

Bu proje Avrupa Birliği ve Türkiye Cumhuriyeti tarafından finanse edilmektedir This project is co-funded by the European Union and the Republic of Türkiye



Technical Assistance for Turkey in Horizon 2020 Phase-II EuropeAid/139098/IH/SER/TR

Focus Group Training

Dr Usman Wajid <u>usmanwajid@gmail.com</u> Dimitris Papageorgiou <u>dimpapageorg@gmail.com</u> Istanbul, 18 July 2022

AI, Data and Robotics Partnership in HE







European Partnerships



New approach to European partnerships



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Webpage on europa.eu: https://ec.europa.eu/info/research-andinnovation/funding/fundingopportunities/funding-programmes-and-opencalls/horizon-europe/european-partnershipshorizon-europe en

Key features of objective-driven and ambitious partnerships:

- Strategic orientation
- Systemic approach
- Simple architecture and toolbox
- Common set of criteria for the life-cycle

CO-PROGRAMMED

Based on Memoranda of Understanding/contractual arrangements; implemented independently by the partners and by Horizon Europe

CO-FUNDED

Based on a joint programme agreed and implemented by partners; commitment of partners for financial and inkind contributions

INSTITUTIONALISED

Based on long-term dimension and need for high integration; partnerships based on Art 185/187 of TFEU and the EIT legal acts for 2021-2027







49 candidate European Partnerships



CLUSTER 1: Health	CLUSTER 4: Digital, Industry & Space	CLUSTER 5: Climate, Energy & Mobility	CLUSTER 6: Food, Bioeconomy, Agriculture,	EIT (KNOWLEDGE & INNOVATION COMMUNITIES)	SUPPORT TO INNOVATION ECOSYSTEMS
Innovative Health Initiative	Key Digital Technologies	Clean Hydrogen	Circular Bio-based Europe	InnoEnergy	Innovative SMEs
Global Health Partnership	Smart Networks & Services	Clean Aviation	Rescuing Biodiversity to	Climate	
Transformation of health systems	High Performance	Single European Sky ATM Research 3	Climate Neutral,	Digital	
Chemicals risk	Computing	Europe's Rail	Sustainable & Productive Blue Economy	Food	
assessment	(Art. 185)	Connected and Automated Mobility (CCAM)	Water4All	Health	
ERA for Health	Al-Data-Robotics		Animal Health & Welfare*	Raw Materials	
Rare diseases*	Photonics	Batteries	Accelerating Farming	Manufacturing	
One-Health Anti Microbial Resistance*	Made in Europe	Europe Zero-emission waterborne transport	Systems Transitions*	Urban Mobility	
Personalised Medicine*	Clean steel – low-carbon	Zero-emission road	Agriculture of Data*	Cultural and Creative	
Pandemic Preparedness*	steelmaking	transport	Safe & Sustainable Food System*	Industries	
Co-funded or co-programmed	Processes4Planet	Built4People			
	Global competitive space systems**	Clean Energy Transition	CROSS-PILLARS II & III		
Institutionalised Partnerships (Art 185/7)		Driving Urban Transitions		European Open Science Clou	bu



Institutionalised Partnerships / EIT KICs

Co-Programmed

Co-Funded







Presentations Horizon Europe Info Day: Cluster 4 AI, Data & Robotics 17/06/2022 <u>https://adr-association.eu/wp-</u> <u>content/uploads/2022/06/Adra-presentation-infoday-17-</u> <u>June-2022-OFFICIAL.pdf</u>

Video: <u>https://www.youtube.com/watch?v=4eTGlu6TYql</u> 2:28 min - 14:05 min







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Dimitris Papageorgiou <u>dimpapageorg@gmail.com</u> Istanbul, 18 July 2022

European R&I Activities on AI, Data and Robotics in H2020 & HE







European AI, Data and Robotics Framework and Enablers

Legal & societal fabric

Essential ingredients for effective innovation & deployment

Core technical competences



Source: Strategic Research, Innovation & Deployment Agenda; AI, Data and Robotics Partnership; 3rd release September 2020

European AI, Data and Robotics Framework

European Fundamental Rights, Principles, and Values

Capturing Value for Business, Society, and People

Policy, Regulation, Certification, and Standards (PRCS)

Innovation Ecosystem Enabler

Skills and Knowledge

Data for Al

Experimentation and Deployment

Cross-Sectorial AI, Data and Robotics Technology Enablers



Robotics Deep-Dive

Trustworthiness, Skills, Regulation, Standards

Producer and Consumer of Data

Analytics and Knowledge

Data in Context: On-board processing Cloud services: Knowledge and Service Data in Volume: Sensing & Perception Connectivity: Real time

Physical Intelligence

Robotics

Needs:

Physical Safety Guarantee Intuitive and smooth interaction Explainable action and interaction Learning from few examples Real time dynamic decision making

Innovation Barriers

Extended time to market: Hardware takes longer to develop and validate Greater investment : Physical prototypes and test infrastructure at higher TRLs Testing Zones: Need regulatory framework for testing as well as operation On-Board Processing: Full autonomy needed for safety and in many use cases

