THE ALLIANCE ARTIFICIAL INTELLIGENCE PROGRAMME

ROADMAP 2024 - 2027

Driving the development and application of trustworthy AI for the benefit of society

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY   WAGENINGEN UNIVERSITY & RESEARCH   Utrecht University   UMC Utrecht

Mission and ambitions

*The Alliance Artificial Intelligence programme supports the realization of
trustworthy and innovative AI for the benefit of society
by making use of multidisciplinary and complementary expertise in the alliance.*

In 2027 the Aritificial Intelligence programme has reached the following milestones:

1) A well-established center of excellence - *the Alliance Artificial Intelligence Hub* - in which the complementary AI expertise areas in the alliance strengthen each other in **unique propositions** and **return on investment** is pursued from national grants and/or co-funding from societal partners.

2) The unique AI propositions are well-integrated in the research agendas and projects of Preventive Health, Circular Society, CUCo and Living Technologies.

3) The Alliance Artificial Intelligence Hub is a **preferred partner of third parties** to be involved with future AI research.

4) The AI-Hub sustains a **vibrant community for researchers** in the alliance and for societal partners.

5) The AI expertise embodied in the alliance is integrated in the **alliance education curriculum.**

Towards a center of excellence: the *Alliance AI-Hub*

All **research**, **education**, **community building** and **collaboration** activities will take place at the *Alliance Artificial Intelligence Hub* (Alliance AI-Hub).
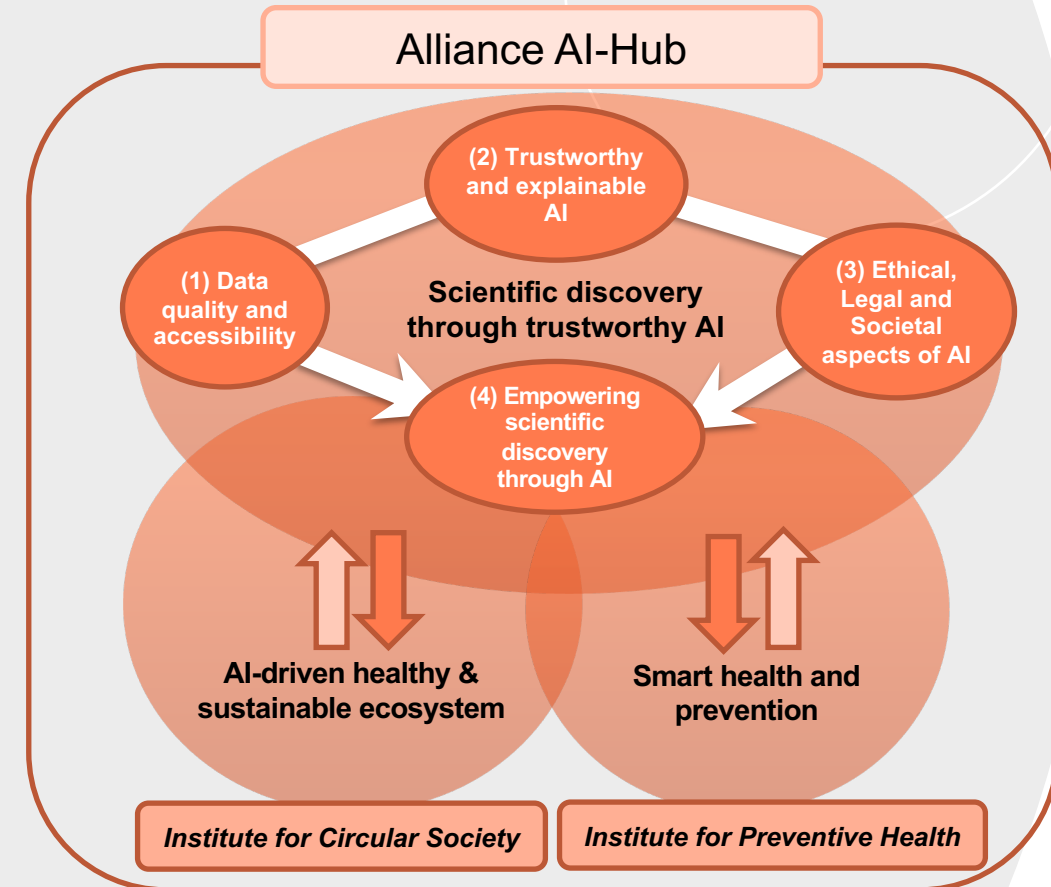
The core research line is AI as enabling technology that revolutionizes the way we do science:

Scientific discovery through trustworthy AI

All four alliance institutes have distinguished expertise in scientific discovery through trustworthy AI. Joining forces and stimulating the interdisciplinary collaboration in the alliance on the development of trustworthy AI will leverage scientific discovery and the application of AI in the societal impact domains. We distinguish two research lines that are closely linked to Preventive Health and Circular Society:

AI-driven healthy and sustainable ecosystem → links to Circular Society
Smart health and prevention → links to Preventive Health

Alliance AI-Hub

(2) Trustworthy and explainable AI

(1) Data quality and accessibility

Scientific discovery through trustworthy AI

(3) Ethical, Legal and Societal aspects of AI

(4) Empowering scientific discovery through AI

AI-driven healthy & sustainable ecosystem

Smart health and prevention

Institute for Circular Society

Institute for Preventive Health

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Research agenda: bridging the gap between "basic research" and applied research

The **core research theme** is AI as key enabling technology that revolutionizes the way we do science: "Scientific discovery through trustworthy AI"; and **two societal impact domains** that connect with Preventive Health and Circular Society

The AI programme aims to stimulate **use-inspired basic research**, as modelled by Pasteur's Quadrant (Stokes, 1997)[1]. This type of research bridges the gap between pure basic research and pure applied research.

Collaboration between all alliance partners is pursued in four aspects within the core research line which can be seen as basic research on **AI building blocks** which form the **preconditions for implementing AI** in the societal impact domains: **(1)** data quality and accessibility, **(2)** trustworthy and explainable AI, **(3)** ethical, legal and societal aspects of AI, **(4)** empowering scientific discovery through AI. See more details about this core research line in **Appendix 1** (slide number 22)
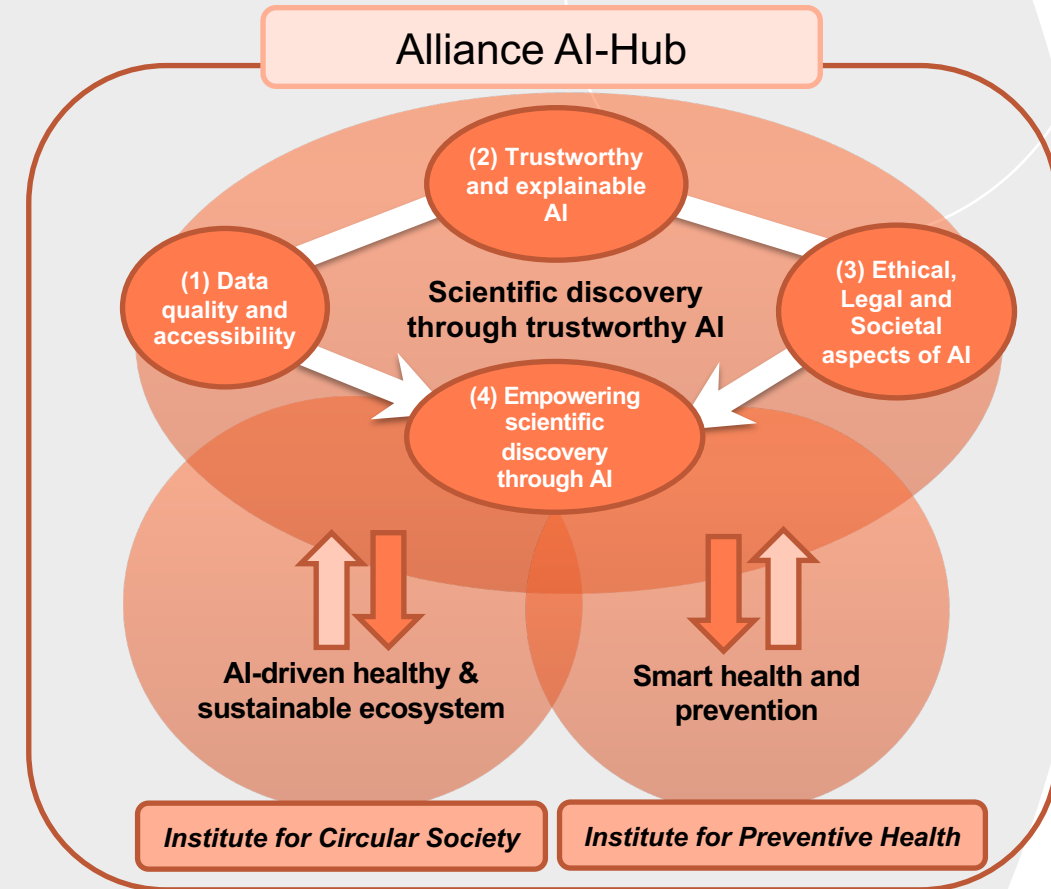
[1.] *Stokes, Donald E. (1997). Pasteur's Quadrant – Basic Science and Technological Innovation. Brookings Institution Press. p. 196.*

