Information and Communication Technologies

Artificial Intelligence and Technologies for Digitising European Industry and Economy		Open	Close
ICT-46-2020	Robotics in Application Areas and Coordination & Support	19-11-2019	22-04-2020
ICT-47-2020	Research and Innovation boosting promising robotics applications	19-11-2019	22-04-2020
ICT-48-2020	Towards a vibrant European network of AI excellence centres	09-07-2019	13-11-2019
ICT-49-2020	Artificial Intelligence on demand platform	19-11-2019	22-04-2020
ICT-38-2020	Artificial intelligence for manufacturing	09-07-2019	16-01-2020
European Data Infrastructure: Big Data and Cloud technologies			
ICT-51-2020	Big Data technologies and extreme-scale analytics	09-07-2019	16-01-2020
5G			
ICT-52-2020	5G PPP – Smart Connectivity beyond 5G	19-11-2019	22-04-2020
ICT-53-2020	5G PPP – 5G for Connected and Automated Mobility (CAM)	09-07-2019	13-11-2019
Next Generation Internet (NGI)			
ICT-56-2020	Next Generation Internet of Things	09-07-2019	16-01-2020
ICT-44-2020	Next Generation Media	09-07-2019	16-01-2020
Digitising and transforming European industry and services: digital innovation hubs and platforms			
DT-ICT-03-2020	I4MS (phase 4) - uptake of digital game changers	09-07-2019	13-11-2019
DT-ICT-05-2020	Big Data Innovation Hubs	09-07-2019	13-11-2019
DT-ICT-09-2020	Boost rural economies through cross-sector digital service platforms	19-11-2019	22-04-2020
DT-ICT-12-2020	AI for the smart hospital of the future	19-11-2019	22-04-2020

ROBOTICS - ICT-2018-2020

ICT-46-2020:

Robotics in Application Areas and Coordination & Support
Opening date: 19 November 2019
Closing date: 22 April 2020

ICT-47-2020:

Research and Innovation boosting promising robotics applications
Opening date: 19 November 2019
Closing date: 22 April 2020

ICT-46 – ICT-47 Topic evolution

European Commission
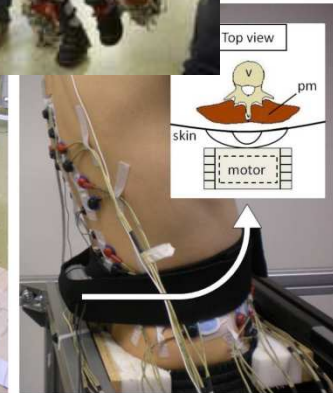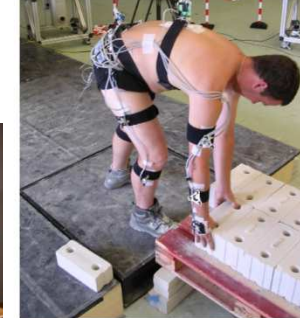
3. Is this new or has it been called before?

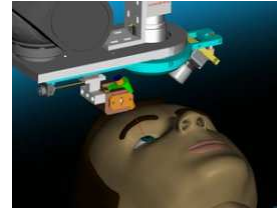e.g. How is it new / different from previous calls
What <u>previous</u> WP topic is it linked to?
What are the main changes?
Is it linked to other topics in the <u>current</u> WP? (e.g. in LEIT or other pillars)

➔ *BACKGROUND IN FOLLOWING SLIDES*

Robotics
4 Priority Areas

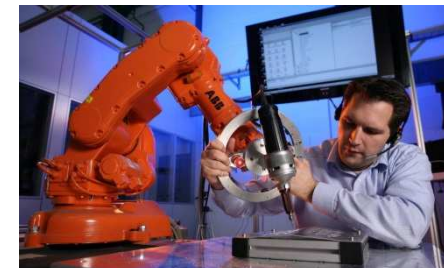❑ Healthcare

❑ Inspection and maintenance of infrastructure

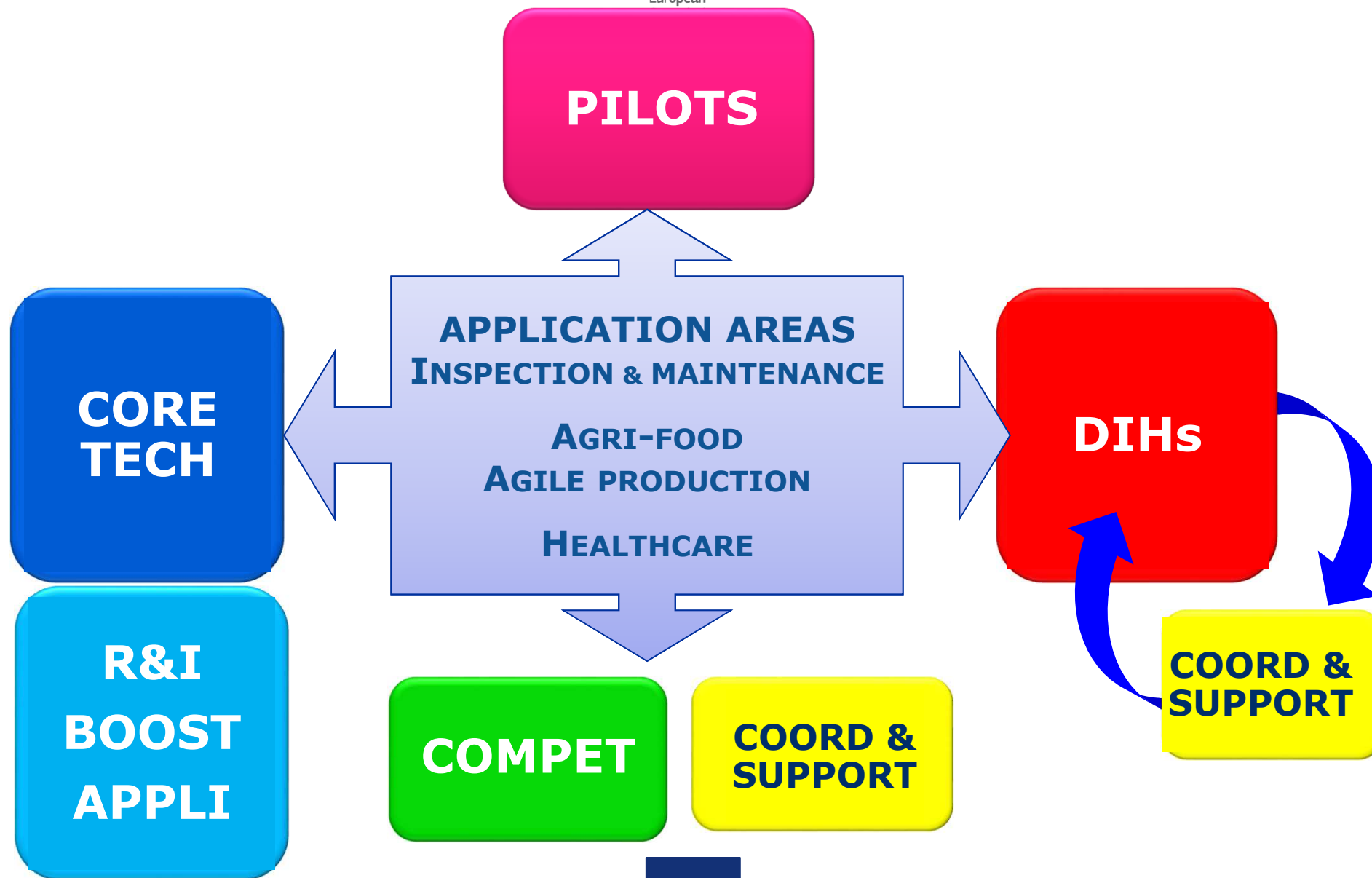❑ Agri-food

❑ Agile production

4 Core Technologies

- ❑ AI and Cognition
- ❑ Cognitive Mechatronics
- ❑ Socially cooperative human-robot interaction
- ❑ Model-based design and configuration tools

5 ACTIONS

- ❑ DIHs (Digital Innovation Hubs)
- ❑ RIAs (Research and Innovation)
- ❑ Large Scale Pilots
- ❑ Competitions
- ❑ Coordination

TIMELINE

OPENING	DT-ICT-02-2018 DIGITAL INNOVATION HUBS	ICT-09-2019-2020: APPLICATION AREAS ICT-10-2019-2020: CORE TECHNOLOGY	ICT-46-2019-2020: APPLICATION AREAS CORE TECHNOLOGY CSA ICT-47-2019-2020: RIA BOOSTING PROMISING APPLICATIONS DT-ICT-12-2020: THE SMART HOSPITAL OF THE FUTURE
31 OCT 2017	17 APRIL 2018	28 MARCH 2019	22 APRIL 2020
OCT2017	2018	2019	2020

ICT46: RIA   41.5M€
ICT46: IA   41.5M€
ICT46: CSA   3M€
ICT47: RIA   20M€
DT-ICT-12   40M€
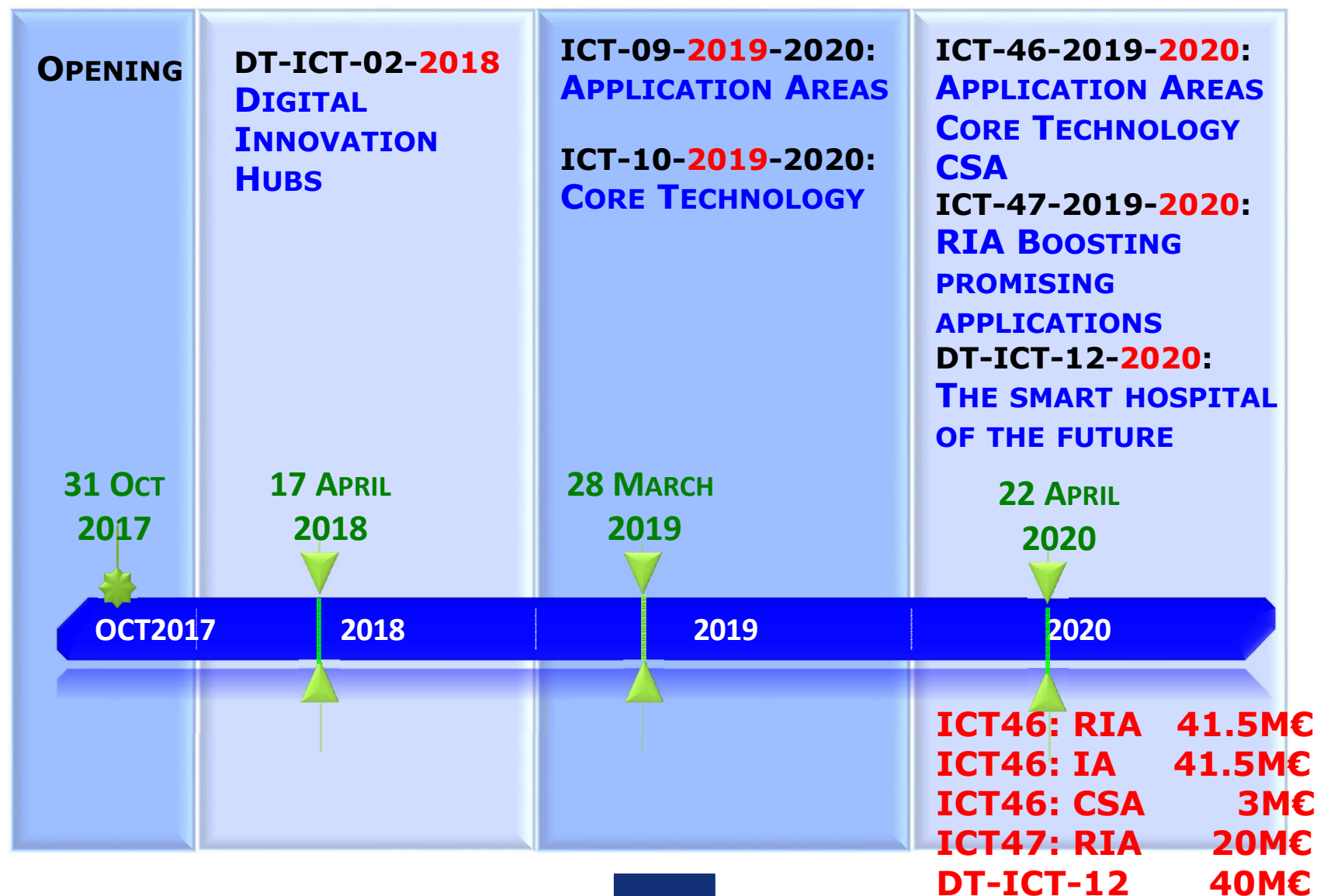
TIMELINE

