6G IoT: Sustainability, Intelligence & Security at Scale

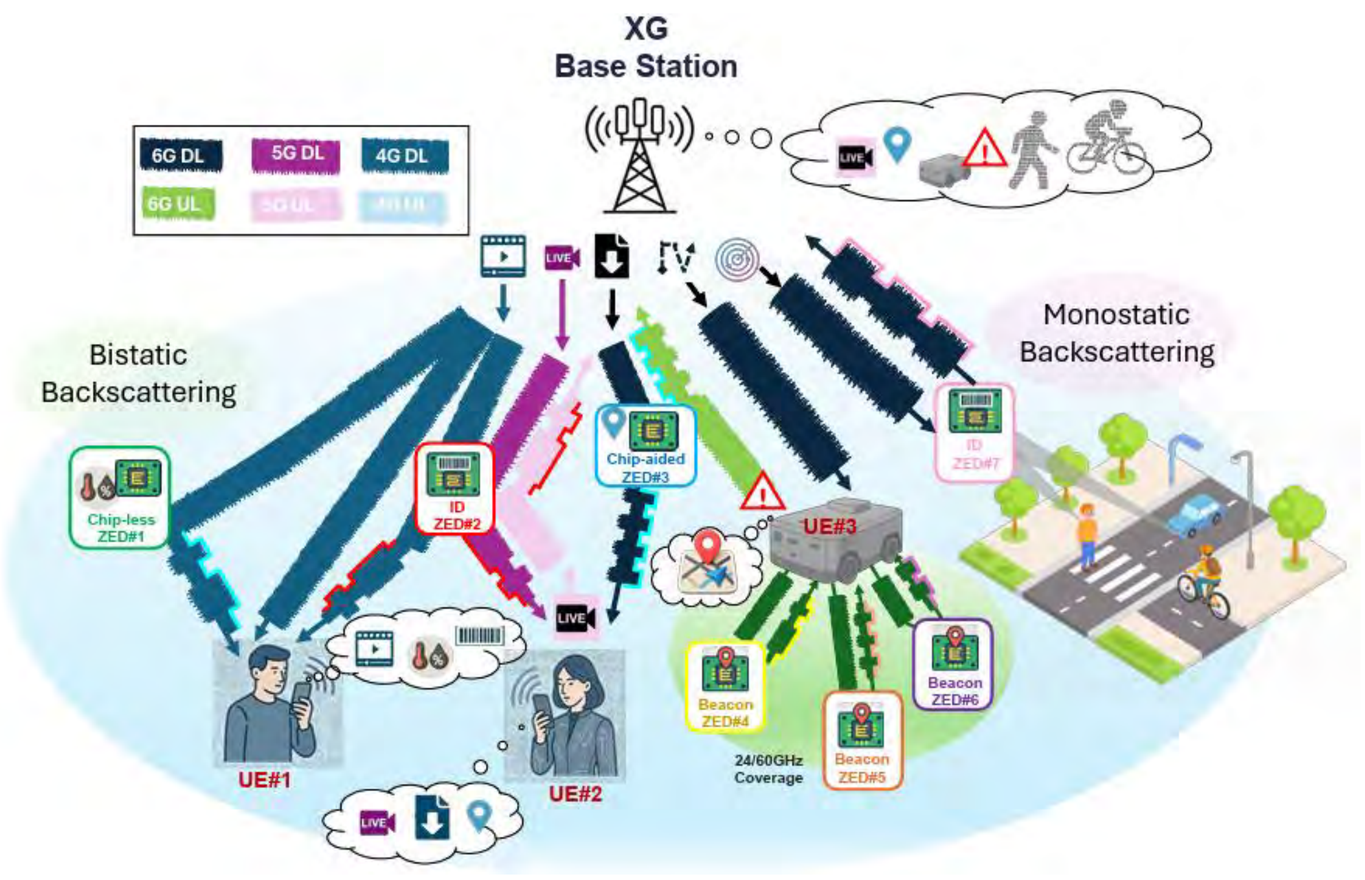
Our vision is that by 2035, Sweden will pioneer truly sustainable cellular-IoT ecosystems, with self-powered devices that intelligently adapt, securely communicate, and integrate seamlessly into everyday life, setting a new benchmark for green digital infrastructure.

- **Sustainability is the foundation**: This project shifts the focus from performance-driven advancements to environmentally conscious connectivity.
- Ambient IoT (A-IoT) enables battery-free, ultra-low-power communication through ambient energy harvesting, creating a path to sustainable and pervasive IoT networks.
- The resulting technologies will enable breakthroughs across digital twinning, smart cities, agriculture, environmental monitoring, and healthcare.

Focus areas

Our cluster's sub-topics are each led by an expert partner, with additional partners collaborating.

- ***EMickers****: Backscatter-based hardware, antenna, modulator, etc.*
- ***Uppsala University****: Low power hardware-constrained DSP.*
- ***RISE****: Energy harvesting and storage. Embedded intelligence and edge computing.*
- ***KTH****: Security and privacy in A-IoT.*
- ***DPPatterning****: Sustainable materials and fabrication methods.*
- ***Qamcom/Ranatec****: Impact, standardization, and market.*



N. Amani, *et. al. "Generation-Agnostic Zero-Energy Devices for Sustainable Connectivity, Sensing, and Localization", arXiv preprint, arXiv:2511.09372*, 2025.

Interest in collaboration and exchange

- Connect with semiconductor/IC design clusters to access expertise in low-power electronic components.
- Coordinate with existing initiatives in the 6G domain to avoid duplication and maximize impact.
- Deepen our already-initiated contacts and discussions with major Swedish telecom and service-provider companies for potential partnership or advisory roles.
- Engage with universities and 6G-focused organizations to strengthen knowledge exchange.

Facts

Start and end date:
11-2025 till 03-2026

Total budget:
1.5 MSEK

Project leaders:
Navid Amani

Funded by:
VINNOVA

Want to learn more? Contact *navid.amani@emickers.com* or visit www.emickers.com.

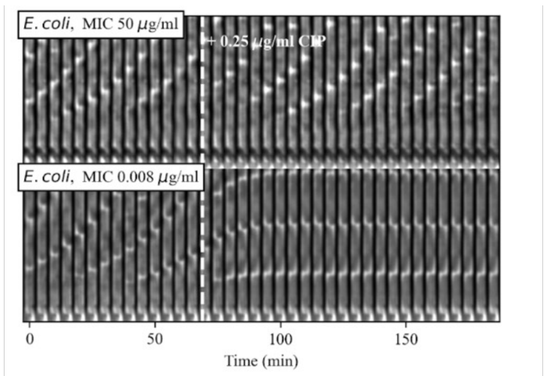
Project partners

A Cluster of Excellence in Groundbreaking Technologies for Personalized Infection Medicine

- Bacterial infections are the second-leading cause of death globally. Antimicrobial resistance (AMR) threatens the effectiveness of modern healthcare medicine, from cancer therapy to routine surgeries, which often need prophylactic antibiotics to be safe.

- The Cluster for Precision Infection Medicine combines world-leading fundamental and applied research from Uppsala, Gothenburg, and Harvard to revolutionize diagnostics and treatment of infectious diseases.

- By combining creative genome-wide optical screens to dissect infection biology, with microfluidics, novel optics, molecular detection, and machine learning, we create rapid, precise, and affordable tests that detect infections directly from patient samples and guide treatment such that the right antibiotic is given in time, and only when it truly helps.



Focus areas

Technological challenges

•Rapid, sensitive, and inexpensive identification of viruses, bacteria, and other pathogens relevant to human health.

•Direct-from-patient antibiotic susceptibility testing for bloodstream and pulmonary infections.

•Heteroresistance and bacterial growth state diversity – diagnostic and treatment challenges.

•Pathogen identification when blood cultures are negative, including host response-based diagnostics that utilize the identification of new biomarkers.

•Identification of interactions between antibiotics or antifungals for optimized combination therapy.

•Host response mechanisms, i.e., observing transcriptomes and proteins and their activity states in host tissues.

•Whole genome sequencing-based approaches to determine optimal treatment strategies, using AI-based approaches to predict atypical forms of resistance.

•Therapeutic drug monitoring to follow antibiotic concentrations in the patient.

Social and economic challenges

•Risks of over-diagnosing and over-treating based on sensitive screening efforts.

•Overcoming implementation barriers based on traditional centralized treatment practices, conservative diagnostic criteria, and insurance-driven reimbursement systems.

•Finding sustainable economic models for developing personalized diagnostics for low-income countries.

Interest in collaboration and exchange

Applicants and contacts for networking are:

- Johan Elf (UU); Bacterial imaging technologies.
- Dan Andersson (UU); Molecular microbiology
- Ulf Landegren (UU); Molecular detection technologies
- Carolina Whälby (UU); Image analysis and AI
- Maria Tänje (UU); Microfluidcis
- Johan Bengtsson Palme (Chalmers); Bioinformatics
- Johan Paulsson (Harvard); Massive throughput optical screening

Facts

Start and end date:
10-2025till 03-2026

Total budget:
1 200 000 SEK

Project coordinator:
Petter Knagge

Funded by:
VR

Want to learn more? Contact any of the applicants or Petter Knagge (petter.knagge@icm.uu.se)

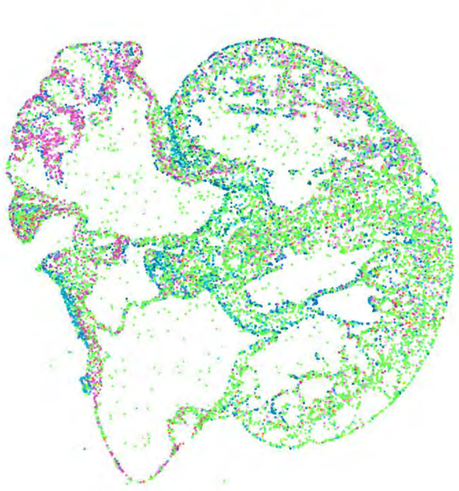
Project partners and other contributing organisations

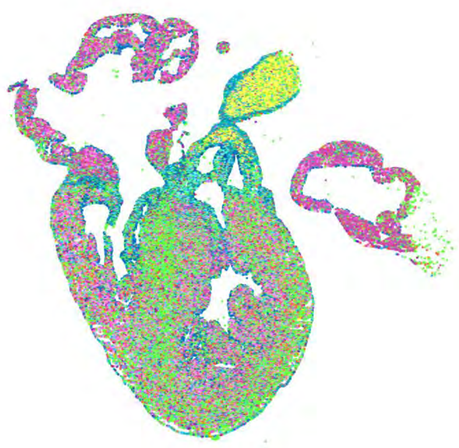
UPPSALA UNIVERSITET

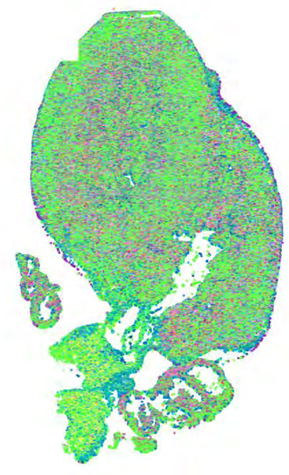
HARVARD MEDICAL SCHOOL

CHALMERS

A Technology Cluster of Excellence in Spatial Biology







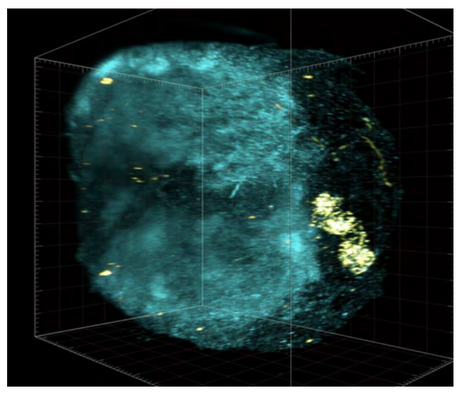
La Manno et al, Nat Genet. 2025

- Spatial coordinates provide essential information for cells related to their cellular and molecular surroundings, fundamentally determining their identities and functions within complex tissues. Alterations in this spatial order can lead to new cellular behaviors, causing further changes in the microenvironment such as in development and disease.
- The emergence of spatial omics efficiently investigates tissue ecosystems by comprehensively interrogating various molecular modalities, including transcriptomics, genomics, epigenomics, proteomics, metabolomics, and tissue morphology.
- The rapid advancement of the spatial omics field has been accompanied by the emergence of a diverse array of computational tools to facilitate the analysis of spatial molecular data and its integration with single-cell measurements.
- Despite the remarkable progress, reflected in the growing scientific interest and versatility, several urgent experimental challenges remain, including developing computational tools to translate the spatial technologies to real-world impact.
- Our proposal addresses current and long-term challenges in spatial biology, building on the applicants' cross-disciplinary and world-leading expertise in technology development,

Focus areas

.Among the urgent challenges in spatial technology are:

- **Spatial multiomics**
- **Spatial multispecies**
- **Spatial measurement of endogenous lineage markers**
- **Spatial dynamic measurements**
- **Spatial 3D**
- **Spatial AI**



Interest in collaboration and exchange

Applicants and contacts for networking are:

- *Joakim Lundeberg, KTH*
  Coordinator of the activities
- *Mats Nilsson, SU*
  Area: Spatial multiomics
- *Stefania Giacomello, KTH*
  *Area: S*patial multispecies
- *Camilla Engblom, KI*
  Area: Spatial lineages
- *Johan Elf, UU*
  Area: Spatial dynamics
- *Carolina Wählby, UU*
  Area: spatial AI
- Lazar, Enikö, KTH
  Area: Scientific coordinator

Facts

Start and end date:
10-2025till 03-2026

Total budget:
1 200 000 SEK

Project coordinator:
Enikö Lazar

Funded by:
VR

Want to learn more? Contact any of the applicants or Enikö Lazar (eniko.lazar@scilifelab.se)

Project partners and other contributing organisations

Advanced Compound Semiconductors: Innovation, Testing and Value chains

Compound semiconductors are critical for groundbreaking electronic innovations in high-frequency systems, quantum applications, optoelectronics, and power electronics. They enable advanced sensing, communication, and energy harvesting technologies. Sweden has a strong position forming our cluster embryo that we will strengthen by innovation-driven research and development, new advanced characterization, and research on the changes in the global ecosystem. The ambitious and innovative cluster research aims at strengthening Swedish position in semiconductors attracting international and industrial support.

- **Compound semiconductor technology development**
- **Advanced characterization techniques (ESS, Max IV, High-frequency etc)**
- **Geopolitics, political economy, and innovation management**

Focus areas

***W**e have identified knowledge gaps where collaborative research and networking are needed in the cluster. We integrate the international perspective with consideration of current geopolitical tensions and the associated policy development. The center combines complementary semiconductor technical research excellence at Lund and Chalmers blended with advanced characterization using the international large-scale infrastructure ESS and Max IV. Technical challenges include control of epitaxial process and interfaces, device perfection for state-of-the-art performance with new system concept demonstration. We further integrate research on innovation and combined, we will identify opportunities for Swedish semiconductor innovations in an international perspective.*

Tentative research themes:

- **Reconfigurable RF-electronics**
- **Earth and Space observations**
- **Wireless communications**
- **Energy harvesting in space**
- **Cryogenic neuromorphics for quantum and space**
- **Advanced testing and characterization**

Interest in collaboration and exchange

The project covers complete value chain from atoms to systems

Will be interested in strengthening:

- **Dual-use**.
- **National lab-to-fab strategy**
- **AI**

Connections to other centres:

- **Quantum, AI and Hardware**
- **Advanced material and production**
- **Connectivity and Radar**

Facts

Start and end date:
11-2025 till 03-2026

Total budget:
1200000 SEK

Project leaders:
Lund University, EIT
Lund University, LUSEM
Chalmers, MC2
ESS

Funded by:
VR

Want to learn more? Contact Lars-Erik Wernersson (lars-erik.wernersson@eit.lth.se)

Project partners and other contributing organisations

EUROPEAN SPALLATION SOURCE

LUNDS UNIVERSITET

CHALMERS

Advanced Connectivity

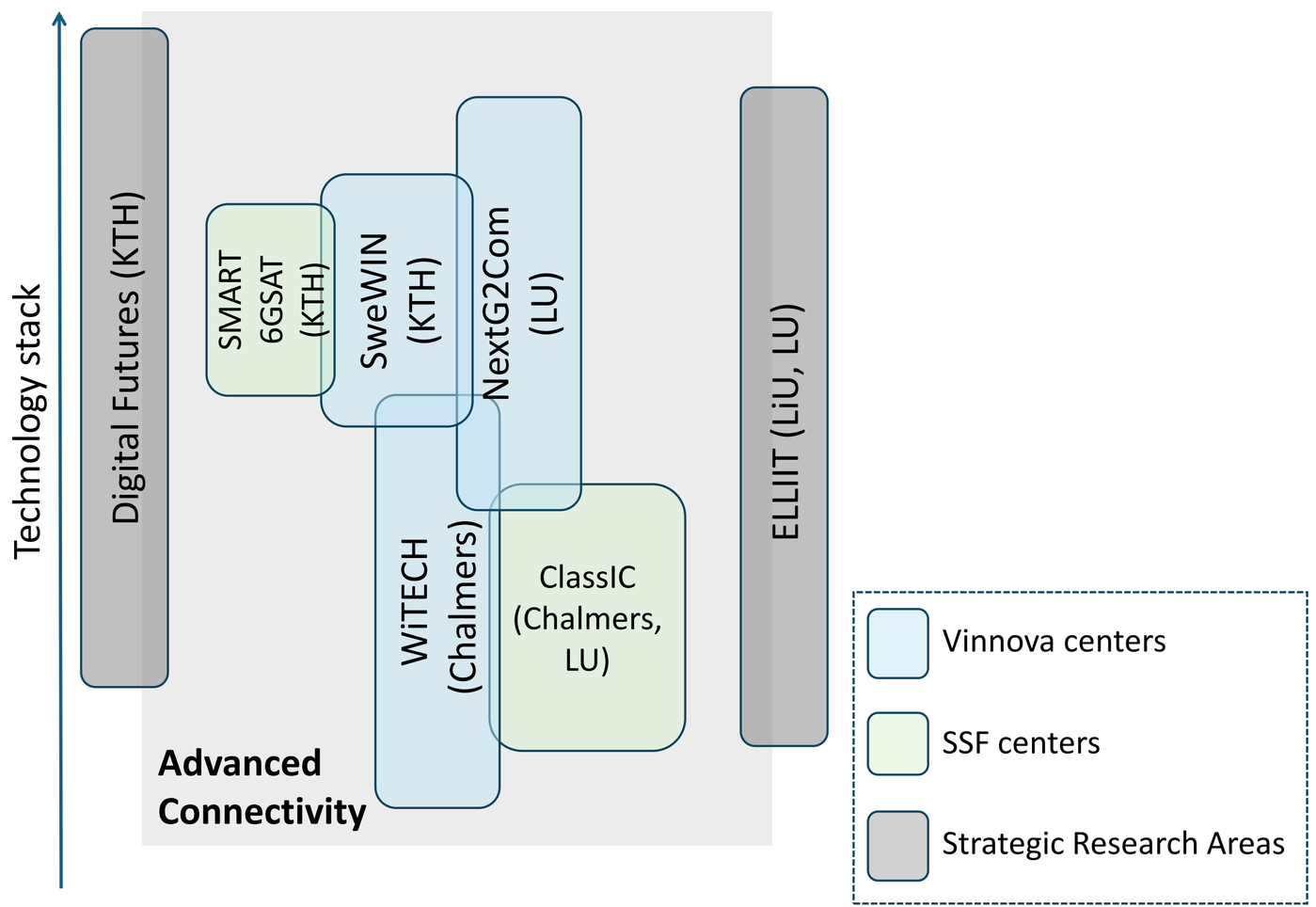
- Driving Research and Innovation in Future Digital Technologies

Advanced connectivity will constitute the backbone of a digitalized industry and society in the future. This excellence cluster will drive research and innovation in digital technologies for resilient, sustainable and advanced connectivity. We will enable fast, reliable, secure, and inclusive interactions between people, devices, and data clouds for innovative solutions with tangible societal and industrial impact.

- We will position Sweden at the forefront of shaping future digital infrastructures, where communication, computing, and sensing converge into resilient, and versatile platforms that underpin next-generation industries and society.
- The foundation of the excellence cluster is world-leading researchers from Sweden's four main universities in the field.
- The cluster includes three Vinnova competence centers, two Strategic Research Areas, and two SSF centers.

Focus areas

- Connected intelligence
- Intelligent connectivity
- Networked systems, control, and optimization
- Non-terrestrial networks
- Optical-wireless networking architectures
- Wireless system design
- Hardware-efficient signal processing
- Antenna systems
- Semiconductor circuit design



Interest in collaboration and exchange

We are open and interested to learn more about enablers and specific application areas for connected intelligence.

We are currently working on to further develop in the following areas: resilience and security, AI-augmented networks and sustainability.

- **Resilience and security:** Connectivity is foundational to critical infrastructure; building resilient networks is essential.
- **AI-augmented networks:** AI can e.g. enhance network management and optimize hardware and algorithms.
- **Sustainability:** The work needs to be built on sustainability principles and enable sustainability in other domains.

Facts

Start and end date:
October 2025 to March 2026

Total budget:
1 490 347 SEK

Project leader:
Fredrik Tufvesson

Funded by:
Vinnova

Want to learn more? Contact Fredrik Tufvesson, email: fredrik.tufvesson@eit.lth.se

Project partners and others

Reference group, including large international companies, SMEs and smaller specialized companies, and institutes and public sector

International advisory board: KU Leuven (BE), University of Oulu (FI), UEC (JP), University of Southern California (US), CTTC (ES)

AESPIRE: AI for Epigenetics and Societal Progress through Innovative Research

Genetic data impacts many aspects of modern life. Epigenetic changes — modifications in gene activity without altering the DNA sequence — can offer insights beyond inherited traits, but can be difficult to interpret without advanced computer applications and large-scale data. Epigenetics has great potential for application to medicine, sports, law enforcement, psychology, animal breeding, environmental protection and more. This initiative aims to build an internationally-leading Centre for AI-driven epigenetics, built on Linköping's broad expertise in epigenetics and AI.

- Apply novel AI approaches to deciphering epigenetic signals in a range of applications
- Develop cutting-edge molecular techniques for research on epigenetics
- Facilitate sharing of data through secure storage, access and computing
- Promote innovation and the commercialization of novel products and techniques

Focus areas

The focus will be on **strengthening collaboration between epigenetics and advanced computer modelling.** Linköping University hosts major investments in computing and data storage, including NAISS, Berzelius, WASP, Arrhenius, and the AIDA Data Hub. The proximity to key forensic and clinical genomics hubs with strong, well-funded epigenetics research teams makes Linkoping unique and well suited for a Centre for AI-driven epigenetics. By promoting innovation and industry collaboration we will ensure societal benefit.