> **Source**: *AI, Data and Robotics Partnership SRIDA Priorities*; November 18th, 2020 Michela Milano (University of Bologna/EurAI)

Connects Digital to Physical

AI Tools and Methods

Perception: Objects and Environments Interaction: People, Objects Learning: Behaviours, Skills and Tasks Planning: Multi-Agent and Uncertain environments

REPUBLIC OF TURKIYE MINISTRY OF INDUSTRY AND TECHNOLOGY

Data





AI

Indicative H2020 projects in robotics (1/4)



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URKEY

Immersive and symbiotic collaboration between human workers and robots

 SYMBIO-TIC: Symbiotic Human-Robot Collaborative Assembly: Technologies, Innovations and Competitiveness; IA; 04/2015-05/2019; https://cordis.europa.eu/project/id/637107

Endowing robots with the ability to control physical collaboration through intentional interaction

 An.Dy: Advancing Anticipatory Behaviors in Dyadic Human-Robot Collaboration; RIA; 01/2017-08/2021;

https://cordis.europa.eu/project/id/731540



Systemic integration of robust, dependable interaction capabilities for teams of humans and compliant robots (humanoid COMAN)

• **CoglMon**: Cognitive Interaction in Motion; RIA; 02/2015-05/2019

https://cordis.europa.eu/project/id/644727







Indicative H2020 projects in robotics (2/4)



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Ships damaged anywhere in the world being HURKEY REPAired in place

- RESURGAM: Robotic Survey, Repair & Agile Manufacture; IA; 02/2021-01/2024; https://cordis.europa.eu/project/id/101007005
- Turkish partner: TURKIYE GEMI INSA SANAYICILERI BIRLIGI DERNEGI
- Multi-robot visual and acoustic inspection, detecting corrosion patches or cleaning the surface
- BugWright2: Autonomous Robotic Inspection and Maintenance on Ship Hulls and Storage Tanks; IA; 01/2020-03/2024;

https://cordis.europa.eu/project/id/871260

Inspection robot capable of in-service operation

 TankRob: In-service intrusive Non-Destructive Testing of above ground and underground petrochemical storage tank floors and walls to detect corrosion; IA; 05/2016-04/2019;

Turkish partner: INTEGRITY NDT MUHENDISLIK SANAYI VE TICARET LIMITED SIRKETI

https://cordis.europa.eu/project/id/701007







Indicative H2020 projects in robotics (3/4)



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TZON 2020

Robots that analyze and track human behaviour over time

 BabyRobot: 'Child-Robot Communication and Collaboration: Edutainment, Behavioural Modelling and Cognitive Development in Typically Developing and Autistic Spectrum Children'; RIA; 01/2016 12/2018;

https://cordis.europa.eu/project/id/687831

Photo: https://babyrobot.eu/babyrobotexhibits-at-iros2018/

REPUBLIC OF TÜRKİYE MINISTRY OF INDUSTRI AND TECHNOLOGY



Domestic service robot to proactively and discreetly assist older persons

• **RAMCIP**: Robotic Assistant for MCI patients at home; RIA; 01/2015-06/2018;

https://cordis.europa.eu/project/id/643433 https://ramcip-project.eu/





Indicative H2020 projects in robotics (4/4)



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<u>RoMaNS Robotic Manipulation for Nuclear Sort & Segregation;</u> From: 1 May 2015 to: 31 October 2018

The RoMaNS (Robotic Manipulation for Nuclear Sort and Segregation) project will advance the state of the art in mixed autonomy for tele-manipulation, to solve a challenging and safety-critical "sort and segregate" industrial problem, driven by urgent market and societal...

 <u>SOPHIA</u> Socio-physical Interaction Skills for Cooperative <u>Human-Robot Systems in Agile Production</u>; From: 1 December 2019 to: 30 November 2023

Collaborative robotics has established itself as a major force in pushing forward highly adaptive and flexible production paradigms in European large and small-medium enterprises. It is contributing to the sustainability and enhancement of Europe's efficient and competitive... • <u>An.Dy Advancing Anticipatory Behaviors in</u> <u>Dyadic Human-Robot Collaboration</u>; From: 1 January 2017 to: 31 August 2021

Recent technological progress in robot physical interaction permitted robots to actively and safely share with human a common workspace. Thanks to these technologies, Europe nowadays leads the robotic market in the niche of safety certified robots by endowing them with the...







Food for thought & Q&A SESSION



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 Dig deeper and better:
Cordis DB (Collection: projects) <u>https://cordis.europa.eu/search/e</u>

AI, Data and Robotics Partnership SRIDA Priorities; November 18th, 2020 Michela Milano (University of Bologna/EurAI) <u>https://ai-datarobotics-partnership.eu/wpcontent/uploads/2020/11/AI-Data-Robotics-Partnership final.pdf</u>











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Teşekkür ederim!

Thank you!







