

15:45	**- ICT WP 2016-17 topics on robotics and autonomous systems** **- Tips for proposers** **- Q&A**	**Cécile Huet – EC** **Antonio Puente – EC**
17:00	SPARC, the Robotics Public Private Partnership	Reinhard Lafrenz (EuRobotics) & David Bisset
17:20	Get ready for the PcP and FSTP: Learn from the experience in ECHORD++ and HORSE	Marie-Luise Neitz (Technical University of Munich)
17:40	Presentation of ideas for proposals	
18:20 – 18:30	Conclusions and wrap-up	Cécile Huet – EC Antonio Puente – EC

PPP in Robotics – SPARC



Industry

Academia

End-Users

Work Programme

Call implementation

http://sparc-robotics.eu/about/

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.

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

- Detailed definition of Technologies, Technology Combinations, Abilities
- 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

How SRA/MAR help in preparing proposals?

SRA/MAR PROVIDE FRAMEWORK/GUIDELINES

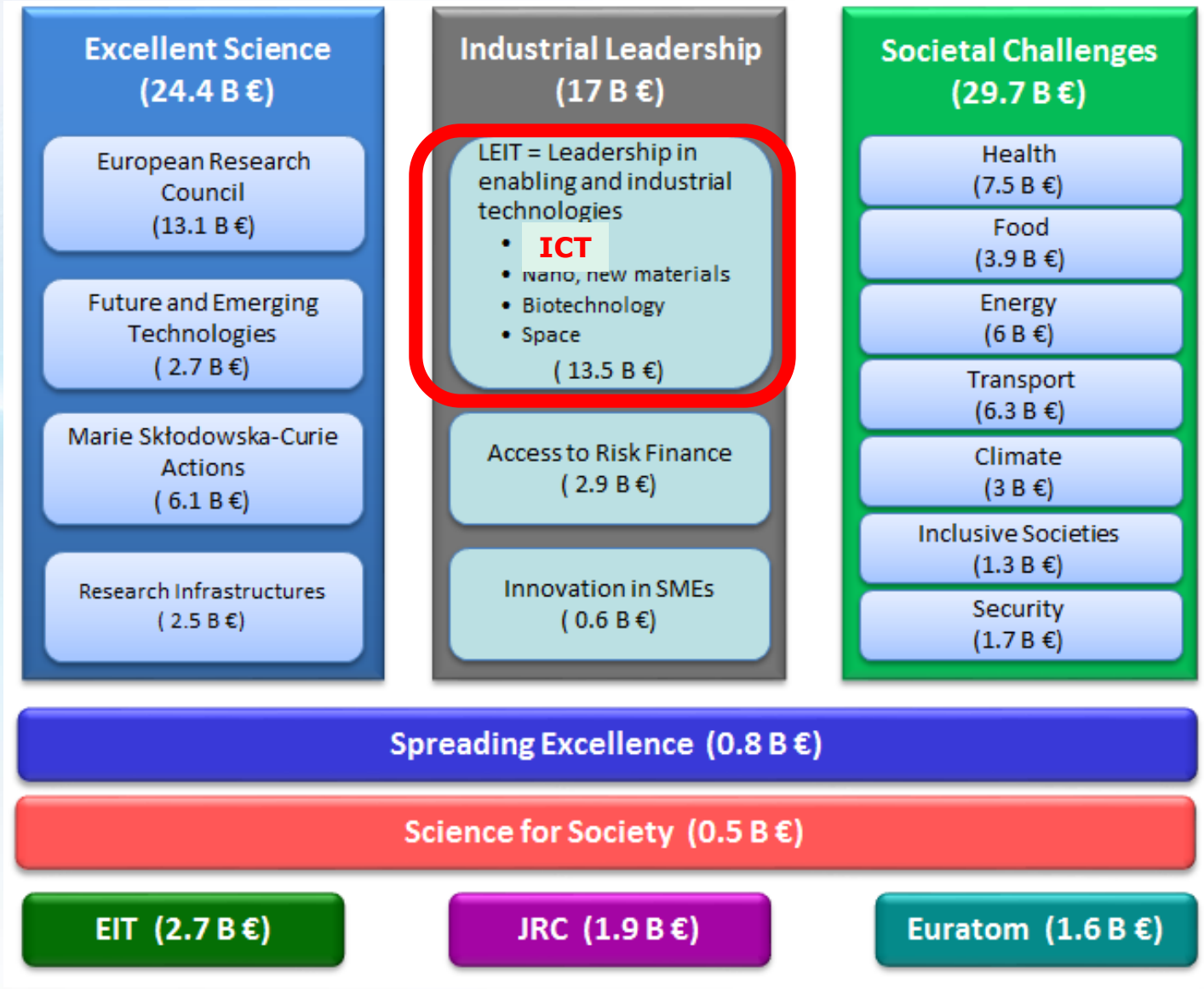
My proposal vs. SRA

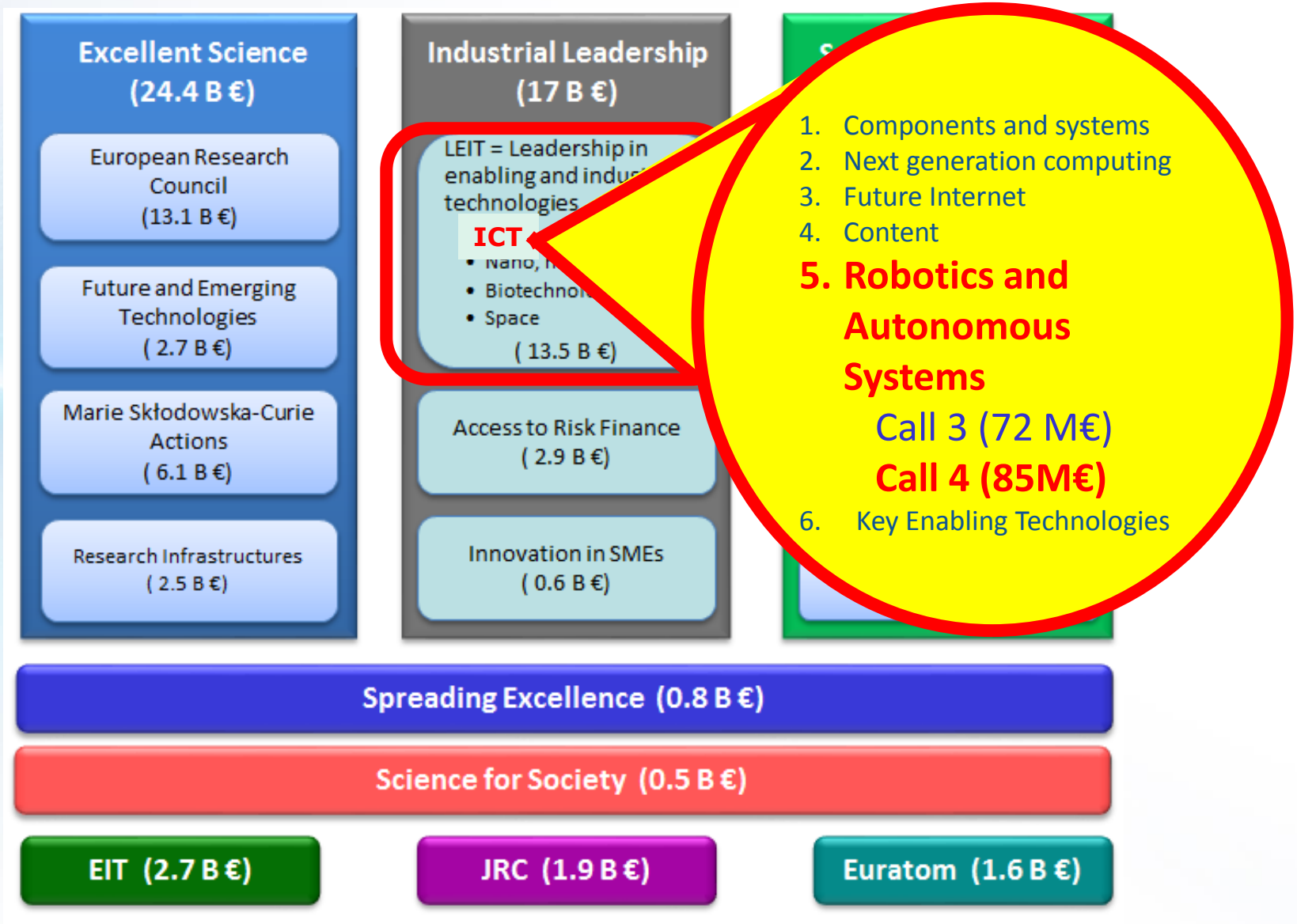
- Show how the proposal addresses the SRA high level goals and strategic objectives.

My proposal vs. MAR:

- Which "step change" in Ability/Technology
- Which impact on the Domains
- Which TRL increase

