



Information Systems research group – expertise and priority calls for Horizon Europe (2025)

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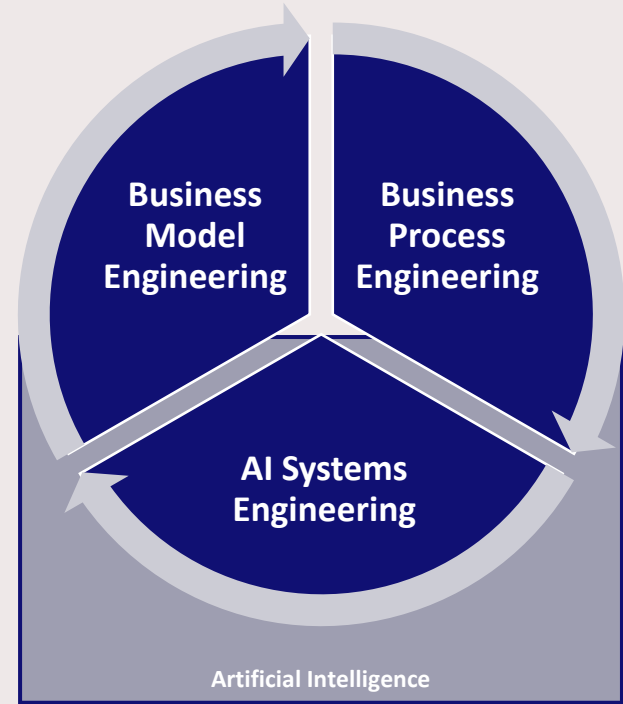
Department of Industrial Engineering and Innovation Sciences (IE&IS)

Digital Transformation @ IE&IS

Our Digital Transformation programme within the Information Systems group covers the following key topics;

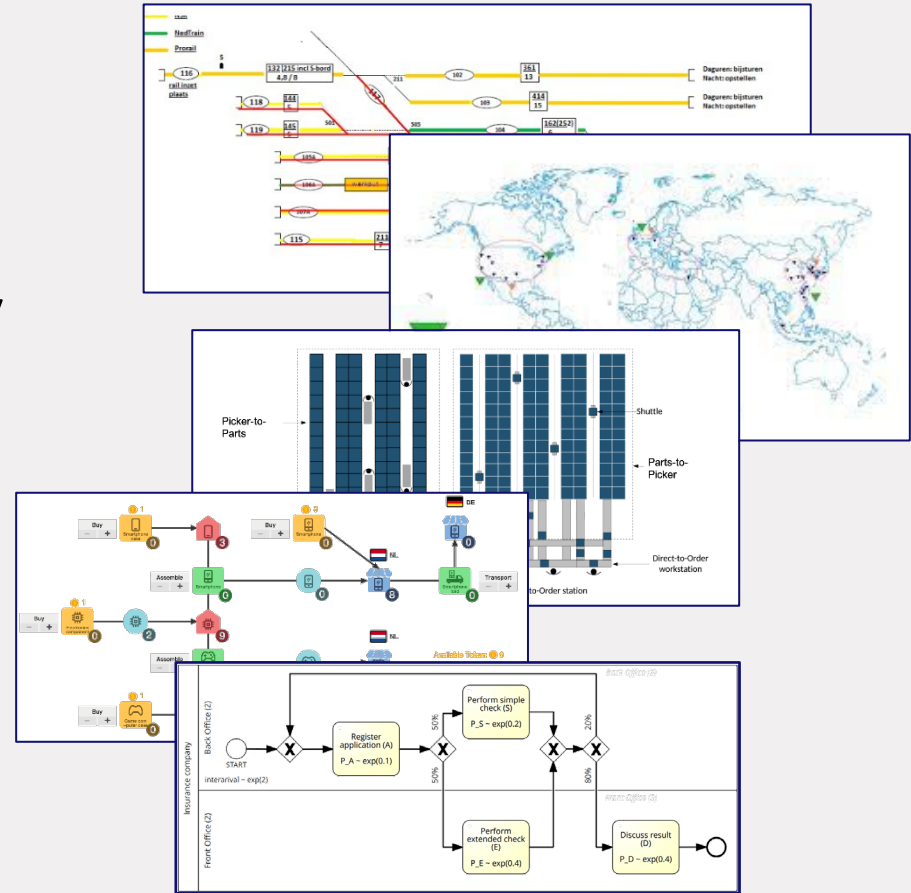
- **Business Process Engineering**
- **AI Systems Engineering**
- **Business Model Engineering**

