Convergence

TU Delft

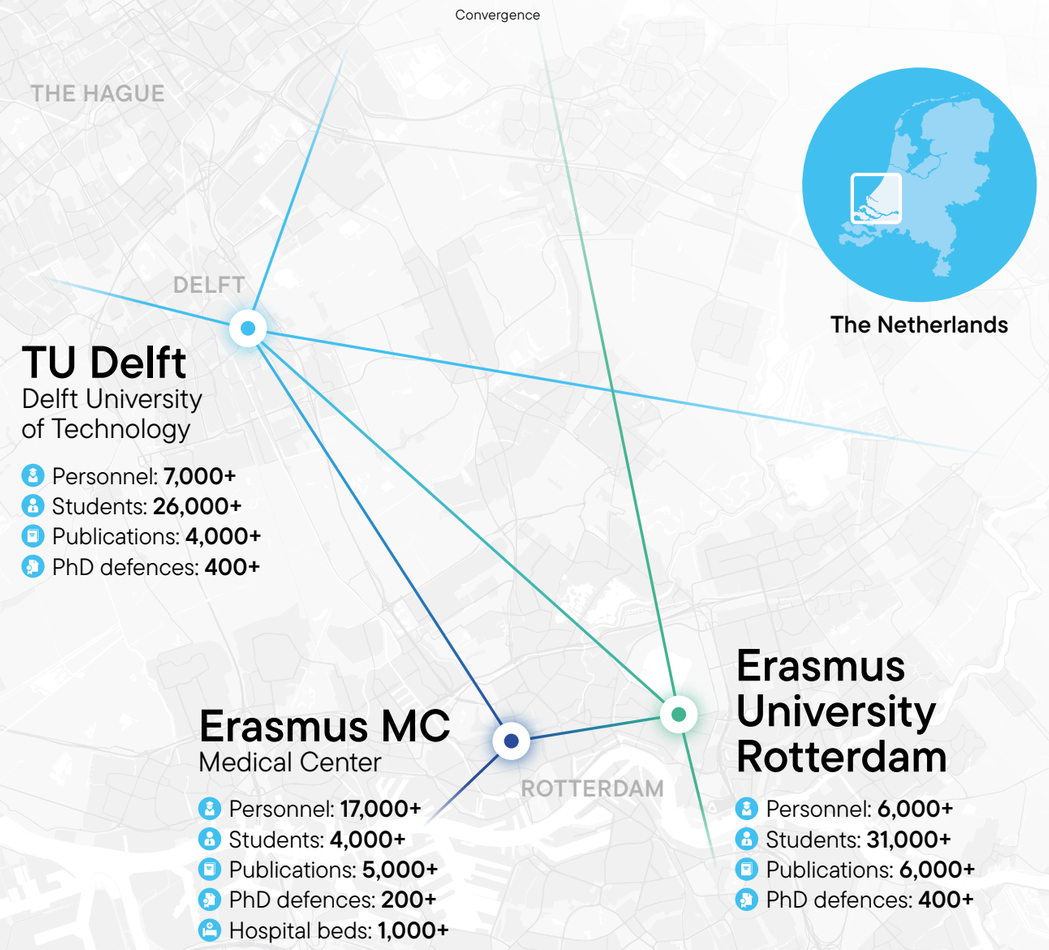
Erasmus MC
University Medical Center Rotterdam

Erasmus University Rotterdam

Unique ecosystem

Delft University of Technology (TU Delft), Erasmus Medical Center (Erasmus MC) and Erasmus University Rotterdam (EUR) have joined forces to converge technical, medical, social and economic sciences, engineering and the humanities. By doing so, we create a unique research and innovation ecosystem with private and public partners in the South Holland region to address complex and urgent societal challenges.

- **3 institutions of excellence**
- **Complementary disciplines**
  Technical, medical, social and economic sciences, engineering and the humanities
- **Shared culture and mentality**
- **Physical proximity** (within 15 km)
- **Region: unique ‘living lab’**



Convergence

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“We believe addressing the urgent societal challenges of our time requires transdisciplinary research and education. We therefore strive for integration of different types of knowledge to drive transformative change.”

Prof. Annelien Bredenoord
President of the Executive Board at
Erasmus University Rotterdam and Member
of the Convergence Executive Board

Our mission: Collaboration for societal impact

In the face of the urgent and complex societal challenges of our time, Delft University of Technology (TU Delft), Erasmus Medical Center (Erasmus MC) and Erasmus University Rotterdam (EUR) have united in the Convergence alliance. Recognising the wicked problems and most urgent societal challenges of our times, Convergence represents a bold departure from traditional monodisciplinary methods, forging new pathways on the intersection of disciplines to address these challenges. This deliberate integration of knowledge and expertise from the medical, technical and social sciences as well as engineering, the humanities and the arts characterises our transdisciplinary approach and transformative forms of knowledge development.

At the heart of Convergence lies a commitment to collaborative research and education, drawing upon the collective strengths, knowledge, and methodologies of its founding institutions. By uniting different disciplines, we address pressing issues, including climate change, sustainability, healthcare, urbanisation, and digitalisation. Such challenges are wicked, complex and multifaceted, demanding inter- and transdisciplinary approaches that transcend conventional boundaries. From the intersection of healthcare and technology to the ethical implications of artificial intelligence, Convergence embodies integration and a holistic approach. Addressing complex public health issues, for example, demands collaboration of epidemiologists, public health experts and sociologists. Similarly, tackling inequalities requires insights from sociology, economics, psychology and data science.