Overview of the Call


Excellent Science
(24.4 B €)
European Research Council
(13.1 B €)
Future and Emerging Technologies
(2.7 B €)
Marie Skłodowska-Curie Actions
(6.1 B €)
Research Infrastructures
(2.5 B €)
Industrial Leadership
(17 B €)
LEIT = Leadership in enabling and industrial technologies
ICT
Nano, new materials
Biotechnology
Space
(13.5 B €)
Access to Risk Finance
(2.9 B €)
Innovation in SMEs
(0.6 B €)
Societal Challenges
(29.7 B €)
Health
(7.5 B €)
Food
(3.9 B €)
Energy
(6 B €)
Transport
(6.3 B €)
Climate
(3 B €)
Inclusive Societies
(1.3 B €)
Security
(1.7 B €)
Spreading Excellence (0.8 B €)
Science for Society (0.5 B €)
EIT (2.7 B €)
JRC (1.9 B €)
Euratom (1.6 B €)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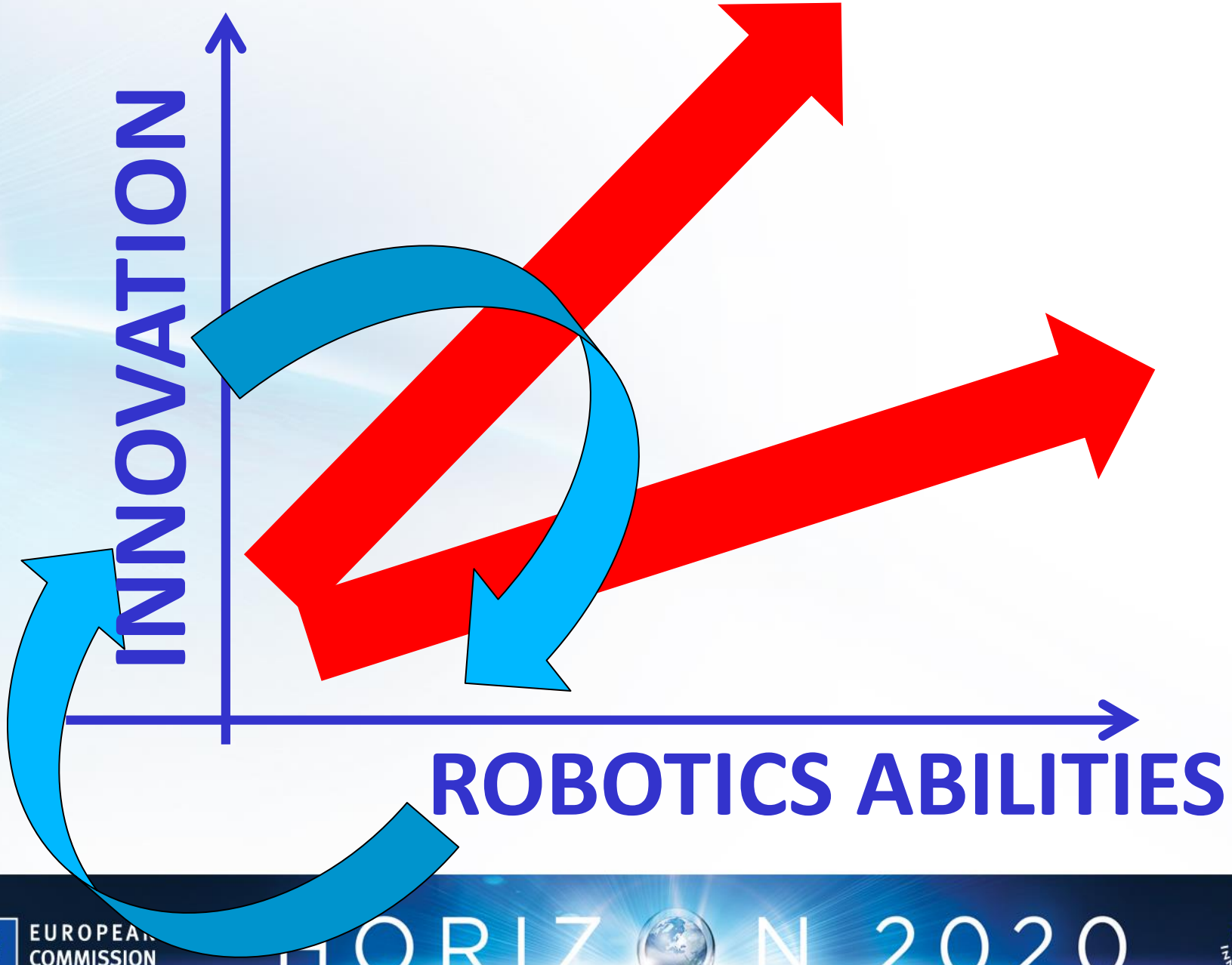
(13.5 B €)
Access to Risk Finance
(2.9 B €)
Innovation in SMEs
(0.6 B €)
1. Components and systems
2. Next generation computing
3. Future Internet
4. Content
5. Robotics and Autonomous Systems
Call 3 (72 M€)
Call 4 (85M€)
6. Key Enabling Technologies
Spreading Excellence (0.8 B €)
Science for Society (0.5 B €)
EIT (2.7 B €)
JRC (1.9 B €)
Euratom (1.6 B €)


INNOVATION
ROBOTICS ABILITIES

4th Robotics and Autonomous Systems H2020 Call Closing: 25-4-2017

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

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

ICT 28-2017: Robotics competition, coordination and support

TYPES OF ACTIONS:

Research and Innovation (RIAs)
Innovation Actions (IAs)
Pre-Commercial Procurement (PcP)
Coordination and Support Actions (CSA)

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Research and Innovation (RIAs)
Innovation Actions (IAs)
Pre-Commercial Procurement (PcP)
Coordination and Support Actions (CSA)

4th Robotics Call in H2020 (closing: 25-4-2017) RESARCH and INNOVATION ACTIONS

ICT 25-2017: Advanced robot capabilities research and take-up			
RIA	15M€	**a) Open**, **Generic** -> All topics and disciplines	2-4 M€/PROJECT*
		b) Step Changes in Technical capabilities	2-4 M€/PROJECT*
ICT 27–2017: System abilities, SME & benchmarking, safety certification			
RIA	28M€	**a) System Abilities**: Perception ability, decisional autonomy, increasing dependability levels, self-verifying behaviour	2-4 M€/PROJECT*
		b) SME-based research and **benchmarks**	5-8 M€/PROJECT*
IA	11M€	c) Shared facilities for safety certification	
PcP	7M€	d) Pre-commercial procurement	
ICT 28-2017: Robotics competition, coordination and support			
CSA	5M€	a) Non-technical barriers b) Standards & regulation c) Community support	

*indicative amounts

TYPES OF ACTIONS:

Research and Innovation (RIAs)
Innovation Actions (IAs)
Pre-Commercial Procurement (PcP)
Coordination and Support Actions (CSA)

4th Robotics Call in H2020 (closing: 25-4-2017) INNOVATION ACTIONS

ICT 25-2017: Advanced robot capabilities research and take-up			
RIA	15M€	a) Open, generic research b) Technical capabilities: System integration, perception, navigation and cognition	
IA	**19M€**	**c) End User driven application development**	**2-4 M€/PROJECT***
		d) End-user driven - Filling tech./ regulatory gaps	**2-4 M€/PROJECT***
ICT 27–2017: System abilities, SME & benchmarking actions, safety certification			
RIA	28M€	a) System Abilities: Perception ability, dependability levels, self-verifying b) SME-based research and benchmarking	
IA	**11M€**	**c) Shared facilities for safety certification**	**6-11 M€/PROJECT***
PcP	**7M€**	**d) Pre-commercial procurement: smart cities**	**5-7 M€/PROJECT***
ICT 28-2017: Robotics competition, coordination and support			
CSA	5M€	a) Non-technical barriers b) Standards & regulations c) Community support	

*indicative amounts

TYPES OF ACTIONS:

Research and Innovation (RIAs)
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4th Robotics Call in H2020 (closing: 25-4-2017) CSA – Coordination and Support Actions