In all three topics areas, our research is informed and shaped by AI



Application Domains

- Transportation and Mobility
- Supply Chain and Logistics
- (High-Tech) Manufacturing
- Healthcare
- Energy
- Services



Business Model Engineering (BME)

- Develop novel methods and techniques to support organizations to implement innovative and sustainable digital solutions within service ecosystems.
- These solutions, such as platforms, leverage digital technologies (like mobile apps, IoT, blockchain) as core enablers.
- They involve collaborations between multiple stakeholders for value co-creation.
- They are designed not only for economic viability but also for environmental and social sustainability.

Micromobility Solution



Pay-per-use Service
(Servitization)



Green Energy-as-a-Service



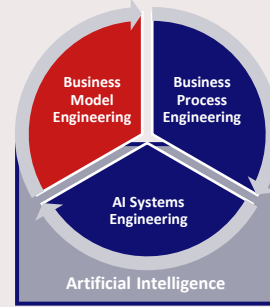
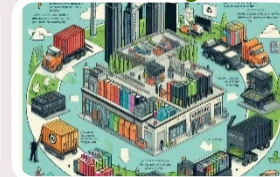
Healthcare Service

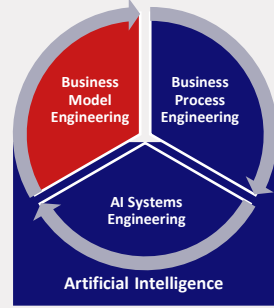


Circular - Closed-loop



Reverse Logistics

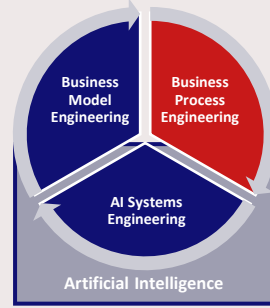




Business Model Engineering (BME)- Research Focus

- Collaborative Business Model Design and Management for Sustainable Digital Solutions
- Evaluation and Impact Assessment of Collaborative Business Models
- KPIs and Performance Management of Business and Operating Models
- Capability and Maturity Models to support Organizations in Digital/Sustainability/Twin Transformation
- **Responsible Digital Solution Design (considering their human, social, and ethical concerns)**

Business Process Engineering (BPE) Research Focus



Business Process Optimization and Improvement
[goal focused, rule compliant, personalized, efficient]

(re-)design

- case-based modeling
- process repair

analysis

- rule matching
- rule mining
- simulation
- process pattern mining
- unstructured process data mining

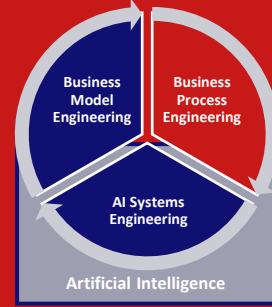
enactment

- resource allocation
- process guidance

monitoring

- predictive process monitoring
- explainable process monitoring

Business Process Engineering (BPE) Domain Focus



Healthcare

Healthcare network support

- Inter-organizational process mining
- Health data spaces (on a 'consultancy level')

Personalized healthcare, personal care pathways

- Evidence-based operational goal setting
- Operational treatment plan derivation and improvement
- Learning healthcare system (protocols)

Collaborative production and supply processes

- Inter-organizational process mining
- Process monitoring
- Simulation model mining (digital twinning)
- Event knowledge graph design

Supply Chain and Manufacturing

Adaptive production and supply processes (mass customization)