Flagship themes

1. Healthcare- build new diagnostic tools in collaboration with clinical partners
2. Forensics- Improve investigative leads by applying AI approaches
3. Lifestyle genetics- develop direct -to-user reporting tools

Interest in collaboration and exchange

Epigenetics spans diverse applications, and broad collaborations are key to establishing a world-leading center for AI-driven epigenetic analysis

Potential areas for collaborations:

- AI-driven data interpretation
- Medical diagnostics
- Large-scale population studies
- Advanced data modelling
- Genomic technologies
- Lifestyle genomics
- Forensics
- Genealogy
- Spatial omics
- Infection & host response
- Animal breeding

Facts

Start and end date:
10-2025 to 03-2026

Total budget:
1.5M SEK

Project leaders:
Colum Walsh
Fredrik Heintz

Funded by:
Vinnova and Linkoping university

Want to learn more? Contact Colum Walsh colum.walsh@liu.se (Lead), Fredrik Heintz fredrik.heintz@liu.se (co-Lead) or Unn Kugelberg unn.kugelberg@liu.se Project Coordinator

Project partners and other contributing organisations (place logos here)

LINKÖPING UNIVERSITY

AI for Education and Lifelong Learning (AI-4-ELL)

By 2035, the excellence cluster AI for Education and Lifelong Learning (AI-4-ELL) aims to establish Sweden as a global leader in AI-enabled lifelong learning.

The planning project will develop and refine a vision for a cluster that will advance cutting-edge research, large-scale evaluation, and innovation to build a resilient, ethical, and competitive ecosystem where AI enhances learning, supports wellbeing, and strengthens industry competitiveness.

- Cultivating cutting edge research on AI and advancing our understanding of how AI can support and empower education and lifelong learning (ELL).
- Conducting world-class, large-scale mixed-method research to build a dynamic and resilient lifelong learning ecosystem.
- Advancing global excellence in understanding psychological resilience and human wellbeing in AI-mediated contexts

Focus areas

The following focus areas are based on what we consider to be key domains to explore in the planning project:

- *FA1. Innovation and evaluation of AI ELL use cases*
- *FA2. AI in Society*
- *FA3. Mental Health and Resilience*
- *FA4. Data Factory*
- *FA5. AI factory*
- *FA6. Development, evaluation and change at scale*
- *FA7. Building the ELL-ecosystem*

The Cluster will comprise –>

Interest in collaboration and exchange

- Institutions, research initiatives, and networks that advance the development of AI, education, and lifelong learning.
- Organizations interested or active in developing the use of AI for learning and skills development in industry and the public sector.
- Actors with the capacity to develop and operate data centres and/or with expertise in AI Factory
- Collaboration on developing secure AI systems and managing risks from insecure AI.

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 499 944 SEK

Project leaders:
Sara Fallahi
Kristina Björn

Funded by:
Vinnova

Want to learn more? Contact Sara Fallahi via sara.fallahi@ri.se

Project partners

RI.SE
AI SWEDEN
GÖTEBORG UNIVERSITY
LINKÖPINGS UNIVERSITET
Swedish Edtech Industry

AI-Driven Drug Discovery and Development (AID³)

Sweden´s Strategic Platform for Pharmaceutical Innovation

AID³ aims to be a global leader in pharmaceutical innovation — an integrated research infrastructure that redefines drug discovery and development through seamless, AI-driven design, synthesis, and translation of novel medicines. Leveraging Sweden's world-class expertise in computational modeling and pharmaceutical R&D, AID³ unites chemists, data scientists, formulation experts, and clinicians in a collaborative ecosystem.

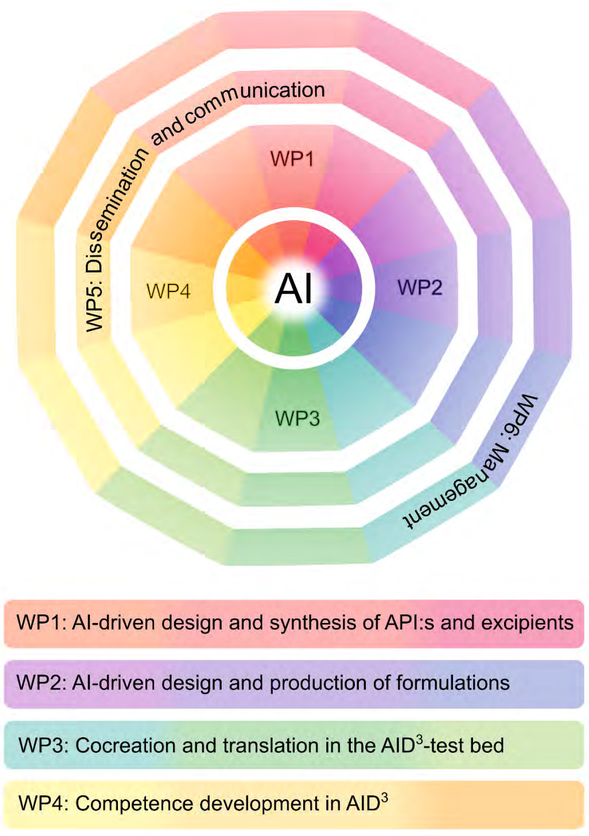
AID³ accelerates innovation through:

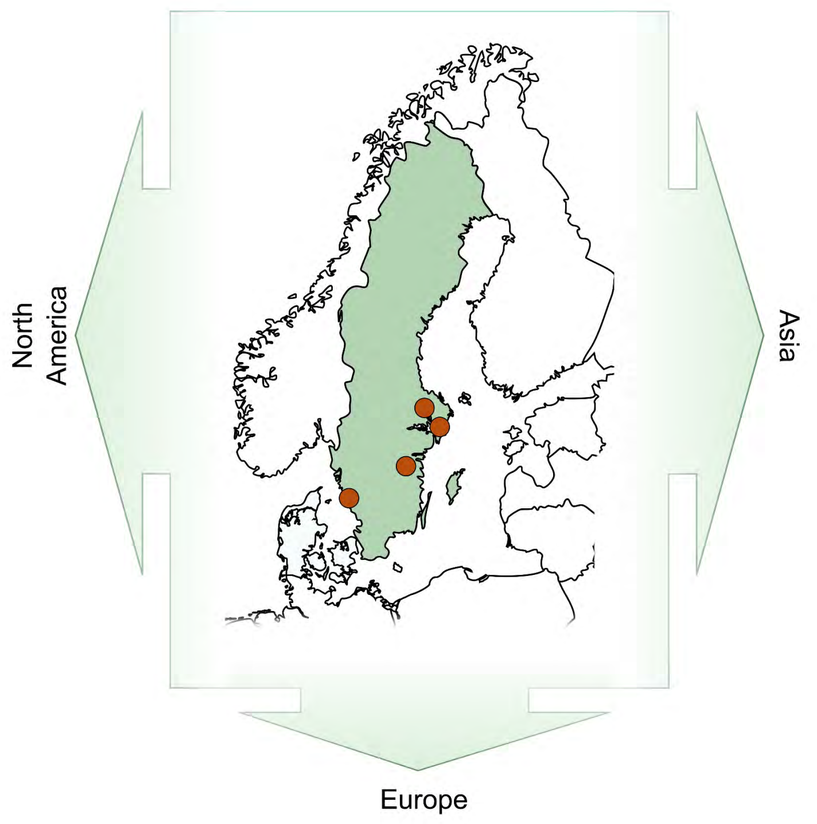
- **Translational Acceleration from molecular design to clinical application through integrated expertise** from Sweden's top researchers across disciplines
- **Automation-Driven Innovation Pipeline with advanced modeling and simulation** for API design, excipient creation, and formulation development.
- **Sustainable Therapeutics for Global Health Needs,** producing next-gen therapies with real-world impact.

Focus areas

AID³ pioneers the future of intelligent medicine—advancing automation, precision, and innovation to reshape how therapies are conceived, developed, and delivered. Unlike fragmented or commercially driven global efforts AID³ is:

- A fully automated pipeline—from API design and excipient creation to formulation and delivery, with integrated digital and experimental characterization at scale (Fig. 1).
- Powered by Swedish leading experts, AID³ connects multidisciplinary actors at the national and international level (Figure 2).





Interest in collaboration and exchange

AID³ position Sweden as a global leader in AI-driven pharmaceutical R&D and expanding global collaborations and the innovation ecosystem.

We aim to shape new standards for interdisciplinary collaboration and translational impact. To achieve this, we need partners at the forefront of AI and science to co-create the future of intelligent medicine. AI is ever-changing, demanding expertise across diverse fields, and we foresee a need collaboration between disciplines typically not associated with drug delivery — AI and data science. In return, actors will be apart of a unique Swedish hub connecting global leaders, enabling resource sharing, policy alignment, and innovation for tomorrow's medicines.

Facts

Project leaders:
Christel Bergström, Uppsala University
christel.bergstrom@uu.se
Pär Matson, University of Gothenburg
par.matsson@gu.se

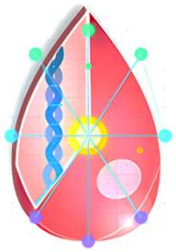
Funded by:
Vinnova

Want to learn more? Contact Pär Matson or Christel Bergström

Project partners and other (place logos here)

Uppsala University
Chalmers University of Technology
Linköping University
University of Gothenburg
Stockholm University
SciLifeLab
AstraZeneca
Cytiva
Testa Center

AIDx - AI Diagnostics Excellence Cluster



Vision

By 2035, Sweden will be the European leader in AI-enabled precision diagnostics. AIDx integrates artificial intelligence into clinical genomics workflows across cancer, rare diseases, infectious diseases, and complex diseases.

Key Goals

- Support clinical decision-making through AI analysis of large-scale genomic and clinical datasets
- Enhance diagnostic quality assurance by monitoring complex pipelines and detecting deviations early
- Reduce diagnostic turnaround times and healthcare costs through improved efficiency
- Enable individualized, evidence-based patient care

Focus areas

AI-enabled diagnostic workflows Development and validation of machine learning algorithms for variant classification, disease prediction, and quality control in genomic diagnostics

Data infrastructure and integration Secure, harmonized access to large-scale genomic and clinical data through NGP, enabling training of robust AI models across healthcare regions

Clinical implementation and validation Testing AI tools in real-world diagnostic settings across multiple disease areas and healthcare regions

Innovation ecosystem Fostering entrepreneurship, startups, and industrial partnerships to translate research into commercial healthcare solutions

Regulatory and ethical frameworks Ensuring compliance with GDPR, EU AI Act, and European Health Data Space requirements for responsible AI in diagnostics

Interest in collaboration and exchange

- Healthcare providers – National Network
- AI and machine learning research groups with expertise in clinical applications
- Healthcare technology companies developing diagnostic software and quality assurance systems
- International precision medicine initiatives for benchmarking and joint innovation
- Regulatory and ethics experts
- Patient organizations to ensure societal needs guide development

We offer

- Collaboration with participating hospitals and medical faculties across Sweden
- Collaboration with GMS and Clinical Genomics
- Datasets for LLM setup and validation

Facts

Start and end date:
03-2025 to 03-2026

Total budget:
1.500.000 SEK

Project leaders:
Rene Kaden, Richard Rosenquist Brandell, Fulya Taylan, Anders Edsjö, Valtteri Wirta, Marene Landström, Paula Mölling, Tobias Strid, Per Sikora, Eva Berglund, Malin Melin

Funded by:
Vinnova

Want to learn more? Contact rene.kaden@akademiska.se

Stay updated: aidx-sweden

Project partners

Universitetssjukhuset i Linköping · gms Genomic Medicine Sweden · SciLifeLab · Skånes universitetssjukhus · Sahlgrenska Universitetssjukhuset · VINNOVA Sveriges innovationsmyndighet · Uppsala Universitet · Akademiska sjukhuset · Region Örebro län Universitetssjukhuset Örebro · norrlands universitetssjukhus · Karolinska Institutet · Karolinska Universitetssjukhuset

AnthroTec

Europe needs to take a distinct path
human-centred, socially responsive,
breakthrough technologies by ***Reima***

The cluster is **situated at the nexus o**
reimagining how intelligent systems

- Autono
- Cyberse
- Persona

ARCUS - Accelerating Resilient & Circular Steel & Metal Solutions

Metals are a cornerstone of modern society, and ARCUS's vision is to position Sweden as the **global leader in resilient and circular steel and metal solutions** by creating an open innovation system where industry, academia, and institutes rapidly turn computationally driven discoveries into climate-neutral products.

- ARCUS will ensure that resources are used, reused, and circulated with the highest quality, security, and efficiency, and with the lowest possible environmental impact over time.
- ARCUS will establish the conditions needed for fundamental, applied, and industrial research to run in parallel across all TRL levels, drastically shortening innovation cycles through open, inclusive and prestige-free collaboration.
- ARCUS will also integrate sustainability, digitalization, and decarbonisation at every stage, with the shared goal of solving global challenges while strengthening Sweden's metal and manufacturing industries
- ARCUS will join forces and establish dedicated platforms for key technologies for industrial transformation. These platforms will integrate deep intradisciplinary expertise with cross-disciplinary fluency and broad systems thinking.

Focus areas

- Connect the entire value chain – from basic research to industrial application.
- Combine materials science, product development, circularity and digitalization.
- Shorten innovation cycles through open and interdisciplinary collaboration.
- Create platforms for key technologies with infrastructure, shared testbeds, pilot lines and digital tools.
- Build skills supply through graduate schools and education linked to industry needs.

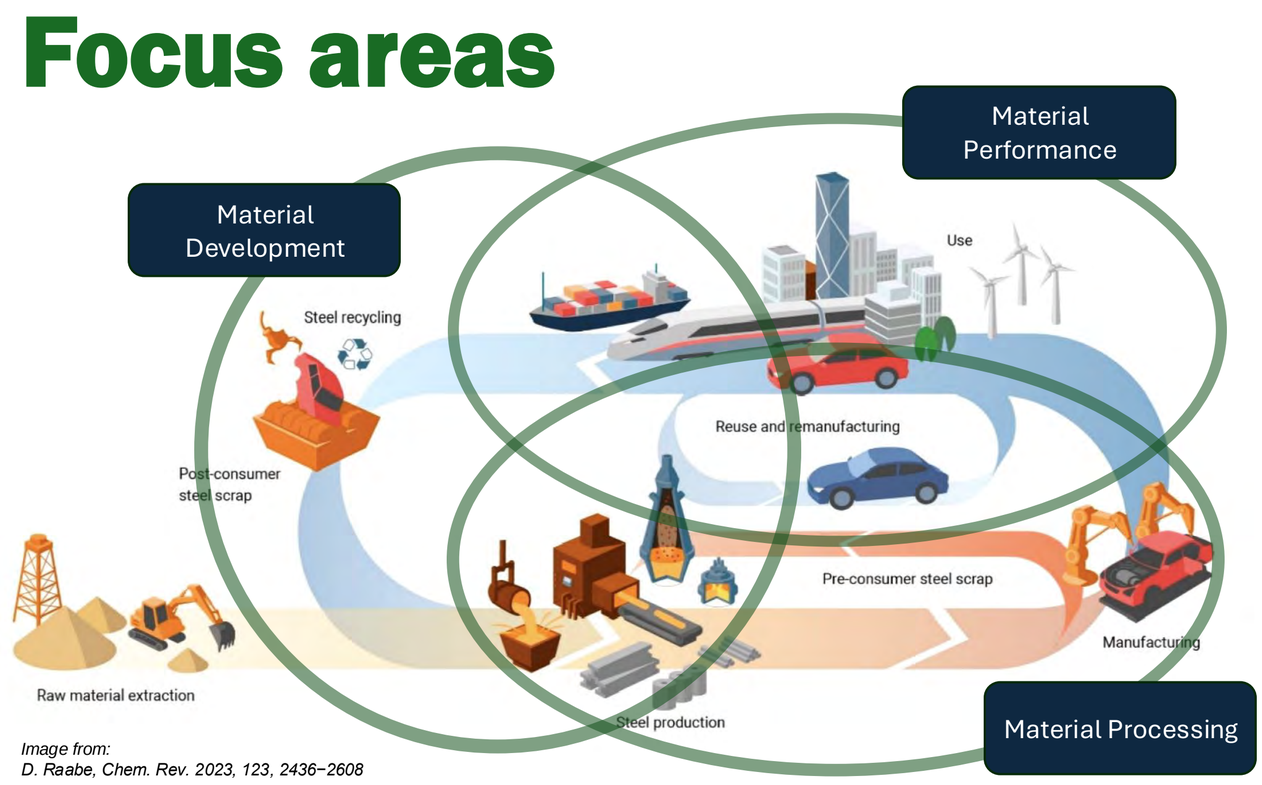


Image from:
D. Raabe, Chem. Rev. 2023, 123, 2436−2608

Interest in collaboration and exchange

ARCUS strives to promote an open and inclusive collaboration between all stakeholders focusing on metallic materials in Sweden and is open to discuss collaboration on many topics.

Examples but not limited to:

- **Generic methods**; AI, Digitalization Integrated Computational Materials Engineering (ICME) and use of Large-Scale Infrastructure (LSI)
- **Material Development**; Alloy design, Heat treatment, Casting, Rolling etc.
- **Material Processing**; Forming, Machining, Welding, AM, PM etc
- **Material Performance**; Fatigue, Corrosion and Strength of materials
- **Sustainability**; LCA, Recycling, Circularity and Remanufacturing

Want to learn more? Contact Johan Moverare, LiU – johan.moverare@liu.se

Facts

Start and end date:
Nov-2025 till March-2026

Total budget:
1 500 000 SEK

Project team:

LiU	Johan Moverare (Project leader), Mattias Calmunger, Mattias Lindahl
KTH	Greta Lindwall, Zuheir Barsoum Joakim Odqvist, Peter Hedström
LTU	Marta-Lena Antti, Erik Olsson Jens Hardell, Hans Åhlin
CTH	Uta Klement, Eduard Hryha, Peter Krajnik
Swerim	Oliver Rod, Mikael Larsson

Funded by:
VINNOVA
Sweden's Innovation Agency

Project partners

LINKÖPING UNIVERSITY · KTH VETENSKAP OCH KONST · LULEÅ TEKNISKA UNIVERSITET · CHALMERS · SWERIM

ATLAS

Air Technologies for Life: From Atom to Society

Ten million people die each year from polluted air and airborne pathogens. Yet our detection systems remain blind to most threats circulating between and through us and airborne health threats remain poorly characterized.

ATLAS addresses critical gaps in airborne health research by integrating fragmented scientific fields to develop the capacity to trace the path from air pollution to human illness. As such, the project tackles the inability to detect specific airborne hazards, track transmission pathways, and link exposures to disease across scales from atoms to society.

ATLAS addresses two fundamental challenges:

Bridges the technological gap and fragmented scientific expertise between isolated scientific disciplines.

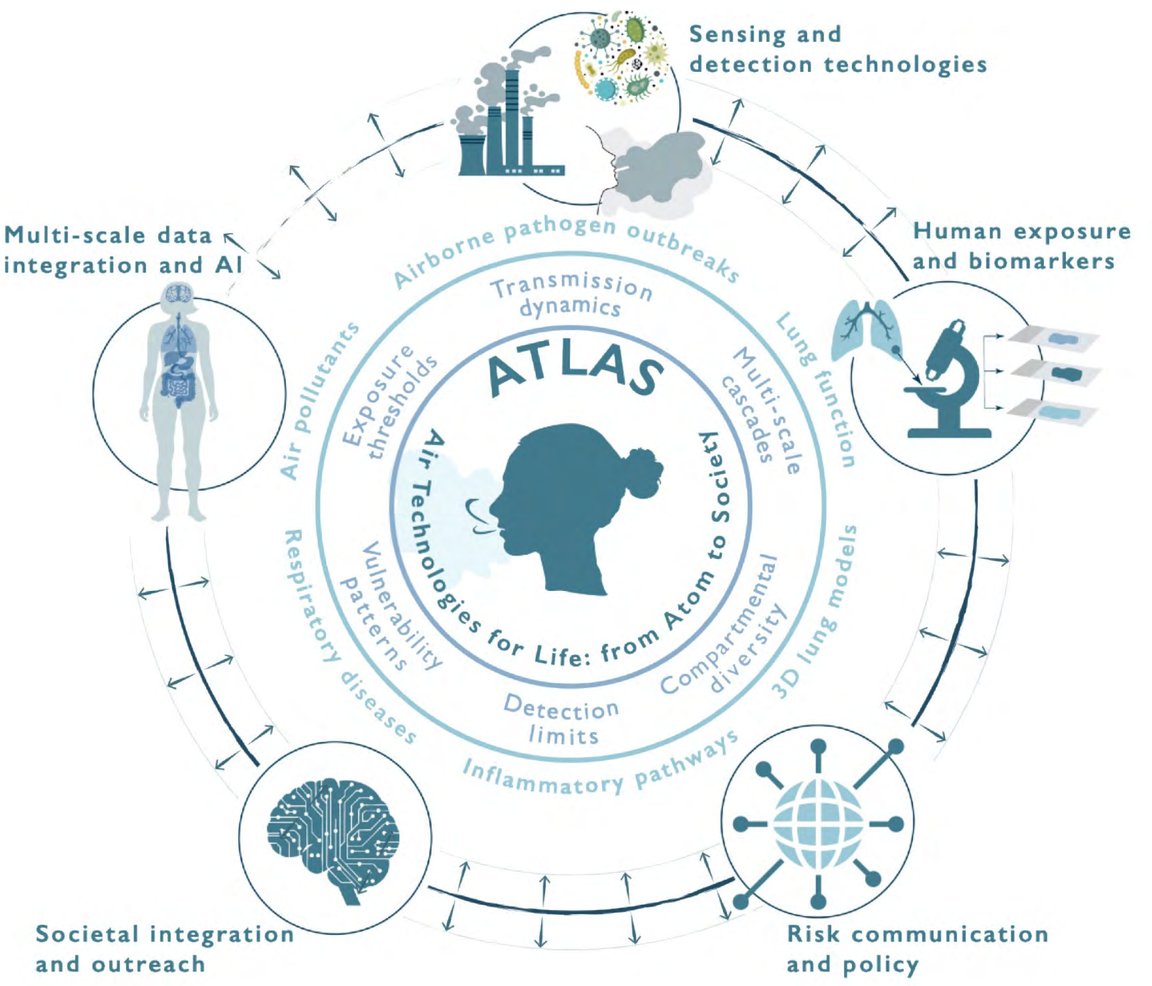
Overcomes the communication barrier between complex science and society by developing channels and policies for communicating invisible risks.

Doing so, ATLAS makes invisible airborne threats visible and traceable from source through symptoms to societal impact. ATLAS advances early detection, precision diagnostics, and targeted interventions to protect public health.