ICT 25-2017: Advanced robot capabilities research and take-up			
RIA	15M€	a) Open, generic research	
		b) Technical capabilities: System abilities, perception, navigation and cognition	
IA	19M€	c) End User driven application development	
		d) Filling technology / regulatory gaps	

ICT 27–2017: System abilities, SME & benchmarking actions, safety certification			
RIA	28M€	a) System Abilities: Perception ability, dependability levels, self-verifying behaviour	
		b) SME-based research and benchmarks	
IA	11M€	c) Shared facilities for safety certification	
PcP	7M€	d) Pre-commercial procurements for capabilities	

ICT 28-2017: Robotics competition, coordination and support			
CSA	5M€	a) Non-technical barriers	3M€*
		b) Standards & regulation	
		c) Community support and outreach	
		d) Competitions	2M€*

*indicative amounts

4th Robotics Call in H2020 (closing: 25-4-2017)

ICT 25-2017: Advanced robot capabilities research and take-up		
RIA	15M€	a) Open, generic research
		b) Step changes in Technical capabilities
IA	19M€	c) End User driven: application development
		d) End User driven: Filling technology / regulatory gaps
ICT 27–2017: System abilities, SME & benchmarking actions, safety certification		
RIA	28M€	a) System Abilities: Perception ability, decisional autonomy, increasing dependability levels, self-verifying behaviour
		b) SME-based research and benchmarks
IA	11M€	c) Shared facilities for safety certification
PcP	7M€	d) Pre-commercial procurement: smart cities
ICT 28-2017: Robotics competition, coordination and support		
CSA	5M€	a) Non-technical barriers
		b) Standards & regulation
		c) Community support and outreach
		d) Competitions

TYPES OF ACTIONS:

Research and Innovation (RIAs)
Innovation Actions (IAs)
Pre-Commercial Procurement (PcP)
Coordination and Support Actions (CSA)

Research and Innovation Actions (RIA) DEFINITION

- Actions primarily consisting of activities aiming to establish **new knowledge** and/or to explore the **feasibility** of a **new or improved** technology, product, process, service or solution
- basic and applied **research**, technology **development** and **integration**, **testing** and **validation** on a *small-scale prototype* in a *laboratory environment* (in robotics necessary but not sufficient!)
- limited **demonstration** or **pilot** activities aiming to show **technical feasibility in a near to operational environment** (Important in Robotics -> not only simulation! testing in "realistic" environment!)
- *Funding rate:* 100%

4th Robotics Call in H2020 (closing: 25-4-2017)

RIA

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		b) SME-based research and benchmarks	5-8 M€/PROJECT
IA	11M€	c) Shared facilities for safety certification	
PcP	7M€	d) Pre-commercial procurement	
ICT 28-2017: Robotics competition, coordination and support			
CSA	5M€	a) Non-technical barriers	
		b) Standards & regulation	
		c) Community support	
		d) Competitions	

ICT-25: Research and Innovation Actions addressing generic advances and technical capabilities

- **a.** Open, generic forward-looking research into **novel technical advances in robotics** – **open** to **all robotics-related research topics** and disciplines. Proposals are expected to address technical topics which **cut across application domains** and which can be developed further with a view to achieving high future **impact** on markets or societal sectors in Europe.
- **b.** Technology research and development to achieve **step changes** in the **capabilities** of the following high priority RAS technologies: systems development, human-robot interaction, mechatronics, perception, navigation and cognition.
- Proposal size: EUR 2 to 4 million funding

→ Identify the center of gravity: a) or b)

ICT-25: Research and Innovation Actions addressing generic advances and technical capabilities

a. **Open - cut across application domains - impact**

b. **Step changes in capabilities**

Funding [2 – 4 M€]*

IDENTIFY THE CENTER OF GRAVITY
a) or b)

*indicative amounts

Expected Impact:

- Promote **excellent** science and technology **knowledge** in Europe, demonstrated by a high standard of research outputs (including publications, open source software or, as appropriate, patents);
- Develop a new generation of robotic and autonomous systems with clear and **measurable progress over the state of the art** in terms of step changes in technical capabilities, as evidenced by **improvements in performance** (including in terms of affordability, reliability and robustness, energy autonomy and user acceptability);
- Greater **industrial relevance** of research actions and output as demonstrated by deeper **involvement of industry** and stronger **take-up** of research results;
- Fostering new **links between academia and industry**, accelerating and broadening technology transfer;
- more competitive positioning of European robotics providers in the marketplace, in terms of their penetration in **new or emerging robotics sectors.**

4th Robotics Call in H2020 (closing: 25-4-2017)

RIA

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		b) SME-based research and benchmarks	5-8 M€/PROJECT
IA	11M€	c) Shared facilities for safety certification	
PcP	7M€	d) Pre-commercial procurement: [illegible]	

ICT 28-2017: Robotics competition, coordination and support			
CSA	5M€	a) Non-technical barriers	
		b) Standards & regulation	
		c) Community support [illegible]	
		d) Competitions	

ICT-27-2017.a : Research and Innovation Actions on system abilities.

- **a.** advancing the state of the art in the level of **smart robotics system abilities**. The focus is on the technical challenges; research actions will address cross cutting technology issues that will make a significant contribution to the needs of applications and domains with the highest impact on markets. Proposals are expected to address at least one or a combination of the following **prioritised abilities**: **perception** ability which is immune to natural variation (e.g. changing weather conditions); **decisional autonomy**; increasing **dependability** levels to the level of graceful degradation; systems that are able to **self-verify correct behaviour** in safety critical tasks.
- Proposal size: EUR 2 to 4 million funding

Expected Impact:

- Verifiable **increase** in the **level of system abilities** of value **in the targeted application domains**, in particular improving the innovativeness, robustness and longevity of operations of robots deployed in challenging environments
- **Significant improvements in the technologies** or their combination, underlying the chosen system abilities.