- Traceability of data and activities to goals, rules, quality, and sustainability
- Explainable operational decisions
- Process adaptiveness and resilience

Circular supply processes

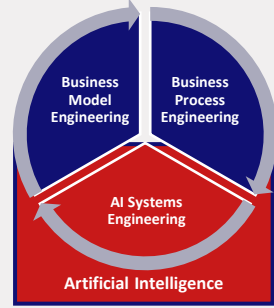
- Traceability
- Network design

Govtech

Citizen-focused governmental processes [future goal]

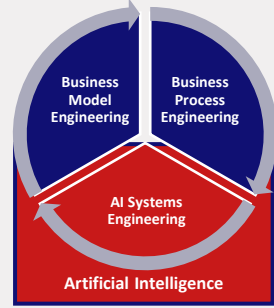
- Explainable and traceable decisions

Cross-cutting: Data spaces; Interoperability; Data integration



AI Systems Engineering - Research Focus

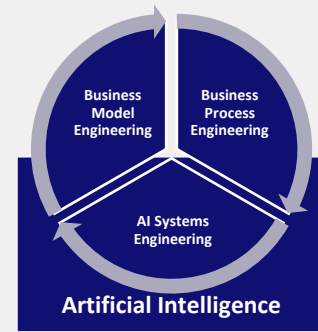
- Empower decision-makers/citizens with explainable and transparent AI methods;
- Modular and adaptable AI decision-making methods and tools, that cater to different trustworthiness dimensions and trade-offs;
- Sustainable AI techniques for green transformation;
- AI (foundation) models for industrial and societal optimization problems.



AI Systems Engineering - Expertise

- ML, DL, RL, optimization, planning & search;
- Generative Artificial Intelligence (GAI)
- Prediction modelling & Sequential Decision Making (using XAI)
- Parameter tuning;
- Data-centric predictive maintenance
- Data-driven optimization methods and algorithms
- Transparency, Explainability & Fairness in Machine Learning & Optimization

Information Systems Group – relevant projects



Healthcare

- [IpSPINE](#) – development of novel technologies and Advanced Therapy Medicinal Products (ATMPs) for the advanced therapy research and development community;
- [DM Coach](#) – improvement of patients and citizens' lifestyle by increasing the awareness on the risks related to having a not-healthy lifestyle;
- [GOAL](#) - development of a multi-dimensional theoretical framework that supports evidence-based overweight prevention via gamified health technologies.
- [HealthyW8](#) - advanced data analysis techniques to derive multi-dimensional models from various data sources including personal health and social-environmental data, and development of health gamification tools.
- [Well-Data](#) - making health-promoting technologies and the associated personal data on lifestyle, well-being, health(care) and daily functioning interchangeable

Production & Manufacturing

- [CERTIF-AI](#) – facilitates the certification that a production process leads to quality products and, when this is not the case, diagnose the problems in the production process;

Supply Chain/Logistics

- [AI Planner of the Future](#) – development of supply chain and logistics planning based on a hybrid form of decision-making in which both human and artificial intelligence are combined to be able to properly handle the complexity.

Explainable AI

- [TEPAIV](#) – this project aims to empower citizens to understand the basis of all AI-driven predictive analysis that is directed at them;

Civil Engineering

- [Stability](#) – development of new planning methods using artificial intelligence to prioritize and schedule lifespan-extension measures for civic and cultural structures in inner-city settings;