Alliance AI-Hub

(2) Trustworthy and explainable AI

(1) Data quality and accessibility

Scientific discovery through trustworthy AI

(3) Ethical, Legal and Societal aspects of AI

(4) Empowering scientific discovery through AI

AI-driven healthy & sustainable ecosystem

Smart health and prevention

Institute for Circular Society

Institute for Preventive Health

Research lines and projects in the AI-Hub, start-up phase in 2023

With the seed money projects from our November 2021 and July 2022 calls (see **Appendix 2**), we have identified themes in which the alliance partners can strengthen each other in the development of **unique propositions in AI development and application**.

Under the core research line **Scientific Discovery through trustworthy AI** there are the following **research projects** starting up:

1) Algorithms for explainable AI (start April 2023)
2) Ethical, Legal and Societal aspects of AI (ELSA lab proposal in preparation for NWO call May 2023, deadline September 2023)
3) Empowering Scientific Discovery through AI (start April 2023)

In the **societal impact domains** there are the following **research projects**:

4) Dissemination of remote patient monitoring and wearables in the context of the "juiste zorg op de juiste plek" (start April 2023)
5) The personalization of medicine by machine learning for image interpretation (start April 2023)
6) Deep learning on multimodal inputs (video, sensors) with use case: individual feeding behaviour from consumption data (start September 2022)

To make the collaboration effective, the alliance AI Programme will help establishing standards for EWUU **Data quality and accessibility**. In collaboration with experts from the Data Competence Centers and Ethical Boards of the alliance, we will develop requirements and guidelines for data property and data sharing as well as recommendations for infrastructure and tools for research collaboration between alliance partners.

Artificial Intelligence research lines in alignment with Preventive Health and Circular Society

	Research lines Preventive Health				Research lines Circular Society	
	Healthy Start	**Preserving Health**	**Living with disease**	**Health @ home**	**Circular safe hospitals**	**Urban-rural circularity**
1. Scientific discovery through trustworthy AI						
Algorithms for explainable AI	▦	▦	▦	▦	▦	▦
Ethical, Legal and Societal aspects of AI	▦	▦	▦	▦	▦	▦
Empowering Scientific Discovery through AI	▦	▦	▦	▦	▦	▦
2. Smart health and prevention						
Dissemination of remote patient monitoring and wearables in the context of the "juiste zorg op de juiste plek"	▦	▦	▦	▦		
The personalization of medicine by machine learning for image interpretation		▦	▦			
Deep learning on multimodal inputs (video, sensors) with use case: individual feeding behaviour from consumption data	▦	▦				
3. AI-driven healthy and sustainable ecosystem *-- to be developed with Circular Society --*					▦	▦

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Milestone 1 A well-established center of excellence - **the Alliance Artificial Intelligence Hub** - in which the complementary AI expertise areas in the alliance strengthen each other in **unique propositions** and **return on investment** is secured from national grants and/or co-funding from societal partners.