PILOTS - APPLICATION AREAS:
- **AGRI-FOOD**
- **AGILE PRODUCTION**

PILOTS
- **SMART HOSPITAL OF THE FUTURE**

CORE TECHNOLOGIES
- **AI & COGNITION**
- **COGNITIVE MECHATRONICS**
- **SOCIALLY COOPERATIVE HRI**
- **MODEL-BASED DESIGN & CONFIG. TO**

ICT-46-2019-2020:
APPLICATION AREAS
CORE TECHNOLOGY
CSA

ICT-47-2019-2020:

DT-ICT-12-2020:
THE SMART HOSPITAL OF THE FUTURE

2020

CSA – 3M€
BUDGET: 3M€/PROPOSAL

RESEARCH & INNOVATION (RIA)
BOOSTING PROMISING APPLICATIONS

3. Is this new or has it been called before?

MAIN CHANGES:

Easier structure:

- *All topics linked to the Prioritised Application Areas are in ICT-46*
- *All topics NOT related to Prioritised Application Areas (open to ALL application areas) are in ICT-47*

NEW: *ICT 47 lists a number of Research Areas linked to* **PHYSICAL INTELLIGENCE**

SAME AS BEFORE:

- The 4 Core technologies for the 4 Prioritised Application Areas (ICT 46 a)

BUT NEW: *call text imposes that at least 1 proposal per technology funded*

ICT- 46 Topic evolution

3. Is this new or has it been called before?

- ICT-46 a) has been called in 2019. These are strong underlying technical areas and there is the absorptive capacity in the community for this to be called twice

- ICT-46 b) Is new and is strongly linked to the DIH Call in 2018

- ICT-46 c) Sets out new focus and impact that reflects the change in market status for robotics where the technology exists to deploy first stage solutions at scale but where market barriers and knowledge barriers still exist

1. What are you looking for?

European Commission

ICT-46-2020:

Robotics in Application Areas and Coordination & Support
ICT-47-2020:

Research and Innovation boosting promising robotics applications

TOPIC: ICT-46-2020

European Commission

Robotics in Application Areas and Coordination & Support

a) **RIAs: Increased autonomy**
Robotics Core Technology
➔ Budget: 6-7M€/action – TOTAL: 41.5M€ - min 1 per Core Techno.

b) IA: Large scale pilots in Robotics demonstrating the use of robotics in highly realistic environments in

- **Agri-Food** / **Agile Production**
➔ Budget: ~6-7M€/action TOTAL: 41.5M€ min 3 proposals/application area

c) Coordination and Support Action (CSA) – Robotics
➔ Budget: <3M€/action TOTAL: 3M€

TOPIC: ICT-46-2020

Robotics in Application Areas and Coordination & Support

a) RIAs: Increased autonomy

Robotics Core Technology

- AI and Cognition
- Cognitive Mechatronics
- Socially cooperative human-robot interaction
- Model-based design and configuration tools

➔ Develop core modules/toolkits for application in prioritised application areas

➔ Link to Robotics DIHs networks funded in 2018 call

➔ Address 1 Core technology

➔ Min. 1 action in each core technology to be funded

➔ Budget: 6-7M€/action – TOTAL: 41.5M€

Robotics in Application Areas and Coordination & Support

b) IA: Large scale pilots in Robotics demonstrating the use of robotics in highly realistic environments in

- **Agri-Food** from farming to processing and distribution

Or

- **Agile Production**
  - Link to other sources of funding – sustainability
  - Reference architectures, platforms,
  - Performance targets and evaluation
  - Ecosystem building
  - Acces to pilot – link to DIHs
  - Technical & non-technical issues

➔ Budget: ~6-7M€/action TOTAL: 41.5M€ min 3 proposals/application area

Robotics in Application Areas and Coordination & Support

c) Coordination and Support Action (CSA) – Robotics

- awareness and knowledge transfer

- high-level stakeholder forum + communication strategy

- legal and societal issues - AI-based robotics technology

- best practice to robotics stakeholders

- Advice on: socio-economic, cyber-security, data protection, ethical and privacy issues

- public understanding /awareness activities

➜ Budget: <3M€/action TOTAL: 3M€

European Commission

ICT-46-2020:

Robotics in Application Areas and Coordination & Support

ICT-47-2020:

Research and Innovation boosting promising robotics applications

European
Commission

Research and Innovation boosting promising robotics applications

Specific Challenge*:*

- **Physical Intelligence**

- Applications with high socio-economic impact and low environmental footprint – **OPEN TO ALL APPLICATION AREAS**

- Demonstrate the potential for take-up in the selected application(s).

TOPIC: ICT-47-2020

Research and Innovation boosting promising robotics applications

Research Areas:

- Micro- or millimetre scale robots
- Novel materials for service robotics
- Beyond human manipulation of objects
- Non-visual sensing novel for service robotics
- Intrinsically safe physical powerful robotic systems
- Variable/shared autonomy systems
➔ TRL4 integrated demos
➔ Budget: 2-3 M€/proposal

TOPIC: ICT-47-2020

What are you looking for?

- Novel and innovative approaches to addressing the technical areas listed.
- Step change improvements in technical performance arising from novel approaches (driven by a clear understanding of the current state of the art).
- Technical developments that open new market or application opportunities.
- Well established demonstrators of the improved performance within sufficiently realistic operating environments.
- Engagement with excellence centres in multiple technical disciplines so that novelty from cross-fertilization of capability can be exploited

![European Commission logo]

ROBOTICS & AI
in H2020 - ICT-2018-2020

ICT-46-2020:

Robotics in Application Areas and Coordination & Support

ICT-47-2020:

Research and Innovation boosting promising robotics applications

DT-ICT-12-2020:

AI for the smart hospital of the future

TOPIC: DT-ICT-12-2020:

AI FOR THE SMART HOSPITAL OF THE FUTURE

IAs: large-scale pilot

➜ in-facility pilot demonstrators

➜ innovative AI-based solutions in a health and care setting (hospital, primary care facility or care home).

➜ enable or support clinical, diagnosis and treatment, etc. carried out with clinical outcomes comparable to human delivered procedures and with comparable results.

➜ AI-based systems combining digital and physical services

➜ integrate health and care partners

➜ access to the relevant operational environment

➜ Link to DIH in robotics healthcare - https://dih-hero.eu/

➜ Budget: 7-10M€/action – TOTAL: 40M€

5. Current project portfolio *(if relevant)*

e.g.Please mention some highly relevant projects!
   Is there an overview of current project portfolio?
   Are there clusters / groups of projects?

- 5 Networks of DIHs in Robotics + 1CSA: DIH^2 / DIH-HERO / TRINITY / RIMA / RODIN

   - AI4EU – AI on demand platform

   - Note for ICT 46: « Model-based design and configuration tools »
   Relevant projects: ROSIN   ROBMOSYS

2. What do you <u>NOT</u> want?

- RIAs focusing impact on "other impact", (economic or societal), and neglecting the impacts expected by the call. This is nice to have but this is not where you get the sores

  - For all actions ➔ Focus on the impacts listed in the WP and explain HOW you will contribute to them (concrete actions)

- RIA focusing on Integration rather than technology improvements

ICT-47-2020: Research and Innovation boosting promising robotics applications

2. What do you NOT want?

- Proposals that only address incremental improvements in existing technologies.
- Developments that only address the niche needs of just one small or narrow market.
- Proposals that fail to identify the potential for application impact.
- Proposals that operate in a silo.

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4. Unique instructions for ~~evaluators~~ PROPOSERS on this WP topic? Excellence, Impact and more

➜ WP is the bible!

➜ LESSONS LEARNED FROM PREVIOUS EVALUATIONS

- HOW (not only WHAT)

- KPIs + Monitoring of progress

- ROLE ALLOCATION AT TASK LEVEL

- DESCRIPTION of Milestones & Deliverables

- RESPECT PAGE LIMIT – INCLUDING REFERENCES

- IMPACT = ACTUAL – EXPECTED impact ➜ if flaws in approach – impact score reduced

- BE EXPLICIT – evaluators do not read between the lines

4. Unique instructions for ~~evaluators~~ PROPOSERS on this WP topic? Excellence, Impact and more

ICT-46 a) Need to make sure there is step change novelty not incremental advance. That TRL levels are accurately accounted and evidenced. That there is awareness of the real world impact of the technical advance and that there is scalability.

ICT-46 b) Needs to be clear linkage to existing Digitization Initiatives such as DIHs, understanding of the industrial purpose of demonstrators and pilots. Sufficient capacity in the consortium to both construct, deploy and disseminate the pilot. Particularly to have a realistic chance of exploring actual use cases and developing novel insights into business models and economic returns through the running of the pilot. Sustainability of the pilot beyond funding is also desirable.

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Commission

4. Unique instructions for ~~evaluators~~ PROPOSERS on this WP topic? Excellence, Impact and more

ICT-46 c) Consortia of mixed capabilities that reflect the demands of the desired impacts, but which can deliver an integrated strategic approach to delivery. Need to avoid fragmented consortium structure that only delivers benefit at a task by task level.

ICT 47 – Topic evolution

4. Unique instructions for evaluators on this WP topic? Excellence, Impact and more

- Unique solutions that may cross technology discipline boundaries.
- Balance of technology capability and application awareness
- Clear plan to construct application relevant demonstrators
- Plan for engagement with DIHs and other platforms
- Involvement of relevant technical competences.

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6. Who are the leading players?
See DIHs, Projects portfolio – but don't limit to these, bring new users, new Research teams

- ICT-46 a) Leading Universities and key technology SMEs.

- ICT-46 b) Members of the relevant DIH and key end users across each domain ideally along each supply chain.

- ICT-46 c) Associations and effective dissemination partners, market data providers.

Digital Innovation Hubs

- TRINITY (https://projects.tuni.fi/trinity/)
- DIH2 (https://dih-hero.eu/)
- agROBOfood (https://www.wur.nl/en/project/agROBOfood-Towards-a-European-network-and-effective-adoption-of-robotics-technologies-.htm)

7. Is there a key group of actors (eg. cPPP or other) driving this? *e.g. Relevant cPPP(s), technology platform(s), other groups …*

euRobotics - SPARC

Work Programme topic

8. Are there any additional / background documents?

e.g. *call specific background / guidance notes;*
      EC communications and other policy documents;
      work programme consultation workshop reports;
      strategic research agendas, other research roadmaps;

SRA from SPARC

Q&A – Participant portal

Future Outlook

9. Do you have information about future trends, emerging initiatives, roadmaps, key players in this area? How are you bridging to Horizon Europe?

9. Do you have information about future trends, emerging initiatives, roadmaps, key players in this area? How are you bridging to Horizon Europe?

HORIZON EUROPE (HE):

- Continue R&D&I in Ai with an important Robotics component

DIGITAL EUROPE PROGRAMME (DEP):

- Continue the AI-on-demand-platform – to gather AI tools and bring them to industrial standard
- Large scale reference testing and experimentation facilities to validate AI-based technologies (including robotics!) in real(istic) environments in application sectors of major impact.