Horizon Europe 2025 – Target Calls

- HORIZON-CL4-2025-03-DIGITAL-EMERGING-07: Robust and trustworthy GenerativeAI for Robotics and industrial automation (RIA) (AI/Data/Robotics & Made in Europe Partnerships)
- HORIZON-CL4-2025-04-DIGITAL-EMERGING-04: Assessment methodologies for General Purpose AI capabilities and risks (RIA) (AI/Data/Robotics Partnership)
- HORIZON-CL4-2025-04-DIGITAL-EMERGING-07: GenAI4EU in Robotics and industrial automation (RIA) (AI/Data/Robotics & Made in Europe Partnerships)
- HORIZON-HLTH-2025-03-STAYHLTH-01-two-stage: Improving the quality of life of persons with intellectual disabilities and their families
- HORIZON-HLTH-2025-03-DISEASE-04-two-stage: Leveraging artificial intelligence for pandemic preparedness and response
- HORIZON-HLTH-2025-01-CARE-01: End user-driven application of Generative Artificial Intelligence models in healthcare (GenAI4EU)
- HORIZON-HLTH-2025-01-TOOL-03: Leveraging multimodal data to advance Generative Artificial Intelligence applicability in biomedical research (GenAI4EU)



HORIZON-CL4-2025-03-DIGITAL-EMERGING-07: Robust and trustworthy GenerativeAI for Robotics and industrial automation (RIA) (AI/Data/Robotics & Made in Europe Partnerships) (SLIDE #1)

- Research & Innovation Action (RIA), €85M total available, €40M-€45M per project; opens 10/06/25, closes 02/10/25; start at TRL 2 and achieve TRL 6 by the end of the project; to ensure a balanced portfolio covering the two type of proposals, the budget will be split in a balanced way between Type A and Type B proposals, provided that the applications attain all thresholds; A minimum of EUR 10 million of the EU funding requested by the proposal should be allocated for the purpose of financial support to third parties

Expected outcomes: Proposals are expected to address **at least one** of the expected outcomes, either type A) or B). The type must be clearly identified within the proposal;

Type A) GenAI4EU : **Generative AI for Robotics for industrial automation: Development of advanced foundation models for robotics**, fostering increased autonomy and generalization capabilities, thus enabling robots to **dynamically learn and comprehend** their physical surroundings in real-time, ensuring **adaptability and reliability** across diverse and complex scenarios; **Validation of the model** through fine-tuning and downstream application to address industrial automation use-cases

Type B) **Trustworthy and robust generative AI for improved manufacturing: Increased productivity by high quality, flexible and resource-efficient industrial automation**, both on the shop floor and in engineering/business processes; Significantly improved facilitation of product and process certification and compliance assessment, as well as **reliability, efficiency and sustainability of manufacturing processes**, supporting easier high-mix production and manufacturing of products based on sustainable and advanced technologies; significantly facilitated installation, commissioning and decommissioning of production facilities, through **tools that enable faster industrialisation of factory automation** well beyond the pilot phase, while reducing the need for manual on-site interventions.

HORIZON-CL4-2025-03-DIGITAL-EMERGING-07: Robust and trustworthy GenerativeAI for Robotics and industrial automation (RIA) (AI/Data/Robotics & Made in Europe Partnerships) (SLIDE #2)

- Research & Innovation Action (RIA), €85M total available, €40M-€45M per project; opens 10/06/25, closes 02/10/25; start at TRL 2 and achieve TRL 6 by the end of the project; to ensure a balanced portfolio covering the two type of proposals, the budget will be split in a balanced way between Type A and Type B proposals, provided that the applications attain all thresholds; A minimum of EUR 10 million of the EU funding requested by the proposal should be allocated for the purpose of financial support to third parties

Type A Scope: “...Proposals should detail strategies to **leverage cutting-edge generative AI techniques** to enhance the **adaptability and reliability** of these models across complex and dynamic scenarios, as well as how to **ensure human-centricity and environmental considerations**. The goal is to **train and fine-tune generative AI models** that meet the necessary standards for ensuring the safe operation of robotics hardware.” “...Research activities should explore the **training methodologies for these foundation models**, emphasizing their **ability to process multimodal data and derive actionable insights to inform robotic decision-making processes...**” “...The proposals are also expected to include the **validation of the trained models through applications**. Proposals should **detail methodologies for conducting rigorous testing procedures**, incorporating both simulation-based evaluations and physical experiments. These tests aim to **evaluate the performance and scalability of developed foundation models...**” “...The research will be driven by impactful scenarios defined by **major manufacturing industry players**, that should be well integrated in the consortium...” “...Proposals are expected to **enhance the accuracy and robustness of generative AI systems in robotics**, ensuring that the solutions developed are **trustworthy and reliable** in their applications, hence **in line with the AI Act requirements...**” “...Proposals should address both the **safety of robotic operations**, ensuring protection against physical risks, and **cybersecurity measures** to safeguard against digital threats and ensure system integrity...”