> **By leveraging our shared expertise and geographical proximity, Convergence cultivates a knowledge and innovation ecosystem.**

This alliance is not just about academic excellence; it's about creating positive societal impact. Through five thematic programmes we unite doctors, nurses, researchers and students from different disciplines in a shared mission to create this positive societal impact with a diverse array of partners, from policy makers to entrepreneurs and civil society. By leveraging our shared expertise and geographical proximity, Convergence cultivates a knowledge and innovation ecosystem where new ideas flourish and solutions take root.

> **Through strategic collaborations with industry leaders, government bodies and societal partners, we harness the power of our region as a 'living lab'.**

Through strategic collaborations with industry leaders, government bodies, and societal partners, we harness the power of our region as a 'living lab', testing and implementing solutions to actual societal challenges in real time. Maintaining an open and continuing dialogue with our societal partners, we strive to devise solutions in co-creation with society. By exporting our knowledge and applications to metropolitan areas, deltas, and ports worldwide, Convergence aspires to bring multifaceted innovation to the global stage.

In our alliance, we find not just a convergence of disciplines, but a convergence of purpose—a shared commitment to addressing the most wicked challenges of our time. Join us in this transformative journey as we pioneer a future defined by collaboration, innovation, and positive societal impact. Together, we can make a difference.


Erasmus MC Hoofdingang

Transdisciplinary approach: The added value and relevance

Convergence builds a knowledge ecosystem, characterised by a deep and systematic integration of alpha, beta, gamma, and medical sciences and engineering. Within this context, our academics and students engage in collaborative projects, co-creating alongside external stakeholders. This dynamic exchange cultivates a robust system in which our knowledge, experience and expertise are brought in, brought together, built up, expanded, secured and anchored in an appropriate relationship with societal partners and an ongoing dialogue with society.

Through this continuous interaction, broadening, deepening and converging of different types of scientific and non-scientific knowledge, we aim to establish a transdisciplinary and transformative approach to education and research. Such interaction, however, makes investing in relationships with societal partners and an ongoing dialogue with society necessary as a precondition for joint innovation in a social context with complex issues.

> **Through this continuous interaction, broadening, deepening and converging of different types of scientific and non-scientific knowledge, we aim to establish a transdisciplinary and transformative approach to education and research.**

Major societal challenges are also ‘wicked problems’, characterised by ambiguity and value-laden debates. Dealing with such issues, therefore, requires specialised expertise and innovative approaches. As an alliance we recognise the multifaceted nature of these issues, necessitating a synthesis of system knowledge (what is), target knowledge (what could be), and transformation knowledge (how we realise change). This synthesis spans empirical, normative, and value-based disciplines, as well as non-scientific, experience-based insights and contextual knowledge. As such, our approach is at the intersection of fundamental, applied and mission-driven research.

Our commitment extends beyond theory. We actively support initiatives that operate at the interface of academia and society, fostering co-creation to address societal challenges.

> **We actively support initiatives that operate at the interface of academia and society, fostering co-creation to address societal challenges.**

Through the convergence of disciplinary perspectives and stakeholder engagement, we aim to redefine problem definitions, develop sustainable solutions, and generate new scientific insights.

An integral aspect of our vision on transdisciplinary research and education is the leadership role of integration experts in teams. Such experts alleviate the coordination and integration-demands on ‘disciplinary experts’ and accelerate collaborative learning outside of the scope of disciplinary silos. Convergence thus serves as an incubator for experimentation and innovation in transdisciplinary and transformative approaches to research and education by providing a supportive ecosystem, including dedicated roles that facilitate this process. By providing a supportive ecosystem, we catalyse knowledge creation, drive innovation, and enhance collaboration efficacy.

“With this alliance we transcend institutional and disciplinary boundaries, creating an innovation ecosystem of impactful change.”

Prof. dr. ir. Tim van der Hagen
President of the Board and Rector Magnificus at TU Delft and Member of the Convergence Executive Board

Read more about our transdisciplinary approach

Our approach in practice: Integration experts

At Convergence, we are transforming how research is conducted by developing a new type of academic known as 'integration expert'. Embedded within several academic programmes – such as Resilient Delta (Gluon Researchers) and Healthy Start (Convergence Fellows) - they are essential to our transdisciplinary approach, enhancing the effectiveness and impact of our research initiatives.

Our experience shows that having dedicated integration experts reduces the coordination and integration demands on 'disciplinary experts'. This not only speeds up collaborative learning beyond traditional disciplinary confines but also ensures that research outcomes are essential and applicable to various sectors and stakeholders. Convergence Fellows integrate multiple disciplinary perspectives and actively build bridges between science and society through dedicated stakeholder engagement. The fellows deliver impact-products, such as policy recommendations next to academic papers. Gluon Researchers design, implement and study procedures for collective learning that result in integration reports containing transdisciplinary knowledge agendas. In contrast with traditional quality control by peers, quality control of such 'gluon reports' occurs via serial review of the participants in the procedure.

Employing different kinds of integration experts thus diversifies academic output, improves access to interdisciplinary hypotheses, and creates streamlined research agendas across the gap between science, technology, engineering and medicine on the one hand and social sciences and the humanities on the other.

We are committed to actively facilitating transdisciplinary processes in research, thereby enhancing the effectiveness and societal relevance of our projects. By bridging gaps between disciplines and academic cultures, integration experts make sure our research effectively addresses societal challenges, maximising real-world impact.

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> “Transformative education and research require academics, who in various (non-)academic contexts, are capable of developing methods, knowledge and expertise on how to incorporate this diversity into research and education.”