4th Robotics Call in H2020 (closing: 25-4-2017)

RIA

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		b) STEP CHANGES in Technical capabilities: Systems development, HRI, mechatronics, perception, navigation and cognition	2-4 M€/PROJECT
ICT 27–2017: System abilities, SME & benchmarking, safety certification			
RIA	28M€	a) System Abilities: Perception ability, decisional autonomy, increasing dependability levels, self-verifying behaviour	2-4 M€/PROJECT
		b) SME-based research and benchmarks	5-8 M€/PROJECT
IA	11M€	c) Shared facilities for safety certification	
PcP	7M€	d) Pre-commercial procurement	
ICT 28-2017: Robotics competition, coordination and support			
CSA	5M€	a) Non-technical barriers	
		b) Standards & regulation	
		c) Community support	
		d) Competitions	

ICT-27-2017.b : Research and Innovation Actions for SME-based research

- Stimulate **SMEs** in the robotics sector to develop novel and challenging technology and systems applicable to new markets.
- Provide SMEs with access to technical and non-technical support services and technology relevant to the new market addressed.
- Provide to SMEs, who are not necessarily in the original consortium, with **facilities to carry out their research** more efficiently and may include access to specialised development facilities or technology.
- Proposals should also identify **how** they will enable SMEs to access stakeholders in new markets.
- Proposals addressing extended clinical validation for healthcare are specifically excluded.
- Proposal size: EUR 5 to 8 million funding*

*indicative amounts

Expected impacts

- Contribute to overall growth of SMEs targeting new robotics markets
- SMEs conducting and utilising research to access new markets

ICT-27-2017.b : Research and Innovation Actions for SME-based research

- provide to SMEs, who are not necessarily in the original consortium […].

- Financial support to third parties
  - Minimum 50% of the EU funding
  - ~ [50k€ – 200k€] per party
  - Proposals should define the selection process of additional users/suppliers

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.

4th Robotics Call in H2020 (closing: 25-4-2017)

RIA

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ICT 28-2017: Robotics competition, coordination and support			
CSA	5M€	a) Non-technical barriers	
		b) Standards & regulation	
		c) Community support	
		d) Competitions	

ICT-27-2017.b : Research and Innovation Actions for benchmarks

- Development and implementation of robotics **application-relevant benchmarks and metrics** to assess progress in technologies and systems.
- **Qualitative** and **quantitative** information to support the assessment and development of systems addressing step changes and ability levels
- Benchmarks and metrics which are **useful to an end user**
- Proposal size: EUR 5 to 8 million funding*

*indicative amounts

ICT-27-2017.b : Research and Innovation Actions for benchmarks

- Financial support to third parties
  - Minimum 60% of the EU funding
  - ~ [50k€ – 100k€] per party
  - Proposals should define the selection process of additional users/suppliers

Expected impacts

- More efficient development of the robotics sector and wide acceptance in both academia and industry of new benchmarking tools
- Improved systems characterisation and improved means of robotics system performance evaluation.

Recipe for a good RIA proposal*

ABILITY OR TECHNOLOGY

- Step change / Improvement: current vs. target
- How? Methodology

VALIDATION

- Plans to demonstrate progress/step changes in abilities/ technologies
- Targeted improvements (e.g.: TRLs), metrics, validation plans

IMPACT

- Specific Objective(s)
- Concrete plans to reach the objective(s)

CONSORTIUM

- Right mix in expertise (topics + function: S&T provider/integrator/users)
- Cover the value chain (right balance tech. push / user driven)

* Mostly applicable to ICT25-ICT27.a

RIA

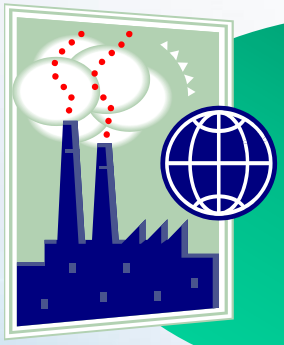
TYPE	2017
RIA	▪ OPEN ▪ Step changes in prioritised technologies
RIA	▪ Advanced perception ▪ Decisional autonomy ▪ Increasing dependability ▪ Self-verifying & self-correcting systems
RIA	▪ SME-based research ▪ Benchmarking

INNOVATION ACTIONS

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

Typical consortium of IA



End users

- Define user needs
- Provide real-world test environments
- Validate results

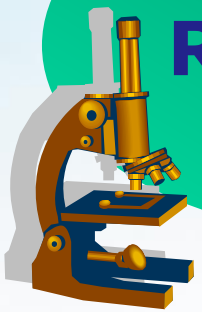
- Integrate solutions for real-world problems
- Generalize results
- Market outreach

- Supply SotA technology
- Conduct experiments

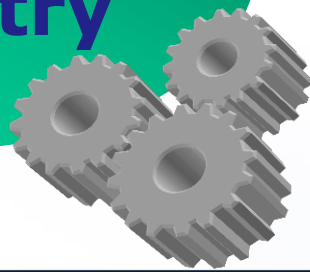
Validation

Technology transfer

Research



Robotics industry



Technology Readiness Levels

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

ICT-25-c

Application domains of IA

No limitations, provided that the applications are taken from the real-world:

industry (all kinds),

utilities,

transport and logistics,

farming and fishing,

civil engineering and building,

mining and quarrying,

private and public services (including health and education),

emergency and rescue,

…

Exploitation

The economic potential of the intended results should be demonstrated by means of:

market screening,

competitive position,

marketing goals,

business plans,

…

Can IA include research?

Yes but …

… keep in mind that the main focus is **technology transfer**.