Combining interdisciplinary expertise with unique propositions
In 2023-2025 research teams consisting of representatives from each of the alliance institutes will work on the 6 identified research lines of the AI Hub to develop unique propositions and explore collaborations with societal and public partners.

Liaison officers will facilitate the preconditions for AI development by helping establishing standards for EWUU **Data quality and accessibility**.

Return on investment
The teams will develop pilot projects and pursue external funding with the support of liaison officers.
The main strategies will be:

1. Leverage partnerships with existing AI Labs. All PI's of the research lines in the AI-Hub are connected to AI labs within their home institutions.

2. Developing proposal for public funding: In cooperation with i4PH and CS build consortia for public calls in which the AI will have a distinct role as a working package with focus on expandability and trustworthiness. The relevant calls are:

NWO Open Competition Domain Science –XL (pre-proposal September 2023, full proposal June 2024)

NWA-ORC 2023 and NWA-ORC 2024 (Research on Routes by Consortia, to be launched in 2023)

KWF CALL 2024-2 / Development and Implementation (September 2023)

European Research Council Synergy Grant (once per year)

and other calls

Ethical, Legal and Societal aspects of AI: A full alliance team prepares an ELSA lab proposal on trust with the Nederlandse Patientenfederatie as a societal partner" (Q1 – Q2 2023).

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AI-Hub research lines and connections to AI labs in EWUU institutes

Research lines AI Programme		AI Labs in the alliance		
		TU/e	WUR	UU / UMCU
Scientific discovery through trustworthy AI	Data quality and accesibility			
	Trustworthy and explainable AI			DS/AI Methodology
	Empowering scientific discovery through AI	Digital Twin Lab		AI-aided Knowledge Discovery
	Ethical, Legal and Societal aspects of AI	In the proces of creating EWUU ELSA lab		
Smart health and prevention	Dissemination of remote patient monitoring and wearables: "de juiste zorg op de juiste plek"			Healthy Living and Preventive Health
	The personalization of medicine by machine learning for image interpretation	E/MTIC AI-Lab on personalized treatment		DS/AI lab Imaging & Image guided interventions
	Deep learning on multimodal inputs		OnePlanet ICAI-lab for Precision Health, Nutrition and Behavior	
AI-driven healthy and sustainable ecosystem	--- to be developed together with Circular Society ---			AI & Sustainability lab

All PI's of the research lines in the AI-Hub are connected to AI labs or in the process of creating an AI-Lab

Connecting our AI-Hub with AI Labs is one of the strategies for milestone 1 and 3

Strategy for:
- Return on investment
- Sustainable collaboration in the alliance
- Collaboration with public and private partners
- Developing AI solutions for the benefit of society

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Agenda

December 2025

Milestone 1

Evaluation of the hub research projects (agile approach, AI changes fast, dependence on researchers wanting to collaborate) on the extent to which the projects have:

- achieved sustainable collaboration with alliance partners and possibly external partners.
- managed to attract (external) funding.
- an innovative combination of alliance expertise.
- impact in collaboration with Preventive Health, Circular Society and external partners.

New targets will be outlined based on the evaluation, for the period 2026-2027.

Agenda

Milestone 2 The unique AI propositions are well integrated in the research agendas and projects of Preventive Health, Circular Society, Living Technologies and CUCo.

Objectives
Leveraging funds and enabling smart partnerships in *preventive health, circular society, living technologies* and *unusual collaborations.*

Milestone 3 The Alliance Artificial Intelligence Hub is a preferred partner of third parties to be involved with future AI research.