DIGITAL IN THE NEXT MFF: OVERVIEW

Digital in Horizon Europe

1. Digital under "global challenges"
   - Digital and industry cluster
   - Digital in other clusters - health, mobility, energy, environment,..
2. FET Open under Open Innovation
3. Research Infra under Open Science

€100 Bn with share to digital of 15Bn

Digital Europe Programme

1. High Performance Computing (HPC)
2. Artificial Intelligence (AI)
3. Cybersecurity
4. Advanced digital skills
5. Digital transformation and interoperability

€9.2 Bn

CEF - Digital

Connectivity
- Synergies with Transport /Energy
- WIFI/BB 4EU
- 5G roll out

€3 Bn

MEDIA under Creative Europe within Cohesionand Values
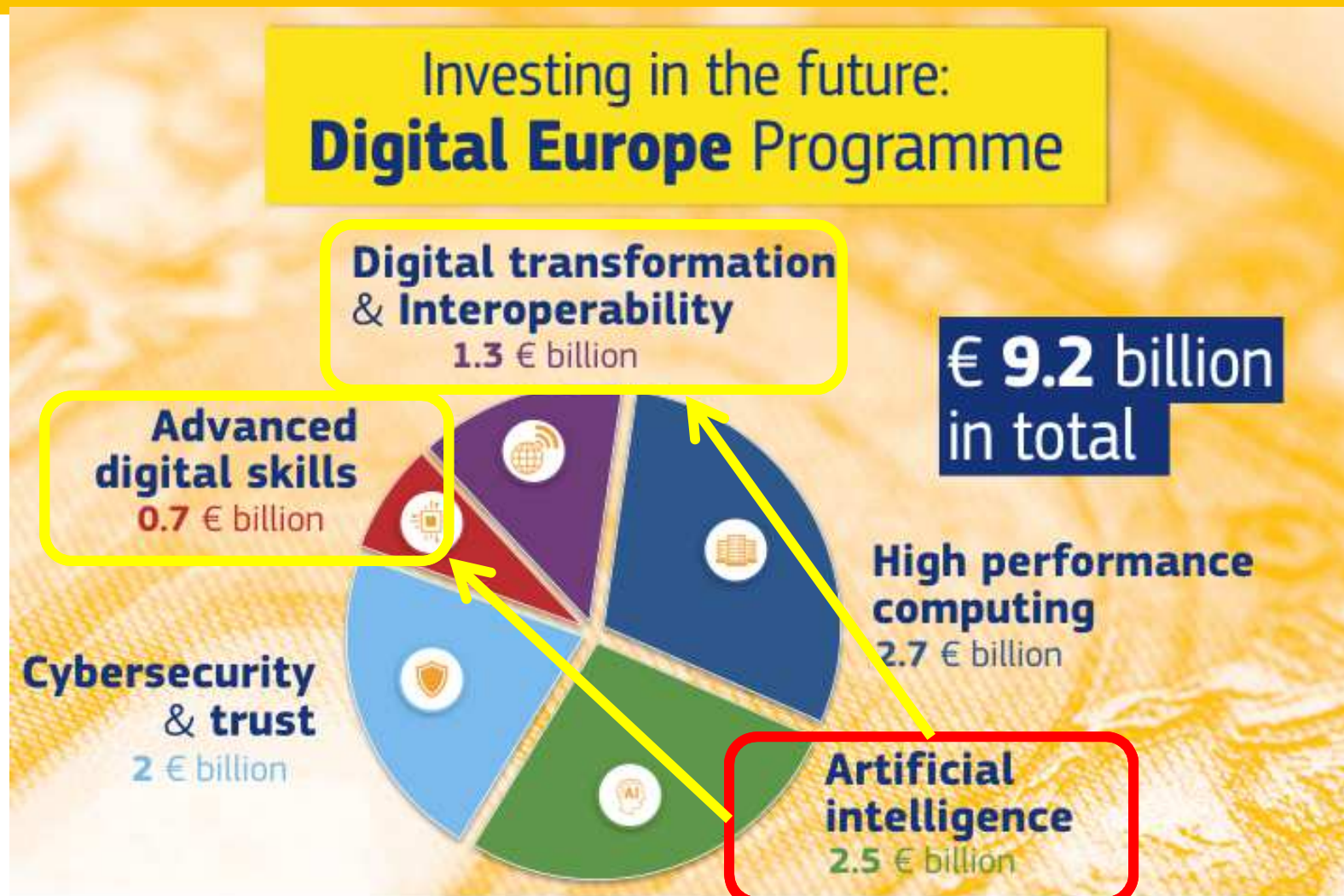
- Distribution of works
- Creation

€1.1 Bn

Horizon Europe: "AI and Robotics"

- "advanced human-machine interactions"

- "Safe, smart and efficient robotics and complex embodied systems"

- "User-driven AI technologies for AI-based solutions"

- "Developing and networking the research competences of AI competence centres across Europe"

- Technologies for open AI platforms including software algorithms, data repositories, robotics and autonomous systems platforms

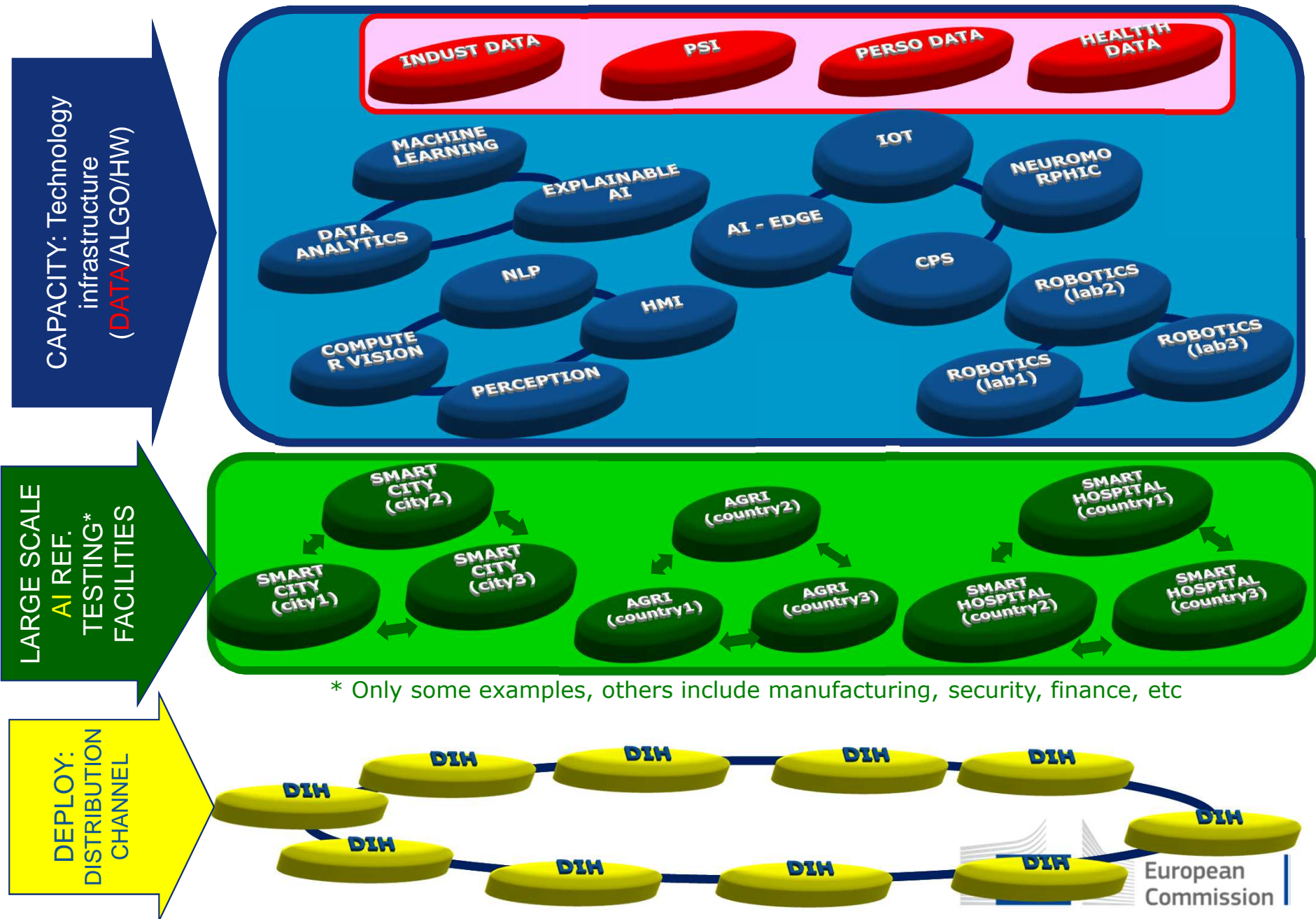# DIGITAL EUROPE PROGRAMME: CAPACITY BUILDING AND DEPLOYMENT

AI & Digital Europe Programme (DEP): Capacity building & Deployment

CAPACITY: Technology infrastructure (DATA/ALGO/HW)

- INDUST DATA
- PSI
- PERSO DATA
- HEALTH DATA

- MACHINE LEARNING
- EXPLAINABLE AI
- IOT
- NEUROMO RPHIC
- DATA ANALYTICS
- AI - EDGE
- NLP
- CPS
- HMI
- ROBOTICS (lab2)
- COMPUTER VISION
- PERCEPTION
- ROBOTICS (lab1)
- ROBOTICS (lab3)

LARGE SCALE AI REF. TESTING* FACILITIES

- SMART CITY (city2)
- AGRI (country2)
- SMART HOSPITAL (country1)
- SMART CITY (city1)
- SMART CITY (city3)
- AGRI (country1)
- AGRI (country3)
- SMART HOSPITAL (country2)
- SMART HOSPITAL (country3)

* Only some examples, others include manufacturing, security, finance, etc

DEPLOY: DISTRIBUTION CHANNEL

- DIH
- DIH
- DIH
- DIH
- DIH
- DIH
- DIH
- DIH
- DIH
- DIH
- DIH

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Upcoming events Information days

10. Please list upcoming information days and other events of relevance to this area

- SEPTEMBER 19-20 – ICT-46 and ICT-47:
  AI session at the proposers Day Helsinki

- MOST PROBABLY BROKERAGE EVENT ON ROBOTICS NOV/DEC in Brussels:
- ➔ QUESTION to NCP: INTEREST? ADDED VALUE?

THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZON 2020

ROBOTICS & AI in H2020 - ICT-2018-2020

Cécile Huet, PhD
Deputy Head of Unit A1
Robotics & AI
European Commission

Information and Communication Technologies

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AI - in H2020 - ICT-2018-2020

ICT-48-2020:

Towards a vibrant European network of AI excellence centres
ICT-49-2020:

Artificial Intelligence on demand platform

3. Is this new or has it been called before?

> *e.g.*   *How is it new / different from previous calls*
> *What <u>previous</u> WP topic is it linked to?*
> *What are the main changes?*
> *Is it linked to other topics in the <u>current</u> WP? (e.g. in LEIT or other pillars)*

➔ *Both ICT48 and ICT49 build on the AI-on-demand platform – AI4EU, and reinforce it: ICT-48 for the S&T part, ICT-49 to enlarge the user community*

➔ *Main change between ICT26 and ICT-49: ICT26: initial platform - ICT 49 focuses on its use in experiments*