Overview of 2022 Call Topics



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RIZON 2020

HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

AI, Data and Robotics for Industry optimization (including production and services) IA; start at TRL 3-5; end TRL6-7; 3-5M€/ project; 5 projects to be funded

HORIZON-CL4-2022-DIGITAL-EMERGING-02-06

Pushing the limit of physical intelligence and performance

RIA; start at TRL 2-3; end TRL4-5; 7M€/ project; 4 projects to be funded

HORIZON-CL4-2022-DIGITAL-EMERGING-02-07

Increased robotics capabilities demonstrated in key sectors (AI, Data and Robotics Partnership) IA; start at TRL 3-5; end TRL6-7; 9M€; 4 projects to be funded

HORIZON-CL4-2022-HUMAN-02-01

AI for human empowerment (AI, Data and Robotics Partnership) RIA; start at TRL2-3; end TRL4-5; 8M€/ project; 2 project

HORIZON-CL4-2022-HUMAN-02-02

European Network of AI Excellence Centres: Expanding the European AI lighthouse RIA; start at TRL2-3; end TRL4-5; 11.5M€/ project; 3 projects to be funded









Introductions



Bu proje Avrupa Birliği ve Türkiye Cumhuriyeti tarafından finanse edilmektedir This project is co-funded by the European Union and the Republic of Türkiye



- Technical Director ICE (UK and Spain) 2015-2022
- Research Fellow University of Manchester 2008 2015
- 15yr experience in EC funded projects
 - FP6, FP7, H2020, HE ...
- Full lifecycle management of EC proposals ... 85mil+ EC Funding
 - Conception, Writeup, Consortium Development & Budgeting
- Leadership of Large Scale EC funded projects
 - Digital Manufacturing, AI, Robotics, eHealth, Agriculture
- PhD Informatics. The University of Manchester, UK
- MSc E-Commerce. Middlesex University, UK











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Focus Group Training

Dr Usman Wajid usmanwajid@gmail.com Istanbul, 18 July 2022

A Detailed Look: Emerging and Human Topics







Why is the call text so important



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- Can help to define the scope of a project
- Can define the Impact section & metrics
- Sometimes really defines the problem to be solved
- Helps to identify project gaps and potential partner roles
- Identifies potential opportunities for organisations to join consortia
- Can help to keep the project in scope
- Can help to maximise the proposal score







Cluster 4: Digital, Industry and Space Bu proje Avrupa Birliği ve Türkiye Cumhuriyeti tarafından finanse edilmektedir **DESTINATION 4 – Digital and** This project is co-funded by the European Union and the Republic of Türkiye **Emerging Technologies for Competitiveness and Fit for the Green Deal**

Contribution to KSOs of HE Strategic Plan:

- (A) Promoting an open strategic autonomy
- (C) Making Europe the first digitally led circular, climate-neutral and sustainable economy

Relevant **impact areas**:

 Open strategic autonomy in digital technologies and in future emerging enabling technologies, by strengthening European capacities in key parts of digital and future supply chains, allowing agile responses to urgent needs, and by investing in early discovery and industrial uptake of new technologies





IZON 2020



Emerging: 02-05 2022 Call in figures





- Call HORIZON-CL4-2022-DIGITAL-EMERGING-02-05: AI, Data and Robotics for Industry optimisation (including production and services) (AI, Data and Robotics Partnership) (IA)
- Deadline: 16 November 2022
- Overall indicative budget: 19M€
- Indicative budget per proposal: 3-5M€
- Proposals to be funded: 5

<u>Note 1</u>: Based on Workprogramme Version Final, 21/05/2022 <u>Note 2</u>: Applicants should use the official call documents (including Horizon Europe Cluster 4 Workprogramme; Admissibility conditions, eligibility conditions, financial & operational capacity and exclusion, award criteria, etc. This presentation serves informative purposes.







AI, Data and Robotics for Industry optimization (including production and services) (1/7)





European Partnership on Artificial Intelligence, Data and Robotics

HORIZON-CL4-2022-DIGITAL-EMERGING-02-05 IA (70% for profit; 45pages) Start TRL 3-5 and achieve TRL 6-7 3-5M€; 5 projects to be funded

Outcome

Integrate and optimise AI, data and robotics solutions in order to demonstrate, by addressing use-cases scenarios in actual or highly realistic operating environments, how they optimise production and service use cases







AI, Data and Robotics for Industry optimization (including production and services) (2a/7)





HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

Project results to contribute at least one of the following expected outcomes:

- Advancing AI, data and robotics, and automation for the optimisation of production and services value-chains, optimisation of products, services, processes, to increase competitiveness, improve working conditions, and environmental sustainability, and supporting the European Economy using AI, data and robotics technologies.
- Al or learning systems (including, but not limited to self-learning, continuous and transfer learning, self-configuring systems) adapting production or services workflows to changing environments, dynamic and unpredictable resource constraints and to the capabilities and restrictions of humans and transferring results from one domain to another.







AI, Data and Robotics for Industry optimization (including production and services) (2b/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

<u>Project results to contribute at least one of the following</u> <u>expected outcomes:</u>

- Advancing AI, data and robotics, and automation for the optimisation of production and services value-chains, optimisation of products, services, processes, to increase competitiveness, improve working conditions, and environmental sustainability, and supporting the European Economy using AI, data and robotics technologies.
- Al or learning systems (including, but not limited to selflearning, continuous and transfer learning, self-configuring systems) <u>adapting production</u> or services workflows to changing environments, dynamic and unpredictable resource constraints and to the capabilities and restrictions of humans and transferring results from one domain to another.