Focus areas

ATLAS solution integrates multiscale technologies:

- Sensor design and development for multi-pollutant detection (particulates and bioareosols)
- Sensor fusion, network analysis and multi-scale AI data integration for predictive modelling
- Spatial biology of lung diseases and biomechanics linking exposure patterns to cellular-level damage, inflammation pathways, and disease progression
- Science-to-policy translation bridging research findings with public health actions and risk communication
- Precision biomarker diagnostics for early detection of exposure-related health impacts
- Together with MAXIV: detection of elemental particle composition both in air and spatially in tissues
- Climate testbed for assessing emerging airborne threats



Interest in collaboration and exchange

Opportunities for dialogue and potential collaborations on following topics:

- *Biomarker development*
- *Risk communication*
- *Biomechanics and bioengineering*
- *Climate effects on air composition and implications for health*
- *Sensor networks & AI spatial statistics*

- Discuss experiences in working with governmental agencies like Public health agency and Swedish Civil Contingencies Agency (MSB), and the Swedish armed forces.
- Spatial omics in lung biology and inflammation research

Facts

Start and end date:
10-2025 - 03-2026

Total budget:
1.2 MSEK

Project leaders:
Gunilla Westergren-Thorsson, LU
Niklas Arnberg, UmU

Funded by:
Vetenskapsrådet (VR)

Want to learn more? Contact gunilla.westergren-thorsson@med.lu.se

Project partners

Lunds universitet
Göteborgs universitet
Umeå universitet
Stockholm University
SciLifeLab
MAX IV

Acknowledgements

Vetenskapsrådet

AutoEvolve

Autonomous Self-Evolving Systems for the Next Era of Software-Intensive Innovation

The vision is that by 2035 Sweden will lead the world in autonomous self-evolving software-intensive systems: systems that can continuously monitor, learn, redesign and optimize themselves based on stakeholder intent, while ensuring compliance, safety, and sustainability. Instead of manually building systems, we ***"build the system that builds the system"****, integrating AI, data, autonomous agents, and advanced digital infrastructure. These systems evolve during operation using fleet-level data, federated learning and generative AI, enabling rapid adaptation to changing requirements, regulations, and markets*

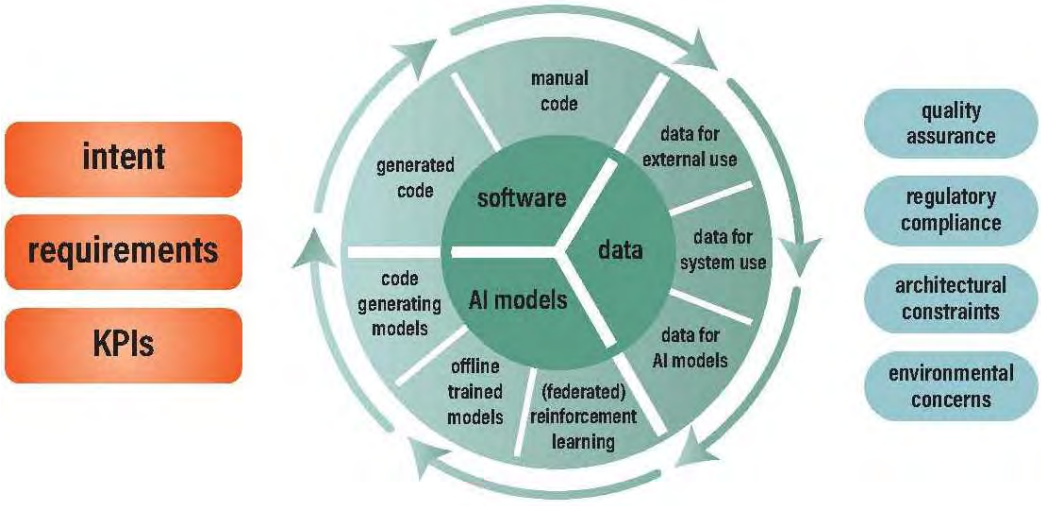
The goal of AutoEvolve is to mobilize a strong Swedish-led cluster of academia, industry, SMEs, and public actors to define a roadmap, technological enablers, and an aligned ecosystem. It aims to establish Sweden's leadership, drive industrial competitiveness, ensure societal trust, and prepare for large-scale international collaboration and a full excellence cluster proposal.

Focus areas

Focus is on autonomous self-evolving software-intensive systems:

- *automation of the full lifecycle from intent specification to continuous design,*
- *coding,*
- *testing,*
- *deployment, and*
- *runtime evolution.*

Integration of AI, data, and autonomous agents for self-monitoring, compliance, and optimization. Research spans continuous compliance, safety, security, advanced digital infrastructure, fleet-level learning, and cross-sector platform innovation enabling "the system that builds the system."



Interest in collaboration and exchange

To realize this vision, we need

- *industry,*
- *academia,*
- *SMEs, and*
- *public actors*

to jointly explore

- *use cases,*
- *regulatory needs, and*
- *technological enablers for autonomous self-evolving systems.*

Dialogue should identify data access, compliance, and lifecycle automation challenges, while creating opportunities for shared platforms, pilots, and international scaling.

Collaboration for

- *cross-sector learning,*
- *accelerated adoption, and*
- *positioning of partners at the forefront of next-generation software innovation.*

Facts

Start and end date:
01-2027 till 12-2035

Total budget:
1.600.000.000 SEK

Project leaders:
Jan Bosch
Per Runesson
Miroslaw Staron
Daniel Varro
Helena Holmström Olsson
Mikael Sjödin

Funded by:
Vinnova

Want to learn more? Contact jan.bosch@chalmers.se

Project partners and other (place logos here)

AVANCEZ 1829 · UNIVERSITY OF GOTHENBURG · LINKÖPINGS UNIVERSITET · LUNDS UNIVERSITET · MALMÖ UNIVERSITY · Mälardalens universitet

BAM!

💫 Bridging Advanced Materials

By 2035 the cluster has accelerated **world-class innovation in applications of advanced materials**, thereby contributing to **closing the innovation gap**.

Upscaling and commercialisation of research and innovations is done much faster than today with **startups and scaleups attracting investments and building strong value chains** to large OEMs. **Sweden leads the way**.

- **The startups and scaleups are growing as drivers of a dynamic ecosystem built around the cluster.**
- **Investors see the potential of investing in advanced materials.**
- **Researchers are systematically transferring results to IP and commercial implementation through new and established companies.**
- **Large companies use advanced materials to improve the sustainability and resilience of their products and processes, working together with their suppliers in small and larger companies.**
- **The cluster has positioned Sweden as one of the global leaders in innovations of advanced materials, resulting in enhanced competitiveness and making us attractive for the top talents in the area.**

Focus areas

The focus is on speeding up the innovation cycle of advanced materials.

Advanced materials are materials with significant improvements in properties or performance for a specific application.

- Advanced materials enables other technologies.
- Europe is investing heavily in the field of advanced materials with focus on construction, electronics, energy, health and mobility.
- The innovation cycle is currently too long, and it takes too long to scale up – we will change that.

Interest in collaboration and exchange

We are building the Swedish ecosystem around advanced materials and connecting it globally. Our approach is multisectoral and cross-disciplinary.

A paramount task in the BAM-project is to exchange thoughts with the ecosystem and formulate a cluster with the best impact. We seek broad collaboration with stakeholders interested in advanced materials:

- **Other clusters;** regardless of funding.
- **Other initiatives/programs/networks**; with interest in advanced materials or upscaling.
- **Universities and institutes**; working on advanced materials.
- **Companies**; producing, developing or using advanced materials.
- **Policymakers**; with influence over policies, including regulations, standards etc.

Facts

Start and end date:
October 2025 to March 2026

Total budget:
1 500 000 SEK

Project leaders:
Johan Ek Weis
Chalmers Industriteknik

Funded by:
Vinnova

Want to learn more? Contact Johan Ek Weis: johan.ek-weis@chalmersindustriteknik.se.

Project partners and other

CHALMERS INDUSTRITEKNIK · KTH ventures · RI.SE · THINGS

Interest group with ~20 organisations.

LIGHTer · SIO GRAFEN

BioAnalytical Cluster of Excellence - BACE

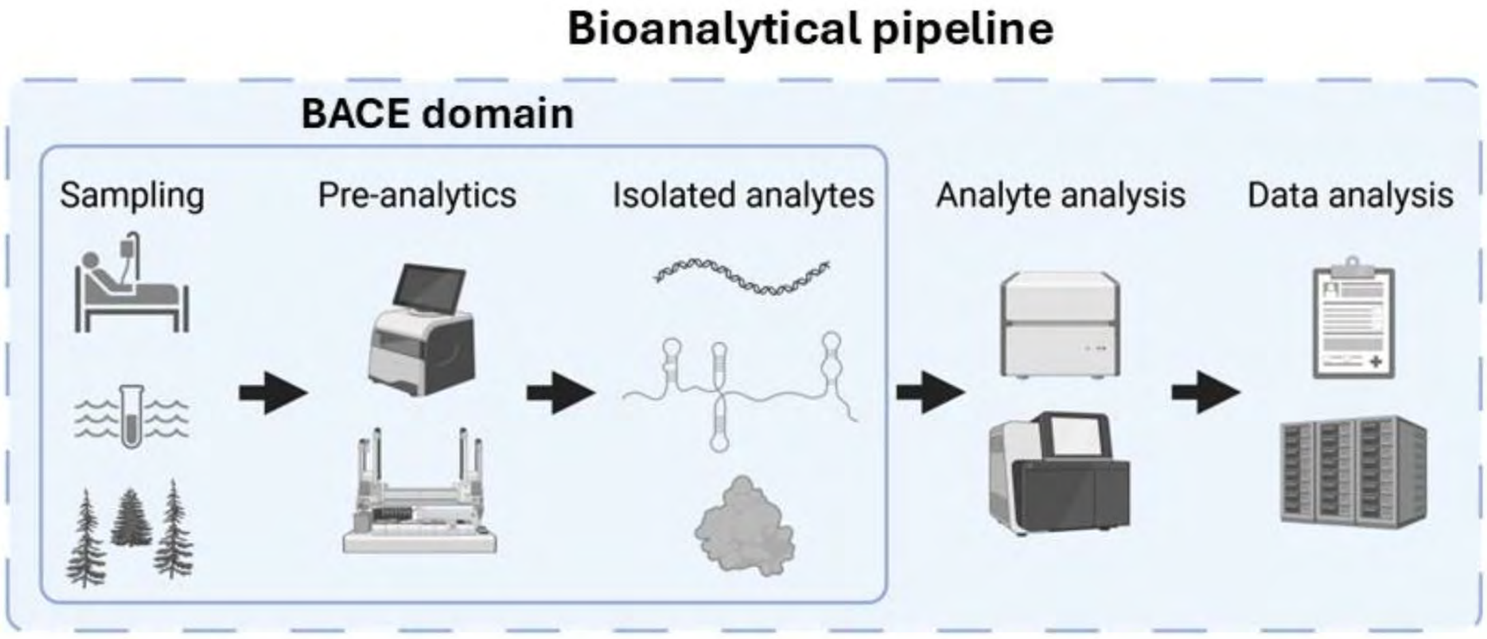
The BioAnalytical Cluster of Excellence (BACE) will establish Sweden as the global leader in bioanalytics and in particular preanalytics: the critical phase from sample collection to readiness for molecular analysis.

Ultra-sensitive molecular technologies can detect single molecules, but without proper preanalytical processes, results risk being misleading or irreproducible. BACE will close this gap by uniting leading expertise from academia, research institutes, industry, healthcare and governmental agencies to develop, validate and standardize end-to-end workflows adaptable across multiple omics fields.

With state-of-the-art laboratories, strong competence in international standardization and a global network, BACE will deliver solutions that ensure sample integrity, reproducibility, scalability and most importantly, biological relevance. Applications span precision medicine, treatment monitoring, public health, pharmaceutical innovation, environmental monitoring, food diagnostics, veterinary medicine, forensics and biodefense.

Focus areas

- Precision Bioanalytics/Diagnostics
- Pre-analytics (sample processing from collection to analytics)
- Pre-preanalytics (lifestyle, circadian, environmental factors)
- Near patient sampling
- Multiomics workflows
- Workflow optimization and validation strategies (AI)
- Harmonization (AI)
- Data analysis and modelling (AI)
- Test bed for implementation
- Translation from innovation to implementation of bioanalytical methodologies.
- Vertical knowledge transfer and collaborations (from inventors to biotech and end users)



Interest in collaboration and exchange

- Competence in bioanalytical method development and optimization
- Competences in pre-analytics
- Interest, experience of and competence in pre-preanalytical effects
- Experience in sample management
- Experience of complex sample matrices
- Validation experience of biomolecular workflows
- Data harmonization (AI)
- Multiomics data analysis and modelling (AI)
- Users of bioanalytical methodologies
- Familiarity with biobanking routines and long-term sample storage strategies
- Experience in cross-platform data integration (omics + clinical + metadata)
- Competence in troubleshooting and quality assurance of analytical workflows

Start and end date:
Oct 2025 – March 2026

Total budget:
1 975 714 SEK

Project leaders:
Joakim Håkansson, RISE
Yalda Bogestål, RISE
Mikael Kubista, Precision BioAnalytics
Anders Ståhlberg, Göteborg University

Funded by:
VINNOVA

Want to learn more? Contact mikael.kubista@precisionbioanalytics.com or visit www.precisionbioanalytics.com

Project partners and other (place logos here)

BioAnalytical Cluster of Excellence - BACE

The BioAnalytical Cluster of Excellence (BACE) will establish Sweden as the global leader in bioanalytics and in particular preanalytics: the critical phase from sample collection to readiness for molecular analysis.

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Focus areas

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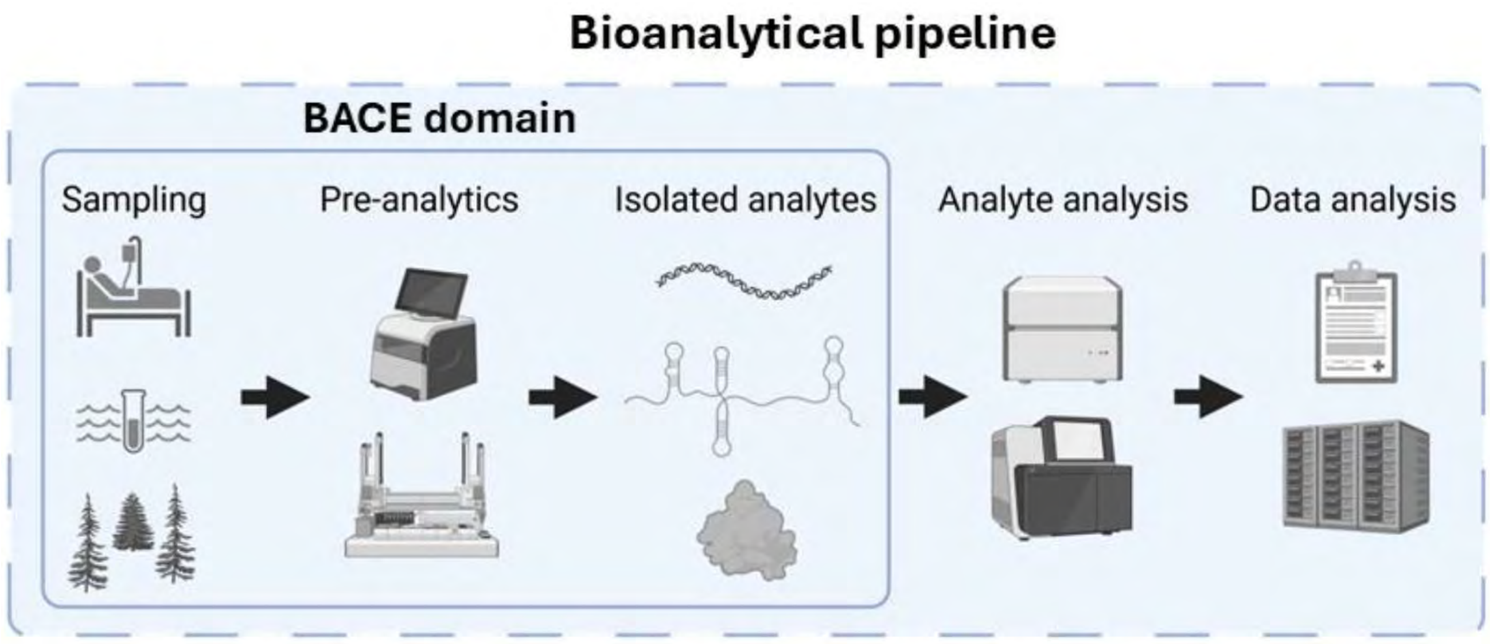

Interest in collaboration and exchange

- Competence in bioanalytical method development and optimization
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- Interest, experience of and competence in pre-preanalytical effects
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- Competence in troubleshooting and quality assurance of analytical workflows

Start and end date:
Oct 2025 – March 2026

Total budget:
1 975 714 SEK

Project leaders:
Joakim Håkansson, RISE
Yalda Bogestål, RISE
Mikael Kubista, Precision BioAnalytics
Anders Ståhlberg, Göteborg University

Funded by:
VINNOVA

Want to learn more? Contact mikael.kubista@precisionbioanalytics.com or visit www.precisionbioanalytics.com

Project partners and other (place logos here)

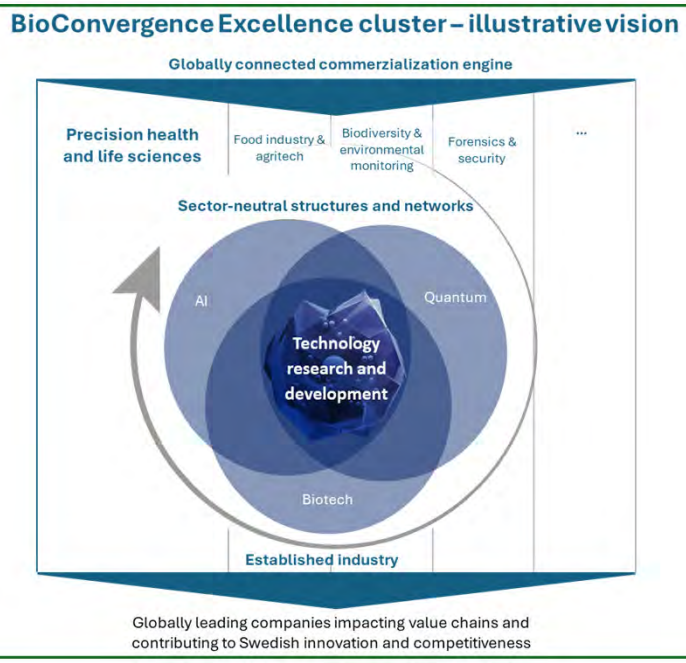
BioConvergence Excellence Cluster

- Position Sweden at the global forefront where **biotechnology, artificial intelligence, and quantum technologies converge.**
- Unite Sweden's internationally recognized strength in **ultra-sensitive molecular technologies** with advanced AI and **quantum capabilities**
- Accelerate the shift from reactive to **predictive, precise and preventive healthcare**
- Designed to be a **globally competitive innovation engine**, catalyzing scientific advances into real-world impact.

Focus areas

Create sector-neutral collaborative structures that unite leading researchers, developers, and industries around key technological challenges—integrating BioConvergence technologies to spark cross-sector and cross-value-chain innovation.

Build a globally connected commercialization engine that transforms world-class science and early start-ups into scalable solutions and successful companies—leveraging Sweden's strong life-science to accelerate international market reach and cross-sector deployment.



Interest in collaboration and exchange

Map relevant national and international infrastructures and organisations in biotechnology, AI and quantum computing

Evaluate collaboration candidates:

- Banbrytande teknologier i molekylär liv svetenskap för framtidens precisions medicin
- PROMISE- Precision Omics Initiative Sweden
- BACE – BioAnalytical Cluster of Excellence
- Precision Cardiology Sweden
- QuiteCute
- QuantumSTREAMS
- M4-HEALTH

Facts

Start and end date:
Oct 2025 to March 2026

Total budget:
1,1 MSEK

Project leaders:
Josefin Klingvall, Sahlgrenska SciencePark
Kristina Levan, Business Region Göteborg

Funded by:
Vinnova

Josefin.klingvall@sahlgrenskasciencepark.se and **kristina.levan@businessregion.se**

Project partners and other

Breakthrough Technologies in Molecular Life Science to Power Precision Medicine and the Future of Healthcare in Sweden

Our vision is that by 2035, Sweden will be a global leader in translating breakthrough biotechnology and AI into patient-centered, transformative healthcare and sustainable growth.

We are establishing a national excellence cluster that connects SciLifeLab, Sweden's universities, and university hospitals into one innovation ecosystem — enabling continuous integration of cutting-edge molecular profiling, imaging, and AI-driven data analytics in clinical practice.

Our goal is to:

- **Empower precision medicine and accelerate data-driven clinical trials**
- **Transform healthcare workflows through new biotechnological methods and AI tools**
- **Foster innovation, new companies, and talent attraction across Sweden**
- **Build a model that ensures equal national access and is scalable globally**

Focus areas

The preparatory project will develop a **roadmap** for establishing the national cluster, focusing on:

- Creating **precision medicine units** at SciLifeLab's seven nodes, co-run with universities and hospitals
- Integrating **molecular and clinical data** for AI-based diagnostics and decision support
- Defining shared **governance, data management, and ethical frameworks**
- Enabling **technology-based, nationally coordinated clinical trials**
- Strengthening **industry collaboration** and **biotech innovation** through shared infrastructure
- In these units, **researchers, clinicians, and data scientists** will jointly translate genomics, proteomics, metabolomics, spatial biology, and advanced imaging into clinical practice.

Fig 1. Core implementation concept of the excellence cluster to create a set of joint precision medicine units where SciLifeLab technology and data experts and clinicians work side by side

Fig 2. National distribution of the planned excellence cluster integrating SciLifeLab with the University hospitals

Interest in collaboration and exchange

Let's connect to shape Sweden's next-generation healthcare system together. **Add your contact details here!**

Contact

Jan Ellenberg, SciLifeLab
Director
director@scilifelab.se

Learn more on scilifelab.se/strategic-areas/translation-to-healthcare/ →

Project partners

SciLifeLab

CIRCULAR MATERIALS AND MANUFACTURING EXCELLENCE CLUSTER (CMEC)

The Vision

- Secondary material to be used rather than primary material for advanced engineering
- Calls for breakthrough scientific and technological solutions.
- Swedish industry is strongly committed to fulfil scientific targets and can act as driver

The Challenges

- Speed of materials development is *too slow* to find best possible solutions
- Scalability of manufacturing solutions *across and along value chains not efficient enough*
- Product innovation capacity is *not properly linked* to the materials innovation and manufacturing excellence

The Scope

- To reduce the cost and time required for *exploration and qualification of new sustainable materials* through use of simulation, artificial intelligence and efficient physical testing.

To move beyond AI as a simple tool, ambition is to deeply integrate digital twins and physics-informed machine learning into materials development. A leading position for the cluster will be secured at the convergence of advanced materials and digital technology by making this a core strategic pillar

Focus areas

Analytics-supported materials innovation, integrated computational materials science and physics-based laws with artificial intelligence (AI) support to bring initial materials innovation capacity in place.

In-depth theory approaches, thermodynamics-based modelling and material-structure-property understanding to set critical limits of material composition and tools for refinement of solutions.

Rapid testing and evaluation of promising material, high-throughput strategy to match digital and theoretical solutions.

Manufacturing excellence driven by dedicated laboratory to pilot solution demonstrations in selected fields of technologies (advanced metallic and composite materials manufacture)

Cost modelling and sustainability assessment along with the developments, it is crucial to align these with a holistic approach, coupling with cost modelling that incorporates sustainability criteria.