➔ *Many calls have an AI component – In ICT LEIT and beyond*

➔ *NEW: Network of AI excellence centers*

➔ *See next slides*

BACKGROUND:
Building on project
funded under ICT-26-2018

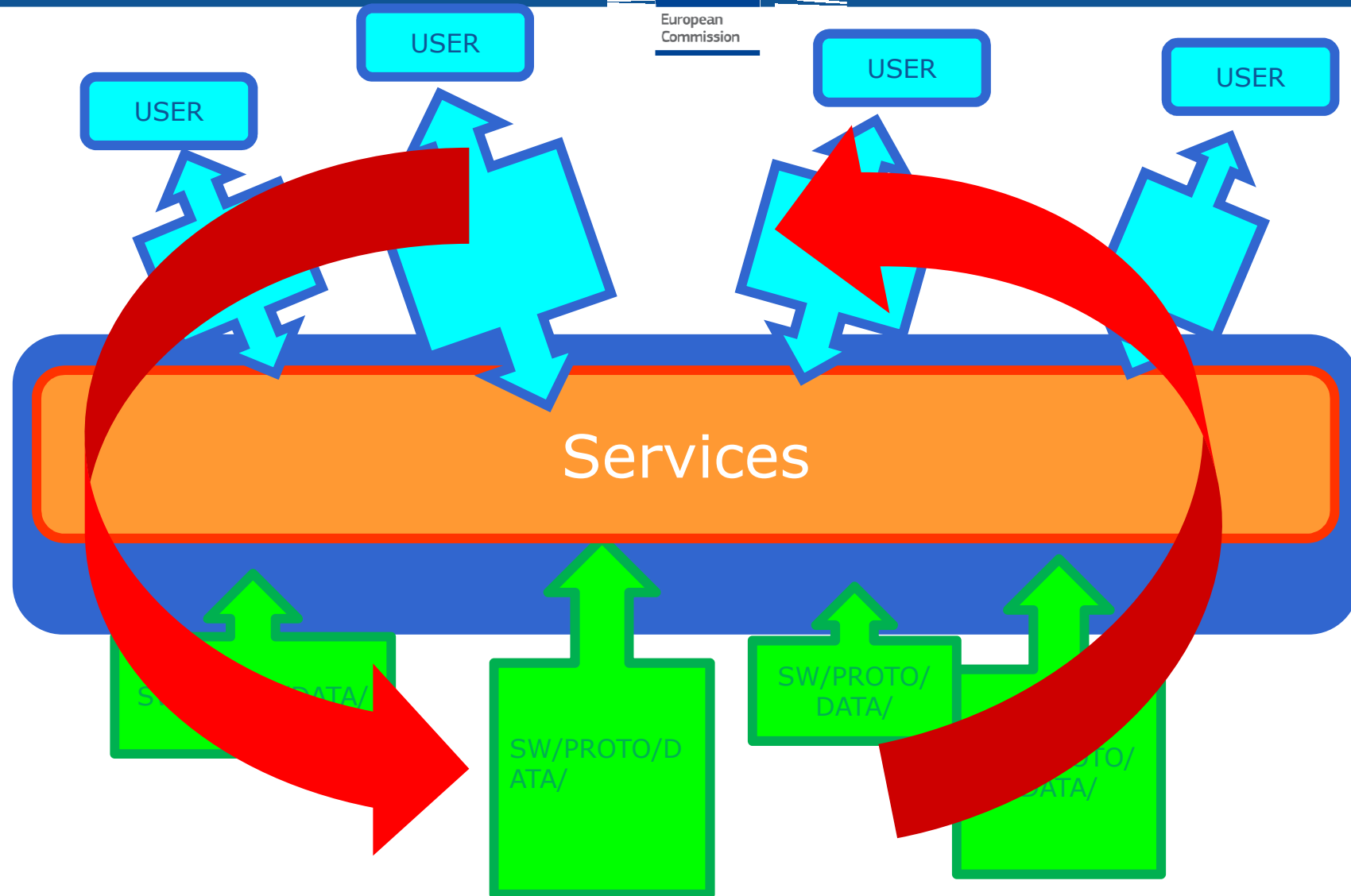# WP18-20: EUROPEAN AI-ON-DEMAND PLATFORM

https://www.ai4eu.eu/

AI4EU Advancing Europe through collaboration in AI

THE Central access point – shared resource for Europe

- Integrating tools and resources
- Offering solutions and support to all users of AI to integrate AI into applications, products and services
- Mobilisation of the community
- Large project - 20M€ – 3M€ to be redistributed

Only the start → Expect « CONTINUITY » until 2027 (at least)

BACKGROUND:
Building on project
funded under ICT-26-2018

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USER

USER

USER

USER

Services

SW/PROTO/DATA/

SW/PROTO/DATA/

SW/PROTO/DATA/

SW/PROTO/DATA/

AI – related calls in LEIT

Information and Communication Technologies

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European Commission

AI in H2020 > LEIT-ICT

Excellent Science

Frontier Research (ERC)

Future and Emerging Technologies (FET) **AI**

Skills and career development (Marie Skłodowska-Curie)

Research Infrastructures **AI**

Industrial Leadership

Leadership in enabling

and industrial technologies

ICT **AI**

Nanotech., Materials, Manuf. & Processing

Biotechnology

Space **AI**

Access to risk finance

Innovation in SMEs

Societal Challenges

Health, demographic change and wellbeing **AI**

Food security, sustainable agriculture, and the bio-based economy

Secure, clean and efficient energy **AI**

Smart, green and integrated transport **AI**

Climate action, resource efficiency, and raw materials **AI**

Inclusive, innovative and reflective societies **AI**

Secure societies **AI**

ICT-48-Network

1. What are you looking for?

- Join forces at European level to be competitive internationally: AI Made in Europe – Ethical and Trustworthy AI
- Attract the TOP LEVEL scientists/Labs ALL over Europe
- Involve Industry
- Focus: where Europe can make a difference
- Research agenda/roadmap-based
- Not only Structuring but Also Research
- Not only Research – Also initiating a strong structuring mechanisms for the AI community – bringing all labs to the top level
- Talent creation: industrially-oriented PhDs, AI modules in masters (CSA)
- Foster excellence ➜ VIBRANT AI CLOSELY CONNECTED COMMUNITY IN EUROPE
- Foster Innovation
- Diffuse knowledge (via DIHs, AI-on-DemandPlatform, education, etc)
- Become a reference virtual center of excellence
- Integrate and boost the AI-on-Demand-Platform

ICT-48-Network

1. What are you looking for?   ICT-48-2020 a)

- Proposals with the power to defragment the AI community in Europe.
- Operationalisable mechanisms for defragmentation that can cohere the AI community into distributed centres of excellence around core European AI competencies.
- Establishment of strong connectivity outside of the core partners.
- Proposals for workable mechanisms that connect across regions to propagate European AI excellence.
- The fostering of effective cooperation between all actors in the AI community and between the AI community and end users.
- A workable and operationalizable scheme to integrate AI centers of excellence around a common roadmap that has buy-in from industry.
- A clear vision for the development of an "AI for Europe".
- An implemented mechanism that both retains talent and ensures that talent flows to where it is needed to boost AI uptake and impact.
- Proposals that promote openness and accessibility to benefit European companies and researchers.
- Continuous curation of material for the AI on Demand Platform so that it remains valuable and relevant as AI develops over the longer term

ICT-48-Network

1. What are you looking for?

- Budget/Type of projects:

4 RIAs of ~12M€ + 1 CSA of ~2M€ (supporting the 4 RIAs + 1 task on including AI skills in non-tech Master programmes)

- Detailed presentation follows – not presented in details at the NCP training but provided as support to NCPs

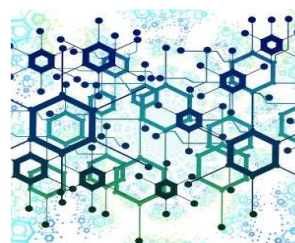# Boosting the EU's technological and industrial capacity: WP 2018 - 2020

European Commission

€1.5 billion EC investments into AI in 2018-20

BY 70% INCREASE OF ANNUAL INVESTMENT

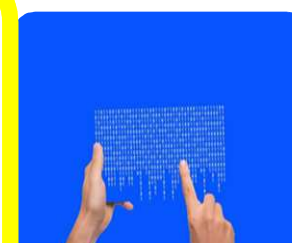| Basic and industrial research (health, transport, agriculture, manufacturing, etc.)	AI-on-demand platform AI4EU	Network of AI-focused Digital Innovation Hubs (DIHs)	Strengthe-ning AI excellence centres	Setting up an industrial data platform

Beyond 2020:

Increasing investments to €20 billion / year (PUB & PRIV)

ICT-48-2020: Towards a vibrant European network of AI excellence centres

BUDGET/TOPICS:

- **4 RIAs** (Research and Innovation Actions) **48M€**
- **1 CSA** (Coordination and Support Action) **2M€**
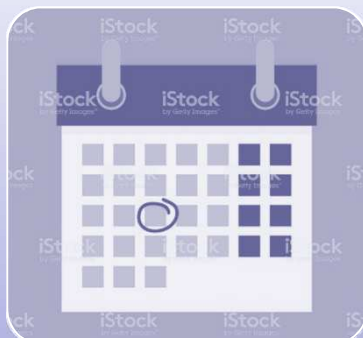
DATES:

- Opening: 09 July 2019
- **Closing: 13 Nov 2019**

ICT-48-2020: Towards a vibrant European network of AI excellence centres

CHALLENGE

SCOPE

a) Research and Innovation Actions (RIA)

b) Coordination and Support Action (CSA)

EXPECTED IMPACT

European Commission

- European strategic autonomy in AI ➔ Huge potential socio-economic impact

- Stay at the forefront of AI developments

- Essential to reinforce and build on Europe's assets in AI, including its world-class researcher community

- Efforts are scattered ➔ joining forces is crucial to be competitive at international level

- Scale up existing research capacities & tighter networks of European AI excellence centres ➔ critical mass

➔ **Foster cooperation among the best research teams in Europe, joining forces to tackle more efficiently major scientific and technological challenges in AI hampering deployment of AI-based solutions.**
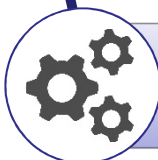
SCOPE

a) Research and Innovation Actions (RIA)

European Commission

OBJECTIVES OF THE NETWORKS

COMPOSITION

ACTIVITIES

TECHNOLOGY FOCUS

SYNERGIES WITH THE AI-ON-DEMAND PLATFORM

BUDGET

Invest in strengthening AI research excellence centres across Europe and facilitate their collaboration and networking.

OBJECTIVE: develop networks of excellence centres to

- *Boost the research capacity in Europe*

- *Europe as a research powerhouse for AI*

- *Attractive for scientists and new talents*

- *Contribute to the development of ethical and trustworthy Artificial Intelligence, the trademark for AI "made in Europe".*

➔ *Mobilise researchers to collaborate on key AI topics, to reach critical mass on these topics and to increase the impact of the funding in progressing faster in joined efforts rather than working in isolation, with fragmented and duplicated efforts.*

European Commission

- *Up to 4 networks*

- *MAJOR Scientific or technological challenges*

- *Reinforce Europe's CAPACITY and PROGRESS in critical technologies*

- *SPREAD the latest and most advanced knowledge to ALL THE AI-LABS in Europe and prepare the next generation of TALENT in AI (AI-on-demand platform & CSA)*

- *Synergies & cross-fertilization with INDUSTRY → internships of academic staff (at all levels) in industry, or PhD programmes with industry*

- *The set of networks will form a COMMON RESOURCE - SHARED FACILITY - virtual laboratory offering access to knowledge and expertise and attracting the talents*

- *REFERENCE, creating an easy ENTRY POINT TO AI EXCELLENCE IN EUROPE and should also be instrumental for its VISIBILITY*

- *Driven by LEADING FIGURES IN AI from MAJOR EXCELLENT research centers, bringing the BEST SCIENTISTS distributed ALL OVER EUROPE. They will bring on board the necessary LEVEL of expertise and variety of DISCIPLINES and profiles to achieve their objectives.*

- *INDUSTRIAL participation:*

  - *research teams*

  - *identify important technological limitations hampering deployment*

  - *help defining the research priorities & raise new research questions.*

- *Demonstrate access to the required RESOURCES and INFRASTRUCTURE*

  - *Data (including Copernicus)*

  - *HPC (central, GPUs, edge computing), storage, robotics equipment, IoT infrastructure*

  - *Support staff and engineers to develop experiments, etc.*

For each activity, select the most appropriate mechanisms & detail it :

- *To structure activities ➡ focus on*

  - important scientific or technological *CHALLENGES* with *INDUSTRIAL* relevance

  - where Europe will *MAKE A DIFFERENCE* (build on *STRENGTHS*, or fill *CRITICAL GAPS*)

- *Challenge ➡ Develop and implement common research agendas:*

  - The main *VISION*

  - *ROADMAP* with targets within the projects

  - Methodology to implement and *MONITOR PROGRESS*

  > SPECIFIED IN PROPOSAL & FURTHER DEVELOPED DURING THE PROJECT.