Prof. dr. Liesbeth Noordegraaf-Eelens
Professor of Transformative Academic Education at the Erasmus School of Philosophy, Erasmus University Rotterdam


Convergence
TU Delft
Erasmus MC
Erasmus University Rotterdam

Inspired by our vision, we have developed five collaborative programmes, each dedicated to tackling specific pressing societal issues. Researchers and students across all three institutions are actively engaged in these programmes, collaborating with societal partners to explore innovative transdisciplinary approaches, gain valuable insights, and implement effective solutions.

Resilient Delta

Designing resilience solutions in the real-world dynamics of our living lab, the Dutch delta

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Resilient Delta

Designing resilience solutions in the real-world dynamics of our living lab, the Dutch delta

Mission & vision

Resilient Delta is committed to crafting resilient solutions within the Dutch delta with national and global applicability. Our mission is to design integrated strategies to address complex societal challenges such as rising sea levels, poverty, inequality, air pollution, population density, and technological shifts.

Recognising the urgency of these pressing issues, we aim to lead in solution development by combining the complementary expertise of three leading educational institutions in Rotterdam and Delft. The convergence of diverse streams of knowledge accelerates the development of long-term resilience strategies.

Through interdisciplinary research and collaborative co-creation, we create practical and scalable solutions that encompass policies, technologies, business models, and methodologies. These solutions are specifically tailored to address real-world challenges in urban delta regions. Operating from co-creation hubs in Rotterdam and Delft, we engage with leaders from both the private and public sectors to conduct research, develop solutions, and foster educational programmes that prepare future professionals. By strengthening the resilience of the Dutch delta, we also contribute to the economic potential of the Netherlands.

> “We strive for solutions to global challenges in urban deltas.”

Hans de Voogd
Programme Director
Resilient Delta

How researchers can help municipalities build future proof neighbourhoods: Transforming the Maasterras into a high-quality living environment

The Dutch government has set an ambitious target of constructing one million new homes over the next decade. However, this endeavor faces significant challenges, including tight timelines and the crucial need to consider climate adaptation and other transitions – all of which compete for space. To meet housing demands, the City of Dordrecht will transform the Maasterras, an unbanked waterfront into a high-quality living environment. The Resilient Delta Initiative has partnered with the City of Dordrecht and Mecanoo Architects to explore the potential for the Maasterras to serve as a self-sufficient shelter during extreme flooding events.

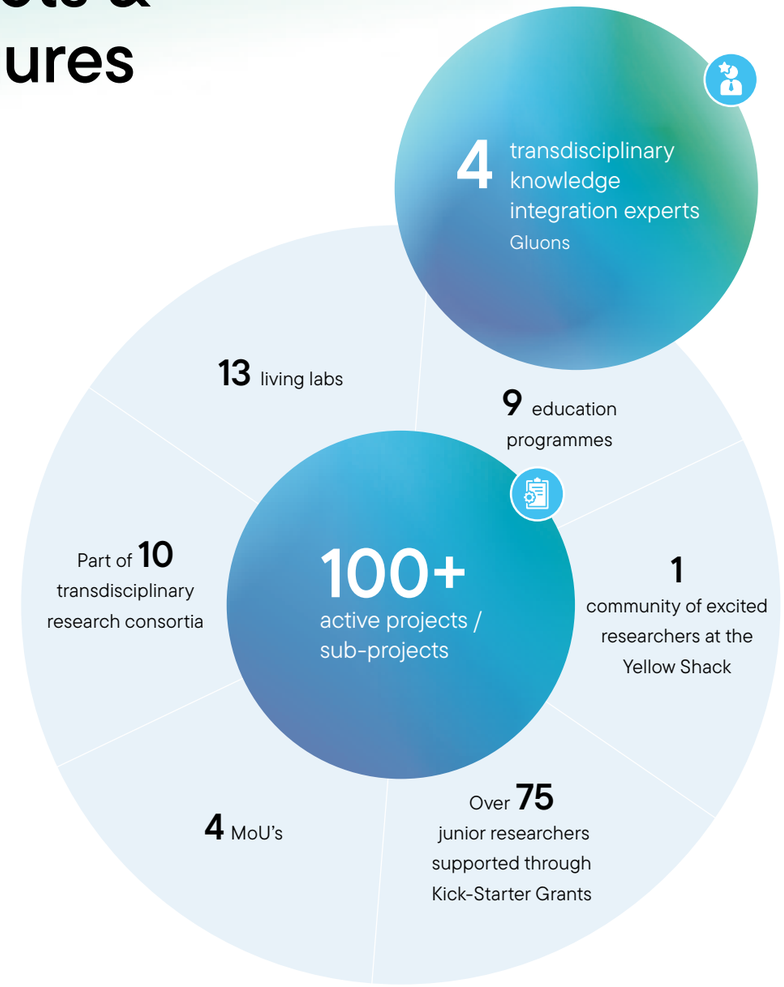
While municipalities often collaborate with architects and planners on redevelopment projects, the inclusion of a diverse range of academic expertise in this initiative is noteworthy. Zac Taylor, Resilient Delta Theme Lead Delta Systems, highlights the rare opportunity provided by the invitation from the City of Dordrecht, “It allowed us to experiment and actively test the collaboration between science and practice in a short-term, action-oriented environment. Dordrecht and Mecanoo willingly embraced the challenge and rolled up their sleeves with us.”

For Berry Gersonius, advisor for the Green Blue City at the City of Dordrecht, the project represents a significant opportunity: “Our collaboration with Resilient Delta helped to secure the buy-in from the project team and steering group of the Maasterras. It helped to show that water can be a strong lever for smart area development – not just another addition to a long wish-list of ambitions. With this buy-in, we are able to carry the flood shelter concept into the next stages of the development.”