Advancements in AI, data and Robotics,



- Competitiveness
- Working conditions
- Sustainability

Advancements in of AI learning (may involve data and Robotics),

helps adapt the production/service processes for ____

- Unexpected events
- Resource constraints
- Human restrictions
- Changing environment







AI, Data and Robotics for Industry optimization (including production and services) (3/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

Scope - Focus on:

- More autonomous and more intuitive and easier to operate technologies ... tailored for their needs, with the adapted and guaranteed levels of performance, reliability, safety, dependability, security and transparency
- Providing trustworthy AI solutions combining various sources of data, sensors, interaction and information to address industrial challenges
- Combining FAIR data, autonomous or interactive robotics, smart devices and next generation networks and computing to increase automation and optimise processes, resources, and services







AI, Data and Robotics for Industry optimization (including production and services) (4/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

Scope - Focus additionally on:

- How major European industries can substantially benefit from optimising AI, data and/or robotics to maximise such benefits
- Focus on specific use-cases to demonstrate benefits, cross-sector is encouraged
- Demonstrations with qualitative and quantitative industry and service relevant KPIs, benchmarking and progress monitoring
- Demonstrate the **added value of AI, Data, Robotics technologies** to optimise valuechains, products, services or associated processes, including knowledge automation.
- Should be application driven, involving problem owners to define needs and validations







AI, Data and Robotics for Industry optimization (including production and services) (5/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

Scope - Focus additionally on:

- Non-technical issues hampering the adoption of AI, data and robotics e.g. ethical aspects for the possible replacement of human operators, trust, security and safety etc.
- Production or service industries, where substantial added value of AI, data and/or robotics can be demonstrated ... at TRL6-7
- User industries are expected to play a major role in the requirement and validation
- Build on and reuse public results from relevant funded project & public results







AI, Data and Robotics for Industry optimization (including production and services) (6/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

2 Types of Projects to be funded:

- Type 1 Projects: Focused projects (approx. EUR 3.00 million EC contribution), involving the user industry and technology provider(s). No financial support to third parties.
- **Type 2 Projects:** Projects (approx. **EUR 5.00 million** EC contribution) with financial support to third parties (only SMEs and Start-ups and at least 40% of the funding):
 - AI, data and robotics solution providers in a application sector with common challenges and use-cases
 - Maximum of EUR 200k per third party and 70% funding (100% for start-ups) to include robotics components, requiring high equipment investment and/or important effort to integrate in a use-case
 - Technical support (engineering integration, testing and validation) to be provided to help companies
 - Maximum one type of third party project will be funded per focused area i.e. production or services







AI, Data and Robotics for Industry optimization (including production and services) (7/7)



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Finally – Focus on:

HORIZON-CL4-2022-DIGITAL-EMERGING-02-05

- Connections to the **Digital Innovation Hub networks** ... in Robotics, Data and AI areas
- Use common resources available in the AI-on-Demand platform, Digital Industrial Platform for Robotics, data platforms and, other relevant digital resource platforms
- Share results with above platforms for European AI, Data and Robotics ecosystem
- Re-use and share data for AI and Data innovation and for UN SDGs and the Green Deal
- Dissemination to increase awareness of value for society, people as well as the business
- Allocate tasks for cohesion activities with AI, Data and Robotics related funded actions and CSA HORIZON-CL4-2021-HUMAN-01-02







Emerging: 02-07 2022 Call in figures





- Call HORIZON-CL4-2022-DIGITAL-EMERGING-02-07: Increased robotics capabilities demonstrated in key sectors (AI, Data and Robotics Partnership)
- Deadline: 16 November 2022
- Overall indicative budget: 36M€
- Indicative budget per proposal: 9M€
- Proposals to be funded: 4

<u>Note 1</u>: Based on Workprogramme Version Final, 21/05/2022 <u>Note 2</u>: Applicants should use the official call documents (including Horizon Europe Cluster 4 Workprogramme; Admissibility conditions, eligibility conditions, financial & operational capacity and exclusion, award criteria, etc. This presentation serves informative purposes.







Increased robotics capabilities demonstrated in key sectors (1/8)





European Partnership on Artificial Intelligence, Data and Robotics

HORIZON-CL4-2022-DIGITAL-EMERGING-02-07 IA (70% for profit; 45pages) Start TRL 3-5 and achieve TRL 6-7 9M€; 4 projects to be funded

Outcome

Application oriented use cases that enhance specific sectors in achieving significant improvements in functional and application performance







Increased robotics capabilities demonstrated in key sectors (2a/8)





HORIZON-CL4-2022-DIGITAL-EMERGING-02-07

Project results to contribute at least one of the following expected outcomes:

- Demonstrators able to show the added value of robotics and their performances in addressing challenges in major application sectors, or in dangerous, dull, dirty tasks or those strenuous for humans or in extreme environments.
- Systems able to demonstrate **beyond human performance in complex tasks**, with high impact in **key sectors**, that show **extended levels of adaptation** and flexibility.
- Systems able to show high levels of reactivity and responsiveness and intelligibility when performing human-robot and robot-robot interactions in major application sectors.