- *PROGRESS demonstrated in USE-CASES ➡ industry-academia*

- *STRONG LINKS among the members of the networks*
  - *collaborative projects, exchange programmes, or other mechanisms to be defined by the consortia*
- *Mechanisms to FOSTER EXCELLENCE, increase efficiency of collaboration, and develop a vibrant AI network in Europe.*
- *DISSEMINATE the latest and most advanced knowledge to ALL the academic and industrial AI laboratories IN EUROPE*
  - *Involving them in collaborative projects/exchange programmes*
  - *Projects defined initially or via financial support to third parties – max. 20% of EU contribution [OPTIONAL! ➔ select the most efficient solution]*
- *Interactions with the INDUSTRY (in/out the consortium)*
  - *New scientific questions*
  - *Take-up of scientific advances*

European Commission

- *Collaboration with the relevant* DIGITAL INNOVATION HUBS
  - *disseminate knowledge and tools & understand their needs*
- *Common academic/industrial PhD - PostDoc programmes focusing on industrial challenges.*

➔ *Ambition:* WORLD-RECOGNISED *brand for a European programme for* INDUSTRIALLY-ORIENTED PHDS IN AI *and to keep researchers in Europe afterwards*

- *Foster* INNOVATION *& exploit new ideas coming out of the network's work (e.g. incubators).*
- *Become a* VIRTUAL CENTER OF EXCELLENCE:
  - *Offering access to knowledge*
  - *Serving as a reference in their field*
  - *Ensure visibility.*

European
Commission

Collaborative projects focus on ONE OR SEVERAL of the following topics & bring necessary competencies :

- *Advances in FOUNDATIONS of AI (e.g.: learning and reasoning approaches) and APPROACHES for TRUSTED AI SOLUTIONS (including explainable AI, unbiased AI, safety, reliability, verifiability etc.),*

- *Developing the next generation of INTELLIGENT ROBOTS,*

- *Advanced PERCEPTION or INTERACTION with humans (for human-centered AI) and environments,*

- *AI at the EDGE and HARDWARE for AI.*
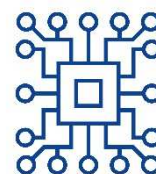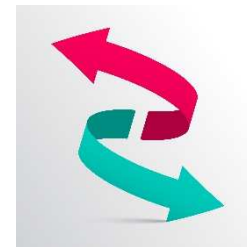
WP18-20: EUROPEAN AI-ON-DEMAND PLATFORM

https://www.ai4eu.eu/

AI4EU — Advancing Europe through collaboration in AI

THE Central access point – shared resource for Europe

- Integrating tools and resources
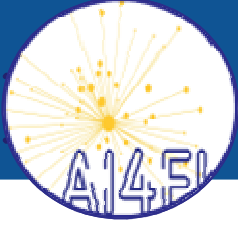- Offering solutions and support to all users of AI to integrate AI into applications, products and services
- Mobilisation of the community
- Large project - 20M€

Only the start → Expect « CONTINUITY » until 2027 (at least)

- *AI-on-demand platform = ONE-STOP-SHOP FOR AI resource in Europe ➔ backbone of these networks:*

  - **PROVIDING** *tools and algorithms, data, support services, also to the research community*

  - **LINK TO THE COMMUNITY AT LARGE** ➔ *spread the knowledge and develop collaborations*

  - **ENRICHING** *the platform (tools, competencies, services)* ➔ *make it the* **REFERENCE** *and* **QUALITY LABEL** *for resource in AI.*

  - *tools, algorithms, resources developed in the networks of excellent centres ➔ available to all via the AI-on-Demand platform*

- **EUR 12 million per network (indicative)**

- **Develop SYNERGIES and EXCHANGE**

  - *between the selected projects*

  - *with other relevant projects (AI-on-demand platform, community at large, academic and industrial)*

- **Support the four RIAs in COMMON ACTIVITIES ➔ economies of scales**

  - *Organization of events, logistics support for calls for FSTP, exchange mechanisms among labs, etc.*

  - *Exchanges of best practices to reinforce and optimize cooperation, etc.*

- **Support the RIA projects in their DISSEMINATION ACTIVITIES towards industry, users, and citizens. Diversity and gender aspects should be addressed, when relevant.**

European Commission

To maximise the AI benefits
➜ **Equip professionals with right**
SKILLS

Support academia in cooperation with industry:

➜ *What? Identify*

- AI courses and modules that could be integrated in *NON-ICT* education master programmes

- Mechanisms for *INTEGRATION*.

➜ *How? Workshops & other appropriate approaches*

- **EUR 2 million per network (indicative)**

European Commission

- Reinforce Europe's **RESEARCH CAPACITY** in AI

- Ensure Europe's **LEADERSHIP** in key **STRATEGIC** research topics

- Make Europe a research **POWERHOUSE** for AI

- Increase Europe's **ATTRACTIVENESS** for scientists ➜ nest for future generations of scientists and breakthrough in AI

- Strengthen the **AI-ON-DEMAND PLATFORM**

- Mobilization and commitment from the community & high level experts ➜ making AI-on-Demand platform **THE REFERENCE RESOURCE** for European researchers, developers, integrators and users

- Pave the way to enrich the **EDUCATION OFFER** ➜ equip a broad range of **NON-ICT PROFESSIONALS** with the necessary AI skills

ICT-49-PLATFORM

1. What are you looking for?

AI on demand platform: Consolidation and exploitation

- **Innovation Action**:

- Build on AI-on-Demand platform funded under ICT-26 – AI4EU

- Reinforce service layer

- Enlarge user community, esp. non-tech sector & SMEs;

  FSTP (cascading fund) – min 2M€/project – to fund use-cases and small-scale experiments (50-200k€)

- **Budget:**

- Up to 5M€ /proposal - Total: 20M€

ICT-49-PLATFORM

1. What are you looking for?

MAXIMISING THE IMPACT/USE OF AI4EU – THE REFERENCE FOR AI RESOURCES IN EUROPE

- Develop an **eco-system** around the platform: large and diverse user community, especially non-tech sector & SMEs
- Reinforce the **service layer** of the platform
- Mechanisms for long term **sustainability**
- **European coverage**:
  - origin of the resources made available on the platform
  - users of the platform
- **Cascading**: small-scale experiments
  - Min 2M€ (50 – 200k€/third party)
  - Prioritise projects maximising the impact & demonstrating the benefit of AI
  - SMEs and low-tech sector
  - Wide spread of application sectors ➔ versatility and scalability of the platform offer.

5. Current project portfolio *(if relevant)*

e.g.Please mention some highly relevant projects!
Is there an overview of current project portfolio?
Are there clusters / groups of projects?

AI4EU — Advancing Europe through collaboration in AI

HumaineAI : Human-Centered Artificial Intelligence – CSA

In Robotics – "SPARC projects"

In Big Data, "BDVA projects"

ECSEL – Neuromorphic computing / quantum computing

ICT-48-Network

2. What do you <u>NOT</u> want? (1/2)

- Standard RIA project

- Purely academic consortium, disconnected from the industrial needs

- Too large consortium including all labs from all "quality level" (the "not yet top-tier" should be brought in through dissemination, community building activities aiming at structuring the community and bringing all labs to top level)

- Too narrow focus – these are large initiatives aim at structuring the European AI landscape (not necessary to address the 4 technology focus but a too narrow focus would not create the expected impact and structuring effect of the community)

- Disconnected Initiatives: the 4 Networks, together with the CSA, will have to cooperate to serve the entire community => plan a cooperation task in each proposal

- Too much focused on just doing research, or just doing the networking/structuring activities

- Open-ended research ➔ should be roadmap-based

European
Commission

2. What do you <u>NOT</u> want? (2/2)

- Proposals that only focus on one narrow view of AI
- Proposals that do not connect to end users or connect up the community.
- Proposals that seek to create a closed community of excellence
- Proposals that seek to replicate the work of the AI On Demand Platform in a different format
- Proposals that fail to address industrial collaboration

ICT-49- Platform

2. What do you <u>NOT</u> want?

- Mere continuation of AI4EU: the goal is to drastically expand its user base and accelerate its use

- Lack of strategy to attract large user-base and to build a solid mechanism to develop ecosystems

- Underestimating the critical role of the service layer

4. Unique instructions for ~~evaluators~~ PROPOSERS on this WP topic? Excellence, Impact and more

- Excellence of the team➔ Consortia must have known centres of excellence at their core - essential to gather top scientists on the various relevant disciplines / representing the various AI approaches, leading figures capable of driving the community and structure it
- Consortia must clearly demonstrate the capability and capacity to address one or more of the four topic areas.
- Credibility of the strategy to combat the fragmentation ➔ Must demonstrate a clear understanding of network creation and outreach.
- Maximise the leadership of Europe in AI excellence
- Make Europe "the place to be" for AI to create, retain and attract talents

ICT49- Platform – topic Evolution

4. Unique instructions for ~~evaluators~~ PROPOSERS on this WP topic? Excellence, Impact and more

- Credibility of the approach to maximize the impact and use of AI4EU (clear objectives (with KPIs), convincing approach)
- Maximise deployment of AI-based solutions
- Maximise visibility of benefit AI can bring

6. Who are the leading players?

AI-on-demand platform, AI4EU will serve as a backbone

BUT this is a COMMUNITY platform, not a closed club

- For ICT-48 it is essential to gather top scientists on the various relevant disciplines / representing the various AI approaches, leading figures capable of driving the community and structure it.

- For ICT-49 it is essential to involve "integrators" capable of attracting a very broad set of users of the platform and support them in using the platform and exploiting the resources it offers

7. Is there a key group of actors (eg. cPPP or other) driving this?

e.g. Relevant cPPP(s), technology platform(s), other groups …

Relevant cPPPs/JU: BDVA, euRobotics, ECSEL

8. Are there any additional / background documents?

e.g. call specific background / guidance notes;
EC communications and other policy documents;
work programme consultation workshop reports;
strategic research agendas, other research roadmaps;

- Q&A – Participant portal - https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/faq;categories=;programme=H2020;actions=;keyword=

Policy documents:

- European AI Strategy:
  - EC Communication April 2018
- Coordinated plan on AI between EC and the Member States:
  - EC Communication Dec. 2018

9. Do you have information about future trends, emerging initiatives, roadmaps, key players in this area? How are you bridging to Horizon Europe?

Emerging initiatives (for info – not necessarily linked to these calls):

- Joint initiative from BDVA and euRobotics: Strategic Research, Innovation and Deployment Agenda for an AI PPP – consultation release

- AI4EU working on Strategic Agenda for European AI
- Humane-AI working on a research Agenda
- High Level Expert Group on AI:
  - Ethics Guidelines for Trustworthy Artificial Intelligence (AI)
  - Policy and investment recommendations for trustworthy AI

- OTHER EXISTING/EMERGING INITIATIVES/PLAYERS:

EurAI

CLAIRE

ELLIS

9. Do you have information about future trends, emerging initiatives, roadmaps, key players in this area? How are you bridging to Horizon Europe?