Taylor echoes this sentiment, emphasising the importance of the buy-in generated throughout the process: “We have a university brimming with scientific innovations and a world seeking solutions. Bridging that gap and identifying the sweet spot adds a fascinating dimension to this project. The insights we gained on the Maasterras project will help us to refine our methodological toolkit for taking on similar puzzles in the future.”

Read more about this and other Resilient Delta projects

Facts & figures



Partners involved in RDI-supported projects include:

Deltares • Dutch Association of Insurers • Municipality of Rotterdam • Municipal Health Service • Rotterdam University of Applied Sciences • Ministry of Economic Affairs and Climate Policy • Nationaal Programma Rotterdam Zuid • PBL Netherlands Environmental Assessment Agency • Port of Rotterdam • Province of South Holland • Rotterdam Ahoy • Smart Port • Safety Region Rotterdam Rijnmond • Veldacademie • KWP Stedelijke arbeidsmarkt • GovernEUR • WeerWoord • Ruisdael • Rotterdam Makers District • Port of Ghent • Port of Athens • Topsector Logistiek • Clingendael International Energy Program • Shipping Transport College • Maritime Museum • De Werkshop • Delta Alliance • Vereniging Delta Metrapool • Bauhaus • Seas-at-Risk • Verhalenhuis Belvedere • RIVM • Platform Zero • ABN AMRO • Accez • Achmea • Blue21 • Bouwinvest • BPD • De Facto • De Nederlandsche Bank • Delta Program • Deltametropolis Association • Dutch Green Building Council • Fakton • Gemeente Den Haag • Gemeente Dordrecht • Gemeente Zuidplas • HKV • Hogeschool Rotterdam • ING • KIN • Ministerie BZK • Ministerie I&W • Ministerie LNV • Ministerie FIN • Nederlandse Vereniging van Banken • Nederlandse Waterschapsbank • NextGreen • NHG • NWO • One Architecture • PBL • PGGM • Platform 31 • PWC • Rabobank • Rebel • Rijkswaterstaat • RLI • Royal Haskoning DHV • RVO • Samen Klimaatbestendig • Stimuleringsfonds Volkshuisvesting • Unie van Waterschappen • Sustainable Finance Platform • Verening Deltametropool • Waag Futurelab

www.convergence.nl/resilient-delta

For more information, please contact:
resilientdelta@convergence.nl


Scenario-making
Citizen Voice
Biodiversity
Design guidelines
Map-based prototypes
Soundscapes
Redeveloped harbor areas
Social cohesion
Social cohesion
Participatory research
Joint collaboration
Transdisciplinary research
Urban resilience
Design innovation
Mission-driven initiatives
New Outlooks In Sonic Environmental
GENERATION DELTA
CONFERENCE
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Health & Technology

Shaping the future of health and healthcare

Mission & vision: Rethinking the healthcare systems

The current state of healthcare systems globally faces numerous challenges, from accessibility and affordability to efficacy and sustainability. In light of these challenges, there's an urgent need for a comprehensive re-evaluation of healthcare paradigms. As Convergence Health & Technology, we propose a visionary approach that integrates medical, engineering and social sciences to foster lifelong health improvement for all individuals.

We are on a mission to create a sustainable healthcare ecosystem where our cutting-edge technologies are seamlessly integrated with personalised health interventions to empower individuals in managing and optimising their health throughout their lifespan in the living and working environment. By leveraging advancements in digital health, artificial intelligence, telemedicine, and wearable devices, we aim to democratise access to quality healthcare, promote preventive care, and facilitate early intervention, ultimately leading to improved health outcomes and enhanced quality of life for all.

In re-thinking healthcare systems on meso, macro and micro level through the lens of health and technology, we have the opportunity to revolutionise the way healthcare is delivered, experienced, and perceived. By embracing this vision and pursuing collaborative efforts, we can overcome existing barriers, promote equity in healthcare access, and empower individuals to lead healthier, more fulfilling lives. Let us embark on this journey towards universal lifelong health enhancement together.

“Health & Technology are converging to create extraordinary solutions. Our ecosystem is not just tackling challenges; it’s redefining the future.”

Prof. dr. Stefan Sleijfer
Chairman of the Executive Board and
Dean of the Faculty of Medicine and Health
Siences at Erasmus MC and Member of the
Convergence Executive Board

Health & Technology

We are facilitating the **development, adoption** and **implementation** of technology to promote health by making care more **effective, efficient, inclusive** and **sustainable**

90+
Health & Technology Convergence programmes

1200+
Involved scientists

150+
External partners

Leads of all three institutes

Our aims

Keeping the population healthy for as long as possible using innovative technology
Reducing the impact of hospital care on our living environment
Keeping care sustainable in the long run

Impulse Programme

17 programs — 72

- **60+** publications in renowned peer-reviewed journals
- **19+ mln** additional grants collected
- **Prototypes development** such as stability backpack
- **Collaborations** with several international universities, such as Oxford
- Clinical trial developed, and transferred to **patient study**

Open Mind

27 projects selected — 180

Short span projects, aimed at early & mid-career researchers

125 proposals submitted

Working proto-type **exoskelet** ‘Cloudwalker’ developed

Prototype Brain Self Portrait launched

OR Triage dashboard launched

Flagship Programmes

10 top-level research programmes — 300+

- **130 publications** in renowned peer-reviewed journals
- **70+** Scientific staff hired for transdisciplinary positions
- Durationof 5 years, financed by Convergence Fund
- **12+ mln** matching grants collected

‘Consultation room of the future’
Use of innovative techniques, including AI, to keep people out of the hospital for as long as possible.