H2020 ICT-25-2017 - IA

Advanced robot capabilities research and take-up

RIA

a

Open, generic, all topics and disciplines

€2–4m

b

Step changes: systems development, HRI, mechatronics, perception, navigation and cognition

€2–4m

€15m

2017

14/12/2016

25/4/2017

IA

c

Open, end user-driven application development, areas with significant market potential
> TRL5

€2–4m

d

Filling technology and regulatory gaps through end user-driven innovation actions

€2–4m

€19m

ICT-25-2017 Advanced robot capabilities research and take-up - IA

- Innovation Actions (IAs) driven by end-users

c. Improving the deployment prospects of RAS through **end-user-driven application developments** in domains and application areas with significant **market potential.**

- To address system development beyond TRL 5.
- The outputs will not be purely technological; actions will generate economic and operational data that will provide a valuable basis for setting operating parameters and for reducing commercial risks for future investors

d. Filling technology or regulatory gaps through end-user-driven innovation actions, where the gap represents a challenging market entry barrier.

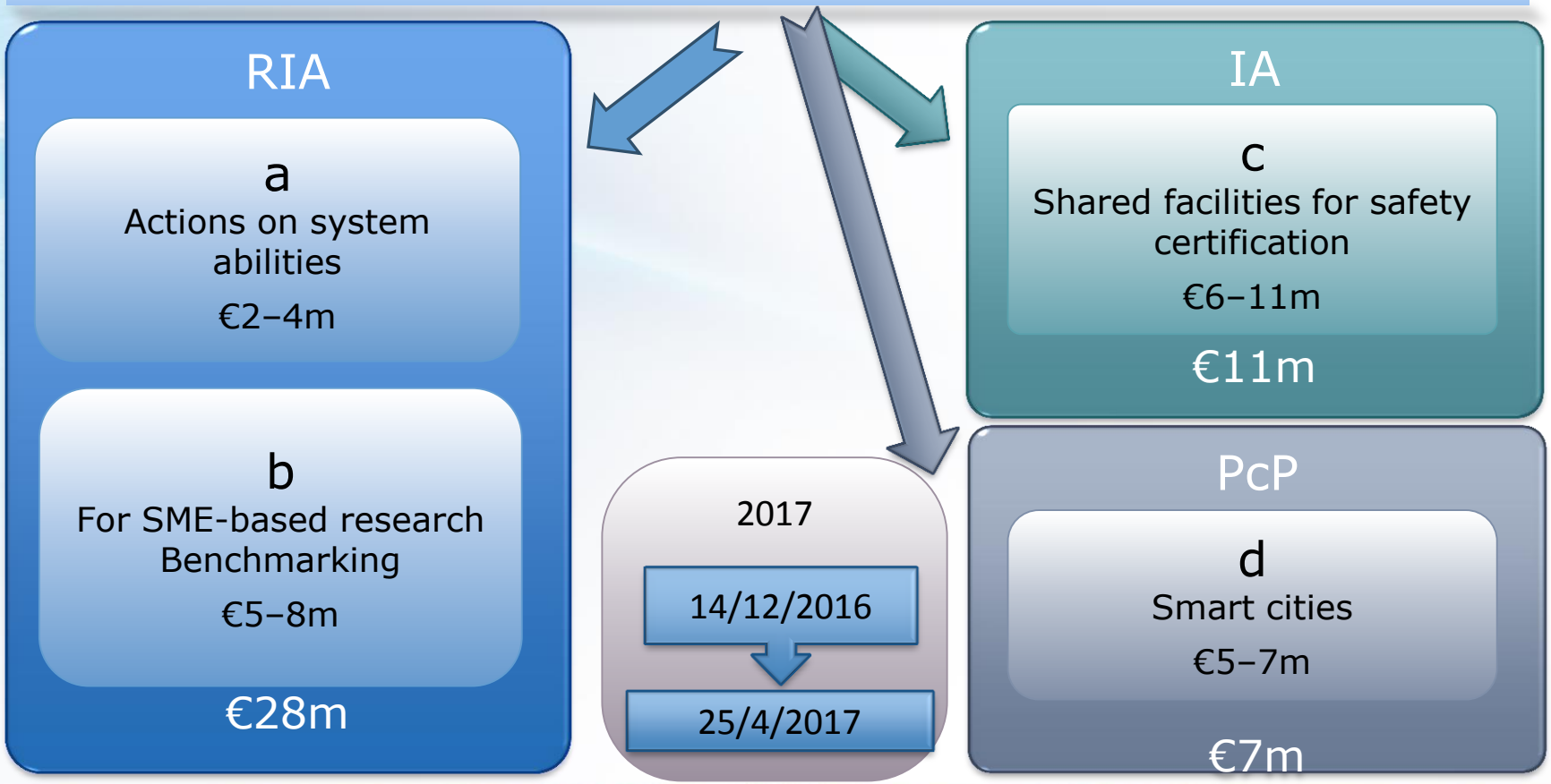
- Proposals to address a gap in either technical capability or system ability.
- The targeted gap and the required steps to tackle the gap must be clearly identified in the proposal.