Objectives
Initiate consortia and partnership building with external partners for joint projects and developing proposals.
Connect to existing AI labs.
Become an attractive partner who is regularly invited to join partnerships.

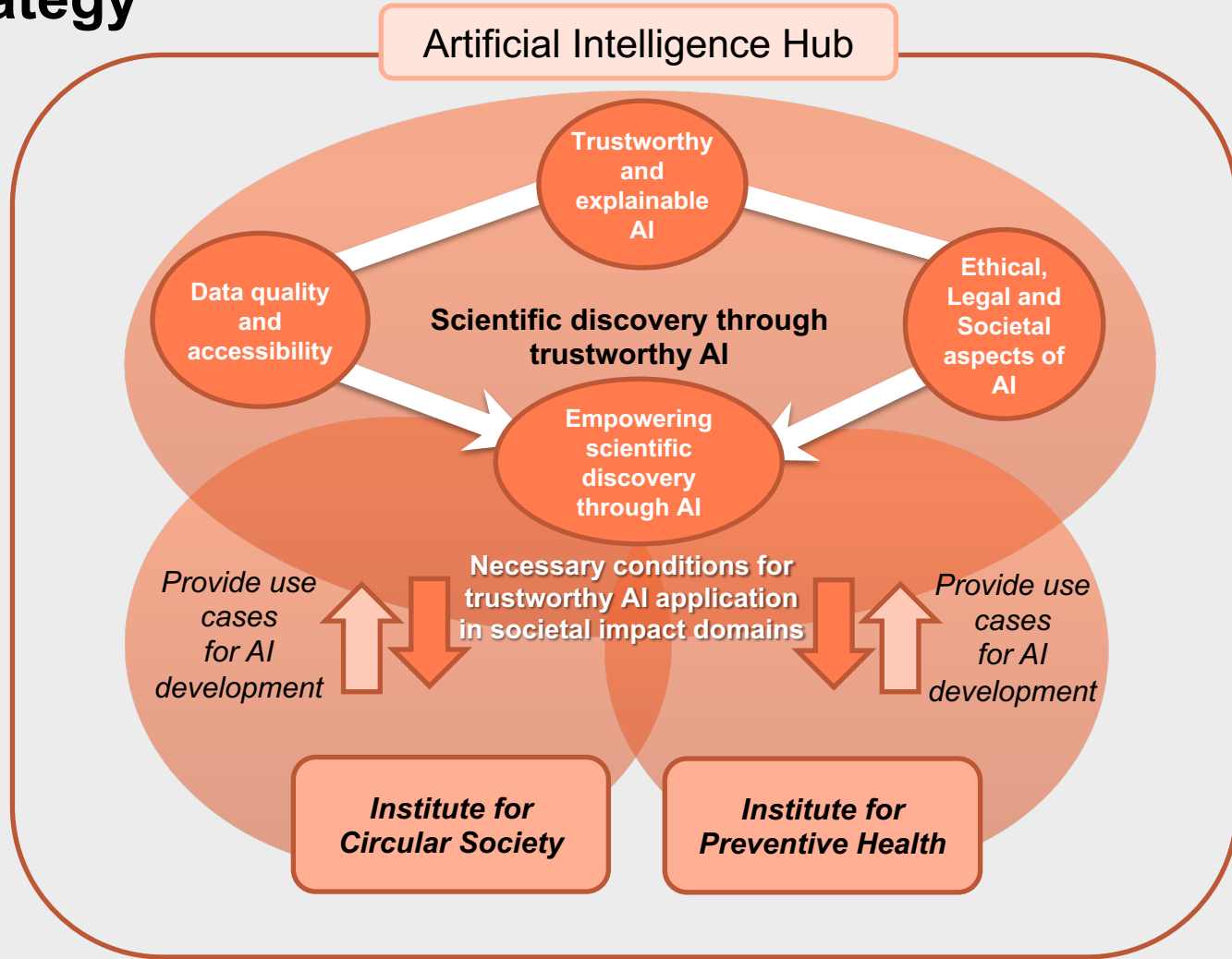**For collaboration strategy see next slide.**

Collaboration strategy

Top-down hub projects (2022 - 2024) in core AI research line and societal impact domains.