Organ Transplantation
‘Making unsuitable organs suitable

‘Realtime monitoring’
Development of real-time wireless sensors to monitor health effects of climate change and pollution

Sustainable Health Programmes

3 programs — 42

Initiated by Erasmus MC, implemented by Convergence Health & Technology

Start: November 2023

- Technological innovations for nurses
- SMART Operation Room 2030
- Zero Emission Endoscopy

H&T Consortia

26 active research consortia — 726

Varying from research on metastasis and self-sufficiency of the elderly to VR solutions for mental symptoms and development of AI for the ICU.

Development Organ-on-a-chip facility

2 patents filed within Theranostics

Opening Virtual Reality Lab

TU Delft · Erasmus MC · Erasmus University Rotterdam

Healthy Joints: Pioneering a comprehensive approach to combat ostheoarthritis

Osteoarthritis (OA) is a leading cause of pain and disability, impacting half a billion people worldwide, with older adults and women being the most affected. As life expectancies rise and sedentary lifestyles become more common, the prevalence of OA is expected to increase. Currently, joint replacement is the ultimate solution, but we believe we can do better.

‘Healthy Joints’ is a groundbreaking initiative that embodies the spirit of interdisciplinary collaboration. Recognising that joint health is essential for an active, fulfilling life, this project aims to revolutionise how we approach osteoarthritis. By combining insights from biology, medicine, engineering, and psychology, ‘Healthy Joints’ tackles OA from every conceivable angle.

Understanding ostheoarthritis: A multifaceted challenge

Despite its prevalence, the root causes of OA are still poorly understood. The disease involves a complex interplay of factors leading to the degradation of joint integrity, especially cartilage. ‘Healthy Joints’ is determined to change this by employing a comprehensive strategy to address OA’s multifaceted nature.

Innovations spearheaded by Healthy Joints

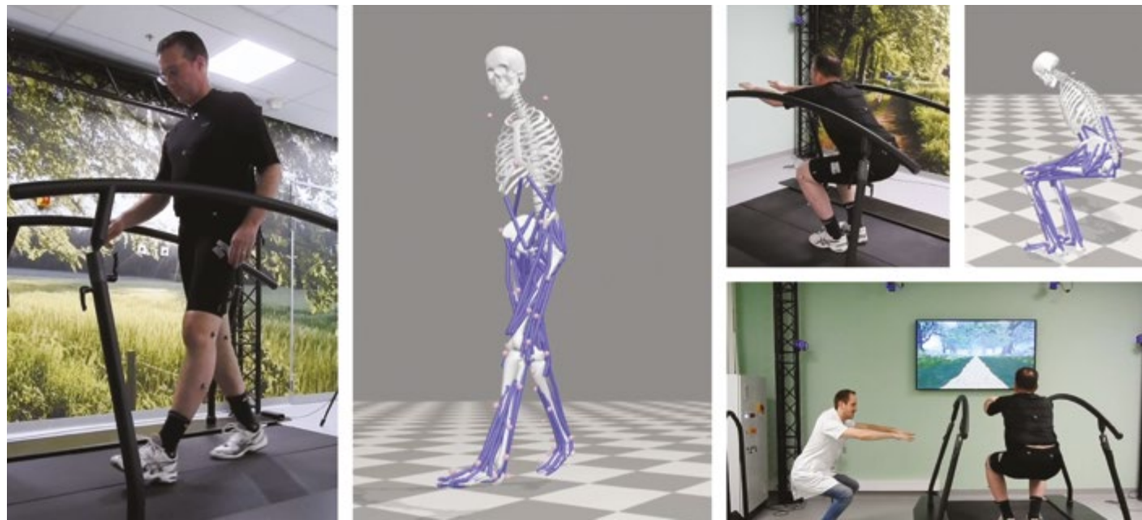
- Cellular models and joint-on-a-chip: By creating cellular models for different joint tissues, we aim to uncover the personal drivers of OA. Our innovative ‘joint-on-a-chip’ technology allows for testing interventions at the cellular level.
- Advanced diagnostics: Utilising cutting-edge imaging techniques and computational biomechanics, we aim to enhance the early detection of OA, paving the way for targeted therapies.
- Machine learning: Leveraging this technology to improve the early recognition of joint tissue changes and identify patterns specific to each individual.
- Computational models for joint health: Developing personalised models to predict healthy joint growth and assess risks in individuals prone to early-stage OA, enabling the testing of new, precise preventive measures and interventions.
- Preventive and early stage interventions: By combining early diagnostics with insights into behaviour and patient preferences, ‘Healthy Joints’ is exploring preventive treatments to halt the disease’s progression.

The vision for the future

The ultimate goal of ‘Healthy Joints’ is to prevent osteoarthritis wherever possible or diagnose it early and accurately to enable personalised treatments. Our ambitious approach aims to extend a good quality of life by at least five years for those affected by OA.

Read more about this and other Health & Technology projects

As part of the programme a unique laboratory is being realised by merging imaging diagnostics and movement biomechanics to precisely diagnose the pathomechanics of joint load in an individual.