HORIZON-CL4-2025-03-DIGITAL-EMERGING-07: Robust and trustworthy GenerativeAI for Robotics and industrial automation (RIA) (AI/Data/Robotics & Made in Europe Partnerships) (SLIDE #3)

- Research & Innovation Action (RIA), €85M total available, €40M-€45M per project; opens 10/06/25, closes 02/10/25; start at TRL 2 and achieve TRL 6 by the end of the project; to ensure a balanced portfolio covering the two type of proposals, the budget will be split in a balanced way between Type A and Type B proposals, provided that the applications attain all thresholds; A minimum of EUR 10 million of the EU funding requested by the proposal should be allocated for the purpose of financial support to third parties (FSTP). Up to € 30 million towards the development of the foundation mode

Type B Scope: "...the manufacturing sector should strongly benefit from **increased levels of automation** made possible by breakthroughs provided by AI, in particular by the family of technologies know as generative AI, including (e.g.) **AI foundation models, large language models, transformers, multimodal generative AI**. A priority of this topic is the development of Generative AI solutions dedicated to the manufacturing sector and making use of manufacturing data available in production lines. Proposals should address **at least one** of the following use-cases: 1) **Robustness and trustworthiness of digital technologies and data management** at industry-grade quality, to raise the automation levels on production sites and across industry and supply chains; 2) **Enhance product and process qualification/certification and compliance assessment** through higher levels of automation, digitalisation and data management, taking into account related requirements; 3) **Automation of manufacturing processes** to achieve higher reliability, efficiency and sustainability; 4) **Automated tools** for fast and large-scale deployment and reconfiguration of production assets and for rapid innovation cycles.

Projects should exploit the most suitable from the following approaches: exploiting the most suitable approach(es) among the ones described below:

- 1) The **integration of generative AI applications exhibiting trained model(s)** specifically designed for manufacturing, providing measurable advantages in one of more of these key areas: manufacturing cost, increased productivity, quality, flexibility, resilience, sustainability, circularity, time to market and usability. Applications can target factory-floor operations and/or management of data, knowledge and documentation associated to products and production (for use-case 1 or 2); 2) **Development and integration of digital production systems** capable of significantly increasing productivity and managing high-mix production with close to zero time needed for re-purposing and capability to manage different mixes of materials and components (for use-case 3); 3) Development of deployment **tools to automate the management of production** lines, namely through automatic configuration, integration with legacy systems, placement of data translators and connectors, and deployment of machines and sensors on the shop floor (for use-case 4).

HORIZON-CL4-2025-04-DIGITAL-EMERGING-04: Assessment methodologies for General Purpose AI capabilities and risks (RIA) (AI/Data/Robotics Partnership)

- Research & Innovation Action (RIA), €7M total available, €3M-€4M per project; opens 10/06/25, closes 02/10/25; start at TRL 2 and achieve TRL 5 by the end of the project;

Expected outcomes (all): New assessment and validations methodologies developed allowing to evaluate General Purpose AI (GPAI) models, including **multimodal systems, and systems' capabilities and risks**; Use of the research outcomes by GPAI providers, policymakers, public institutions, and other relevant stakeholders to **evaluate GPAI models and systems' capabilities and risks**; Support to the AI Office in its function to **conduct evaluations of general-purpose AI models** with a view to **enforce the AI Act' rules** for general purpose AI models and **facilitate self-evaluation** for GPAI model developers to ensure **compliance with AI Act requirements**.