Increased robotics capabilities demonstrated in key sectors (2b/8)



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Project results to contribute at least one of the following expected outcomes:

- Demonstrators able to show the added value of robotics and their performances in addressing challenges in major application sectors, or in dangerous, dull, dirty tasks or those strenuous for humans or in extreme environments.
- Systems able to demonstrate beyond human performance in complex tasks, with high impact in key sectors, that show extended levels of adaptation and flexibility.
- Systems able to show high levels of reactivity and responsiveness and intelligibility when performing humanrobot and robot-robot interactions in major application sectors.

HORIZON-CL4-2022-DIGITAL-EMERGING-02-07 <u>Project results to show robotic applications in:</u>

- Processing heavy workloads with optimal performance
- Performing DDD in high levels of radiation or toxicity
- Performing tasks in high pressure and temperatures
- Processing heavy workloads in unstructured environments
- Real-time adaptation to changes in extreme conditions
- Enhanced perception & cognition in dynamic collaborations
- Applying frugal AI for enhanced reactivity and responsiveness in collaborative scenarios







Increased robotics capabilities demonstrated in key sectors (3/8)





HORIZON-CL4-2022-DIGITAL-EMERGING-02-07

Proposals should focus on one of the following use-cases:

- Demonstrating substantial added value of robotics in major application sectors with high socio-economic and/or environmental potential impact, improving the effectiveness and efficiency of processes or services.
- Demonstrating how robotics can improve human working conditions and satisfaction in taking over dangerous, dull, dirty or strenuous tasks, keeping workers away from unsafe and unhealthy jobs.







Increased robotics capabilities demonstrated in key sectors (4/8)



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Scope – Focus on:

HORIZON-CL4-2022-DIGITAL-EMERGING-02-07

- Application oriented use cases that enhance specific sectors in achieving significant improvements in functional and application performance
- Novel robotics technology solutions capable of autonomously taking over dangerous, dull and dirty jobs, or that are capable of achieving tasks beyond human capabilities
- High level of **reactivity**, **flexibility** and **adaptivity** and **natural intelligibility** for humanrobot, as well as robot-robot collaboration and interaction
- Engagement with SSH expertise for human robot interaction design, behavioural intelligibility of robot interaction and action, especially in novel service applications, and to provide expertise on trustworthiness and acceptability by humans







Increased robotics capabilities demonstrated in key sectors (5/8)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-07

<u>Scope – Focus on:</u>

- Exploit the latest robotics advances and demonstrate at TRL6-7 use-case scenarios in highly realistic operating environments
- Highlight added value of such technologies, and demonstrate scalability, and shortterm deployment potential
- Progress should be demonstrated by qualitative and quantitative KPIs, demonstrators, benchmarking and progress monitoring
- Primarily application driven and concrete problem-solving approach in real-world scenarios which can benefit in short term from the technology and demonstrate substantial impact on the chosen application







Increased robotics capabilities demonstrated in key sectors (6/8)



<u>Scope – Focus on:</u>



- Human-centred and socio-economic approaches in combination with multistakeholder co-design activities for sustainable development of new enabling technologies
- People at the forefront in developing new and agile sociotechnical learning and tools ... feedback loop systems and utilise existing technology in novel ways
- Technical, SSH and ethics, researchers to improve interaction design on trustworthiness and acceptability, and address gender equality and intersectionality where relevant.
- User industry and social partners ... not only to identify the needs/scenarios, but also for **testing and feedback on optimising the working conditions** and performances.
- Human acceptance (also age, gender etc) of technology with trustworthy AI principles







Increased robotics capabilities demonstrated in key sectors (7/8)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-07

<u>Scope – Focus on:</u>

- At least 20% of funding for FSTP for SME or Start-up demonstrators
- Maximum of EUR 200k per third party, and 70% of the costs (100% for start-ups) to include robotics components, requiring high equipment investment and/or important effort to integrate in a use-case
- Technical support with expertise in engineering integration, testing and validation to SMEs and start-ups acting as technology providers to demonstrate the added value of their solutions to address the challenges of the use-cases
- Configuration and deployment tools as well as tools for rapid configuration and reconfiguration of robotics to improve deployability, reduce time to deployment, increase user driven (re)configuration, including through model-based approaches







Increased robotics capabilities demonstrated in key sectors (8/8)



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Finally – Focus on:

- Connections to the **Digital Innovation Hub networks** ... in Robotics, Data and AI areas
- Use common resources available in the AI-on-Demand platform, Digital Industrial Platform for Robotics, data platforms and, other relevant digital resource platforms
- Share results with above platforms for European AI, Data and Robotics ecosystem
- Re-use and share data for AI and Data innovation and for UN SDGs and the Green Deal
- Dissemination to increase awareness of value for society, people as well as the business
- Allocate tasks for cohesion activities with AI, Data and Robotics related funded actions and CSA HORIZON-CL4-2021-HUMAN-01-02







Pushing the limit of physical intelligence and performance (1/7)