Interest in collaboration and exchange

- *We interested in bridging our initiative with other initiatives*
- *We have pressure die casting, additive manufacturing and composite technology as key enablers)*
- *We are open to other technologies and steels/metals and functional materials*
- *We have end-users involved from start (Volvo Cars, Volvo, GKN Aerospace, SAAB)*

WE believe that key is (independed on technology area and material focus) to cover:

- High throughput materials screening
- Digital materials innovation
- High throughput characterisation/testing
- Raw material to product prototyping
- Manufacturing excellence lab to pilot

Facts

Start and end date:
2025-11-01-2026-03-31

Total budget:
1700000 SEK

Project leaders:
Lars Nyborg, Chalmers
Malin Åkermo, KTH

Funded by:
VINNOVA, industrial in-kind

Want to learn more? Contact LARS NYBORG, lars.nyborg@chalmers.se

Project partners and other contributing organisations (place logos here)

Chalmers University of Technology (Chalmers)
Royal Institute of Technology (KTH)
Jönköping University (JU)
University West (HV)
RISE

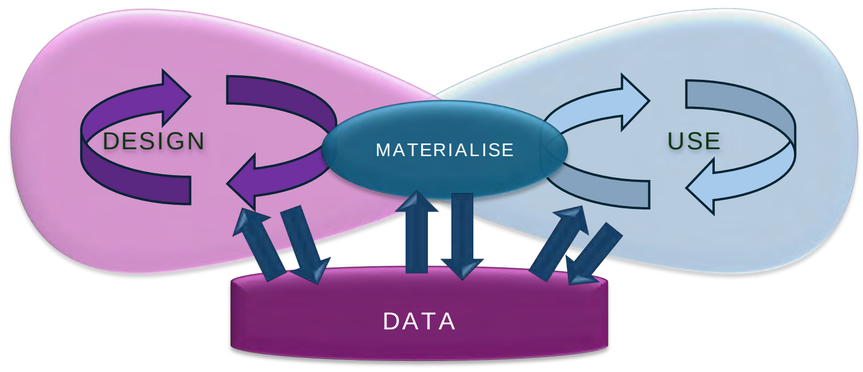
Volvo Car Corporation
AB Volvo
SAAB AB
GKN Aerospace Sweden AB

Circular Velocity - Creating the digital high-speed circular industry

The Challenge: Current manufacturing system is not set up to develop and provide circular solutions to market with the speed necessary for competitiveness, nor to meet the urgent, disruptive sustainability challenges. Sweden need to take a leading position on a global market with annual 10% growth

The Vision: By 2035, we have established a **world-leading** excellence cluster delivering a **tenfold acceleration** of sustainability transformation through circular industrial innovation and operations.

The strategy: By bringing together expertise from all phases of the life cycle and applying data-driven methods- high potential breakthrough solutions are designed, explored and formed, early and concurrently. Participants learn of limitations, risks, and potential of novel solution. Three existing national centra and partners form the base



Focus areas

A co-owned vision and strategy focusing

•**Swedish Manufacturing Competitiveness** – Focus on transformation actions in industrial and societal transformation and competitiveness

•**Innovation for Sustainable and Circular Solutions** – While many initiatives address circularity, this Excellence Cluster focuses on the **acceleration and integration** of circular technologies across the value chain.

•**Digital Infrastructure and Resources** – Digitalisation is a key enabler, through data-driven methods, generative technologies, and advanced modelling, simulation, and visualisation. Existing Chalmers capacities such as Wingquist, SII-Lab and CAM2 lead such development within their areas

•Direct engagement with **world leading expertise in materials and manufacturing technologies**, providing high potential solutions for next generation and international collaboration and positioning

Interest in collaboration and exchange

Open to collaborate and exchange, e.g.

- **Centra/actors** with Related High potential manufacturing and material technologies
- **Venues and arenas** for accelerated innovation and testing
- **Standardisation perspectives,** important for scaleability and efficiency
- **Additional Industrial partners,** not already engaged in Winquist, SII-Lab or CAM2 centra (Volvo AB,, SAAB, GKN Aerospace, SSAB, Stena, Scania, Sandvik, and many more)
- **Digital Solution** providers

Facts

Start and end date:
2025-10-20 - 2026-03-31

Total budget:
1800 k SEK

Project leaders:
Ola Isaksson, Chalmers
Centra leaders

Funded by:
Vinnova, Chalmers, CAM2, Wingquist and SII-Lab

Want to learn more? Contact Ola.Isaksson@chalmers.se

Including ca 60 Industrial Partners engaged in the three centra

Excellence Cluster for Additive Manufacturing: Resilience through Material and Process Innovation (CAMP)

The Goal — *to establish a world-leading excellence cluster by 2035, that supports the transition to a sustainable society through the use of sustainable materials and resilient manufacturing processes enabled by additive manufacturing.*

The Vision — *to become a global leader in sustainable and resilient additive manufacturing and to integrate AM into broader industrial practice.*

The Mission — *to accelerate the transition of inter-disciplinary research into commercial products and processes, catalyze the national ecosystem in multi-functional materials and advanced manufacturing, raise awareness of the potential of AM technology for emerging applications and train future AM experts to meet the future needs of industry and society.*

Resources and capabilities — CAMP is based on eight competence centres - *CAM²*, *FibRe*, *AM4Life*, *SweDeliver*, *PEA*, *WiTECH*, *NEXT* and *Wingquist Laboratory* – more than 100 national and international partners. State-of-the art research infrastructure based on *WISE Additive*, funded by the Wallenberg Initiative Materials Science for Sustainability (WISE).

Focus areas

- ***Materials and manufacturing process development*** for metal, polymer and ceramic materials driven by a variety of end-user sectors and applications
- The enormous ***potential*** of AM to tailor material properties and product design
- ***AM-enabled synthesis*** of entirely new materials and their combinations (composites, gradient materials, etc.)
- Capability to produce ***multifunctional*** components - unattainable using conventional manufacturing
- ***Customization and individualization*** - from personalized drug delivery systems and medical implants to tailored consumer products
- ***Sustainable manufacturing*** – repair, near-net shape manufacturing, bio-based materials, reuse and recycling
- ***Resilience*** - localized production and closed-loop material cycles

Interest in collaboration and exchange

- **Synthesis of sustainable materials** enabled by AM
- **Multi-materials**
- **Applications-driven** development of novel materials/multi-materials
- **Expanding** range of AM and hybrid technologies
- **Multi-functional components**
- **Hybrid manufacturing** – combination of AM and conventional manufacturing
- **Re-manufacturing** - AM as enabler in combination with other technologies
- **Resilient manufacturing** enabled by AM, circular material flow
- **Sustainability,** AM as enabler to combat environmental challenges
- **Bridging CAMP initiative** with other initiatives

Facts

Start and end date:
2025-11-03 to 2026-03-31

Total budget:
1 500 000 SEK

Project leaders:
Eduard Hryha, Chalmers University of Technology/CAM²
Cecilia Persson, Uppsala University/AM4Life

Funded by:
VINNOVA

Want to learn more? Contact Eduard Hryha: hryha@chalmers.se

Project partners and other contributing organisations

Data-driven and Emerging Production Technologies for Circular Factories - DEEPTECH

DEEPTECH aims to secure Sweden's long-term industrial competitiveness through breakthrough production technologies that enable material and product circularity. Our vision is for Sweden to lead globally in integrating forward and reverse flows within circular factories—where production, reuse, repair, remanufacturing, and recycling operate seamlessly through a technological fundament for regenerated components and material.

By combining cutting-edge research in digital twins, AI-driven decision-making, robotics, flexible automation, and intelligent logistics with pioneering advances in technologies for reuse, repair, remanufacturing and recycling, DEEPTECH will create resource-efficient and resilient industrial circular systems and value chains. The cluster acts as an engine for innovation and industrial renewal, ensuring Swedish industry shapes the global transition to carbon neutrality through integrated circular production systems, testbeds, and innovation ecosystems.

Focus areas – three pillars

1. Five key production technology research areas

- Manufacturing process technologies
- Industrial automation and intelligent robotics
- Digital infrastructures for production
- Production management technologies and methods
- Production system integration technologies

2. International and national partnerships

- Connect with key national and international stakeholders.

3. Innovation, testbed and industrial eco-system

- Testbed facilities, pilot platforms and certification expertise through RISE, industrial and university involvement
- Accelerating the technologies into innovation and entrepreneurship though the innovation eco-system
- Secure successful implementation by considering technological, social and human aspects.

Interest in collaboration and exchange

For a more comprehensive excellence cluster in materials and production technologies for circularity, DEEPTECH is open for dialogue within areas:

- AI and autonomous systems
- Material science and technology
- Deepened industry commitment
- Innovation eco-system actors
- Standard and regulatory bodies
- International partners
- SME engagement

Achieving full circularity across industry and society requires an integrated approach that includes business strategy, product development, supply chains, manufacturing, financial systems and policy frameworks.

Facts

Start and end date:
Nov 2025 to March 2026 (and onwards)

Total budget:
1,5 MSEK

Project leader:
Magnus Wiktorsson, KTH

Funded by:
Vinnova

Want to learn more? Contact Magnus Wiktorsson, magwik@kth.se

Project partners and other contributing organisations

Industrial partners, technology providers and innovation actors

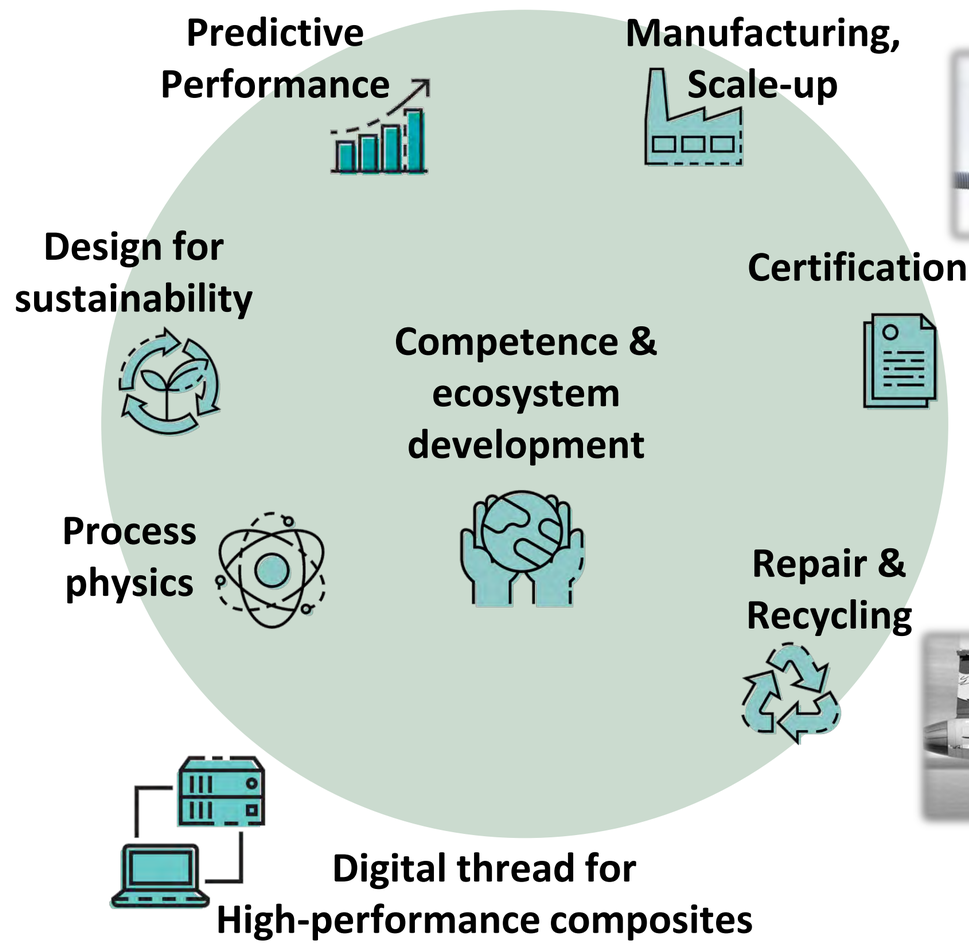
Efficient digital thread for composite structures: From process physics to predictive performance

Towards predictive, circular, and certifiable composite technologies:

- Build the foundation for a research and innovation infrastructure in advanced **high-performance** composite systems
- Connect **process physics → multi-physics modeling → performance prediction** through an **efficient digital thread.**
- Enable **reliable**, **circular, sustainable**, and **dual-use** composite structures for Swedish industry
- Industrial partners (Saab, GKN, Hitachi Energy), RISE, and leading universities (UU, LTU, LiU, KTH, Chalmers) in a coordinated national effort
- Mobilize actors within composite technology in Sweden

Focus areas: Research & Innovation Priorities

- **Digital thread for composites**: interoperable data, digital twins, and predictive models
- **Process–structure–performance integration**: physics-based and data-driven.
- **Circularity & lifecycle intelligence**: design for sustainability, repair, traceability, digital passport.
- **High-performance composites**: dual-use relevance across aerospace, defence, and energy, among others.
- **Competence & ecosystem development**: shared methods, demonstrators, and education.



Interest in collaboration and exchange

- Open to **collaboration** with clusters working on digitalization, AI, materials data, material chemistry, sustainability, and testbeds.
- **Interested** in shared demonstrators, data standards, and methods.
- Welcoming **dialogue** with clusters exploring energy systems, sensing, and circularity.
- Open to exploring **strategic synergies**, while keeping our core composite focus.
- Expand engagement **beyond our core industry partners** with shared challenges in composite performance and digitalization.
- Open to **exchange ideas** regarding the organization and governance of a cluster of excellence

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 816 800 SEK
(1 500 000 SEK from Vinnova)

Project leader:
Mahmoud Mousavi

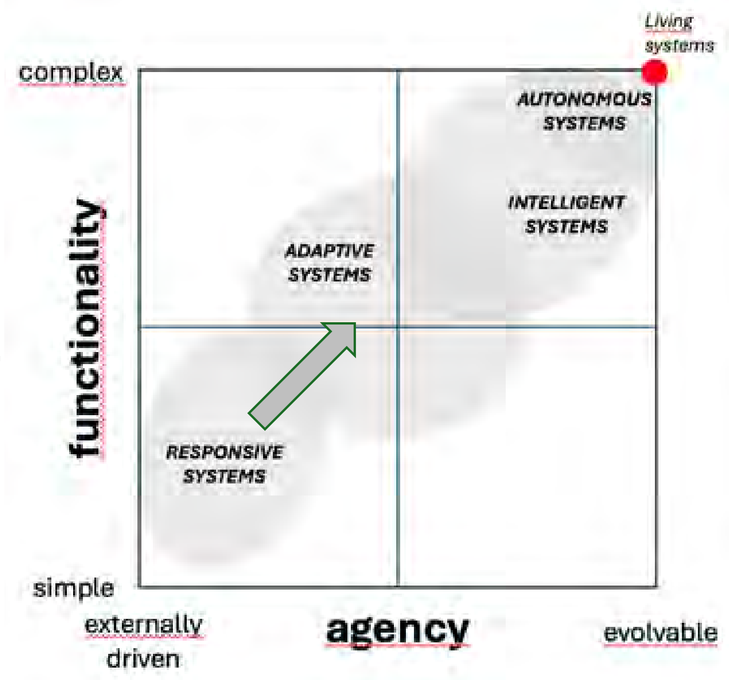
Funded by: Vinnova,
Co-funded by
SAAB, Hitachi Energy, GKN

Want to learn more? Contact Mahmoud Mousavi mahmoud.mousavi@angstrom.uu.se.

Project partners

EXCITE: Excellence Cluster for Innovative soft adaptive materials and Technologies

Our vision is to develop a theoretical and practical foundation to enable the realisation of devices and systems based on adaptive soft matter that exhibit complex functionality and high degrees of autonomy. These developments will provide a common under-pinning for hitherto inaccessible technologies across multiple sectors, such as pharma, biomedical devices, separation systems, environmental monitoring, and functional foods.



The key goals of the project are to achieve:

Designable Nonequilibrium Matter: Enables adaptation and autonomy based on the abilty to select and control system-specific attractors and dynamics.

Multiscale Architecture Control: Allows function to be encoded physically to achieve materials whose static and/or dynamic structures give rise to robust and reproducible performance within narrow tolerance limits.

Translational Adaptive Soft-Matter Technologies: Rely on fundamental knowledge to develop adaptive soft-matter systems that solve specific technological and societal problems.

Dynamic Excellence Cluster: Builds on synergy between fundamental research and technological innovation through continuous iteration and collaboration.

Focus areas

The key focus areas of the project are to:

1. lay the foundation to a thermodynamic and kinetic framework to understand, predict, and control soft matter far from equilibrium
2. develop predictive mesoscale design and 'fabrication' rules for self-organizing, adaptive networks
3. identify controlled-aging and remodeling laws for adaptive soft matter, analogous to lifetime engineering
4. establish an integrated national experimental infrastructure to support the understanding and development of adaptive soft matter systems.

Interest in collaboration and exchange

Opportunities for dialogue & collaboration:

- Integration of groundbreaking research and technological transformation, including: (i) how research should be conceptualized, organized, and communicated, (ii) how basic research feed into industrial development and vice versa, and (iii) how perspectives from humanities and social sciences can be effectively incorporated in research and technology transformation.
- Integration of AI approaches with hypothesis-driven soft-matter science to enable large, asymmetric, and complex datasets to be addressed, allowing predictive data-driven adaptive system design.
- Identification of areas and initiatives, for which adaptive soft matter may allow seemingly different application areas to connect through a unifying advanced material framework, in turn allowing technological cross-fertilization.

Facts

Start and end date:
10-2025 till 03-2025

Total budget:
1,2 MSEK

Project leader: Emma Sparr (LU)

Co-PI's: Martin Malmsten (LU, KU), Karen Edler (LU), Daniel Aili (LiU), Hanna Barriga (KTH), Fredrik Höök (Chalmers), Andreas Dahlin (Chalmers), Magnus Johnson (LiU), Mats Fahlman (LiU)

Funded by:
Swedish Research Council

Want to learn more? Contact Emma Sparr, emma.sparr@fkem1.lu.se

Project partners and other contributing organisations

Lunds Universitet · Chalmers · Linköpings Universitet · KTH Vetenskap och Konst · ESS · MAX IV · SciLifeLab

Field Robotics CoE

*Our goal is to advance **AI-driven perception, decision-making, control, and human-robot collaboration**, while pioneering technologies for **resilient, large-scale mobile autonomy**.*

*We will **develop, validate, and transfer** groundbreaking automation technologies – **from lab and supercomputers to the field and to industry** – cementing Sweden's role as a **global leader in real-world and field-tested autonomous systems** by 2035.*

*Our vision is a future where **autonomous systems**, underpinned by cutting-edge AI, **operate seamlessly in unstructured, dynamic environments**, addressing a shrinking workforce and resource independence.*

*We are not building robots for controlled environments or digital AI agents. We create truly field-ready autonomous systems that thrive in the unpredictable, unstructured real world. **Our systems don't just work in perfect conditions – they excel when something inevitably does go wrong.***

Focus areas

We focus on **application areas** spanning over forestry & agriculture, mining & construction, search & rescue, logistics & transport.

Research verticals include AI-based perception & navigation, manipulation & interaction, and adaptivity & integration.

We develop **excellence** in research, business & innovation, and trustworthy & safety-aware AI-based autonomy.

	Perception	Navigation	Manipulation	Interaction	Adaptivity	Integration
Forestry	tree health assessment	locomotion in terrain	log grasping, planting	shared control	uncertain and changing environment	multi-vehicle sensor reconciliation
Agriculture	yield mapping	low-compaction traversal	precision picking, pruning, weeding	shared control	seasonal modelling	weather-resistant operation
Construction	air flow mapping	mm-tolerance localisation	granular material handling	gesture-based interfaces	contiunal structure changes	interoperability
Logistics and Transport	out-of-distribution detection	scalable fleet coordination	human–robot co-manipulation	trust in self-optimising fleets	human-aware navigation	edge–cloud integration
Public Safety	low-visibility perception	highly dynamic environments	precision delivery	high-stress interfaces	resource-bounded reasoning	unreliable communications
Mining	ore/waste differentiation	tight manoeuvers	loading fragmented rock	mixed human/ autonomous traffic	adaptive drilling	underground communication






Interest in collaboration and exchange

Needs

- Integration pathways linking novel hardware with robust AI control systems.
- Advanced sensing and low-level processing for reliable perception under challenging conditions.
- Methods to scale integration and deployment for autonomous systems.

Collaboration opportunities

- Co-developing multimodal perception and AI-driven decision systems.
- Applying field-proven autonomy to accelerate deployment in industrial and outdoor settings.
- Aligning strategic roadmaps for long-term innovation in autonomous machines.

Facts

Start and end date:
11-2025 to 03-2026

Total budget:
1492K SEK

Project leaders:
Martin Magnusson, ORU
Olov Andersson, KTH
Mariusz Wzorek, LiU
Martin Servin, UMU
Linnéa Hansson, Skogforsk
George Nikolakopoulos, LTU

Funded by:
Vinnova

Want to learn more? Contact Martin Magnusson: martin.magnusson@oru.se.

Project partners

ÖREBRO UNIVERSITET · KTH VETENSKAP OCH KONST · LINKÖPINGS UNIVERSITET · UMEÅ UNIVERSITET · skogforsk · LULEÅ TEKNISKA UNIVERSITET

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Our vision is a future where ***autonomous systems****, underpinned by cutting-edge AI,* ***operate seamlessly in unstructured, dynamic environments****, addressing a shrinking workforce and resource independence.*

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Facts

Start and end date:
11-2025 to 03-2026

Total budget:
1492K SEK

Project leaders:
Martin Magnusson, ORU
Olov Andersson, KTH
Mariusz Wzorek, LiU
Martin Servin, UMU
Linnéa Hansson, Skogforsk
George Nikolakopoulos, LTU

Funded by:
Vinnova

Want to learn more? Contact Martin Magnusson: martin.magnusson@oru.se.

Project partners

ÖREBRO UNIVERSITET · KTH VETENSKAP OCH KONST · LINKÖPINGS UNIVERSITET · UMEÅ UNIVERSITET · skogforsk · LULEÅ TEKNISKA UNIVERSITET

FLUX - Fluid Science Driving Technology Breakthroughs

Fluid Mechanics is one of Sweden's most important disciplines

- It is the science of moving gases, liquids, particles, and soft materials.

FLUX vision:

Break critical barriers in Sweden's strategic sectors by developing intelligent models that enable the design, prediction and control of complex flows.

Focus areas

- We target strategic areas where **fast and reliable models of flows** are essential:

1. Hydrogen production & combustion of green fuel.
2. Predicting extreme weather events & climate adaption
3. Precision biomaterials through controlled assembly and mixing
4. Precision medicine via digital twins of the circulatory and respiratory systems
5. Sustainable propulsion and high-speed vehicles

Interest in collaboration and exchange

*FLUX will develop **next-generation intelligent of complex flows:***

- *Turbulence*
- *Multiphase flows*
- *Complex and non-Newtonian fluids*
- *Biological and active flows*

Intelligent models will enable:

- *Real-time prediction & control of flows*
- *Fast & reliable flow models for engineering design*

*Our mission: use intelligent models **to break critical barriers** with high probability of impact in strategic sectors.*

Facts

Project leaders:
Shervin Bagheri (KTH)
Christer Fureby (Lund)
Fredrik Lindsten (LiU)
Dan Henningson (KTH)
Outi Tamisola (KTH)
Ricardo Vinuesa (KTH)

Funded by:
Vetenskapsrådet (Network grant)

Want to learn more? Contact Shervin Bagheri (shervinb@kth.se) or visit www.kth.se/profle/sherwinb.

Project partners and other contributing organisations

KTH VETENSKAP OCH KONST · LUNDS UNIVERSITET · LINKÖPINGS UNIVERSITET · Vetenskapsrådet

Fusion Center of Excellence (FCE)

By early 2030's, Sweden will host a world-leading Fusion Center of Excellence that will be recognized as frontrunner for moving fusion from a scientific frontier to industrial reality.