ICT-25-2017 Advanced robot capabilities research and take-up – IA

- **Main centre of gravity to be identified** – whether c or d targeted in the proposal
- At least one action to be supported from c) and d)
- Proposals are expected to require an EU contribution of typically €2–4 million
  - This does not preclude submission and selection of proposals requesting other amounts

H2020 ICT-27-2017

System abilities, SME & benchmarking actions, safety certification



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

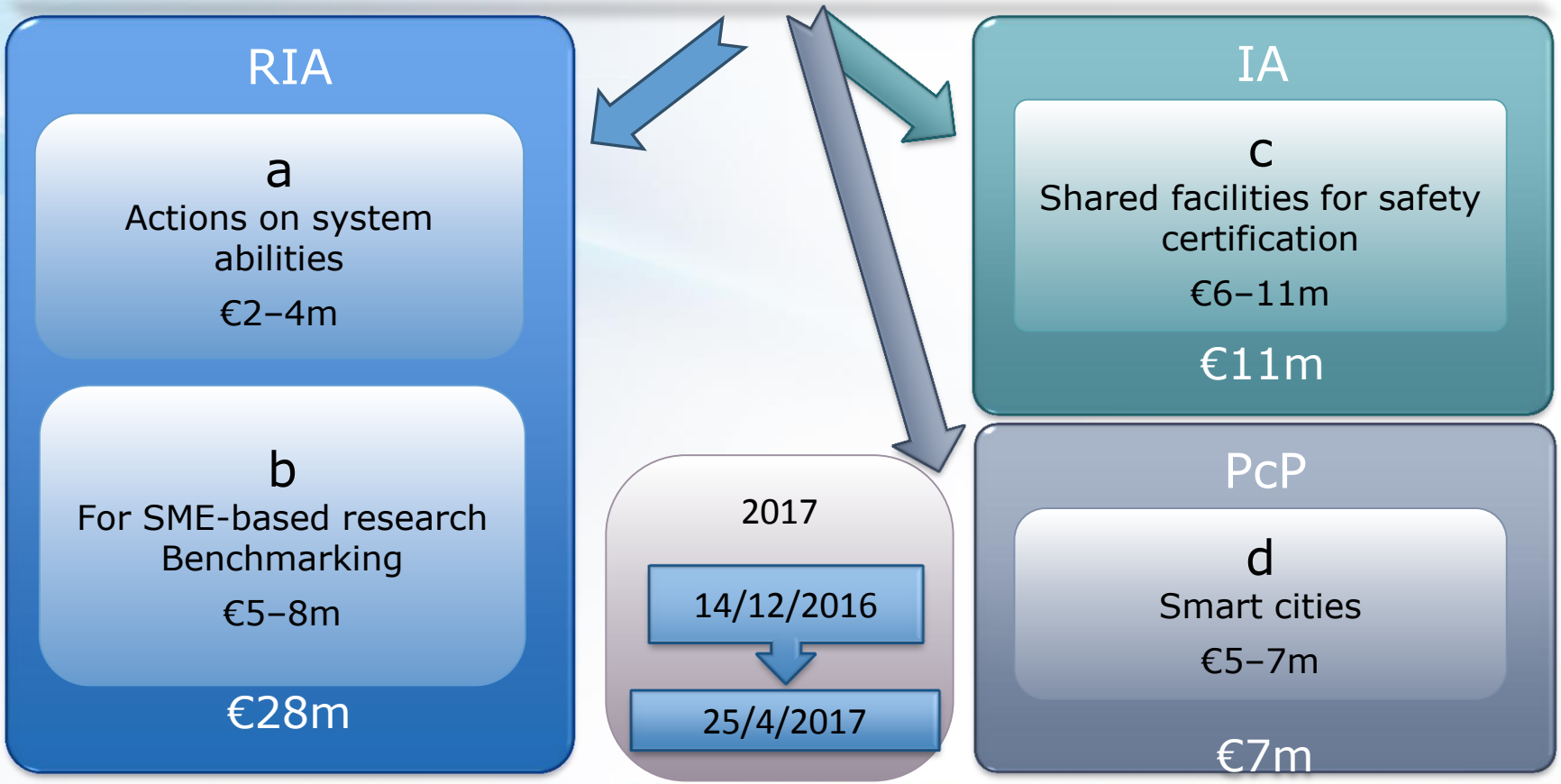
c. IAs on shared facilities and safety certification

- Development of testing protocols for shared space cooperative and collaborative systems leading to viable safety certification standards
- Proposals must cover a range of domains and applications where safety certification is a market barrier
- May involve financial support to third parties (**FSTP**)

PRE-COMMERCIAL PROCUREMENT

H2020 ICT-27-2017

System abilities, SME & benchmarking actions, safety certification



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

d. Pre-commercial procurement action

- Demand-driven PCP actions in the area of **smart cities**
- Actions will aim at but not be limited to one or several of the following topics: waste management, transport (with focus on smart mobility), the provision of city-wide utilities and services, the provision of healthcare, social care and education (including social innovation)
- Actions will be expected to show how the PCP instrument and procurers will be mobilised to develop new robotics related solutions in a smart cities context