Facts & figures

Over **70** hired postdocs and PhDs are driving societal impact through their ground-breaking research within our flagship initiatives

Our **90+** ongoing transdisciplinary projects and programmes are driving innovative solutions to complex societal challenges

A network of over **1200** scientists actively engaged

Our transdisciplinary PI's, representing all three institutes, are driving collaborative efforts to address pressing global issues

Development underway for the inaugural Convergence Health & Technology Research Master

Since the launch of the Flagship Programmes our research has been featured in over **130** renowned peer-reviewed journals, including Nature and The Lancet, demonstrating a significant impact on the field

150+ external partners

Partners

Sanofi Genzyme • Themis • Organ Assist • Fluidigm • Janssen • MSD • Seaweed Harvest Holland • Medtronic • InnoSer • Biolegio • Inserm • Hankamp Rehab • Amphera • Medical Meals • Elfi-Tech • Harbour BioMed • Frame Cancer Therapeutics • SGF • Quantib • Merus • Philips Healthcare • myTomorrows • BiOrion • SkylineDx • TiGenix • Fujirebio • 2M Engineering • Sulfateq • Everix • Methylomics • Optics11 Life • Pfizer • ISA Pharmaceuticals • Erytech • Ncardia • Siemens • Gilead • Kyowa Kirin • General Electric • Stryker • Thirona • PAN-Biotech • ibidi • Harbour Antibodies • GSK • NOvaCair • Galapagos • Bayer • Johnson & Johnson • Univé • ONVZ • Menzis • CZ • Zilveren Kruis • Microsoft • KPN • DSW • AstraZeneca • Zorg en Zekerheid • Philips • National Health Care Institute • Arts en Auto • Achmea • Federatie Medisch Specialisten • Rabobank • Municipality of Rotterdam • Dutch Hospital Association • BaseClear • Medtronic • Barco • CAScination • 2-BBB • CHDR • Astellas • BD • Enraf Nonius • RiverD • Novo Nordisk • Sunrise Medical • BlueBee • Ascom • Castor • Siemens Healthineers • Viroclinics • Micronit • TNO • Demcon • Municipality of Delft • BodyCap • Somnox • Hittech • Besi • VDL ETG • Motek Medical • NewCompliance • imec • DSM • OLVG • 3M • Simendo • CleVR • TMSi • Fleming Medical • Comarch • Boston Scientific • Abbott • ABB • Almende

www.convergence.nl/health-technology

www.linkedin.com/company/convergence-health-technology

For more information, please contact:
healthandtechnology@convergence.nl


Ethics
and the PDPC
LAVAZZA

AI, Data & Digitalisation

Innovating together: AI for positive impact

Mission & vision

The digital transformation is irreversible, rapid, and has undergone significant changes over the past decade. Digitalisation offers vast opportunities as well as significant challenges, and there is currently a global race for leadership in this field. Focusing on AI research and solutions for socio-economic, security and sustainability problems are essential for the Netherlands. The mission of the AI, Data & Digitalisation programme is to be a continuously strong and prominent knowledge cluster with significant social impact, contributing to real solutions and applications of AI for the complex and current challenges facing society. By collaborating across different disciplines, we can take huge strides together. In Convergence AI, Data & Digitalisation, we are preparing for the development of research agendas and the resulting financing opportunities, enabling steps to be taken to address major regional, national, and international social challenges.

> “Academic and societal impact in and with AI asks for a convergence of scientific disciplines and their valorisation activities. By joining forces in Convergence AIDD, for example on AI for Port & Maritime or Responsible AI in Healthcare, we help our scientific talents to create more impact.”

Prof. dr. ir. Geert-Jan Houben
Pro-Vice Rector AI, Data & Digitalisation at TU Delft and Academic Lead Convergence AI, Data & Digitalisation

AI for Energy & Sustainability

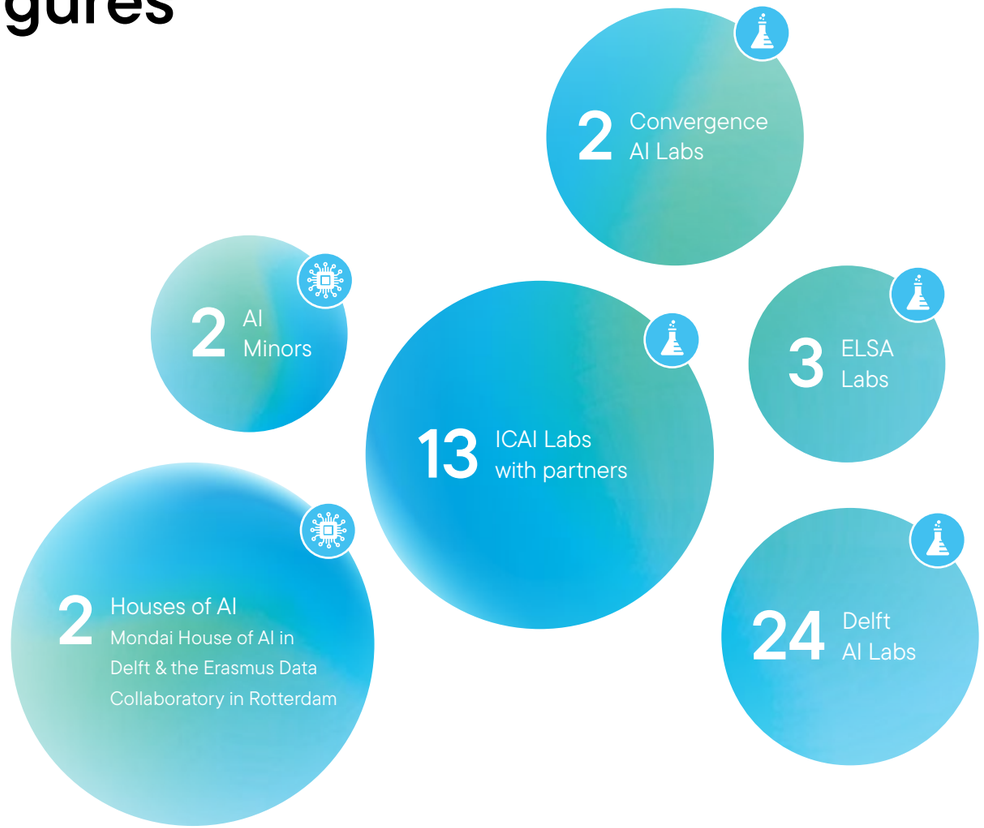
Interdisciplinary AI research in Delft and Rotterdam is supported by the Center for Energy Systems Intelligence, initiated within the AI, Data & Digitalisation programme in Convergence. Professors Mathijs de Weerdt (TU Delft) and Yashar Ghiassi-Farrokhfal (Erasmus University Rotterdam) lead the collaboration, aiming to solve energy transition challenges with AI.