HORIZON EUROPE (HE):

- Continuity of both Network of AI excellence centers and the AI-on-demand platform (for the research community)

DIGITAL EUROPE PROGRAMME (DEP):

- Continue the AI-on-demand-platform – to gather AI tools and bring them to industrial standard
- The excellence centers will have to connect to the DEP activities, to transfer R&D results tested in the lab to DEP initiatives

DIGITAL IN THE NEXT MFF: OVERVIEW

Digital in Horizon Europe

1. Digital under "global challenges"
   - Digital and industry cluster
   - Digital in other clusters - health, mobility, energy, environment,..
2. FET Open under Open Innovation
3. Research Infra under Open Science

€100 Bn with share to digital of 15Bn

Digital Europe Programme

1. High Performance Computing (HPC)
2. Artificial Intelligence (AI)
3. Cybersecurity
4. Advanced digital skills
5. Digital transformation and interoperability

€9.2 Bn

CEF - Digital

Connectivity
- Synergies with Transport /Energy
- WIFI/BB 4EU
- 5G roll out

€3 Bn

MEDIA under Creative Europe within Cohesionand Values

- Distribution of works
- Creation

€1.1 Bn

Horizon Europe: "AI and Robotics"

- - "advanced human-machine interactions"
- - "Safe, smart and efficient robotics and complex embodied systems"
- - "User-driven AI technologies for AI-based solutions"
- - "Developing and networking the research competences of AI competence centres across Europe"
- - Technologies for open AI platforms including software algorithms, data repositories, robotics and autonomous systems platforms

DIGITAL EUROPE PROGRAMME: CAPACITY BUILDING AND DEPLOYMENT

AI & DIGITAL EUROPE PROGRAMME (DEP): CAPACITY BUILDING & DEPLOYMENT

CAPACITY: Technology infrastructure (DATA/ALGO/HW)

INDUST DATA   PSI   PERSO DATA   HEALTH DATA

MACHINE LEARNING
EXPLAINABLE AI
IOT
NEUROMO RPHIC
DATA ANALYTICS
AI - EDGE
CPS
NLP
HMI
ROBOTICS (lab2)
COMPUTER VISION
PERCEPTION
ROBOTICS (lab1)
ROBOTICS (lab3)

LARGE SCALE AI REF. TESTING* FACILITIES

SMART CITY (city2)
SMART CITY (city1)
SMART CITY (city3)
AGRI (country2)
AGRI (country1)
AGRI (country3)
SMART HOSPITAL (country1)
SMART HOSPITAL (country2)
SMART HOSPITAL (country3)

* Only some examples, others include manufacturing, security, finance, etc

DEPLOY: DISTRIBUTION CHANNEL

DIH   DIH   DIH   DIH   DIH
DIH   DIH   DIH   DIH   DIH   DIH

European Commission

Upcoming events Information days

10. Please list upcoming information days and other events of relevance to this area

- SEPTEMBER 19-20 – ICT-48 and ICT-49: AI session at the proposers Day Helsinki

- MAY 28 ICT-48: Brokerage event in Brussels – check all presentations & recording

- ICT-48: Virtual Brokerage tool open until the call deadline - thanks to IDEAL-IST!

#DigitiseEU, #AI

ICT-38-2020
Artificial intelligence for manufacturing

Arian Zwegers

Technologies & Systems for Digitising Industry, DG CONNECT/A2, European Commission

Global GDP impact by effect of AI (£trillion)

$ trillion

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

■ Labour Productivity ■ Personalisation ■ Time Saved ■ Quality
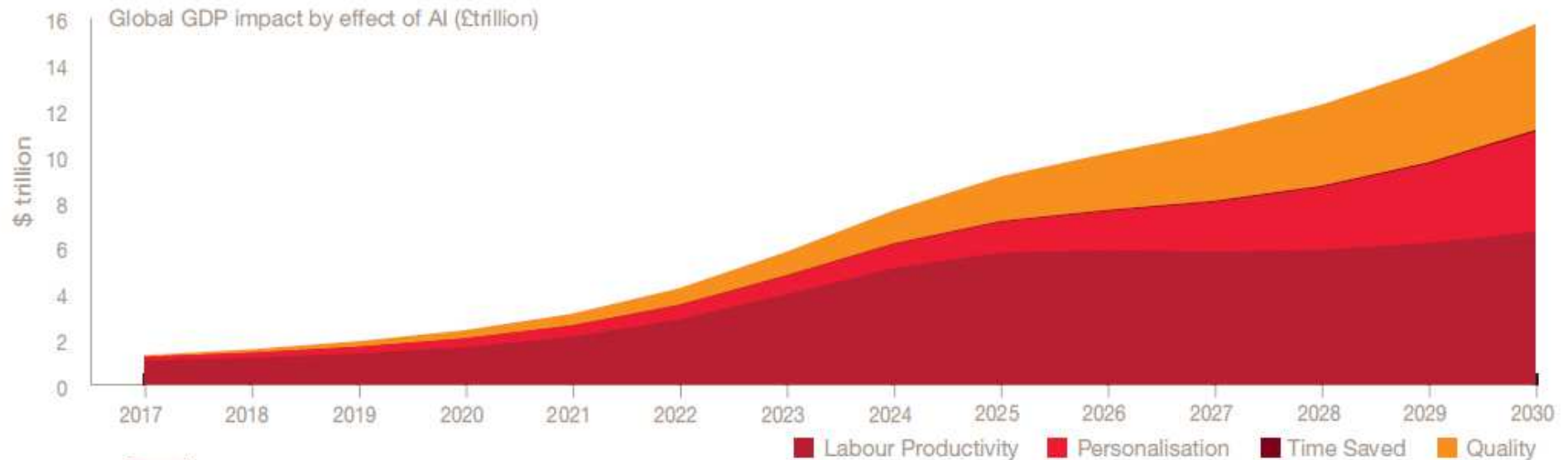
Labour productivity improvements are expected to account for over **55%** of all GDP gains from AI over the period 2017 – 2030.

As new technologies are gradually adopted and consumers respond to improved products with increased demand, the share of impact from product innovation increases over time.

58% of all GDP gains in 2030 will come from consumption side impacts.

Source: PwC analysis

PwC, Sizing the prize, what's the real value of AI for your business and how can you capitalize?, 2017

Sensors detect e.g., sounds or vibrations and send their data to the AI engine for processing

ML algorithms (e.g., anomaly detection) accurately **predict maintenance needs** of machine parts
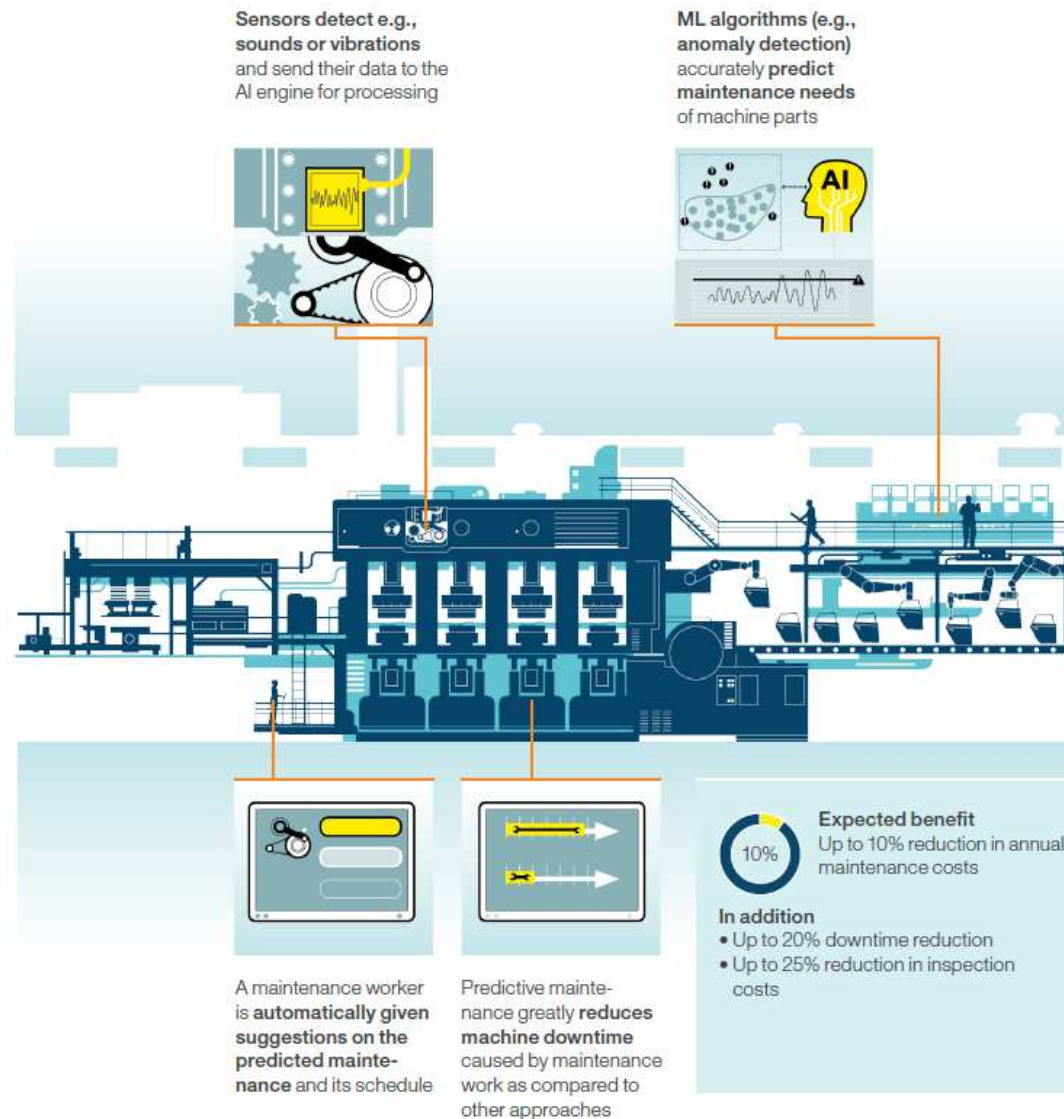
Predictive Maintenance
→ cost reductions

A maintenance worker is **automatically given suggestions on the predicted mainte-nance** and its schedule

Predictive mainte-nance greatly **reduces machine downtime** caused by maintenance work as compared to other approaches

Expected benefit
Up to 10% reduction in annual maintenance costs

10%

In addition
- Up to 20% downtime reduction
- Up to 25% reduction in inspection costs

McKinsey, Smartening up with Artificial Intelligence (AI), April 2017

Artificial Intelligence for Manufacturing
What do analysts say?

European Commission

"A study (in German) commissioned by the German Federal Ministry for Economic Affairs and Energy found that, over the next five years, AI will add approx. €32 billion to Germany's manufacturing output. This figure corresponds to a third of the growth expected to be achieved by the sector over that period."
https://www.de.digital/DIGITAL/Redaktion/EN/Standardartikel/artificial-intelligence-strategy.html

"Accenture's research suggests AI will add approximately US$3.7 trillion to the manufacturing sector by 2035."
https://www.accenture.com/_acnmedia/PDF-74/Accenture-Pov-Manufacturing-Digital-Final.pdf

"Gartner […] surveyed 3,000 CIOs operating in 89 countries in January. The […] firm found that AI implementations grew 37% during 2018, and 270% over the last four years."
https://www.forbes.com/sites/jonmarkman/2019/02/26/artificial-intelligence-beats-the-hype-with-stunning-growth/

Microsoft, The Future Computed – AI & Manufacturing, May 2019

COM(2018) 795, 7 December 2018

- Strategic actions and coordination
- Maximising investments through partnerships
- From the lab to the market: excellence centres, testing facilities, and Digital Innovation Hubs
- Skills and life-long learning
- Data: a cornerstone for AI - Creating a Common European Data Space
- Ethics by design and regulatory framework
- AI for the Public Sector
- International cooperation

COM(2019) 168, 8 April 2019

- Achieving trustworthy AI through 7 essential principles
  - human agency and oversight,
  - robustness and safety,
  - privacy and data governance,
  - transparency,
  - diversity and fairness,
  - societal and environmental well-being,
  - accountability
- Launching large-scale pilots in summer 2019
- Building international consensus for human-centric AI

Context

- Challenge for European economy to seize AI opportunities
  - Essential for Europe's mid and long term competitiveness, and welfare
- Topics support European businesses in developing building blocks of digital transformation

Specific Challenge

- Integrate AI with manufacturing technologies/systems to exploit potential in industry
- Standardisation and international collaboration to support deployment

Scope <u>Research and Innovation Actions</u>:

- Focus on integrating AI technologies in manufacturing
  - Taking into account domain-specific requirements,
  - Effective collaboration between humans and AI,
  - Instantiating ethical principles* by HLEG on AI for manufacturing,
  - Building on existing AI research results, e.g. ICT-26-2018-2020
- Proposals must develop innovative concepts and tools
  - Taking into account status and availability of production resources, learn from past experiences, and deal with unforeseen events
  - If appropriate, combine AI techniques with digital twins and real-life feedback from shop floor
  - Generative design approaches
- Demonstrate technologies and solutions in at least two different manufacturing use cases
  - If applicable, identify legal obstacles to implementation of proposed solutions