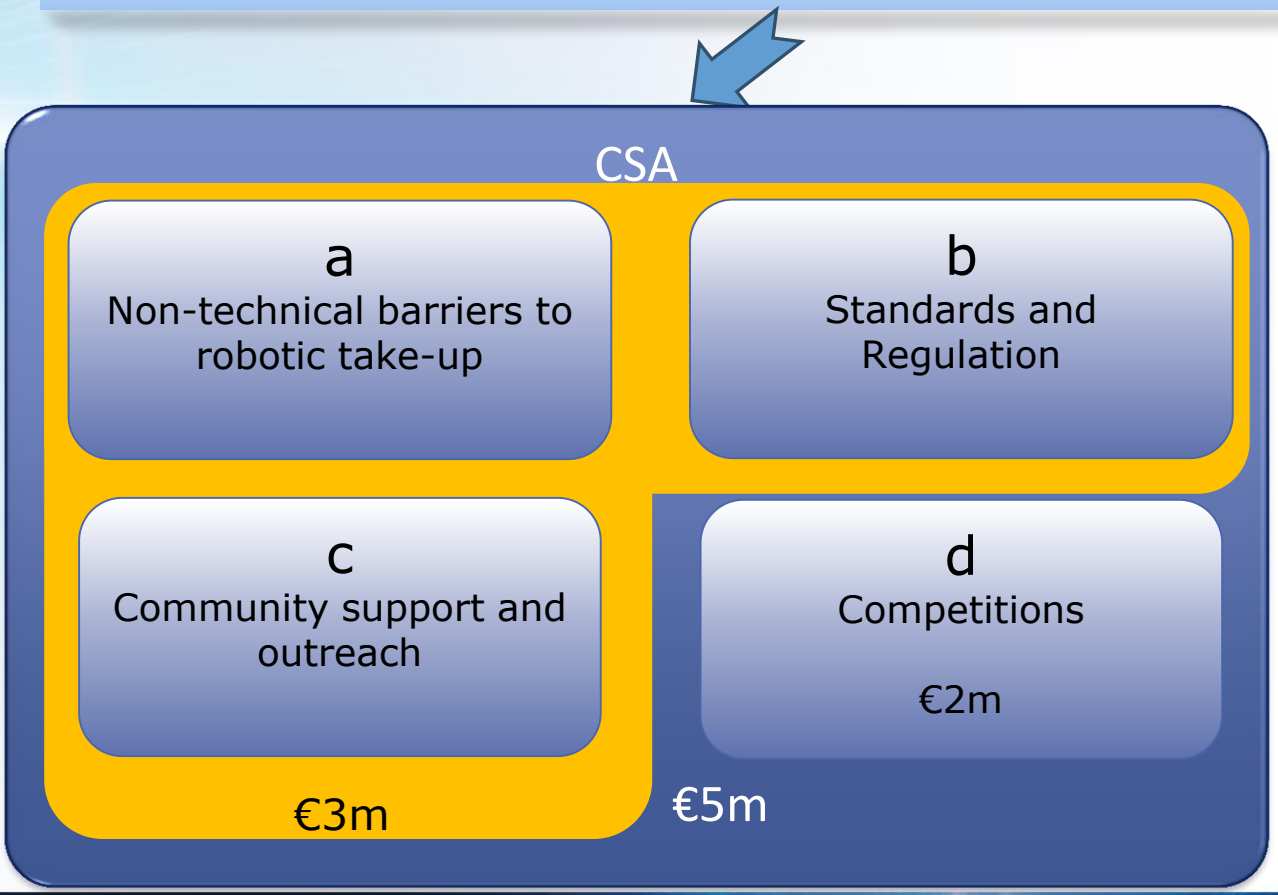
COORDINATION AND SUPPORT ACTIONS

What are Coordination and Support Actions (CSA)

- Actions consisting primarily of accompanying measures such as standardisation, dissemination, awareness-raising and communication, networking, coordination or support services, policy dialogues and mutual learning exercises and studies, including design studies for new infrastructure and may also include complementary activities of strategic planning, networking and coordination between programmes in different countries
- May have one or several beneficiaries

H2020 ICT-28-2017

Robotics competition, coordination and support



2017

14/12/2016

25/4/2017

ICT-28-2017 Robotics competition, coordination and support

a. Non-technical barriers to robotics take-up

- Promotion of entrepreneurial skills specific to robotics and provision of non-technical early-stage support for SMEs and spinouts
- Addressing non-technical market barriers (e.g. ethical, legal and socio-economic issues affecting take-up)
- Promotion of responsible research and innovation in robotics and assessment of societal readiness for robotics products
- Strategies to anticipate new skills requirements, to reduce skills shortage and to provide responses to economic change through training, skills development and education

b. Standards and regulation

- Coordination of standards harmonisation and regulation
- Dialogue with regulatory bodies

ICT-28-2017 Robotics competition, coordination and support

c. Community support and outreach

- To improve information exchange, to provide open access resources, to communicate outcomes of EC-funded projects, to improve the public level of understanding and societal uptake of robotics

d. Competitions

- Robotic competitions to speed up advance towards smarter robots, demonstrating progress and raising public awareness

ROBOTICS IN OTHER WORK PROGRAMMES

WP Food security, sustainable agriculture…

SFS-05-2017 Robotic Advances for Precision Farming

- Opening 4 October **2016**
- Closing 14 February **2017**
- Research and Innovation Actions; budget €7 million
- To help attain high levels of precision in modern farming through the smart use of robotics
- To develop and demonstrate new robotics technologies in real-world scenarios involving such as automated mobility around irregular farmland areas, accurate sensing of crop and livestock conditions, and dextrous manipulation of farmed produce

WP Cross-cutting activities (Focus Areas)

FoF-12-2017 ICT Innovation for Manufacturing SMEs (I4MS)

- Opening 20 September **2016**
- Closing 19 January **2017**
- Innovation Actions; total budget for all actions under the topic (not just robotics) €32 million
- Including robotics: new robot systems that are cost effective at lower lot sizes, with the benefit of long-term improvements in productivity, the ability to work safely in close physical collaboration with human operators; and that are intuitive to use and adaptive to changes in task configuration

Additional information

Useful resources

- **Strategic Research Agenda (SRA)**

  https://eu-robotics.net/cms/upload/PPP/SRA2020_SPARC.pdf

- **Multi-Annual Roadmap (MAR):**

  http://sparc-robotics.eu/wp-content/uploads/2014/05/H2020-Robotics-Multi-Annual-Roadmap-ICT-2016.pdf

- **Q&A document (continually updated) on the Participant Portal**
- **Current projects portfolio**

  https://ec.europa.eu/digital-single-market/en/robotics

- **Topic group on Agricultural Robots**

  https://eu-robotics.net/ppp/objectives-of-our-topic-groups/

Do not miss the next events

1) PcP http://eafip.eu/events/athens-2016/

Robotics session - October 19th

2)

BROCKERAGE EVENT

Dedicated to the ROBOTICS CALL

BRUSSELS

5 December 2016

http://sparc-robotics.eu/