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TURKEYIN HORIZON 202

HORIZON-CL4-2022-DIGITAL-EMERGING-02-06 **Deadline**: 16 November 2022

RIA; TRL2-3 -> TRL4-5; 7M€/ project; 4 projects Relevance: AI4EU project; H2020-ICT-49-2020; Digital Industrial Platform for Robotics; data platforms; cohesion activities; CSA HORIZON-CL4-2021-HUMAN-01-02; synergies with other partnerships

Outcome (at least one per proposal)

- Robots with advanced physical functionalities, capabilities and efficiency (faster, safer, more agile and precise, etc.), to achieve wider variety of tasks efficiently
 - beyond human capabilities (e.g. very large and very small scale capabilities OR
 - beyond human precision, OR
 - beyond human perception & decision making, e.g. by using multi-modal sensing)
- Robots with greatly improved intrinsically safe and efficient human-centric human-robot and robot-environment/objects physical interaction capabilities, at natural human speed or more
- Robots with improved abilities and robustness, allowing them to adapt to changes in the environment, and making them more energy efficient to run autonomously for longer periods of time while maintaining trustworthiness and dependability







Pushing the limit of physical intelligence and performance (2/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-06

Scope

Focus on technology and systems that significantly extend the physical capability of robots beyond the state of the art

Proposals should:

- ✓Improve physical performance of robots
- Develop promising and innovative robotic concepts
 - ✓ enabling adaptation to transformations of industry and society
 - examine design methods and tools for novel configurations and concepts

Example 1: improving robustness and resilience – to handle environment variations and unknown or unexpected situations - and energy efficiency to run safely and autonomously for longer periods of time, increased speed, some operating under extreme physical conditions such as under water, rough terrain, difficult climatic conditions, in the body, in the air, etc.).

Example 2: collaborative, modular and distributed, hyper redundant, highly reconfigurable, soft or miniaturised robotics)







Pushing the limit of physical intelligence and performance (3/7)



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Scope – Scientific approaches



Investigate novel scientific approaches OR push the limit of existing ones to:

- Improve physical capabilities of robots relevant to industry and service needs in sectors where this is a barrier to uptake, such as innovative actuation principles (such as soft robotics, reconfigurable, hyper-redundant, modular robotics), OR
- ✓Advance the field of miniaturized robotics, advanced control, improved hardware and increased trustworthiness and dependability (e.g. building on the latest results in mechatronics, advanced sensing and actuation, advanced materials, integrated and embedded systems for AI at the edge, neuromorphic computing)







Pushing the limit of physical intelligence and performance (4/7)



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Scope – first time right mentality



Starting from the design stage:

Embed techniques, methods and tools that enhance the performance and interaction of robots in real world tasks where testability is limited and a "first time right" mentality must prevail; **Example 1**: in space exploration, in dense urban environments, when developing applications for vulnerable people OR

Example 2: in safety critical infrastructures such as nuclear reactors, pressure vessels or chemical storage tanks







Pushing the limit of physical intelligence and performance (5/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-06

Scope – Rethink robot bodies



Improved physical and interaction capabilities (with the environment and with humans taking into account gender, age and disabilities as appropriate) to reach novel or advanced abilities, such as powerful, fast, precise, and intrinsically safe navigation, manipulation, sympathetic automated adaptation, etc. capabilities.

The shape and size of robots can vary from miniature to large-scale, from soft, to more rigid structure, from manipulators, to ground, air, marine, in-vivo, exoskeletons and wearable robots, etc.







Pushing the limit of physical intelligence and performance (6/7)



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Scope (nice to have)



- Propose innovative approaches in building on and integrating the latest developments in key underlying technologies, OR by exploiting multimodalities (audio, vision, AR/VR, haptics, etc.), improved safety mechanisms, physical collaboration, collaborative and swarm robotics
- Address energy efficiency, to address the current limitation of energy autonomy in robotics
- Focus on advances in cognitive mechatronics, where sensing and actuation are closely coupled with cognitive systems to deliver improved autonomy, dexterity, control, motion quality, interaction (including all modalities), adaptation and learning, and safer systems







Pushing the limit of physical intelligence and performance (7/7)



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HORIZON-CL4-2022-DIGITAL-EMERGING-02-06

- Scope horizontal aspects should have
- ✓ take into consideration trustworthy AI principles
- ✓Progress should be demonstrated by qualitative and quantitative KPIs, demonstrators, benchmarking and progress monitoring
- **Scope** linkages to previous actions and use of results
- Proposals should build on and reuse public results from relevant previous funded actions.
- ✓Proposals should make use of connections to the Digital Innovation Hub networks, (e.g. in Robotics, Data and AI)
- ✓ Full use should be made of the common resources available in the Alon-Demand platform, Digital Industrial Platform for Robotics , data platforms and, if necessary other relevant digital resource platforms









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Human: Leadership in AI based on trust

HORIZON-CL4-2022-HUMAN-02-01 AI for human empowerment (AI, Data and Robotics Partnership)

HORIZON-CL4-2022-HUMAN-02-02 European Network of AI Excellence Centres: Expanding the European AI lighthouse







Cluster 4: Digital, Industry and Space DESTINATION 4 – A Humancentred and Ethical Developmer of Digital and Industrial Technologies

Contribution to KSOs of HE Strategic Plan:

 (D) Creating a more resilient, inclusive and democratic European society, prepared and responsive to threats and disasters, addressing inequalities and providing high-quality health care, and empowering all citizens to act in the green and digital transitions Relevant impact areas:

 A human-centred and ethical development of digital and industrial technologies, through a two-way engagement in the development of technologies, empowering end users and workers, and supporting social innovation







Human: 02-01 2022 Call in figures





• Call - HORIZON-CL4-2022-HUMAN-02-01: Al for human empowerment (Al, Data and Robotics Partnership)

- Deadline: 16 November 2022
- Overall indicative budget: 16M€
- Indicative budget per proposal: 8M€
- Proposals to be funded: 2

<u>Note 1</u>: Based on Workprogramme Version Final, 21/05/2022 <u>Note 2</u>: Applicants should use the official call documents (including Horizon Europe Cluster 4 Workprogramme; Admissibility conditions, eligibility conditions, financial & operational capacity and exclusion, award criteria, etc. This presentation serves informative purposes.







Al for human empowerment (1/6)



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European Partnership on Artificial Intelligence, Data and Robotics HORIZON-CL4-2022-HUMAN-02-01 RIA (100% funded; 45pages) Start at TRL 2-3 and Achieve TRL 4-5 8M€; 2 projects to be funded

Outcome

Next level of **perception**, **visualisation**, **interaction** and **collaboration** between humans and AI systems working together as partners to achieve **common goals**, **sharing mutual understanding** and **learning** of each other's abilities and roles







Al for human empowerment (2/6)



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HORIZON-CL4-2022-HUMAN-02-01

<u>Projects contribute at least one of the following expected</u> <u>outcomes:</u>

- **Truly mixed human-Al initiatives for human empowerment,** combine human and machine knowledge and capabilities including shared and sliding autonomy in interaction, addressing reactivity, and fluidity of interaction and making systems transparent, fair and intuitive to use for acceptance. Systems should adapt to the user rather than the opposite, based on analysis, understanding and anticipation about human behaviour and expectations.
- **Trustworthy hybrid decision-support systems**, for mixed and sliding decisionmaking, for context interpretation, for dealing with uncertainty, transparent anticipation, reliability, **human-centric planning and decision-making**, interdependencies, and augmented decision-making. Transparency, fairness, technical accuracy and robustness, together with validation strategies assessing the quality of the decision of the AI supported socio-technical system.











Al for human empowerment (3/6)



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<u>Scope – Focus on:</u>

HORIZON-CL4-2022-HUMAN-02-01

- Human-centred development of trustworthy AI ... human-AI interaction, acceptance and democratisation of AI, regardless of their age, race, gender or capabilities
- Methods to improve transparency, explainability, expected and verifiable levels of performance, confidence levels, accountability, responsibility, trust and fairness
- Humans empowerment to support/improve responsible behaviours in full respect of the requirements ensuring trustworthy AI, including human autonomy.
- Multidisciplinary and trans-disciplinary approaches paying particular attention to intersectional factors (gender, ethnicity, age, socioeconomics, disability) and SSH
- Collaborative design and evaluation with users involvement should also be considered.







Al for human empowerment (4/6)



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Scope – and pilot activity:

HORIZON-CL4-2022-HUMAN-02-01

- Investigating novel ways of citizen engagement with AI development for optimising usability and experience for citizens (both at professional or daily life environment)
- Next level of perception, visualisation, interaction and collaboration, and understanding between humans and AI systems working together as partners to achieve common goals, sharing understanding of each other's abilities and
- Mechanisms to assess and demonstrate progress with KPIs, benchmarking, progress monitoring and demonstration of added value) and share with AI-on-demand platform
- Cohesion activities with the PPP on AI, Data and Robotics and funded projects, including the CSA HORIZON-CL4-2021-HUMAN-01-02







Al for human empowerment (5/6)



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TURKEY.

DRIZON 2020

Destination Scope and Expected Impact:

HORIZON-CL4-2022-HUMAN-02-01

Credible pathway towards a human-centred and ethical development of technologies:

- Creating a more resilient, inclusive and democratic European society, prepared and responsive to threats and disasters, addressing inequalities and providing high-quality health care, and empowering all citizens
- A human-centred and ethical development of digital and industrial technologies, through a two-way engagement in the development of technologies, empowering end-users and workers, and supporting social innovation.

Destination Headings:

- · Leadership in AI based on trust
- An Internet of Trust
- eXtended Reality (XR)







Al for human empowerment (6/6)



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HORIZON-CL4-2022-HUMAN-02-01

Destination Scope and Expected Impact:

Proposals for topics under this Destination should set out a credible pathway to the following impacts:

- Increased inclusiveness, by supporting a human-centred approach to technology development that is aligned with European social and ethical values, and sustainability
- Sustainable, high-quality jobs by targeting skills mismatches, the need to empower workers, and ethical considerations relating to technological progress







European Network of Al Excellence Centres: Expanding the European Al lighthouse (1/7)



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European Partnership on Artificial Intelligence, Data and Robotics