* https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai

Scope <u>Coordination and Support Actions</u>:

- Standardisation
  - Extend, further develop, and support implementation of a model for synchronisation of standardisation activities on AI and related digital technologies in manufacturing at large
    - At Member State, European level, in global context
    - Taking into account legal and ethical issues where relevant
    - Building on previous activities, e.g. Joint MSP/DEI Working Group on standardisation in support of Digitising European Industry*

- Cooperation EU-Japan
  - Support possible cooperation with Japan in AI-driven innovation in manufacturing and digital industrial platforms
    - Assess opportunities and kick-off cooperation activities
    - Twinning with Japanese projects to exchange knowledge and experience, exploit synergies and develop recommendations for collaboration activities

* https://ec.europa.eu/digital-single-market/en/news/final-workshop-standardisation-support-digitising-european-industry-initiative-report-and

Expected impact:

- Research and Innovation Actions
  - Products and services usable in a wide range of manufacturing processes leading to agile production processes and improved quality of products and processes
  - Humans working together with AI systems in optimal complementarity

- Coordination and Support Actions
  - Increased synchronisation and cooperation on AI and related digital technologies in manufacturing, with higher global impact

- Proposals need to describe how the proposed work will contribute to impact criteria, provide metrics, baseline and targets to measure impact

Open: 9 July 2019
Close: 16 Jan 2020

RIA: 47 M€, between 4 and 6 M€ would be appropriate,

CSA: 1 M€, 0.5 M€ would be appropriate, one CSA for each area

- 2. What do you NOT want?
  - AI research proposals, not for the sake of manufacturing
  - Known technologies applied in known use cases
    - Portfolio with only machine learning, only using machine-generated data, only for predictive maintenance
  - Big roles for non-practicing entities

- 3. Is this new or has it been called before?
  - New topic, building on previous topics, e.g. ICT-26-2018-2020
  - Link with DT-ICT-03-2020, requesting experimentation of innovative AI techniques in manufacturing

- 4. Unique instructions for evaluators?
  - Birds example about comments, scoring, and counting negatives

- 5. Current project portfolio?
  - AI4EU (from ICT-26-2018-2020)
  - Examples presented at 2 July 2019 workshop
    - PREVIEW (H2020-636892)
    - THOMAS (H2020-723616)
    - Boost 4.0 (H2020-780732)
    - Musketeer (H2020-824988)

- 6. Who are the leading players?
  - See 2 July 2019 workshop report

- 7. Is there a key group of actors (eg. cPPP or other) driving this?
  - FoF cPPP
  - BDVA and euRobotics cPPPs, Potential future AI PPP??

- 8. Are there any additional / background documents?
  - See next slide, quoted reports, and the 3 mentioned EC Communications
  - (documents by the 3 cPPPs)

- 9. Future Outlook
  - Discussion on Horizon Europe partnerships
  - Preparatory work by FoF, BDVA and euRobotics ongoing
  - Link with potential Common European Data Spaces topics under Digital Europe Programme

- 10. Upcoming information days
  - See next slide

- European AI Alliance Assembly, 26 June 2019
  - https://ec.europa.eu/futurium/en/european-ai-alliance/join-first-european-ai-alliance-assembly
- Workshop on Artificial Intelligence for Manufacturing, 2 July 2019
  - https://ec.europa.eu/digital-single-market/en/news/workshop-artificial-intelligence-manufacturing
- ICT Proposers' Day 2019, 19-20 Sept 2019, Helsinki
  - https://ec.europa.eu/digital-single-market/en/news/digital-excellence-forum-ict-proposers-day-2019
- European Research & Innovation Days, 24-26 Sept 2019
  - https://ec.europa.eu/info/research-and-innovation/events/upcoming-events/european-research-and-innovation-days_en
- World Manufacturing Forum, 25-27 Sept 2019, Cernobbio
  - https://www.worldmanufacturingforum.org/
- Manufuture 2019, 30 Sept – 1 Oct 2019, Helsinki
  - https://www.dimecc.com/events/save-the-date-manufuture-2019-conference-in-helsinki/
- DEI Stakeholder Forum, 13-15 Nov 2019, Madrid
  - https://ec.europa.eu/digital-single-market/en/news/digitising-european-industry-stakeholder-forum-2019
- Webinar, Nov 2019

Thank you!

Contacts

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Follow the latest progress and get involved

@DigitiseEU #DigitiseEU #AI
@DSMeu

bit.ly/DigitiseEUpillars
bit.ly/futuriumdei

Photonics ICT-36-2020 Disruptive photonics technologies

Anna Pelagotti

A4 Unit – Digital Industry and Artificial Intelligence – CNECT - EC

Photonics calls in ICT Workprogramme 2020

ICT-36-2020 **Disruptive** **photonics technologies [budget 47.5 M€]**

Research & Innovation Actions

i. 3D light field and holographic displays
ii. Packaging and module integration for photonic integrated circuits (PIC)
iii. Light to Fuel
iv. Next generation biophotonics methods and devices as research tools to understand the cellular origin of diseases

Disruptive

ICT-36-2020 i: 3D light field and holographic displays

Objective is to develop innovative photonics **components and systems** which enable 3D light field or holographic displays for use in mixed-reality applications and support functionality such as sensing, connectivity, user interaction, and scene recognition etc.

Actions 3-6 M€

Requirements:
➢ Actions should include validation in application settings.

Expected Impact:
❖ enable European system manufacturers to bring to market highly competitive products
❖ build a Europe-centred value chain from of component manufacturing and software up to the system integration

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Disruptive

ICT-36-2020 ii. Packaging and module integration for photonic integrated circuits (PIC):

Objective is to develop novel packaging, assembly, module integration **technologies** or **testing approaches** to advance scalable production of PIC-based photonic components or modules.

> Actions 3-6 M€

Requirements:
- Actions should demonstrate the technical and industrial feasibility of the proposed technologies.

Expected Impact:
- ❖ enable the introduction of PIC technology in new markets.

Disruptive

ICT-36-2020 iii. Light to Fuel

Objective is to develop photonics devices for the direct and efficient (>5%) conversion of **solar energy into chemical fuel**.

Actions 3-6 M€

Requirements:
➢ Actions should demonstrate technical and economic feasibility.

Expected Impact:
❖ demonstrate the efficient conversion of solar energy into chemical fuels, with a device efficiency of >5% and payback period of <10 years.
❖ enable Europe taking the lead in related solar energy conversion industry

Disruptive

ICT-36-2020 iv. Next generation biophotonics methods and devices as research tools to understand the cellular origin of diseases

Objective is to develop photonics-based **in-vivo/in-vitro imaging** systems.

Actions 3-6 M€

Requirements:
➢ Actions should include medical/clinical doctors or research laboratories with relevant experience.

Expected Impact:
❖ Gain significant understanding of inter- and/or intra-cellular processes
❖ strengthen Europe's industrial position in the biophotonics-related market for microscopes.

Photonics ICT-37-2020

Advancing photonics technologies and application driven photonics components and the innovation ecosystem

Anna Pelagotti

A4 Unit – Digital Industry and Artificial Intelligence – CNECT - EC

Photonics calls in ICT Workprogramme 2020

ICT-37-2020 Advancing **photonics technologies and application driven photonics components and the innovation ecosystem [49 M€]**

Research & Innovation Actions [30 M€]

i. Flexible Farm-to-Fork Sensing

ii. Novel Photonics Integrated Circuit (PIC) Technology building blocks

Innovation Actions [15 M€]

iii. Smart Photonic for Environmental Pollution Detection Sensing

Coordination and Support [4 M€]

iv. An industrial strategy for photonics in Europe

ICT-37-2020 i. Flexible Farm-to-Fork Sensing

Objective is to develop an innovative **smart** photonic sensor solution in the visible to mid-infrared spectral range for monitoring food quality with respect to **microbiological and chemical contamination**

Requirements:

Actions 3-5 M€

➢ Actions should be demonstrated in real settings involving relevant stakeholders along the food supply chain.

Expected Impact:

❖ Increase food yield, quality and safety, and reduce food waste.
❖ Strengthen **small/medium-scale farming** and local or novel ways of food production and processing.

ICT-36-2020 ii. Novel Photonics Integrated Circuit (PIC) Technology building blocks

Objective is to develop **building blocks** in photonic integrated circuit technology with significantly enhanced or novel functions. These should form part of comprehensive **integration platforms** for established or new important application fields.

Actions 3-5 M€

Requirements:
➢ Actions should include a validation of results with **fabricated** PIC prototypes.

Expected Impact:
❖ Reduce the research and development costs of advanced PICs in a wide range of application areas.

ICT-36-2020 iii. Smart Photonic for Environmental Pollution Detection Sensing

Objective is to develop an innovative, cost-effective, portable, smart hyperspectral sensing system operating in the visible to mid-infrared spectral range, for **pollution detection** in environmental sensing applications.

Actions 4-7 M€

Requirements:

➤ Actions should be demonstrated and validated in real settings involving relevant stakeholders.

Expected Impact:

❖ Enable adoption of **cloud-connected** photonic sensing systems for Community-based environmental pollution monitoring and real-time citizen alert on **local pollution** levels and related health risks.

ICT-36-2020 iv. CSA
An industrial strategy for photonics in Europe

Objective is to support the development and implementation of a comprehensive industrial strategy for photonics in Europe which strengthens the links to the end user industries.

Actions up to 4 M€

Requirements:
➢ Actions should develop strategic technology road-maps.
➢ It should achieve strong stakeholder engagement and coordinate regional, national and European strategies.

Expected Impact:
❖ Reinforce value chains and deployment of photonics technologies by stronger cooperation of photonics stakeholders.
❖ Increase competitiveness of the European photonics sector and improve access to risk finance.

Photonics calls in ICT Workprogramme 2020

DT-ICT-03-2020: I4MS (phase 4) - uptake of digital game changers

Innovation Actions
• Laser based equipment in advanced and additive manufacturing
[1 out of 6 topics with total budget of 72 M€]

DT-04-2020: Photonics Innovation Hubs [budget 20 M€]

Innovation Actions

Network of Digital Innovation Hubs:

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

Catalogue of Digital Innovation Hubs

https://ec.europa.eu/futurium/en/content/digital-innovation-hubs-catalogue-project-0

http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-catalogue

Photonics example projects towards DIH:
APOLLO, LASHARE, ACTPHAST,..

Photonics

PILOT LINES

Pix4life
PICs for health & food
8.5 M€ funding
15 partners

MirPhab
Analytical MIR sensing
13 M€ funding
18 partners

PiScale
OLEDs on flexible substrates
14 M€ funding
14 partners

PixAPP
PICs assembling and packaging
15.5 M€ funding
18 partners

InPULSE
Indium-Phosphide PICs
15 M€ funding
16 partners

ActPhast
Access Center for Photonics
Innovation Solutions and
Technology Support
8 M€ funding
23partners

For more information

📥	**CNECT-PHOTONICS@ec.europa.eu**
🌐	**https://ec.europa.eu/digital-single-market/en/policies/photonics**
🐦	**PhotonicsEU**
● ● ●	**http://www.photonics21.org**

PhotonicsEU
@PhotonicsEU
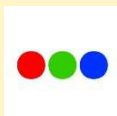
PHOTONICS²¹
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

LEIT ICT WP 2020

ICT-50-2019 Software Technologies

- Dr. Odysseas I. Pyrovolakis
- Cloud and Software (Unit E2)
- DG Connect
- *Odysseas.Pyrovolakis@ec.europa.eu*

Software impact in the EU economy

- Software and Software-based services market (SSBS)
  - 1,8% of EU GDP
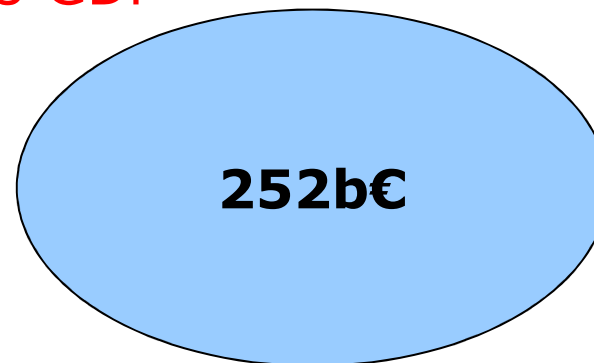
In-house software development

252b€

52,3b€

  - Market Growth:

    2009-2015 →1,5%

    Expected 2015-2020 →
      2,9%(290b EUR in 2020)

Year	Volume (b€)	SBSS share
2015	52,3	20,80%
2020	57,2	19,70%

Key findings of the "2016 Global Innovation 1000 Study"

- Companies allocating 25% or more of their R&D budgets to software offerings report that their revenues are growing faster than those of key competitors that are allocating a smaller portion.