“Our energy system is like an ecosystem,” says Ghiassi-Farrokhfal. “It consists of countless jigsaw pieces and all the interactions between them: energy companies, solar panels, consumers, governments, and so on. If you want to move forward, you need all the pieces. Artificial intelligence enables us to test and optimise decisions with vast amounts of data in this complex system.” De Weerdt adds: “Smart grid is the buzzword, but we still have a dumb network. Smart planning is necessary so that power stations can adjust their production based on the weather forecast and adapt to the supply of solar and wind energy, for example. You should charge electric cars at times when the other usage is low. AI is essential here.”

One of the first projects in the Center for Energy Systems Intelligence was the pilot launch of the data and AI-algorithms sharing platform EnergySHR. The platform aims to match the supply and demand of data and algorithms relevant for research, collaboration, and innovation supporting the energy transition. It will enable data scientists, data consumers, and data providers such as grid operators, local governments, energy service providers, and energy companies to share, collaborate, and commercialise their data services. EnergySHR facilitates this in a secure and privacy-friendly manner, ensuring that data owners retain full control over their data.

Read more about this and other AI, Data & Digitalisation projects

Facts & figures



Partners

Booking.com • DSM • ING • Philips • SAS • Alliander • KickstartAI • Ahold Delhaize • National Police • NS • ProRail • JetBrains • General Electric • AI Hub Zuid-Holland • Digitalzh • NLAIC • AiNed • Province of South Holland • Economic Board Zuid-Holland • Municipality of Rotterdam • Municipality of The Hague • Port of Rotterdam • Port of Moerdijk • SmartPort • PowerWeb Institute • MarktEffect • Hogeschool Rotterdam • Haagse Hogeschool • FME • World Health Organization • Universiteit Leiden • Leids Universitair Medisch Centrum • Delft Digital Ethics Centre • De Nederlandse Bank • AFM • Dutch Blockchain Coalition • Mondai House of AI • Erasmus Data Collaboratory • ECDA • ICAI

www.convergence.nl/ai-data-digitalisation

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Pandemic & Disaster Preparedness Center

Can we be better prepared to face pandemics and disasters that threaten our health and society?

Mission & vision

To prepare society for future pandemics and disasters, founding partners TU Delft, Erasmus MC and Erasmus University Rotterdam have joined forces in the Pandemic and Disaster Preparedness Center. This initiative aims to reduce vulnerabilities and risks and build resilience through effective disaster prevention, preparedness, and recovery measures.

We are committed to:

- Conducting top-level interdisciplinary research on pandemics and disasters.
- Establishing science-based methods, techniques, and innovation paths relevant to preparing for pandemics and disasters.
- Training the next generation of scientists and experts in fundamental and translational research on pandemics and disaster preparedness.
- Developing prevention and intervention measures and translating them into improved pandemic and disaster preparedness, response, and recovery.
- Co-creating, collecting, and sharing knowledge on disasters and pandemics.

The COVID crisis painfully demonstrated the vulnerability of our society to disasters. Climate change and globalisation have heightened the risk of unforeseen virus outbreaks and extreme events. Densely populated areas and urban deltas are particularly susceptible to disruptive events such as rising sea levels and extreme weather.

To prepare for future pandemics and disasters, we must build, test, and implement innovative models that combine knowledge and field data from various sources and scientific disciplines. These models will enable us to characterise and predict ecosystem resilience and vulnerability to outbreaks. Convergence of technical, medical, and social sciences is crucial to developing the next generation of approaches and creating a resilient society.

Using the Rotterdam urban delta as our case study, we aim to develop preparedness measures that can be implemented internationally.

“We’ve now all experienced what dealing with a real pandemic is like and how important preparedness is. What threats and disasters do we face, how do we detect them, and how do we prepare for the consequences in an interdisciplinary way?”

Prof. Marion Koopmans
Head of the Erasmus MC department of viroscience and Scientific Director of the Pandemic and Disaster Preparedness Center

Frontrunner project: Climate change and vectorborne virus outbreaks

The Frontrunner Climate Change and Vectorborne Virus Outbreaks Project is centered around understanding the intricate relationships between climate change, landscape management, and the ecology of mosquitoes, birds, and viruses within the Rotterdam urban delta in the Netherlands. With rising temperatures, altered precipitation patterns, and increased extreme weather events, coupled with changing landscapes due to factors like salinisation from sea-level rise, there's a pressing need to comprehend how these dynamics impact disease transmission.

Researchers within the project will develop scenarios to simulate and predict mosquito habitats in response to changing landscapes, considering factors such as salinisation and alterations in climate patterns. By studying the effects of salinisation and climate on key mosquito species, they aim to uncover how these environmental changes influence the transmission of viruses. Additionally, the project will explore the relationship between water management practices and the distribution of bird species, assessing their potential role in virus transmission to urban areas.

This project is vital in addressing the increasing vulnerability of Rotterdam's urban delta to exotic infectious diseases, exacerbated by climate change-induced salinisation. The findings will be instrumental in informing the development of effective mitigation measures, including nature-based solutions and infrastructure improvements, to reduce the risk of disease outbreaks in urban deltas.