Collaboration with Preventive Health, Circular Society top-down projects 2023-2027.

Collaboration with Cuco to promote innovative transdisciplinary collaborations in AI and the societal impact domains.

Collaboration with Living Technologies on the cross-section between LT and AI, where possible.

Artificial Intelligence Hub

Trustworthy and explainable AI

Data quality and accessibility

Scientific discovery through trustworthy AI

Ethical, Legal and Societal aspects of AI

Empowering scientific discovery through AI

Provide use cases for AI development

Necessary conditions for trustworthy AI application in societal impact domains

Provide use cases for AI development

Institute for Circular Society

Institute for Preventive Health

Community building: events and meetings to promote collaboration among scholars.

Coordinate education activities with the working group **Education**.

Collaboration with working groups **Impact, PH, CS**: Creating opportunities for **external partners** to cooperate on the **societal impact domains** and add economic value to the regions of the alliance.

Collaboration with relevant AI Labs of all alliance partners to build public private partnerships.
Utrecht University : AI Sustainability Lab, AI Lab for Healthy living
UMC Utrecht AI Labs
TU/e: EAISI, E/MTIC AI-Lab, Digital Twin lab
WUR: OnePlanet ICAI-lab for Precision Health, Nutrition and Behavior

Communitity building Agenda

Milestone 4
The AI-Hub sustains a **vibrant community for researchers** in the alliance and for societal partners.

Development of methods and approach to sustain and expand Artificial Intelligence (online) community:

- Map motivation of researchers to be part of the EWUU AI for Health community (2024)
- Development of a network & knowledge platform to connect researchers to each other (2023-2024)
- Optimize communication: mailing list, Teams, website (2023-2024)
- Establish strong connections with external partners (ROM, commercial parties) to explore common interests in the AI field (2023-2027).

Team of researchers in the Hub organise activities for research community: lecture series, webinars, masterclasses, etc. (2024-2027).

Education agenda

Milestone 5: The unique propositions of AI expertise in the alliance is integrated in the **alliance education curriculum**.

- Integration of AI courses in alliance master programme(s).
- Identify packages of data science and AI courses that will be offered on the EduXchange platform.
- Development of series of masterclasses for the alliance community (researchers and other working groups).
- Exploring the development of joint summer school course(s).
- Student challenges.
- Exchange students with third partners.
- Continuous exchange of state-of-the-art AI developments between researchers in the alliance AI-Hub and the alliance educational programme.

Agenda

December 2025

Evaluation of achievements in:
- **Milestone 2** The **unique AI propositions** are well **integrated** in the research agendas and projects of Preventive Health, Circular Society, Living Technologies and CUCo.
- **Milestone 3** The Alliance Artificial Intelligence Hub **is a preferred partner** of third parties to be involved with future AI research.
- **Milestone 4** The AI-Hub sustains a **vibrant community for researchers** in the alliance and for societal partners.
- **Milestone 5:** The unique propositions of AI expertise in the alliance is integrated in the **alliance education curriculum**.

The adjustment will be made to the roadmap and plans based on the results of the evaluation.

Overview of contributing research groups and external partners

TU/e
- Eindhoven AI Systems Institute (EAISI)
- Mathematics and Computer Science
- Biomedical Engineering (Medical Image Analysis)
- Industrial Engineering and Innovation Sciences
- Industrial Design
- Electrical Engineering

WUR
- Human Nutrition and Health
- Dept Social Sciences - Filosofie
- Biometris
- Wageningen Data Competence Centre

UU
- Utrecht AI Labs (Healthy Living, Sustainability, Animal Welfare)
- Focus area Applied Data Science
- Focus area Human-centred AI
- Focus area Governing the Digital Society
- Utrecht AI Task Force
- All Utrecht University Faculties