Our vision is to make Sweden synonymous with fusion innovation: the place where groundbreaking science, bold entrepreneurship, and world-class industry converge to unlock the energy source of the future.

Three goals with the fusion cluster are:

1. To foster early collaboration with utilities, industrial actors & EPC's to accelerate the development of real-world fusion power plants.
2. To build an academic platform dedicated to researching the requirements for transforming fusion technology into an industrial reality.
3. Advocate for regulatory frameworks that support long-term planning for site selection, grid integration, and handling of fusion material etc.

Focus areas for the upcoming pre-study

- Map relevant actors across academia, industry, government, and infrastructure for a future center of excellence.
- Define roles, responsibilities, commitment levels, and develop a timeline for cluster formation.
- Set goals and focus areas for the cluster's research activities.
- Describe collaboration opportunities with Nordic partners.
- Align the cluster with the broader European fusion agenda.
- Propose an advisory committee to guide strategic direction.

Interest in collaboration and exchange

- **Need for dialogue between academia and industry** to align research with future industrial and competence needs.
- **Need for collaboration with industry actors** to define requirements for fusion deployment, supply chains, and operations.
- **Engagement with the nuclear** (fission and fusion) **community** for technical expertise and validation.
- **Dialogue with utilities, EPCs and industry** to explore market integration, business models, and new product opportunities.

Facts

Start and end date:
11-2025 till 03-2026

Total budget:
1.5 Million SEK

Project leaders:
Linnea Strömstedt
Philip von Segebaden

Funded by:
Vinnova

Want to learn more? Contact Philip von Segebaden: philip.vonsegebaden@novatronfusion.com

Project partners

NOVATRON · KTH VETENSKAP OCH KONST · granitor

GaMeAT
Game and Media AI Tools

Goal : Innovation driven by world-leading graphics and machine learning research in collaboration with the Swedish gaming and media industry

Vision : The creation of user-centric AI-based tools for industry and society, using open and ethical AI.

Our Goal and Vision encompasses several further ideals :

- **Creating startup companies that connect world-leading AI research to the gaming and media industries.**
- **Using AI to improve human collaboration and connection.**
- **Bridging the gap between what AI can do, and what we're building with it.**
- **Continuously creating international collaboration to drive world-wide visibility**
- **Pursuing AI sovereignty**

Focus areas

Research Focus :

- Real-Time Photorealistic Neural Graphics : Global illumination, Texture compression, Material models, Animation, Digital twins, Generative models
- Sparse sampling, Neural post-processing
- Language models (LLMs) and processing (NLP), Generative AI models

Innovation focus :

- Human-centered creative tools
- AI-driven tools that work alongside artists and creators
- Novel model architectures using the lastest GPUs
- Model training from computer generated and open source data

Interest in collaboration and exchange

Potential collaborators :

- **AI researchers**
- **Gaming and Media Companies**; small, medium, and large.
- **Organisations**; Gaming and Media industry bodies, Entertainment industry bodies

Looking for dialogue with :

- AI centric excellence clusters.
- Serious gaming experts in contexts such as education, healthcare, and rehabilitation

Facts

Start and end date:
11-2025 till 04-2026

Total budget:
1 280 000 SEK

Project leaders:
Michael Doggett, Lund University
Jonas Unger, Linköping University

Funded by:
Vinnova

www.gameat.se

Project partners and other contributing organisations

GENEVA: A Cluster of Excellence for Generative Vaccine Development

The Cluster of Excellence for Generative Vaccine Development (GENEVA) will combine nucleic acid vaccines and deep learning - both groundbreaking technologies - to elevate vaccine and therapeutic development.

New developments in nucleic acid vaccine platforms will be pursued, with generative AI integrated at various levels: immunogen design and optimization, interpreting immune responses, and improving the nucleic acid platforms themselves. This will all be grounded in a well-established world-class immune response research program.

Together, this will address previously intractable problems and currently unmet needs in vaccine research, shorten development timelines, enhance pandemic preparedness, and improve vaccine efficacy and safety. At a time when mRNA vaccine research is under threat in the US, European institutions must step forward and maintain momentum in this field.

GENEVA will position Sweden at the forefront of next-generation vaccine and therapeutics research, creating a resilient research ecosystem and building capacity that addresses priority pathogens and pandemic prevention, while training the next generation of scientific leaders.

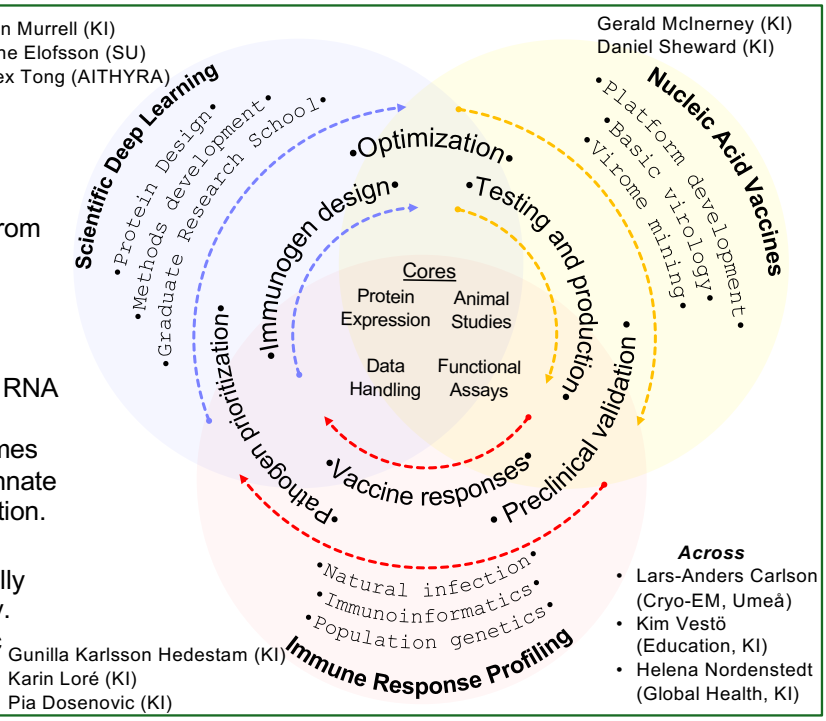
Focus areas

Shared
- Pathogen prioritization.
- Design immunogens.

Immune Response Profiling
- Preclinical testing of designed vaccines.
- Isolation of monoclonal antibodies.
- Detailed studies of antibody responses from natural infection.

Nucleic Acid Vaccines
- Produce mRNA and replicon vaccines encoding designed antigens.
- Explore improvements to self-amplifying RNA replicon systems.
- Improve mRNA vaccines by mining viromes to identify viral elements that modulate innate immune responses and enhance translation.

Scientific Deep Learning
- Develop protein design models specifically targeting open challenges in vaccinology.
- Establish a graduate school in “Scientific Deep Learning”.



Steering Group

- Gunilla Karlsson Hedestam
- Ben Murrell
- Gerald McInerney
- Daniel Sheward
- Karin Loré
- Arne Elofsson

Interest in collaboration and exchange

- Partners for GMP and clinical trials.
- Biology-adjacent AI risk experts.
- Researchers in deep learning at Swedish HEI’s who are interested in collaborating on a graduate school in Scientific Deep Learning.

Facts

Project leader:
Gunilla Karlsson Hedestam

Institutions so far:
Sweden
- Karolinska Institutet
- Stockholm Universitet
- Umeå Universitet

Europe
- AITHYRA (Vienna, Austria)

Contact

Gunilla Karlsson Hedestam (gunilla.karlsson.hedestam@ki.se) and Ben Murrell (benjamin.murrell@ki.se)

Project partners and funding

Karolinska Institutet
Stockholm University
UMEÅ UNIVERSITY
Vetenskapsrådet
Dnr. 2025-07482

Groundbreaking technologies for novel greenhouse gas concentration and flux measurements

Greenhouse gas (GHG) fluxes (F_{GHG}) are putting our future at risk. Most of the strongest GHGs are increasing fast (methane and nitrous oxide) and many carbon sinks are linked to e.g. land use change or waste management. To understand these fluxes, we need widespread, accurate, and cost-effective capacity to measure and map F_{GHG}. However, technology for this is missing. Hence, an Excellence Cluster on new technologies for improved F_{GHG} measurement and mapping capacity responds to a pressing global need.

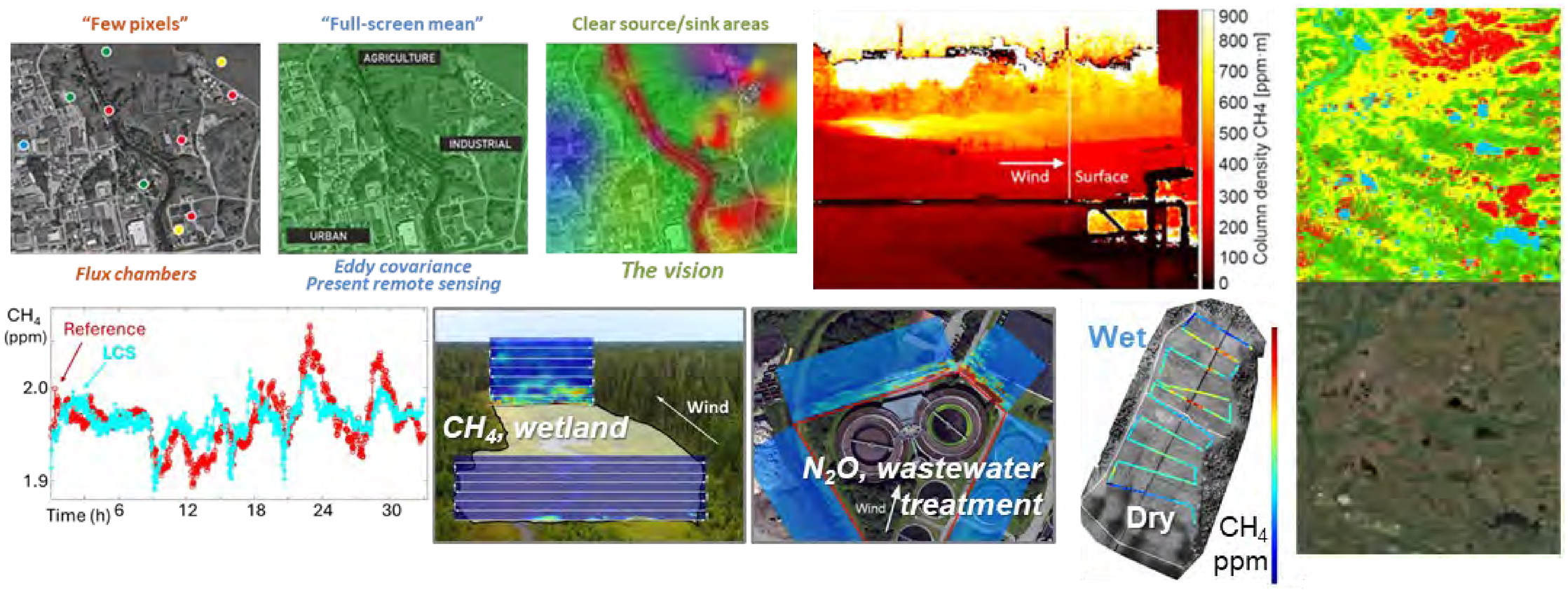
Implementability beyond hardware and software is essential. This includes technologies for signal and data processing, system integration, high-level information fusion, and suitable user-interfaces.

Rapid implementation also requires, close interactions with practitioners and citizens in data collection and analysis, as well as analyses of societal impacts and risks.

The cluster will expand networks in academia and beyond to unite groundbreaking science in addressing urgent societal needs.

Illustrations

Upper left: The need - from point measurements or large-area-means to spatiotemporally resolved high-resolution patterns.



Proof-of-concept technologies, including low-cost sensors (LCS), hyperspectral and drone-borne FGHG measurements, and high-resolution remote sensing, have recently been developed by the team. Additional development paths will be considered.

Interest in collaboration and exchange

We are interested in dialogue on potential collaboration across multiple relevant research domains, as well as with interested companies and other organisations.

The planning includes consideration of the long-term needs for a strong Excellence Cluster, and developing collaborations is therefore central.

Goals of rapid and effective implementation calls for close collaboration and interaction among many disciplines and among various technology producers and technology users.

Facts

Start and end date:
Oct 2025 to Mar 2026

Total budget:
1.2 MSEK (the planning project)

Project leader:
David Bastviken
Funded by:
Swedish Research Council (Vetenskapsrådet)

Want to learn more? Contact David Bastviken (david.Bastviken@liu.se).

Planning project application team:
David Bastviken, Fredrik Gustafsson, Natascha Kljun, Fredrik Lindsten, Tina-Simone Schmid Neset, Yonghao Xu, Magnus Gålfalk, Victoria Wibeck, Guillem Domènech-Gil, Martin Karlson

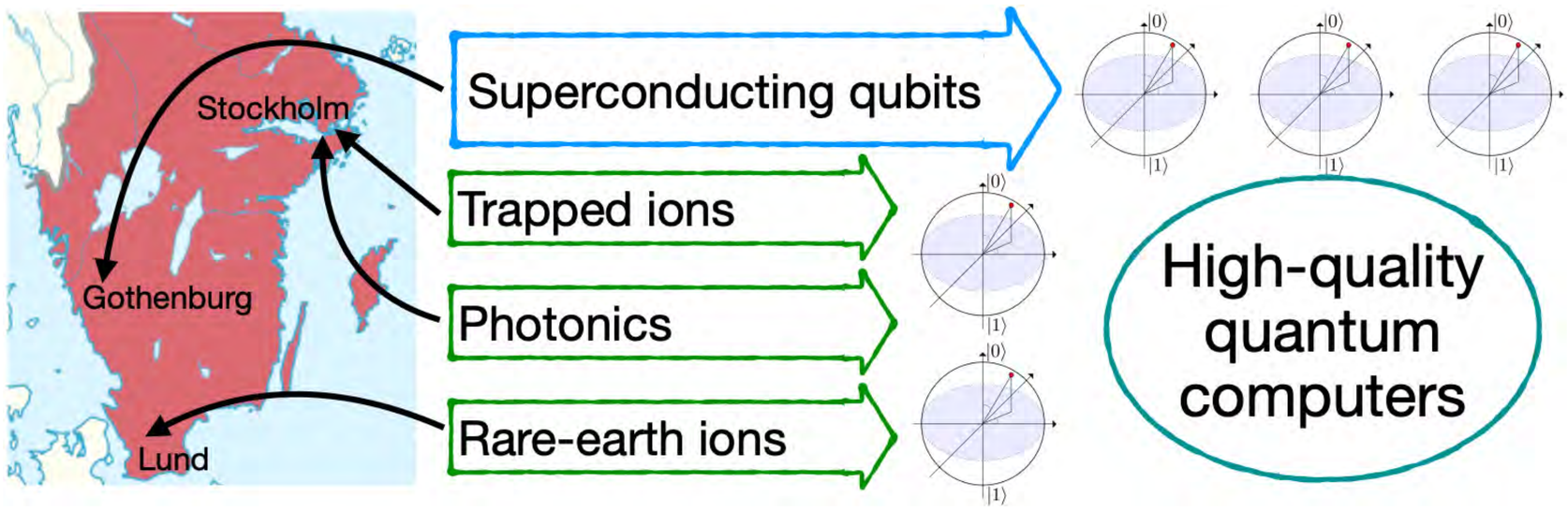
LINKÖPING UNIVERSITY
LUND UNIVERSITY

High-quality quantum computers

There is a global race for developing new technologies exploiting the counterintuitive phenomena arising in systems described by quantum physics. Our excellence cluster aims to leverage Sweden's strength in the quantum technology that is projected to have the greatest impact on the world — quantum computing. We will contribute groundbreaking research towards high-quality quantum computers, creating the next generation of hardware on platforms for quantum computers where Sweden has proven prominence:

- **Superconducting qubits**, where we have demonstrated world-class coherence times and record-low crosstalk in intermediate-scale devices;
- **Trapped ions**, where we have demonstrated very fast operations;
- **Rare-earth ions** in solid-state materials, where we can achieve extremely long coherence times and high connectivity;
- **Photonics**, where we can create integrated devices.

Focus areas



Our guiding motto is "quality before quantity". We will tackle many scaling challenges for quantum bits with a focus on the quality of components (e.g., coherence times) and operations (e.g., speed, fidelity, variety, and connectivity), to prepare high-quality modules that can be connected into a larger quantum computer. Our work towards these goals will be aided by close collaboration between experiment and theory on topics like

- Materials science for hardware development;
- Quantum algorithms and quantum error correction adapted to hardware properties;
- Technology for connecting quantum-computing modules;
- Software for calibration, control, and simulation.

Interest in collaboration and exchange

We see several opportunities for dialogue and collaborations with other clusters, for example regarding

- **Materials science**; Fully tackling the materials challenges for several quantum-computing platforms is an enormous undertaking, which would be helped by collaboration.
- **Machine learning**; there are many areas of quantum computing where machine learning may help find better solutions, e.g., in calibration, control, characterization, error correction, …
- **Infrastructure**; Most hardware platforms for quantum computers require very advanced infrastructure for nanofabrication and for measurement setups, which could potentially be shared between clusters

Facts

Project leaders:
Anton Frisk Kockum

Giovanna Tancredi
Göran Johansson
Markus Hennrich
Stefano Markidis
Kristin Persson
Morten Kjaergaard

Funded by:
Swedish Research Council

Want to learn more? Contact Anton Frisk Kockum (anton.frisk.kockum@chalmers.se).

Project partners

CHALMERS · Stockholms Universitet · KTH Vetenskap och Konst · University of California, Berkeley · Universitas Hafniensis · Lunds Universitet · Uppsala Universitet · Universitas Gothoburgensis

Hydrogen SIC!

Hydrogen – The Systemic Innovation Cluster for Excellence along and across the Value Chains

By 2035, this world-leading excellence cluster on fossil-free hydrogen contributes with groundbreaking R&D, education, component production, and innovations to aid the de-fossilization of our resilient society. Sweden is the first country in the world to reach climate positive hydrogen production via use of fossil-free electricity in combination with biomass with carbon capture and storage. Hydrogen related services and products (components, derivatives) sums up to 5 % of exported goods from Sweden and have a major impact to Sweden's security of supply and resilience.

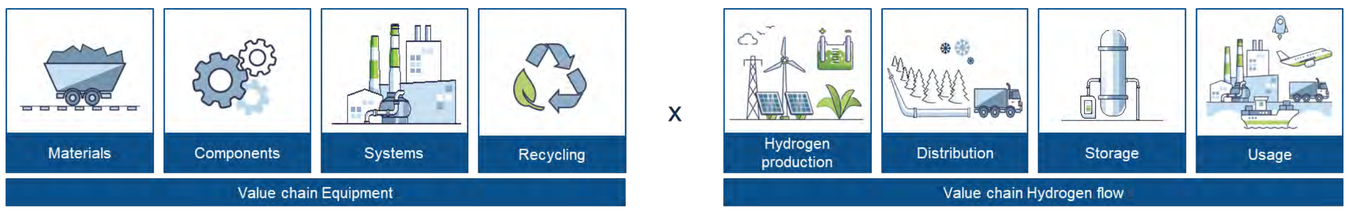
The cluster has succeeded in spreading science-based knowledge to reach social and political engagement, attracted capital and skilled personnel for hydrogen-based solutions, and is supporting the evolving industry and directs the resources by long term R&D programs, leading to world-famous brands, services and products. The hydrogen cluster has been collaborating to find the priorities in development over the years for both short- and long-term effects, based on a national systematic holistic perspective, and is ready to expand its impact world-wide.

(VISION)

Focus areas

Focus application areas are hydrogen usage for industry, transport, energy system and security of supply.

From a holistic perspective we will perform analysis and priorities of the research needs and deployment potential in different areas of importance for hydrogen, *e.g.* safety and security, geomechanics for underground constructions, business development, production of components (including geographical availability) and social science. Giving space for both low and high TRL intra- and inter-disciplinary research for both short- and long-term results and impact. single initiative could address alone.



This Swedish Excellence cluster will support innovation, research, development and deployment for hydrogen along and across these two value chains.

Interest in collaboration and exchange, *e.g.*

We are open for collaboration on overlapping technologies and application areas, innovation management and production methodologies.

Content and applications
- Industrial de-fossilisation and development
- The transition of the transport sector
- Energy system development
- Security of supply – components & energy
- Material and component innovations

Methodologies
- How to evaluate monetary values for the vision?
- Proactiv selection of international collaboration

Overall
- How to support the Swedish stakeholders to be the best in the world?

Facts

Project lead:
Cecilia Wallmark, LTU
Göran Lindbergh, KTH
Thomas Wågberg, UmU
Maria Grahn, Chalmers
Anders Lundblad, RISE
Mikael Larsson, Swerim
Hans Pohl, Lindholmen Science Park

Funded by:
Vinnova

Want to learn more? Contact Cecilia Wallmark, Cecilia.Wallmark@ltu.se or visit www.ltu.se/centres/CH2ESS.

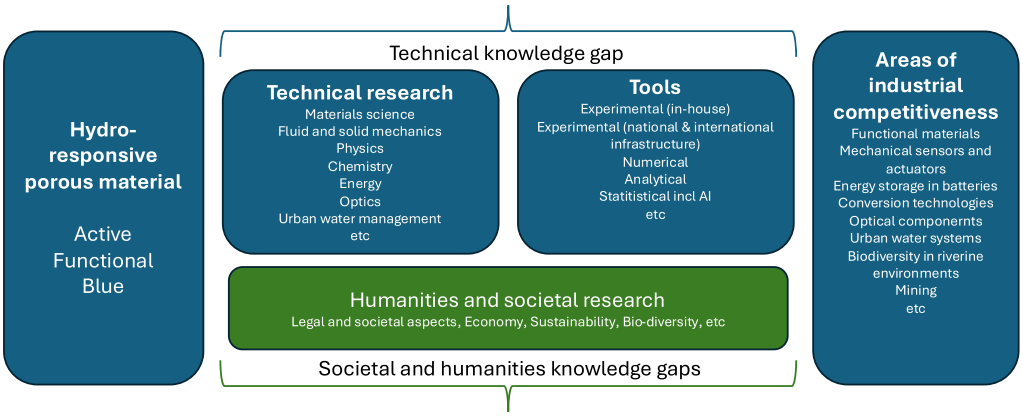
Project team with logos below. The excellence cluster is open for all interested hydrogen-related stakeholders.

Hydro Responsive Porous Materials

HYPERESS

A Platform for Energy, Ecosystems, Safety and Sensing

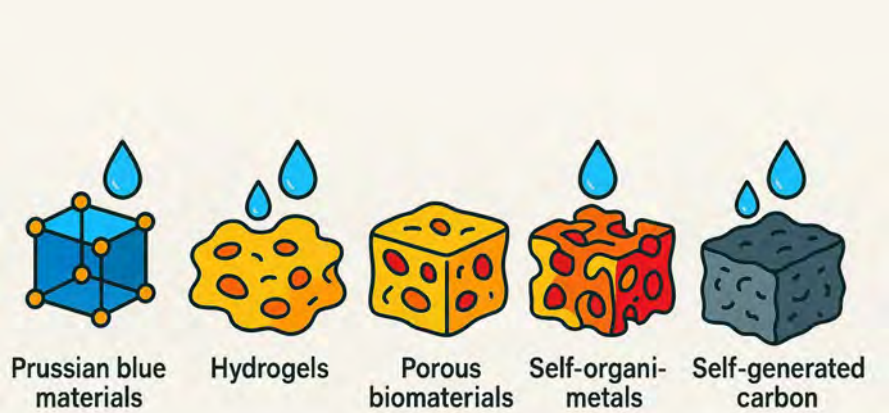
Focus is on the science of water responsive porous materials including active, functional and blue materials. These materials, which exhibit new properties when interacting with water, lay ground for the development of groundbreaking technologies contributing to industrial competitiveness.