Call Scope: This topic aims to **develop robust assessment tools, techniques, and benchmarks specifically designed to rigorously evaluate GPAI models and systems, including multimodal systems**. Proposals should cover **one or more** of the following research areas: Innovative methods for **proactively identifying and forecasting emergent capabilities** in GPAI models and systems. This encompasses the **identification of capabilities with both beneficial and potentially detrimental uses**; **Assessment of GPAI capabilities with a significant economic impact or potential for misuse**. This includes **assessing capabilities** that drive **beneficial innovation and societal good**, as well as **evaluating potential risks** in areas such as chemical, biological, radiological, and nuclear (CBRN) hazards or cybersecurity threats; **Developing assessment techniques** that illuminate the underlying mechanisms of emergent capabilities in AI systems, emphasising interpretability and explainability.

HORIZON-CL4-2025-04-DIGITAL-EMERGING-07: GenAI4EU in Robotics and industrial automation (RIA) (AI/Data/Robotics & Made in Europe Partnerships)

- Research & Innovation Action (RIA), €30M total available, €15M per project; opens 10/06/25, closes 02/10/25; start at TRL 2 and achieve TRL 5 by the end of the project;

Expected outcomes (**at least one**): Development of **General Purpose AI (GPAI) models and architectures** demonstrating enhanced capabilities, such as **formal reasoning**, mathematical problem-solving, confidence level estimation, **long-term planning**, and seamless adaptation to dynamic environments; **Innovative learning approaches** combining self-supervised learning with hybrid learning, active learning, reinforcement learning, transfer learning, relational learning or continual learning and evolutionary learning; Theoretical insights to advance the understanding of **synergies between self-supervised and complementary learning paradigms** in GPAI model development.

Call Scope: This call prioritizes proposals that explore innovative approaches to developing GPAI models, focusing on **at least one** of the following key research areas: (i) **Hybrid Learning Architectures for Advanced Reasoning: Development of architectures** integrating self-supervised learning with symbolic reasoning, knowledge representation, and neuro-symbolic methods to **foster robust reasoning, complex planning**, and problem-solving abilities within GPAI; (ii) Continual and Evolutionary **Learning for Dynamic Environments**: Research on paradigms enabling GPAI models to **seamlessly adapt, learn from changing conditions, and retain knowledge** essential for operation in dynamic, real-world environments; (iii) **Reinforcement Learning Integration**: Research on the fusion of **self-supervised learning** and **reinforcement learning** to overcome challenges like non-stationary data, algorithm sensitivity, and computational cost; (iv) **Explainable AI and Trustworthy Decision-Making**: Integration of **robust XAI methodologies**, exploring causal inference and counterfactual reasoning techniques to **enhance transparency, accountability, and responsible use** of GPAI models in alignment with European values and principles; (v) other Novel Paradigms: Research on the combination of **self-supervised learning** with other learning paradigms, such as active learning, **relational learning, and embodied learning**, to equip GPAI models with new advanced capabilities.

HORIZON-HLTH-2025-03-STAYHLTH-01-two-stage: Improving the quality of life of persons with intellectual disabilities and their families

Research & Innovation Action (RIA), €40M total available, €6M- €8M per project; opens 22/05/25, closes 18/09/25 (S1) and 16/04/26 (S2)

Expected outcomes: proposals must contribute towards **several** of the following outcomes: **improved quality of life** for effected persons and their families/carers; **development of innovative solutions** - medical, technological, digital or others - to reverse and/or reduce the severity level of disabilities; **improved health and autonomy of affected persons**; relevant stakeholders are **informed of the research advances and best practices** addressing the health and needs of persons with intellectual disabilities; **reduced impact** on those disabilities on individuals, their families and society as a whole.