HORIZON-CL4-2022-HUMAN-02-02

Deadline: 16 November 2022

RIA; TRL2-3 -> TRL4-5; 11.5M€/ project; 3 projects to be funded

Relevance: The earlier Networks of Excellence projects on topics H2020-ICT-48, HORIZON-CL4-2021-HUMAN-01-03 and HORIZON-CL4-2021-DIGITAL-EMERGING-01-12

Outcome

- Scientific progress in AI, addressing major challenges hampering its deployment, including systems engineering
- Build-up the European AI lighthouse, initiated by earlier Networks of excellence centers
- Unify and reinforce the world-class European AI community







European Network of AI Excellence Centres: Expanding the European AI lighthouse (2/7)



TURKEY: HORIZON 2020

Scope

✓To ensure European open strategic autonomy in critical technology such as AI, with huge potential socio-economic impact, it is essential to reinforce and build on Europe's assets in such technologies, including its world-class researcher community, in order to stay at the forefront of technological developments Develop mechanisms to reinforce and strengthen the networks of excellence centres in AI.

HORIZON-CI 4-2022-HUMAN-02-02

✓ Bring the best scientists from academia and industry together to join forces in addressing the major AI challenges hampering its deployment, and to reinforce excellence in AI throughout Europe via a tightlycoupled network of collaboration Joining Forces to:

- ✓ Be competitive,
- Scale up research capacities
- Reach critical mass







image: Flaticon.com

European Network of Al Excellence Centres: Expanding the European Al lighthouse (3/7) Scope (continued 1)



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HORIZON-CL4-2022-HUMAN-02-02

Networks are expected to:

- ✓ Mobilise select groups of key researchers from both industry and academia to collaborate on solving significant AI problems in which Europe has exceptional expertise;
- ✓ Increase the impact of the funding by making faster and greater progress through the joint efforts by recognised leaders working together, drawing on both shared and complementary perspectives, such as reasoning and learning, on the chosen problems;
- ✓ Play (together with other mechanisms) an important role in achieving a critical mass of talent and in overcoming the present fragmentation of AI research in Europe.







European Network of Al Excellence Centres: Expanding the European AI lighthouse (4/7)



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HORIZON-CL4-2022-HUMAN-02-02

Scope (continued 2)



- ✓ Mobilise the best European teams in AI community to join forces to address major technical as well as sector- or societal-driven challenges: strengthening excellence, networking, multidisciplinarity, academia-industry synergies
- ✓ Contribute to the H2020 & HE (1st call) initiative to develop a vibrant European network of excellence centres in AI, and a vibrant AI scientific community

Create a network of excellence for the following topics:

- 1. Next Generation AI covering foundational research and emerging and novel approaches,
- 2. Scientific research and technologies prioritised in the latest SRIDA (Strategic Research, Innovation and Deployment Agenda of the AI, Data and Robotics PPP)







European Network of Al Excellence Centres: Expanding the European Al lighthouse (5/7)



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RIZON 2020

HORIZON-CL4-2022-HUMAN-02-02

Targeted Topic

1. Next Generation AI – covering foundational research and emerging and novel approaches, with a view of improving the technical performances of AI-based systems, such as increased accuracy, robustness, verifiability, dependability, adaptability, versatility, graceful degradation, etc. Research is also expected to address functional and performance guarantees.

- Aspects to be covered include, but are not limited to:
- ✓ Foundational research in AI & ML including new paradigms, algorithms, architectures and novel optimization and regularization methods, hybrid AI, hybrid machine learning, data/sample –efficiency







European Network of Al Excellence Centres: Expanding the European Al lighthouse (6/7)



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HORIZON-CL4-2022-HUMAN-02-02

Targeted topic

2. Scientific research and technologies prioritised in the latest SRIDA (Strategic Research, Innovation and Deployment Agenda of the AI, Data and Robotics PPP), and complementing the previously selected Networks of Excellence centres

<u>SRIDA</u> defines the vision, overall goals, main technical and nontechnical priorities, investment areas and a research, innovation and deployment roadmap for the European Public Private Partnership.







European Network of AI Excellence Centres: Expanding the European AI lighthouse (7/7)

Selected networks should:



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TURKEY: HORIZON 2020

HORIZON-CL4-2022-HUMAN-02-02

- ✓Identify the major strength Europe has on a number of specific AI topics, and gather the best teams working on them in Europe in a strongly connected virtual institute, collaborating and competing to progress on these topics;
- ✓ Identify topics where Europe needs support to become competitive at international level, if strategically important
- ✓ Set ambitious challenges, with the overarching aim of becoming a world reference of excellence in AI on the strategic topics prioritised by the Network.

As a result, Europe's diversity will stimulate healthy competition, rather than the fragmentation of the AI community

The scientific progress should be **driven by major societal challenges**,

This should also make it attractive for industries to join the efforts, in bringing their top research teams, and also provide data/challenges







Food for thought & Q&A SESSION



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 Interesting readings:
A Roadmap for US Robotics – From Internet to Robotics 2020 Edition <u>https://www.nowpublishers.com/a</u> <u>rticle/Details/ROB-066</u>
Japan Robot Association <u>https://www.jara.jp/e/various/stra</u> <u>tegy/index.html</u>











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Teşekkür ederim!

Thank you!









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