Focus areas

Many fundamental research questions remain open, providing essential input for more application-driven studies. Key areas to consider include but are not limited to:

- Liquid water transport.
- Wetting/drying.
- Particle transport.
- Optical scattering.
- Charge transport.
- Mechanical behaviour.
- Durability.
- Societal aspects.



Examples of hydro responsive porous materials

Interest in collaboration and exchange

On-going activities

- Exchange among cluster members.
- Identification and discussions on bottlenecks/research questions, cross-cutting themes.
- Selection of invitees having knowledge about certain hydro responsive porous materials and tools with which they can be studied.
- Define international partners.
- Define the need for infrastructure.

Future activities

- Collaboration with invited researchers.
- International visits.
- Meeting with MAX IV.
- Route to ground-breaking technologies & industrial competitiveness.
- Etc.

Facts

Start and end date:
10-2025 till 03-2026
Total budget:
1.2 MSEK
Project leaders:
Staffan Lundström, Kristiina Oksman, Maria Pettersson, Mikael Sjödahl, Maria Viklander (Luleå university of technology)
Stina Jansson, Thomas Wågberg (Umeå university)
Reza Younesi (Uppsala university)
Funded by:
The Swedish Research Council

Want to learn more? Contact Staffan Lundström, Luleå university of technology, staffan.lundstrom@ltu.se

Current project partners

LULEÅ UNIVERSITY OF TECHNOLOGY

UMEÅ UNIVERSITY

UPPSALA UNIVERSITET

Innovations in Ultrafast Laser Science -

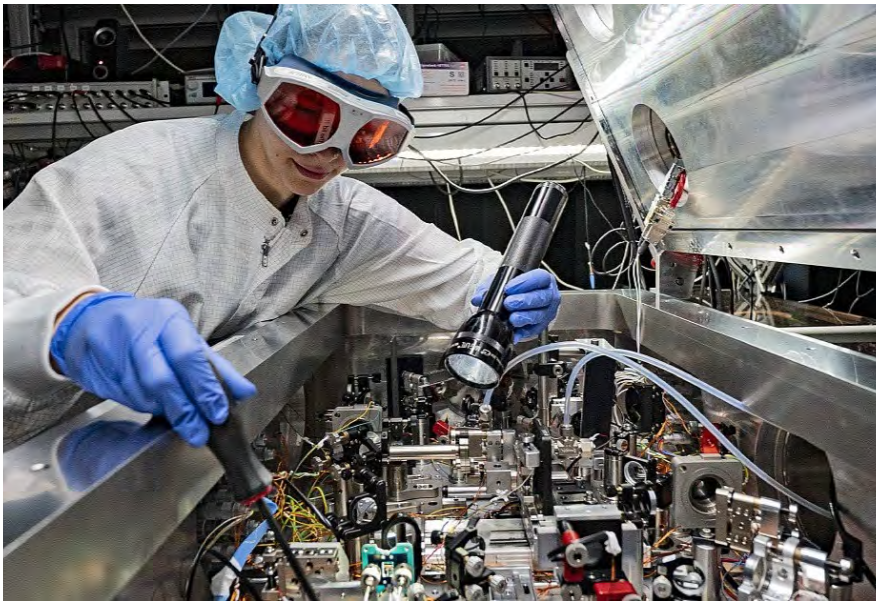
Source Development and Applications

Ultrafast laser science opens extraordinary possibilities to probe and control matter on femto- and attosecond timescales, driving discoveries in physics, chemistry, materials science, and medicine. Sweden is uniquely positioned to establish a world-leading Excellence Cluster for Innovations in Ultrafast Laser Science.

Building on the Laserlab Sweden infrastructure network and a vibrant community of ~200 scientists from many Swedish universities, this initiative will gather top-tier expertise in several frontier areas as outlined in what follows.

Focus areas

- (1) **Advanced laser and detection systems**, pushing the limits of next-generation laser technologies, spatiotemporal field synthesis, and ultrafast diagnostics.
- (2) **Attosecond science**, advancing coherent XUV and X-ray sources for controlling electron dynamics.
- (3) **Ultrahigh-intensity laser–matter interactions**, developing compact accelerators and novel X-ray sources with transformative impact on medicine and industry.
- (4) **Precision spectroscopy**, exploiting frequency-comb innovations for breakthroughs in astrophysics, quantum technologies, and communication systems.



Interest in collaboration and exchange

As part of the planning phase, we are in the process of organizing thematic round-table discussions and a large workshop (January 15 – 16, 2026 in Gothenburg) to shape a unified scientific vision, foster collaborations across the participating environments, the health sector and industry, design the cluster's structure, and identify key research and training needs. Currently, we are in search for:

- **Partners from industry** who are interested in contributing to such a cluster.
- **Partners from the health sector** who are interested in contributing to such a cluster.
- **Representatives from social science and/or humanities** who want to contribute to such a cluster with their perspectives.

Facts

Start and end date:
10-2025 until 03-2026

Total budget:
1.2 MSEK

Project leaders/core group members:
Raimund Feifel, Cord Arnold, Anne L'Huillier, Per Eng-Johnsson, Mattias Marklund, Laszlo Veisz, Valdas Pasiskevicius, Aleksandra Foltynowicz, Ronny Knut, Eva Lindroth & Mikael Strömberg

Funded by:
Swedish Research Council

Want to learn more? Contact Raimund Feifel (+46-708-381689; raimund.feifel@physics.gu.se)

GÖTEBORGS UNIVERSITET · CHALMERS · UMEÅ UNIVERSITET · LUNDS UNIVERSITET · LTH LUNDS TEKNISKA HÖGSKOLA · UPPSALA UNIVERSITET · Stockholms universitet · KTH VETENSKAP OCH KONST · Laserlab Sweden

Integrated development of materials, production and products, accelerated by AI and in-operando monitoring

Our vision is to develop breakthrough technologies by tightly integrating materials design with product performance and production control. This is enabled by:

a) extensive real-time in-operando/in-situ measurements of synthesis, production, and product performance both in products/production and at world-leading infrastructures,

b) tailored AI that advances modelling, synthesis, characterization, and process and production control using their data streams.

The cluster vision centers on metals – especially steel and hard metals – critical to sectors such as energy, transport, food, and defense, and with general transferable knowledge.

Breakthrough outcomes expected in:

- Integrated rapid innovation
- Full recycling of product materials
- Resource minimization
- Resilience
- Renewal

Focus areas

By addressing materials, production and products simultaneously we can develop each component to exactly the needed level to achieve superior overall performance.

Material Design and Development
Combine world-leading synthesis, characterization, and modeling with AI-driven design.

In-Operando and In-Situ Methods
Large-scale characterization facilities and embedded sensors in products and production.

Product and Production Control
Merge physical models and sensor data for real-time, autonomous control including tailored robotics and AI.

Interest in collaboration and exchange

We see strong opportunities for collaborations and merging of visions to create the strongest teams and value proposition for key Swedish industry.

The companies involved represents revenues far more than >1000BSEK 2024 with common denominators over sectors.

Many techniques are needed to realize the vision of the proposal.

Breakthrough enablers:

- Trustworthy, application specific AI
- Deep Integration
- Real-time studies and control
- Automation & robotics

Facts

Start and end date:
11-2025 till 03-2026

Total budget:
1,5 MSEK

Project leaders:
- Anders Mikkelsen, Chair Management group
- Susanne Norgren, Chair Industrial Steering group

Funded by:
Vinnova – Sweden's Innovation Agency

Want to learn more? Contact Professor Anders Mikkelsen, Lund University, anders.mikkelsen@fysik.lu.se

Project partners and others

Industry partners:
Alfa Laval Technologies, Alleima, Sandvik Group, Sandvik Coromant, SECO Tools, Scania, SKF, SSAB, Traton, Volvo GTO Powertrain, Volvo GTT, Tetra Pak Processing

Research infrastructures:
MAXIV, ESS, ARTEMI, Myfab

Molecular tools for drug discovery based on RNA–protein interactions

RNA–protein interactions (RPIs) are fundamental to cellular function, yet remain poorly characterized across organisms and diseases. We outline the development of a national excellence cluster aimed at revolutionizing RPI research through a multidisciplinary approach that integrates RNA biology, proteomics, structural biology, artificial intelligence (AI), and translational science. The cluster will establish a novel technological platform for RPI

- High-throughput identification
- Structural determination
- AI-driven prediction

The goal is the creation of a publicly accessible RPI Atlas. This resource will enable researchers to explore RNA–protein interactomes across species and disease states, facilitating drug discovery, diagnostics, and mechanistic insights.

Focus areas

Technological breakthroughs and a co-ordinated multidisciplinary effort are required.

Technologies used for the methodology are:

- Large-scale RNA sequencing,
- Advanced mass spectrometry
- High-throughput structure determination
- AI-models

Over a 10–20-year horizon, the cluster is expected to:

- Build an open-source atlas for RNA-protein interactions
- Fuel next-generation drug discovery
- Generate interdisciplinary collaboration and training
- Influence international research priorities
- Impact society via biosafety policies and dual-use risk management

Interest in collaboration and exchange

- **Research infrastructure facilitators**
- **Innovators of life science methods**
- **Data science developers**

Facts

Network members:
Francesca Aguilo, Umeå University
Sara Hamis, Uppsala University
Erik Holmqvist, Uppsala University
Erik Jansson, Uppsala University
Francis Lee, Södertörn University
Lindon Moodie, Uppsala University
Maria Selmer, Uppsala University

Funded by:
Swedish Research Council

Contact erik.jansson@uu.se for more information

Project partners

SÖDERTÖRNS HÖGSKOLA | STOCKHOLM

UMEÅ UNIVERSITET

UPPSALA UNIVERSITET

National Excellence Cluster in AI-Driven Antibiotic Innovation

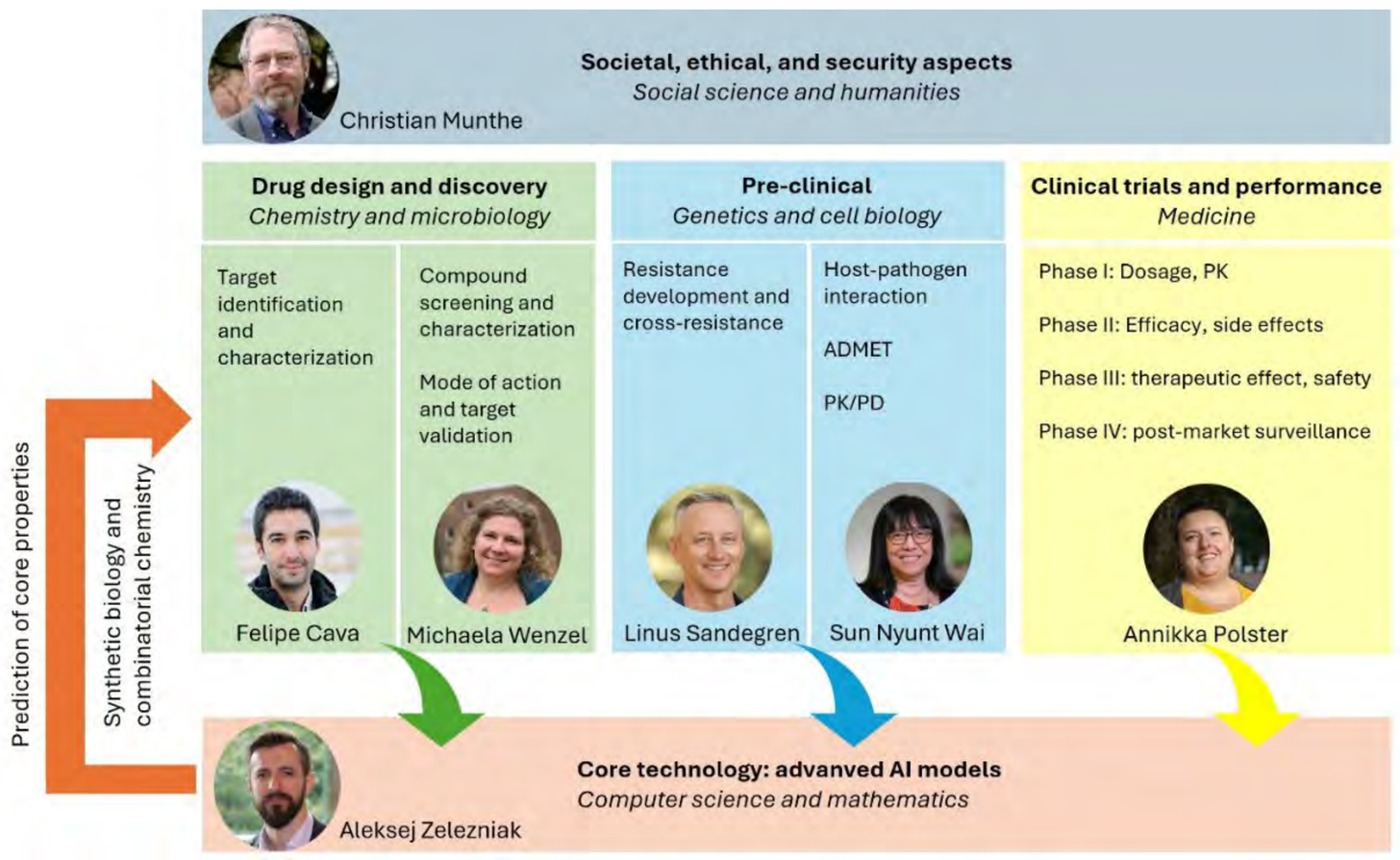
The mission of this excellence cluster is to enable the AI-guided support of antimicrobial drug development at all stages of the pipeline, aiming to deliver accurate, data-driven predictions of new drug candidates with desirable properties, increase hit rates, and reduce compound failure rates at later stages of the drug development process.

- **Antimicrobial resistance (AMR) causes a considerable health and economic burden**
- **New drug development is too slow and not innovative enough**
- **Urgent need for new targets and mechanisms**
- **Critical need for reducing failure rates along the pipeline**

Focus areas

The cluster is organized along the stages of the drug development pipeline, building on AI as core technology and bracketed by ethics and political sciences.

- Identification of crucial data needs for AI-based predictions and AI needs for effective usage of biological data
- Specific data generation to fill critical knowledge gaps
- Development and training of new AI models to predict next-generation drugs candidates
- Synthesis and testing -> feedback into AI models



Interest in collaboration and exchange

We are open to collaborating with other clusters/partners in AI and health science and technology.

- **AI technology**; We are happy to consider complementary AI-based approaches applicable to our cluster.
- **High-throughput screening and automation**; Additional high-throughput technologies and screens that could be of use to the cluster are very welcome.
- **Health science**; We welcome discussions of synergies and joint strategies with other efforts to generate data and/or develop models applicable to related areas of health science.
- **Contribution to other clusters**; We are happy to apply the expertise, data, and technologies present in/emerging from our cluster to other excellence clusters and further initiatives, where applicable.

Facts

Project leaders:
Michaela Wenzel (lead)
Annikka Polster (co-lead)

Felipe Cava
Linus Sandegren
Sun Nyunt Wai
Annikka Polster
Aleksej Zelezniak
Christian Munthe
Florian David
Angelo Frei

Funded by:
Swedish Research Council

Want to learn more? Contact Michaela Wenzel (wenzelm@chalmers.se)

Project partners

CHALMERS · UNIVERSITY OF GOTHENBURG · UPPSALA UNIVERSITET · UMEÅ UNIVERSITET · UNIVERSITY of York

NUCLEAR ENERGY EXCELLENCE BY INDUSTRY AND UNIVERSITIES IN SWEDEN

Sweden has fantastic potential to become world-leading in nuclear-powered decarbonization technology. The nuclear renaissance brings great opportunities for decarbonization and re-industrialization of Europe. The nuclear industry needs to ramp up and accelerate deployment and build a new role as decarbonization-enabling energy provider, with electricity, heat, hydrogen and more.

HOW?

Nexus will leverage recent progresses in nuclear engineering, materials science, digitalisation and process technology to initiate pioneering research and innovation actions. It will result in new knowledge, competences and innovations that are needed and will place Sweden as world leader in nuclear-powered industrial transformation with strong societal value.

WHAT?

An open and dynamic arena with a clear vision to enable leveraging nuclear energy at scale and a long-term strategy to mobilize all existing competences in Sweden and create new expertise needed for the wide deployment of nuclear energy.

WHO?

All major Swedish actors in Nuclear Energy – from research to impact-creating large industries and SMEs, supplemented by large users of nuclear energy in the form of electricity, heat or hydrogen.

CHALMERS UNIVERSITY OF TECHNOLOGY

LULEÅ UNIVERSITY OF TECHNOLOGY

KTH VETENSKAP OCH KONST

LINKÖPING UNIVERSITY

UPPSALA UNIVERSITET

nexus-cluster.se

Nordic Therapeutic Alliance (NTA)

The Nordic Therapeutic Alliance (NTA) brings together Sweden's strongest environments in life science, AI, automation, advanced digital technologies and bioproduction to build a complete, resilient value chain for innovative high-precision therapies. Although Sweden has world-leading research and infrastructures, too few promising biologics and ATMPs reach patients due to long, fragmented and costly development processes. NTA addresses this by mobilizing a uniquely broad consortium and creating a nationally coordinated ecosystem spanning the full pathway from early discovery to patient treatment.

By combining system-level thinking with breakthrough technologies—AI-driven design and digital twins, advanced automation and robotics, multi-omics, organ-on-chip systems and 3D-printing—the alliance aims to transform how therapies are discovered, developed, scaled and produced. This enables faster decision-making, reduced need for animal testing, smarter clinical trial design, and more cost-efficient manufacturing in Sweden.

NTA unites academia, industry, healthcare, infrastructures and tech arenas in unprecedented collaboration, targeting the bottlenecks that matter most for time- and cost reduction. Through strategic alignment, expert groups, and high-impact development projects, the alliance strengthens Sweden's ability to retain IP, attract investment, expand GMP capacity, and accelerate equitable access to next-generation therapies.

NTA aims to position Sweden and the Nordics as a connected global powerhouse in innovative precision therapies—delivering patient impact, industrial competitiveness, and national resilience.

Focus areas

- Holistic end-to-end value chain development: From academic discovery to market adoption and patient treatment — aligning processes, infrastructure and expertise into one coherent national pathway.
- High-impact technological breakthroughs: Applying AI, robotics, organ-on-chip, digital twins, multi-omics and 3D-printing to solve the value chain's most critical bottlenecks.
- Cross-disciplinary excellence at scale: Bringing together world-class research, clinical expertise, engineering, data science and industrial production.
- Scalable national capacity: Building sustainable, future-proof infrastructure for GMP, automation and biologics/ATMP production.
- Stronger translation & commercialization: Turning cutting-edge science into real products and patient impact.

Interest in collaboration and exchange

- Growing a bold, inclusive consortium: Partners who share the mission to make Sweden and the Nordics a global powerhouse in innovative therapies.
- Co-creating high-impact solutions: Tackling key challenges in discovery, development, scale-up and manufacturing through joint efforts.
- Nordic and international dialogue: Connecting with aligned ecosystems across Europe and globally to build long-term alliances.
- Open, ambitious knowledge exchange: Through expert groups, shared testbeds, workshops, and data-driven development.
- Mutual value creation: Partnerships that accelerate patient access, strengthen competitiveness and enhance national resilience.

Facts

Start and end date:
10-2025 to 03-2026

Total budget:
1 496 000 SEK

Project leader:
Alexandra Patriksson

Funded by:
Vinnova

Want to learn more? Contact Alexandra Patriksson at Alexandra.patriksson@testacenter.com

Project partners and other contributing organisations

UPPSALA UNIVERSITET
ÖREBRO UNIVERSITET
TestaCenter In collaboration with Cytiva
KTH VETENSKAP OCH KONST
STUNS

Opening the THz-UV spectrum with integrated photonic-electronic systems

The planning project aims to consolidate world-leading expertise to investigate and utilize the entire spectrum from the terahertz to the ultraviolet spectrum. Cross-spectrum innovation, achieved through the integration of electronics and photonics, inherently offers distinctive technical solutions for emerging technological domains. The long-term objective of this excellence cluster is to exploit and expand the applications of the electromagnetic spectrum to support future scientific and technological progress. At the heart of this initiative are fundamental and cross-cutting research questions:

- **Can integrated photonic systems generate microwave and terahertz signals with spectral purity far beyond the limits of traditional RF electronics?**
- **Can optical clocks be used to synchronize electronic systems, improving digitization resolution and enabling new levels of performance in signal conversion?**
- **Can integrated photonic-electronics bridge uncharted parts of the THz-UV spectrum?**

Focus areas

Our main focus is on integrated devices and circuits across a four-decade wavelength range, from THz to UV.

By linking diverse disciplines, the cluster seeks to create a new paradigm in integrated electronic-photonics, directly supporting the European Chips Act and technological excellence.

Integrating electronics and photonics, enables interdisciplinary research and breakthroughs in:

- Sensing
- Communication
- Control

Interest in collaboration and exchange

The project brings together expertise in nanoelectronics, terahertz technology, photonics, microsystems, solid-state physics, and nanotechnology to investigate the entire spectrum from terahertz to ultraviolet. While the focus is on integrated devices and circuits (THz-UV), we aim to find synergies and potential collaborations related to applications and technologies:

- **Semiconductor technology**
- **Material sciences**
- **Sensing applications** (atmospheric sciences, astronomy, life sciences, radar, process industries**)**
- **Communication technologies**
- **Space technology**

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 200 000 SEK

Project leaders:
Jan Stake
Vanya Darakchieva
Victor Torres-Company
Åsa Haglund
Helena Rodilla
Joachim Oberhammer

Funded by:
Vetenskapsrådet

Want to learn more? Contact Jan Stake at jan.stake@chalmers.se.

Project partners and other contributing organisations

CHALMERS

LUNDS UNIVERSITET

KTH VETENSKAP OCH KONST

Precision Cardiology Sweden

- Aiming to eradicate cardiovascular disease

By combining AI, biotechnology and unique Swedish health data, the project aims to predict, diagnose and treat cardiovascular disease — establishing Sweden as a world leader in precision cardiology.

Our main strategic advantage is the combination of existing large and representative sets of sensitive health data ranging from the cellular level (biobanks), via well-characterized populations (SCAPIS and other cohorts) to the societal level (national population registers).