The ultimate goal is to understand how these environmental shifts affect disease risk, integrating expertise from various disciplines such as climate modeling, ecology, virology, and public health. Through collaborative efforts across different working packages, the project seeks to generate insights that inform mitigation strategies, ranging from nature-based solutions to infrastructural interventions, to address the anticipated increase in disease risks within the Rotterdam urban delta. Through this interdisciplinary approach, the project aims to generate comprehensive insights that can guide future strategies for managing disease risks associated with climate change in urban deltas.

Read more about this and other Pandemic & Disaster Preparedness Center projects

Facts & figures

110 researchers connected to the PDPC network

Partners **31**

Founded: May **2021**

5 frontrunner projects with the scientific generation of tomorrow

1. Climate change and vectorborne virus outbreaks
2. Predicting, measuring and quantifying airborne virus transmission
3. Pandemic lessons for flood disaster preparedness
4. Towards social and urban resilience
5. Integrated early-warning surveillance methods and tools

PDPC Academy

5 translational research projects developed

3 reports produced and an extensive scientific research education programme offered

Partners

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www.convergence.nl/pandemic-disaster-preparedness-center

For more information, please contact:

pdpc@erasmusmc.nl

Healthy Start

Improving the future for new generations

Mission & vision

We are confronted with a pressing societal challenge: thousands of children have an unfavorable position from the earliest stages of life, hindering their ability to achieve their full developmental potential. This has significant implications for their health, well-being, and social engagement. These disparities are exacerbated during times of crisis. Our mission is to optimise developmental opportunities for all children and adolescents, regardless of their backgrounds and starting points. In collaboration with our societal partners, we strive to create inclusive opportunities for diverse youth to become active and contributing members of society.

We believe that integrating medical, social, and technical sciences, along with knowledge from and application in practice, will yield groundbreaking solutions for the complex societal challenges facing youth, from conception to young adulthood.

Early-life development is influenced by many factors, including geographical, social, lifestyle, and stress-related exposures. Therefore, an interdisciplinary approach and convergence of medical, social, and technical sciences are essential. The Rotterdam-Delft region serves as an ideal living laboratory for Healthy Start due to its diverse and engaged young populations, research-oriented city councils, and robust research community. Through collaboration with TU Delft, Erasmus MC, Erasmus University Rotterdam, and a wide array of societal partners, we aim to improve the future for new generations.

Our goal is to create both scientific and societal impact, with a focus on prevention and intervention, to improve the physical, mental, and social health of children and adolescents.

> “With the establishment of Healthy Start, it is possible for the first time to conduct large-scale research into the positive development that young people go through.”

Prof. dr. Eveline Crone
Professor of Developmental Neuroscience in Society at Erasmus University Rotterdam and Academic Lead Healthy Start

Improving mental health and resilience of children and adolescents

In recent years, the mental wellbeing of young people has declined significantly. Today's youth face a myriad of global challenges, from climate change to social inequality and performance pressures. The Healthy Start ambition 'Mental Wellbeing of Youth' is dedicated to finding solutions for this trend by combining scientific insights with the expertise of societal partners and the lived experiences of young people.

School-based prevention and promotion efforts have shown promise in reducing emotional distress among students. However, understanding the specific ingredients that make these interventions effective, and determining what works best for different individuals, requires further research. We aim to bridge this knowledge gap by fostering consensus among researchers, stakeholders, and policymakers on optimising mental health strategies. Our research also delves into additional factors that can strengthen and give purpose to young people's lives, such as the impact of phone bans in schools and the protective influence of role models. Our transdisciplinary approach integrates the experiences of young people with the expertise of stakeholders like teachers and policymakers. This collaboration is crucial for contextualising our research on mental wellbeing and ensuring that our findings effectively address the unique needs and challenges faced by today's youth. We maintain close partnerships with leading societal organisations such as the Netherlands Youth Institute, MIND Us, Kindertelefoon, and the Trimbos Institute. These partners provide invaluable insights and have extensive experience in engaging with young people about their mental health. By working hand-in-hand with young people and societal partners, we strive to develop innovative, widely-supported solutions for promoting mental wellbeing.

Read more about this and other Heathy Start Ambition-projects

Facts & figures

15 transdisciplinary PhDs, fellows and nurses

50+ transdisciplinary projects in science & education

Founded: **2021**

18 scientific leads

30+ engaged partners

Our ambition projects

- The first 1000 days and a resilient life course
- Pediatric hospital of the future
- Digital empowerment of children's physical activity
- Mental well-being of youth
- Tackling juvenile delinquency and addiction
- Youth participation and involvement

74 engaged researchers

Partners

Municipality of Rotterdam • Municipality of Delft • the Netherlands Youth Institute • Nederlands Centrum Jeugdgezondheid • Netherlands Ombudsman for Children • GGD • Jong JGZ • Trimbos Instituut • Rotterdam University of Applied Sciences • University Medical Center Utrecht • KU Leuven • PPP Kansrijke Start • You!nG • De Nieuwe Kans • Bernard van Leer Foundation • Teladoc Health • Amphia Hospital • Hartekind • Nell • MIND Us • Kindertelefoon • RoboHouse • BambiBelt • Rijndam Rehabilitation Centre • Corsano Health • Reinier de Graaf Hospital • HoloMoves • Corsano Health • Hexoskin • So Fit & Fun Centrum • Parnassia Groep

www.convergence.nl/healthy-start

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Join us in our mission to converge knowledge, tackle challenges, and create lasting impact. Together, we can make a difference.

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