Call Scope "... **explore new ways** to **improve the quality of life** of persons with intellectual disabilities and their families and to **reduce to the maximum possible the negative impact** of the disability in their daily lives from different perspectives, such as medical, technological, digital or others..." "...**innovative solutions** are needed in order to deliver medicines, **diagnoses, treatments, protocols, technologies or digital solutions**, etc. that can help in an **early stage** to **prevent the worsening** of the **intellectual disability and/or related co-morbidities**, reverse or reduce it, and to improve the autonomy of affected persons and relieve their carers..." Solutions should address **several** of the following; "...**properly diagnose** as early as possible the disease(s) causing the intellectual disability or conditions worsening them, especially in the case of children..." "...**deliver the necessary** medical treatments, diagnoses, medicines, **protocols, technologies, digital solutions**, habilitation and/or rehabilitation services, etc. that can help **preventing the worsening** of the intellectual disability, **reversing it or reducing its severity**..." "...If applicable, with the **support of assistive technologies and digital solutions**, ensure **optimal autonomy** of persons with intellectual disabilities..." "...help also the **family members and close carers** to take **better care of the person** with intellectual disabilities. Such **technologies must adhere to the relevant standards** and be **grounded in scientific evidence**..." "...Develop **innovative integrated care strategies** - strengthening patient-centred care – to improve the Quality of Life of persons with intellectual disabilities of any age, and their families..." "...**Develop guidelines** in order to provide **adequate support and training** for caregivers, formal and informal, especially for those providing care for persons with intellectual disabilities and/or living with them..."

HORIZON-HLTH-2025-03-DISEASE-04-two-stage: Leveraging artificial intelligence for pandemic preparedness and response

Research & Innovation Action (RIA), €35M total available, €6M- €8M per project; opens 22/05/25, closes 18/09/25 (S1) and 16/04/26 (S2)

Expected outcomes: **all** should be addressed: “...the **potential of Artificial Intelligence (AI) is used** in all aspects that **determine optimal pandemic preparedness and response**, and fast learning systems are supported, to the benefit of scientists, public health responders and policymakers...” “...European pandemic preparedness and response **benefits from readily available, trustworthy and ethical AI-based tools and technologies** that enable it to act fast and in a targeted manner, to timely **detect and understand emerging infectious threats**, to **respond adequately and proportionally** to identified threats, and to **control such threats** effectively and efficiently...” “...**Different data types** from **multiple sources and disciplines** across the **EU and globally** can be **accessed, integrated and analysed**...”

Call Scope: **several** of the following should be addressed: “...**Develop new, or improve existing AI-based tools, methods and technologies**, geared towards greater safety, efficiency and impact of medical, societal or logistical countermeasures...” “...**Scout, assemble and prepare appropriate FAIR datasets** generated across the EU and Associated Countries (e.g. COVID-19, Influenza, etc.), **for the development, training and testing of targeted AI-supported generative assessment and prediction tools**...” “...**Leverage the capacities of the existing and emerging data research infrastructures** and the future European Health Data Space (EHDS)⁹⁰ and the European Open Science Cloud (EOSC)⁹¹ architectures and research environments...” “...comprehensively address cybersecurity, **data privacy, trustworthiness, equity and data quality, interoperability and access modalities**...” “...**Identify and address the current technical, operational, and social limitations** related to the (cross-border) **access to quality data and to the smooth implementation of AI-driven solutions**...” “...**Engage with end-users, policymakers, regulatory bodies and authorities, and other stakeholders** in the **development, improvement, testing and validation of trustworthy and ethical AI-based tools and technologies**, to propose options for the **validation and uptake** of the novel AI tools in real-world settings taking into consideration aspects like **training needs, responsible use, users' trust, energy consumption**, etc...”