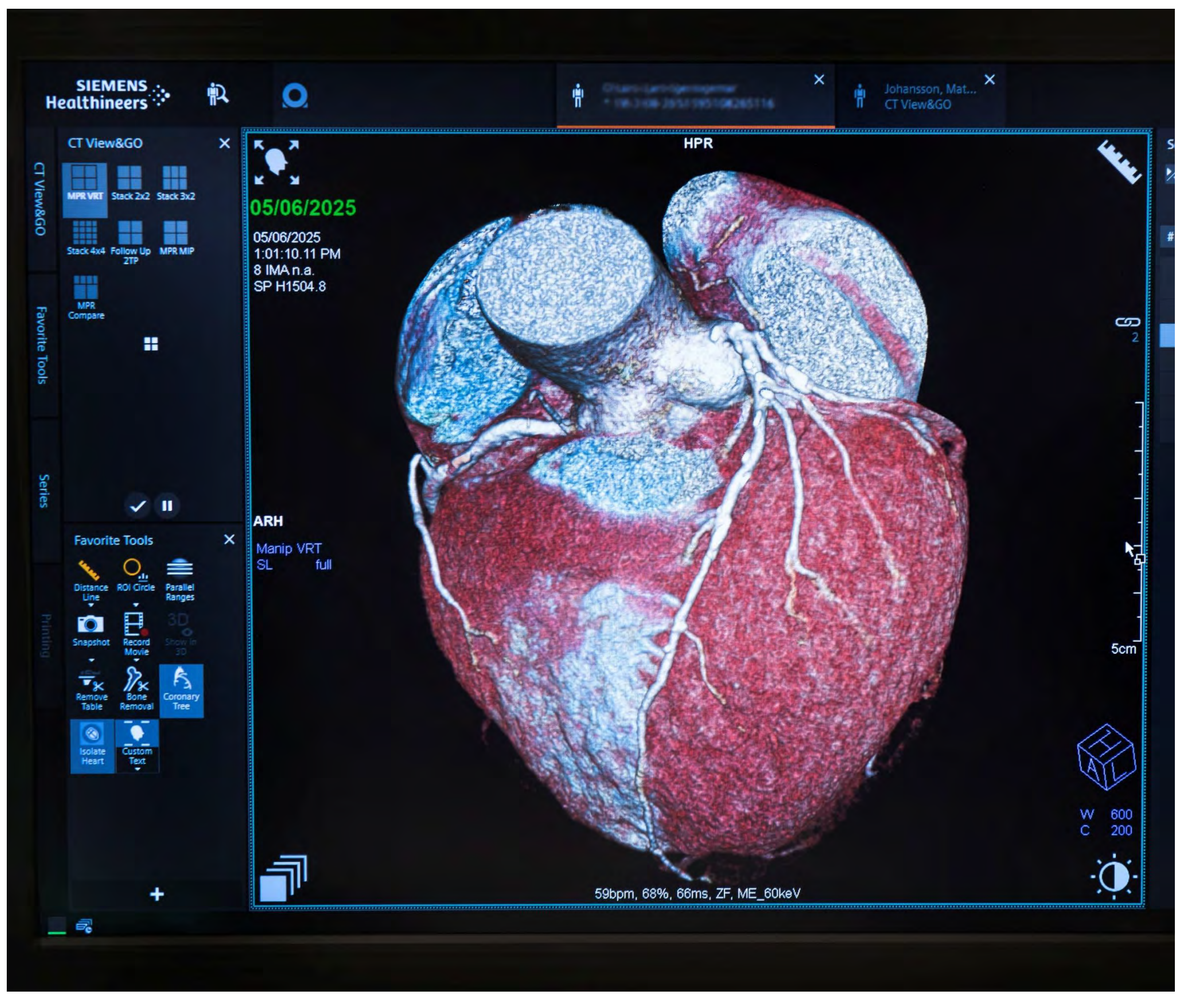
Using AI, biotechnology and Sweden's unique real-world health data, linked via personal identification numbers, the cluster will enable:

- **Early and accurate risk prediction**
- **Precision diagnostics**
- **Individualized treatment**
- **Fast translation of innovations into routine care**

The ultimate aim is a world free from cardiovascular disease.

Focus areas

- Drive progress across genomics, transcriptomics, proteomics, metabolomics, lipidomics, and mechanomics.
- Develop LLM-guided segmentation and feature extraction with voxel-, surface- and graph-based models to map plaque geometry and cardiac and vessel anatomy at high resolution, improving class descriptions, human-readable decision justifications and alignment with other omics outputs.
- Develop a plan to use real-world data to train privacy-preserving generative simulators that produce non-identifiable, non-linkable multi-dimensional synthetic datasets, thereby enabling leading technology experts to work with these datasets and advance the overall vision.



Interest in collaboration and exchange

What we offer

- Access to advanced real-world health data to accelerate radical break-throughs in AI and biotechnology.
- Clinically driven research questions, defined by critical medical needs and strong translational and commercial potential.
- Expertise in biotechnology, multi-omics and AI modelling.

What we seek

- National partners in AI to be onboarded in an initial phase, followed by international expansion.
- Strategic collaborations with pharmaceutical and medtech companies to co-design use cases and translate solutions into clinical and commercial impact.

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 321 708 SEK

Project partners:
Göran Bergström, Göteborgs universitet (PL)

Anna Thorén, Hjärt-Lungfonden
Vibeke Sparring, Hjärt-Lungfonden
Mia Philipson, SciLifeLab
Rikard Landberg, Chalmers
Fredrik Johansson, Chalmers
Mats Ulfendahl, Region Östergötland
Carl Johan Östgren, Region Östergötland

Funded by:
Vinnova

Want to learn more? Contact project management and Göran Bergström, GU, via precisioncardiology@hjart-lungfonden.se

Project partners

GÖTEBORGS UNIVERSITET · Hjärt-Lungfonden · SciLifeLab · CHALMERS · Region Östergötland

Precision Omics Initiative Sweden (PROMISE)

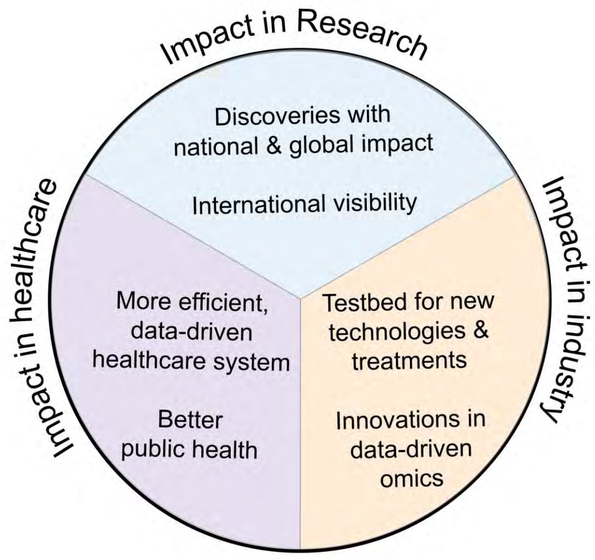
White paper
Nature Medicine

Webpage

By 2035, the Precision Omics Initiative Sweden (PROMISE) envisions Sweden as a world leader in data-driven precision medicine.

Sweden is currently lagging behind its peers in large omics datasets from human cohorts. However, Sweden has all the prerequisites to lead the new frontier of longitudinal data-driven precision omics, by coupling biotechnology with registry and health data in partnership between research, healthcare, and industry.

The PROMISE vision (Nature Medicine 2025), has been formulated by Swedish leaders in the genomics, multi-omics, and precision medicine community.



Focus areas

1. New large-scale multi-omics data and integrating selected existing datasets

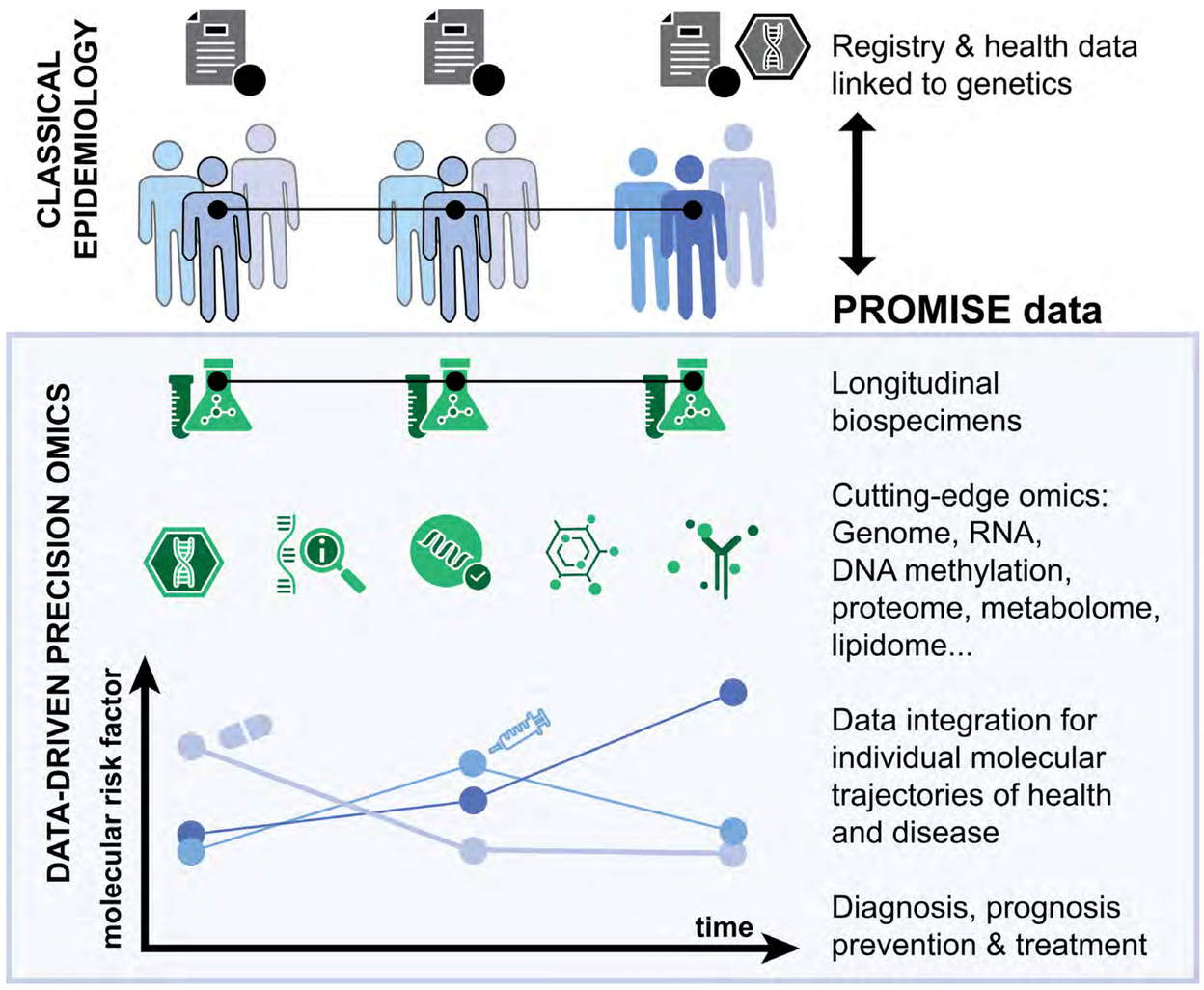
- Multi-omics technology evaluation
- Integrated multi-omics data from 100,000+ people building on existing cohorts
- Cancer multi-omics in U-CAN, SCAN-B

2. Research-healthcare-industry integration

- Research use of omics data from healthcare
- Clinical adoption of new biotechnologies
- A platform to recruit trial participants and return results to patients

3. Improved data access framework

- Opportunities of new and upcoming regulation (research databases, EHDS)
- E-infra leveraging NGP, FEGA, 1+MG-SE
- ELSI work



Interest in collaboration and exchange

PROMISE has an interim governance structure with representation across the country with experts in research, medicine, biotechnology, data, etc. We have discussed partnerships with:

- **SciLifeLab** and other technology and data infrastructures
- **Genomic Medicine Sweden** for healthcare translation
- **Cohorts and biobanks**
- **Pharma and biotechnology** companies
- **Legal and health economics** experts
- **Nordic initiatives** in the same area
- **Patient and public engagement**

PROMISE is designed to empower – not replace – ongoing efforts with shared goals. We look forward to coordinating efforts with related programs!

Facts

Start and end date:
Vision: 2025
Planning, pilots: 2026-2027
Implementation: 2027 → 2035

Total budget for the planning phase:
2.7 SEK

Project leaders:
Tuuli Lappalainen (KTH, SciLifeLab)
Richard Rosenquist Brandell (KI, GMS)
Paul Franks (LU)

Funded by:
VR & Vinnova

Want to learn more? Contact **tuuli.Lappalainen@scilifelab.se** or **anna.clareborn@uu.se**, or visit **www.promisesweden.se**

Project partners and other collaborators

Protein Folding and Misfolding Measurement and Prediction at Single-Molecule Resolution

Proteins must fold into the right 3D shape to function. When this process fails, diseases such as Alzheimer's, Parkinson's, and many cancers can emerge.

While AlphaFold can now predict static protein structures, it still cannot reveal how proteins fold, why folding sometimes fails, and how this can trigger aggregation — knowledge that is essential to understanding and preventing misfolding.

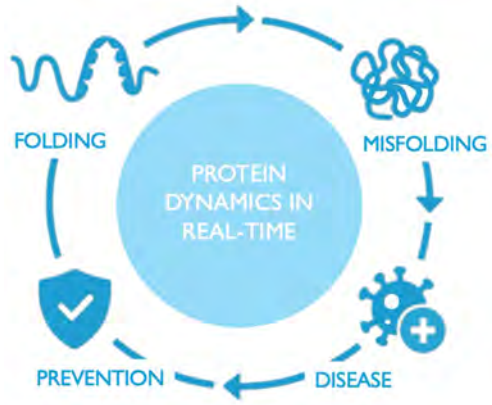
Our cluster unites Swedish leaders in biophysics, simulations and AI to track protein folding in real time and at single-molecule resolution.

Using high-speed force spectroscopy, multiscale microscopy, nanochannel technologies and deep-learning models, we uncover the rules of folding and misfolding to drive new diagnostics, therapies, and prevention strategies.

With protein-folding research entering a new era of real-time and AI-driven approaches, Sweden has a unique opportunity to shape the global landscape. By coordinating national expertise and infrastructure, our cluster positions Sweden to lead this transformation.

Focus areas

- **Real-time protein dynamics** – single-molecule force spectroscopy and optical tools to detect folding intermediates and misfolded states.
- **Multiscale imaging** – live-cell and super-resolution microscopy, single-molecule FRET, nanochannels and integration with cryo-EM, NMR, and synchrotron data.
- **AI & simulations** – deep learning and molecular dynamics to predict folding pathways and misfolding routes from sequence to structure to function.
- **Clinical translation & biomarkers** – connect folding signatures to patient data and proteomics in neurodegeneration and other misfolding diseases.
- **Ethics & society** – work with humanities and social sciences on responsible AI, data use and long-term societal impacts.



From folding to society. We follow the full journey of proteins in real time, identifying when and why misfolding leads to disease, and informing new strategies for diagnostics, therapies, and prevention — while also working with humanities experts to ensure these advances align with societal needs.

Interest in collaboration and exchange

Shared **methods and platforms** for imaging, single-molecule measurements, and AI-driven analysis.

Joint **applications** in disease models, clinical cohorts, large imaging, and proteomics datasets.

Ethics, policy and foresight for AI-enabled protein technologies.

Training and mobility – co-developed PhD courses, workshops and exchanges at the interface of biophysics, AI and medicine.

Join our conference in Stockholm on 11–13 March 2026 to help shape the future Swedish platform for protein-folding research.

Facts

Start and end dates:
October 2025 – March 2026

Total budget:
1.2 MSEK

Project Coordinator:
Giovanni Volpe (GU)

Funded by:
Vetenskapsrådet

Want to learn more? Contact Giovanni Volpe at 070-99 66 181 (also WhatsApp), or giovanni.volpe@gu.se

Project partners and other

PSC-derived Cell Therapies

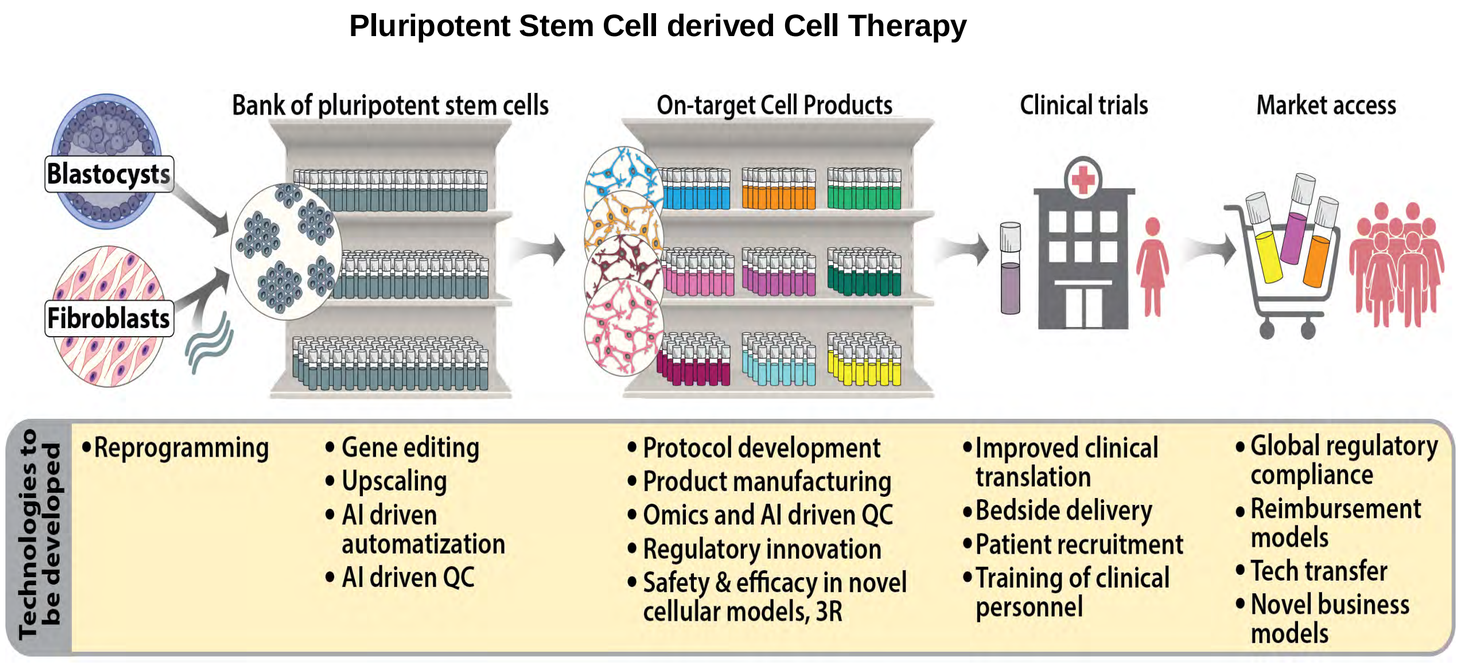
Pluripotent stem cell (PSC)-based therapies are poised to revolutionize medicine by enabling the generation of virtually any human cell type, offering repair or replacement of damaged tissues and curative potential of previously untreatable diseases. Advances in induced pluripotent stem cell (iPSC) technology allow for patient-specific, gene-corrected therapies with reduced immunogenicity, while also providing powerful platforms for disease modelling and drug discovery.

We propose establishing an excellence cluster to develop novel transformative technologies that accelerate the development and translation of PSC-derived cell therapies. Uniting world-leading experts in cell therapy, clinical translation, technology innovation, process development, and tech transfer, we aim to position Sweden and the Nordics as a global hub for PSC-based cell therapies technologies, attracting top talent, scientific excellence, strategic investments, and international recognition

Focus areas

Pluripotent Stem Cell (PSC) can be expanded massively, can differentiate to all cell types of the body and can be cryopreserved long-term and is the starting material for deriving cell therapy products for replacing or improved cellular function. Globally, just over 100 first in human clinical trials are being performed and data show remarkable results, patients cured from diseases regarded incurable, type 1 diabetes and cancer.

In Sweden and the Nordics, we are in the frontline within stem cells research and cell therapies, but we are losing grounds in clinical and technology translation and only 10% of the global pipeline resides in Europe.



Interest in collaboration and exchange

We are mapping out the need for research and technology development to reduce time and cost for producing PSC derived cell therapies and way to derive novel and improved cell therapy products. We are interested in technologies within:

- *Cellular models and organoids*
- *Bioprocessing*
- *Sensors*
- *Upscaling*
- *Multiomics*
- *AI and machine learning*
- *Imaging*
- *Protocol development*
- *Gene editing*
- *Automatisation*
- *Tech transfer*
- *Novel business models*

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 200 000 SEK

Project leaders:
Anna Falk
Fredrik Lanner

Funded by:
Vetenskapsrådet

Anna Falk anna.falk@med.lu.se

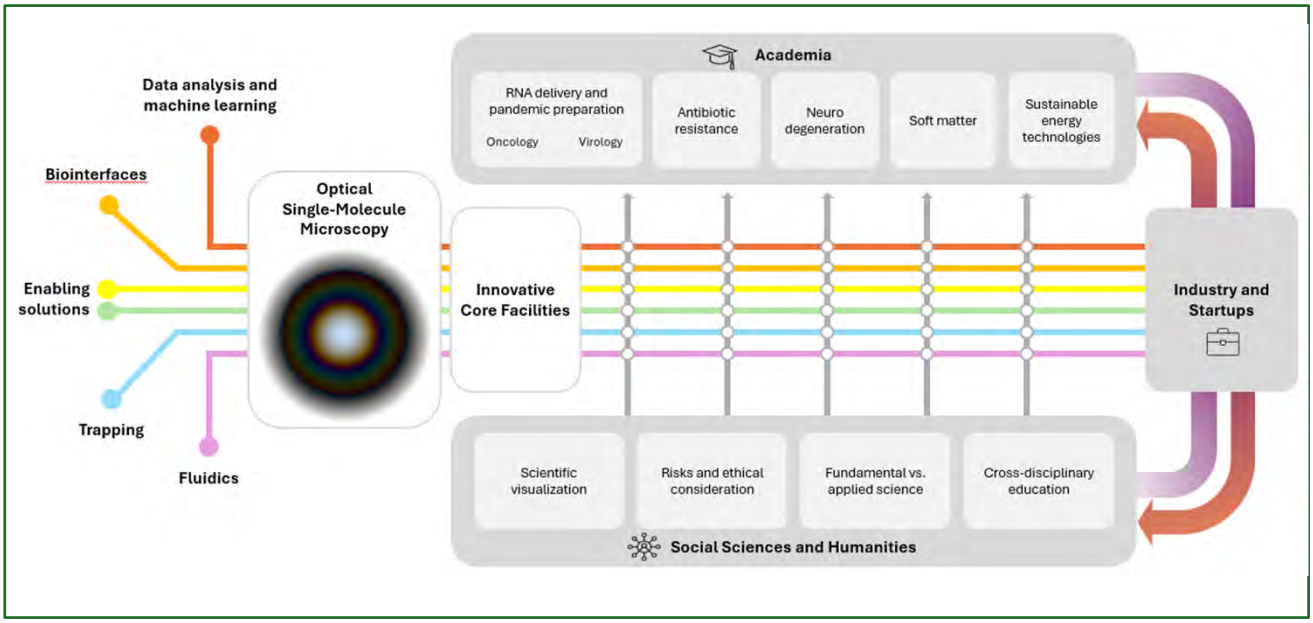
Project partners

Quantitative Single-Molecule Microscopy to Advance Biomedicine and Beyond

We present the creation of a Swedish Excellence Cluster to advance single-molecule optical microscopy through collaborative innovation. By combining interdisciplinary research teams, integrating technology development, and fostering global partnerships, the initiative will drive progress in single-molecule microscopy, nano- and microfluidics, and machine learning-based data analysis with focus on life sciences, but also for soft matter and sustainable energy and other green technologies. This model will accelerate advance, establish Sweden as a leader in quantitative single-molecule optical microscopy, and accelerate access to cutting-edge technologies for academia, industry, and the biomedical community.