- Regionally, companies in North America are making the strongest shift to software offerings—from 15% of total R&D spending in 2010 to 24% in 2020.

- By 2020, companies will have shifted the majority of their R&D from product offerings to software and services.

- The top reason companies are shifting R&D budgets toward software and services is the "need to stay competitive"

FP7/H2020 project portfolio in Software

45 Projects - 173.6 M €

FP7 - Call 1

Service/Software Engineering (complexity, dependability):

DEPLOY, Protest, COMPAS, ALIVE, MOST, MANCOOSI, DIVA, Q-Impress

FP7 - Call 8

Advanced Software Engineering

MODAClouds   **ARTIST**
PROWESS   MIDAS
MARKOS   OSSMETER
RISCOSS   U-QASAR

FP7 - Call 10

Innovative software & tools for services

Agile Software Prototyping	Model Driven Engineering
S-Case	*Mondo*

WP2016-17 Call 2

Software Technologies

CROSSMINER
DECIDE, ELASTEST
OPENREQ, COEMS
Q-RAPIDS, STAMP

WP2018-20 Call 1

Software Technologies

Decoder, Fasten, Radon, ReachOut
Sodalite, Unicore

*35,6 M €**   *31,1 M €*   *5,1 M €*   *31 M €*   *21.5 M €*

2007   2009   2011   2013   2015   2017   2019

FP7 - Call 5

23,3 M €   *27 M €*   **WP2014-15 Call 1**

Advanced Software Engineering

Service coordination	Testing	Maintenance	Migration to clouds	Open source development
CHOReOS, ACSI	FITTEST	FastFix	REMICS	ALERT

Tools & Methods for Software Development

DICE   ARCADIA
HyVar   CHOReVOLUTION
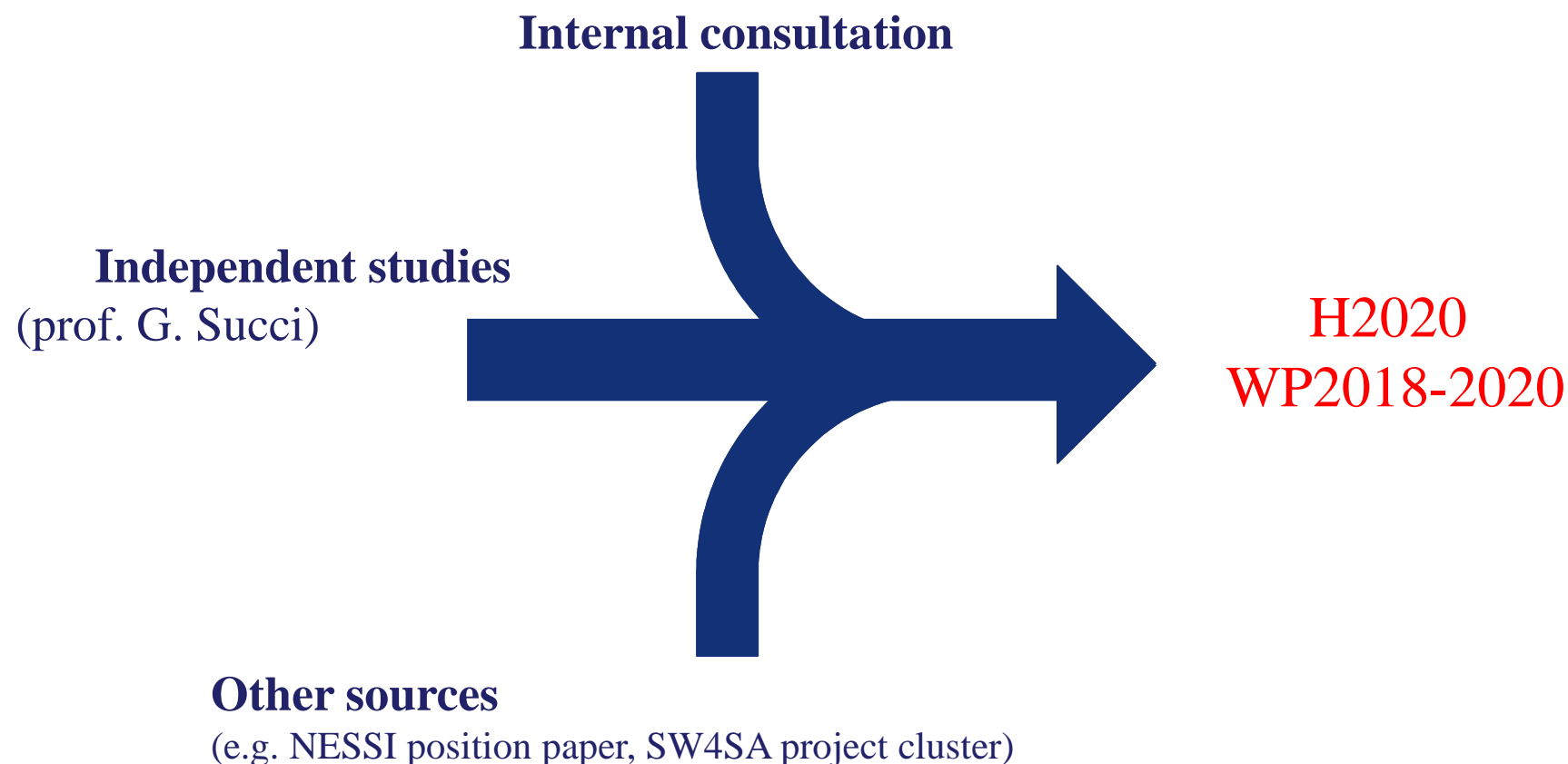ALIGNED   RePhrase
SWITCH   SUPERSEDE

*EC Contribution

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Acceptance ratio and participation in Software Technologies related topics

WP	Topic	EC Funding (M€)	Projects Funded	Requested Funding (M€)	# proposals	Acceptance ratio	EC funding ratio
WP2014-15	*Tools and Methods for Software Development*	27	8	244.40	74	10.8%	11.0%
	Overall in ICT-LEIT (2014)	660.6	209	5,461.00	1639	12.8%	12.1%
WP2016-17	*Software Technologies*	31	7	356.80	90	7.8%	8.7%
	Overall in ICT-LEIT (2016)	456.8	134	3,696.00	1071	12.5%	12.4%
WP2018	***Software Technologies***	**21.55**	**6**	**212.23**	**56**	**10.7%**	**10.2%**

From H2020 WP2016-17 to WP2018-20
Preparation process

Internal consultation

Independent studies
(prof. G. Succi)

Other sources
(e.g. NESSI position paper, SW4SA project cluster)

H2020
WP2018-2020

The specific Challenge

- **Increased complexity** of present and emerging ICT systems poses several challenges at software and hardware level including new requirements in terms of integration and cybersecurity.

- **Increased levels of adaptability** is becoming more and more essential in modern ICT systems in order to manage the needs of highly complex and dynamic environments pushing for continued development and operation (DevOps).

- **Increasing trust, security, reliability** while keeping system performance and reducing energy consumption has become non trivial.

Call opened 9/7 – Call closes 13/11

An overview of Actions

Research & Innovation Actions (RIA) | 29 MEuros |

1. **Development tools & methods for interoperable, adaptive, secure and trustworthy software.**

2. **Advanced Software systems and architectures.**

Coordination & Support Actions (CSA) | 1 MEuro |

a. **Stakeholders coordination, projects results dissemination, R&I road mapping.**

Research & Innovation Actions (RIA) Scope (1/2)

- **Development tools & methods for interoperable, adaptive, secure and trustworthy software.**

    1. New programming models and software engineering tools.

        Increased validation, verification and testing capabilities for ensuring trustworthiness.

        Incorporate semantic reasoning, self-learning and self-healing mechanisms.

        Focus on transparent and unbiased algorithmic decision making for the end-users.

    2. Advanced development environments

        Dealing with the increased complexity of modern software based systems.

        Faster software development and increased integration with operations.

        Maintaining reliability and confronting with cyber-threats.

Research & Innovation Actions (RIA) Scope (2/2)

- **Advanced Software systems and architectures.**

  1. Self-managed software

     Semantic adaptation of entities to dynamically changing contexts

     Coping with cyberattacks, hardware and software failures.

  2. Software systems that effectively deal with resources complexity and volatility.

     Address the operation in highly heterogeneous environments with wide distribution, loose, weak or unreliable connectivity between key service components, unpredictable affinity to data sources and cyber-dangerous environments.

     Optimizing and pooling resources across disparate infrastructures to deliver prescribed levels of quality of service and security.

     Demonstrate the applicability and viability of the proposed solutions across multiple application domains

     Mid-sized actions: 3-5 MEuros

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Coordination & Support Actions (CSA) Scope

- Coordinate stakeholders in the area of software technologies, digital infrastructures and cybersecurity.

- Act as support to R&D programmes/activities by disseminating project results and organising scientific and policy events, developing research and innovation roadmaps.

Small actions: ~ 1MEuro

Expected Impact

- Research & Innovation Actions (RIA)

  - Increased capacity of the European software industry to exploit the capabilities of software-defined infrastructures.

  - Improved reliability and cybersecurity of software developed, which will result in the reduction of loses for software failures or attacks.

  - Expand research and innovation potential in software technologies & infrastructures while overcoming fragmentation in the European supply base, optimizing investments and use of resources to yield multi-domain software-based products and related software services.

  - Contribute to EU's technology independence in Software.

- Coordination & Support Actions (CSA)

  - Creation of a sustainable European forum of stakeholders representing the Software research, industry and end users.

Provide appropriate metrics for claimed impacts

Hints to Proposers

What are we looking for?

- ✓ Development of **cross-cutting and advanced software technologies, mechanisms, techniques, etc.**

- ✓ The proposals should **demonstrate the applicability and viability of the proposed technological solutions** across multiple application domains.

What do we NOT want?

Any User Application development using existing software technologies

Upcoming events / information days

ICT Proposers' Days 2019 in Helsinki
September 19-20, 2019

ICT-50-2020: "Software Technologies" will be presented in session:
"Cloud and software challenges beyond 2020"
→ September 20th, from 15:00 - 16:15

Further Information

The Economic and Social Impact of Software and Services on Competitiveness and Innovation (SMART 2015/15) study
https://ec.europa.eu/digital-single-market/en/news/economic-and-social-impact-software-and-services-competitiveness-and-innovation

NESSI Strategic Research and Innovation Agenda 2017
http://www.nessi-europe.com/files/NESSI_SRIA_2017_issue_1.pdf

Software engineering for services and applications: current and future challenges, White Paper, SE4SA project cluster
https://eucloudclusters.files.wordpress.com/2017/11/se4sa-contribution-to-wp-2020-2027.pdf

2016 Global Innovation 1000 Study, PwC
https://www.strategyand.pwc.com/innovation1000

Software Technologies R&I Project portfolio :
https://ec.europa.eu/digital-single-market/news/software-services-cloud-computing-h2020-project-portfolio

Expert Workshop on the Challenges & Opportunities for the European Software Industry (6 October 2016)
https://www.pac-online.com/expert-workshop-challenges-opportunities-european-software-industry