HORIZON-HLTH-2025-01-CARE-01: End user-driven application of Generative Artificial Intelligence models in healthcare (GenAI4EU)

Research & Innovation Action (RIA), €40M total available, €15M- €20M per project; opens 22/05/25, closes 18/09/25

Expected outcomes: **all** should be addressed; Healthcare professionals... have access to **user-centric, robust and trustworthy virtual assistant solutions** based on **Generative Artificial Intelligence (AI) models and other AI tools...** “...patients benefit from **enhanced outcomes**, more **personalised care**, and **increased engagement** with their healthcare professionals...” “... **Healthcare systems** benefit from **improved and cost-effective patient outcomes**, **superior** to the current standard of care in terms of **accuracy and quality**, as well as from **cost savings** through advancements in **highly accurate, transparent, traceable, and explainable Generative AI-based solutions...**”

Call Scope (**all** to be addressed): “...Develop **virtual assistant solutions** based on new or optimised trustworthy **Generative AI models, augmented by other AI tools** to support healthcare professionals...models should **leverage** extensive, diverse, and **complex multimodal health and research data**, public knowledge, and healthcare systems information...**development and training of the Generative AI models** should take place in **multinational consortia** and **federated governance approaches** for developing and training the solutions should be considered...” “...Demonstrate the **added-value and clinical utility of the virtual assistant** solutions in at least **two** relevant healthcare **use case(s)** in **different medical fields...** The applicants should **provide evidence** of **high maturity technology** for the proposed use cases ...**actively engage healthcare professionals as end users**, and other essential stakeholders such as patients, caregivers in the **co-design, development and testing of the solutions...**” “...Develop or adapt existing methodologies for **continuous assessment** of the proposed Generative AI-based virtual assistant solutions, in particular by adopting (i) **Appropriate performance metrics** for evaluating and testing the **technical robustness and clinical utility** ... (ii) Appropriate solutions to **identify and mitigate potential bias and confounding** of the Generative AI models... (iii) Methods to **systematically address and assess ELSI** (Ethical, Legal and Societal Implications) aspects, including **data privacy concerns** and risk of **discrimination/bias...** (iv) Appropriate techniques to **discover cause-and-effect relationships** and **explainability** of the model reasoning to increase users’ trust...”

HORIZON-HLTH-2025-01-TOOL-03: Leveraging multimodal data to advance Generative Artificial Intelligence applicability in biomedical research (GenAI4EU)

Research & Innovation Action (RIA), €50M total available, €15M- €17M per project; opens 22/05/25, closes 18/09/25

Expected outcomes: **all** should be addressed; “... Researchers, including clinical researchers, have access to **robust, trustworthy and ethical Generative Artificial Intelligence (AI) models** able to effectively advance biomedical research towards **predictive and personalised medicine...**” “...Researchers, including clinical researchers, know how to **use Generative AI models** to **synthesise the available scientific information and large-scale multimodal data** and how to apply the necessary precautions...” “...Research community benefits from **advanced methodologies** to assess the validity and application of **accurate, transparent, traceable, and explainable Generative AI models...**”

Call Scope (**all** to be addressed): “... **Develop new or re-purpose existing Generative AI models** for biomedical research across various medical fields and/or therapeutic indications ... models should be **robust, based on the use of large-scale, complex, and multimodal high-quality data** (real and/or synthetic data) ...” “...**Develop a proof of concept with at least two use cases** relevant for **predictive and personalised medicine** in different medical fields to demonstrate the **scientific added value** compared to currently used methods and/or **potential future clinical utility of the Generative AI models** in biomedical research...” “...**Develop or revise existing methodologies to assess applicability, limitations, and performance** of the developed and/or repurposed Generative AI models and their added value in biomedical research ... methodologies should demonstrate the **technical, scientific, and potential future clinical utility, robustness and trustworthiness** of the developed or repurposed Generative AI models, including (i) **Appropriate performance metrics...** (ii) **Appropriate metrics for model intelligibility, robustness, alignment with ethical principles and approaches for ethical evaluation** of AI trustworthiness (iii) **Appropriate solutions to identify and mitigate potential bias and confounding of Generative AI models** (iv) **Methods to systematically address and assess ELSI** (Ethical, Legal, and Societal Implications) aspects, including data privacy, risk of discrimination/bias... (v) **Appropriate techniques to discover cause-and-effect relationships and explainability** of the model reasoning in order to **increase users’ trust...**”

Thank you