UMC Utrecht
- Julius Center Methodology group
- Digital Health (applied Data Science)
- Computational Imaging for MRI-guided therapy
- Utrecht AI labs

Eindhoven region partners:
- Brainport
- Hightech Campus Eindhoven
- Workplace Vitallity Hub
- iMTEC

Wageningen region partners:
- AI Hub oost-Nederland
- ROM Oost NL
- Food Valley NL, Food Valley Region
- OnePlanet Research

Utrecht region partners:
- AI Hub midden-Nederland
- ROM Utrecht Region
- Utrecht Holdings
- Health-RI Utrecht

Private partners

Private partners

Private partners

Private partners

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Governance, organisation

Advisory Board
Approval of the strategic decisions and budget.

Steering committee
Advice on and approval of scientific and managerial decisions, setting up scientific agenda, contribution to developing strategies and roadmaps.

Programme team

Liaisons and coordinator
2.1 FTE for 4 liaisons and coordinator representing TU/e, WUR, UU and UMCU. Coordinate development of strategic documents, plan and implement scientific and fundraising activities. One of the liaisons functions as coordinator representing the working group at the EWUU meetings.

Communications officer
Maintaining of the AI for Health webpage, social media, promotion of the events.

Supervisory Board

TU/e	WUR	UU	UMC Utrecht

Edwin van den Heuvel

Richard Harrison

Wilco Hazeleger

Gerard Pasterkamp

Steering Committee

TU/e	WUR	UU	UMC Utrecht
Patricia Jaspers	Guido Camps	Peter van der Heijden	Carl Moons
Paul Merkus	Ben Schaap	Remco Veltkamp	Peter Luijten

Programme team

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Utrecht University

UMC Utrecht

Management

Programme team:
- Financial control and accountability
- Developing and implementing the programme, aligning the four institutions toward common goals
- Monitoring national funding opportunities together with RSO's
- Aligning activities with the other working groups of the alliance
- Community building, organising events
- Communications
- Support for researchers, consortium building
- Partnership building

Appendix 1. Core research line: Scientific discovery through trustworthy AI

Data science and AI are **key enablers for scientific discovery** through new technologies that allow for addressing new research questions that cannot be answered by hard-coded programming rules. **AI is not only a tool, but also a research field in its own right**, when developing new insights or algorithms to work with data. However, the intrinsic risk of working with data is misuse, validity concerns or other unwanted effects. The alliance Artificial Intelligence program aims to stimulate research collaboration in the alliance leading to **scientific discovery and societal impact** while maintaining **trustworthiness of AI**.

Data quality and accessibility

Data accessibility, interoperability, machine re-usability

Data curation methods

Multiple imputation methods

Methods to deal with **complex data** (heterogeneous, multi modal) to be able to perform predictive modeling, digital twinning.

Trustworthy and explainable AI

Robustness and performance: Algorithms should be safe and secure, not vulnerable to compromise of the data they are trained on; and also meet the criteria: accuracy, reliability and reproducibility.

Bias and discrimination: algorithms and systems should avoid unfair treatment of individuals.

Interpretability and explainability: algorithmic decision making systems should make decisions that can be understood by their users.

Algorithm Privacy: systems should be trained following data minimization principles as well as adopt privacy-enhancing techniques to mitigate personal or critical data leakage.

Ethical, Legal and Societal aspects of AI

Algorithm Ethics: the need to standardise and operationalise the AI ethics discipline.

Legal framework in algorithmic development and decision-making and the emerging legal status of algorithms (legal entity).

Human-centred AI: the need to understand how algorithms affect humans and how humans interact with AI to be able to develop trustworthy AI.

Empowering scientific discovery through AI

Integrating scientific knowledge in data science and AI systems (e.g. SciML)

Learning from data beyond traditional pattern recognition to identify predictive models, such as probabilistic machine learning, model-based machine learning, causal machine learning, algorithms for multi source multi domain data.