- We will conduct comprehensive assessments and strategic planning regarding the optimal design of a national cluster, including exchanges with leading global centers and industry partners.
- We will develop an action plan and a clear roadmap: from technological and competency needs to educational initiatives, strategic recruitment of future research leaders, and national as well as global collaboration.
- By integrating social sciences and humanities, we will also highlight broad communication, educational needs and societal risks associated with this type of technological development within life sciences and beyond.

Focus areas



Interest in collaboration and exchange

To successfully complete the report, we actively seek collaboration and exchange with users of single-molecule optical microscopy and related technologies in the following fields:

- **Life Science and Biomedicine**; such as RNA biophysics and live-cell imaging of RNA delivery as well as new insights related to i) of virus infections and antiviral drug design, ii) neuro degenerative conditions and iii) antibiotic resistance initiatives.
- **Soft matter technologies**; such molecular responsive self-assembly systems for biomedical applications.
- **Sustainable energy and green technologies**; such as heterogeneous catalysis, nanomaterial and green chemical synthesis, and nanomaterial-based photovoltaics and sensors.

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1.2 MSEK

Project leaders:
Fredrik Höök (Chalmers)
Christoph Langhammer (Chalmers)
Maria Tenje (Uppsala Uni)
Ilaria Testa (SciLifeLab)
Andreas Dahlin (Chalmers)
Giovanni Volpe (Göteborg Uni)
Anders Wittrup (Lund Uni)
Björn Högberg (KI)
Marta Bally (Umeå Uni)
...

Funded by:
Vetenskapsrådet

Want to learn more? Contact Fredrik Höök (fredrik.hook@chalmers.se)

Project partners

CHALMERS · UPPSALA UNIVERSITET · LUND UNIVERSITY · UMEÅ UNIVERSITET · KTH VETENSKAP OCH KONST · Karolinska Institutet · GÖTEBORGS UNIVERSITET

Quantum Era Nordic

To create Swedish competitiveness, a Swedish alliance has been formed between some of the largest industry players and research institutes, to create a Nordic 'powerhouse' in quantum technology. Through world-leading innovation and rapid adaptation of hybrid technologies (classical high performance, AI and quantum computers) for research and innovation, we are creating a Sweden for the future.

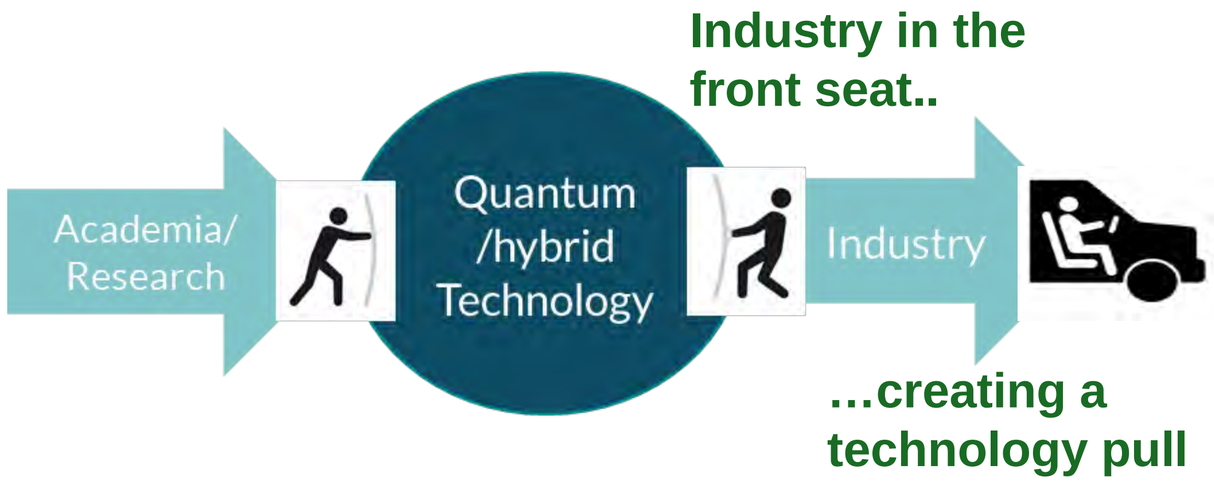
Our long-term objective:

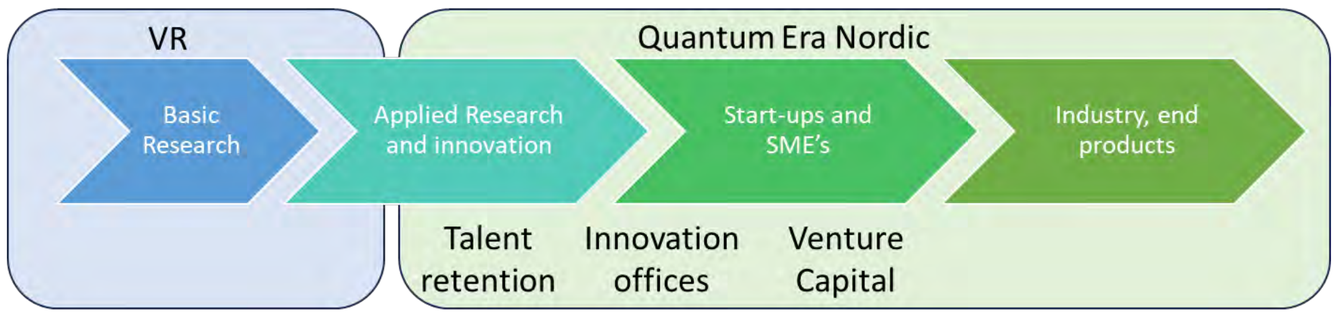
- **By 2035, the Nordic region will surpass all other regions in the world in producing unicorns (unicorns per capita).**
- **The Nordic way of working has resulted in a large net inflow of business start-ups in the region.**
- **Nordic universities are established as world leaders in quantum technologies.**
- **Majority of global talent has chosen to stay in the region.**

Focus areas

To accelerate innovation we will:

- Put industry needs in the front seat for a technology pull
- Include whole innovation ecosystem
- Build a Nordic stronghold, with international collaboration
- Build on Swedish excellence
- Focus on solutions, not limited to utilize pure quantum





Interest in collaboration and exchange

Aside from quantum, we are interested to collaborate on related technologies and solutions

- **Industry**; Industries and institutes interested in quantum
- **Research Platforms**; Related research platforms and enabling technologies.
- **Related Technologies**; AI, Space, cybersecurity, sensors.
- **Innovation systems**; Innovation offices
- **Telent Retention**
- **Venture capitalist**

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 822 111 SEK

Project leaders:
Linda Johansson, RISE
Mikael Rönnholm, Volvo Group

Funded by:
Vinnova

Want to learn more? Contact Linda Johansson, linda.johansson@ri.se

Project partners

VOLVO SAAB ERICSSON einride RI.SE Research Institutes of Sweden

Quantum Sensing Technology from Research and Applications to Market and Society

Our vision is a cluster of excellence that will form the backbone of a Swedish ecosystem in quantum sensors, where research is given the conditions necessary to become world leaders in a number of cutting-edge areas, and where this research generates innovations and societal benefit. We will bring together actors within the entire Swedish quantum technology ecosystem – academia, infrastructures, start-ups, large established companies, research institutes and other organizations.

Focus areas

The planned Cluster of Ecxellence (CoE), Quantum-STREAMS, would stimulate real-world applications based on quantum sensing techniques within biological sensing & imaging, position & navigation, detection & metrology, operating beyond classical capabilities to the benefit of Swedish spearhead areas in life science, defense and industry having significant societal impact. QuantumSTREAMS will build on Sweden's documented leading innovation capacity, the strong trend of a growing number of quantum technology spin-outs from academia.

We will interact with all actors of quantum technology, look abroad for good examples, contact smaller and larger companies and interact with other planning grants. The CoE will build arenas for networking and other support actions including directed funding schemes and aim at to increase the fraction of low-TRL quantum sensing start-ups crossing the 'Valley of Death' into higher TRL stages.

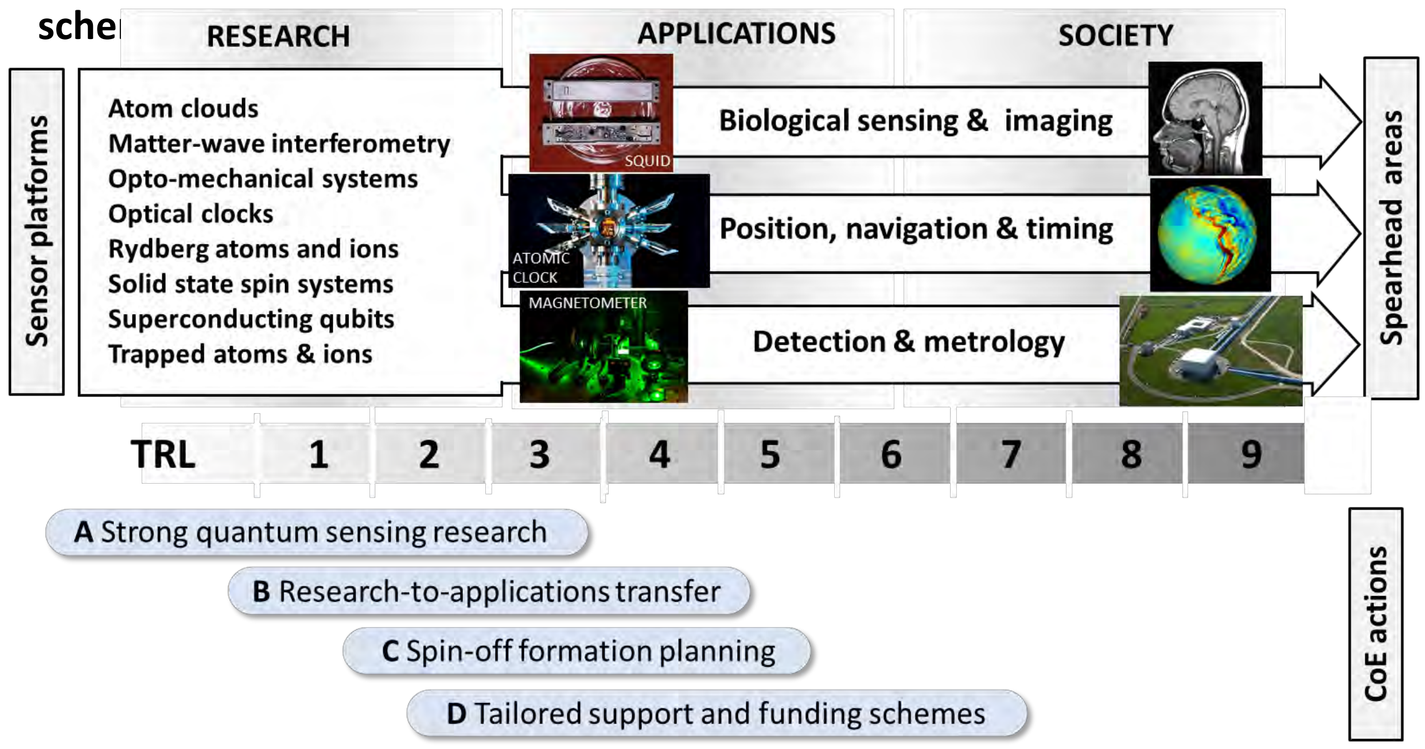
To stimulate the creation of new start-ups in quantum sensing and enabling them to develop successfully requires a chain of interconnected actions across TRL-levels, shown in fig:

A. Strong quantum sensing and quantum technology research.

B. An incentive to transfer research results to applications.

C. Adequate planning from the start of a spin-off formation.

D. Tailored support and funding



Interest in collaboration and exchange

Project partners: Three Swedish Universities, two start-up companies and three public organizations with activities in quantum sensing.

Actors: Research groups from six Swedish universities, seven start-up companies and five public organizations.

Possible collaborations:

- Clusters planned in or across quantum technology areas (computing, communication, sensing), Vinnova and/or VR.
- Other sensing initiatives and clusters, nationally and internationally.
- Major Swedish industry and end-users of advanced sensing technologies.

Facts

Start and end date: 10-2025 to 03-2026

Total budget: 1.5 MSEK

Project leaders:
Peter Samuelsson, Martin Leijnse,
Stefan Kröll (LU)
David Haviland (KTH)
Daniel Lundqvist (KI/QLSC)
Anders Sjögren (Deep Light Vision)
Val Zwiller (Quantum Scopes)
Linda Johansson, Martin Zelan,
Karin Cedergren (RISE)
Jon Wingborg (Chalmers industriteknik)
Hannes Eder Öhrström (KTH Innovation)

Funded by Vinnova

Want to learn more? Contact Peter Samuelsson (peter.samuelsson@fysik.lu.se)

Project partners and other (place logos here)

Quantum Sensing, Metrology and Control (Q-SMaC)

Quantum sensors take advantage of fundamental quantum mechanical properties, such as superposition, entanglement, and coherence, to perform measurements with unprecedented sensitivity, accuracy, and precision.

Quantum sensing technologies are capable of measuring quantities such as time and frequency, electromagnetic fields, gravity, and acceleration, with an accuracy that exceeds that of any classical sensor.

The planned cluster Q-SMaC will develop and coordinate the spearhead activities of the Swedish quantum sensing ecosystem, ensuring fundamental discoveries and ground-breaking applications in biological and medical systems, geology, materials design, defense, and other areas.

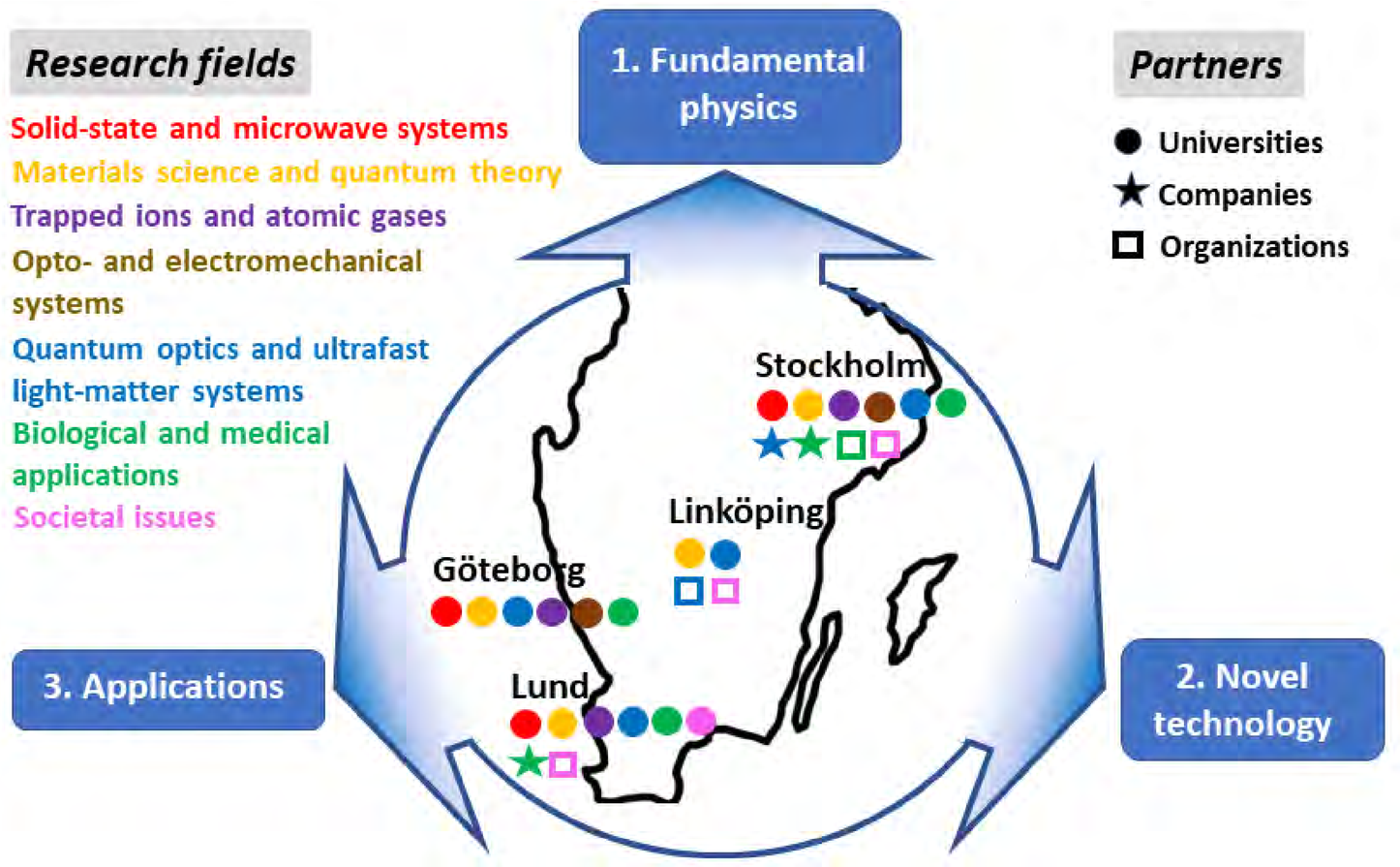
Planning the cluster around key objectives of quantum sensing, metrology, and control guarantees that Q-SMaC will make a significant technological and societal impact.

Focus areas

Fundamental physics: Novel concepts in, for example, quantum optics or attosecond physics, novel quantum materials and devices, and unconventional theoretical approaches.

Novel technology: New functionalities and proof-of-concept devices and instruments which will out-perform their classical sensing counterpart.

Applications: Lifting technologies from labs to innovations and industry, thereby making significant societal impact.



Interest in collaboration and exchange

Application team: PIs from 5 Swedish Universities with complementary expertise in different research fields.

Partners: More than 50 academic research groups, 4 other public organizations and 7 companies.

Possible collaborations:

- Other quantum quantum technology areas (communication, computing).
- Other sensing research initiatives.
- Major Swedish industry.
- End-users of advanced sensing technologies (for example in the medical area).

Facts

Start and end date: 10-2025 to 03-2026

Total budget: 1.2 MSEK

Project leaders:
Martin Leijnse, LU
Anne L'Huillier, LU
Aurelija Lukoseviciene, LU
Peter Samuelsson, LU
Stefan Kröll, LU
Witlef Wieczorek, CTH
Igor Abrikosov, LiU
Markus Hennrich, SU
Vaishali Adya, KTH

Funded by VR

Want to learn more? Contact Martin Leijnse (martin.leijnse@ftf.lth.se)

Project partners

Quantum-Secure Sweden, Excellence cluster in Quantum Communication

Our vision is to establish Quantum-Secure Sweden, a national excellence cluster that positions Sweden as a global leader in Quantum Communication technologies and their implementation in real-world infrastructure.

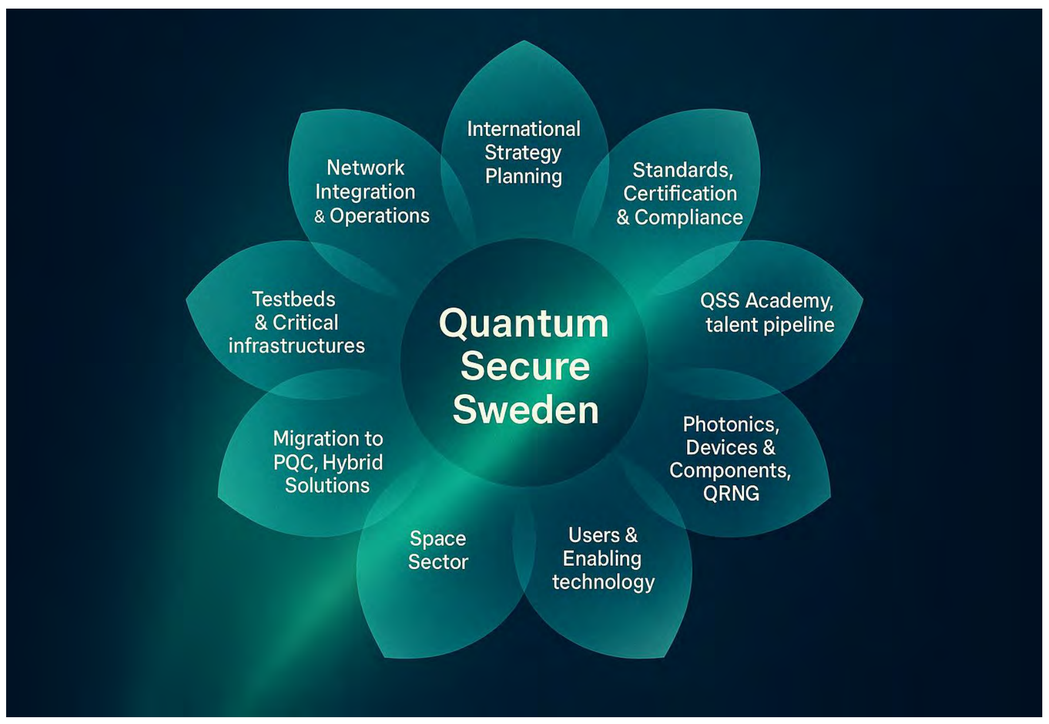
Building on Sweden's strengths in quantum physics, photonics, telecommunications and information security, the cluster will safeguard critical systems and digital sovereignty. The cluster mission is to:

- Develop and deploy robust Quantum Communication Technologies.
- Create testbeds and innovation platforms for companies.
- Foster collaboration across academia, telecom providers, IT firms and government agencies.
- Adress societal needs ensuring trust, privacy and responsible innovation.
- Invest in skills development through education, training and industry placements.

Focus areas

Quantum-Secure Sweden *will focus on these technological and application areas:*

- **Quantum Key Distribution (QKD):** Developing robust and practical QKD systems, including hardware devices, integrated photonics and software protocols.
- **Quantum-Secure Networking**: Showcasing the integration of QKD into existing network setups.
- **Hybrid Approaches with Post-Quantum Cryptography (PQC):** Hybrid layered solutions will be explored as they will offer resilience against threat models and support easier adoption.
- **Standardization and Certification:** **P**articipation in shaping EU and international standards.



Interest in collaboration and exchange

***Shifting to quantum-secure communication: a once-in-a-generation opportunity for Sweden*.**

The demand for secure solutions will open many collaboration opportunities:

- **Protecting sensitive data**; Financial systems, Government Agencies and Healthcare providers in need to protect and secure data now.
- **Delivering quantum-safe infrastructure**; Close collaboration between network providers and telecom sector.
- **Cybersecurity and resilience**; Collaboration with security experts to explore hybrid security models.
- **International collaboration**

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1.5 MSEK

Project leaders:
Dr. Laia Gines, RISE
Prof. Mohamed Bourennane, Stockholm University

Funded by:
Vinnova

Want to learn more? Contact Dr. Laia Gines: laia.gines@ri.se or Prof. Mohamed Bourennane: boure@fysik.su.se

Project partners and other

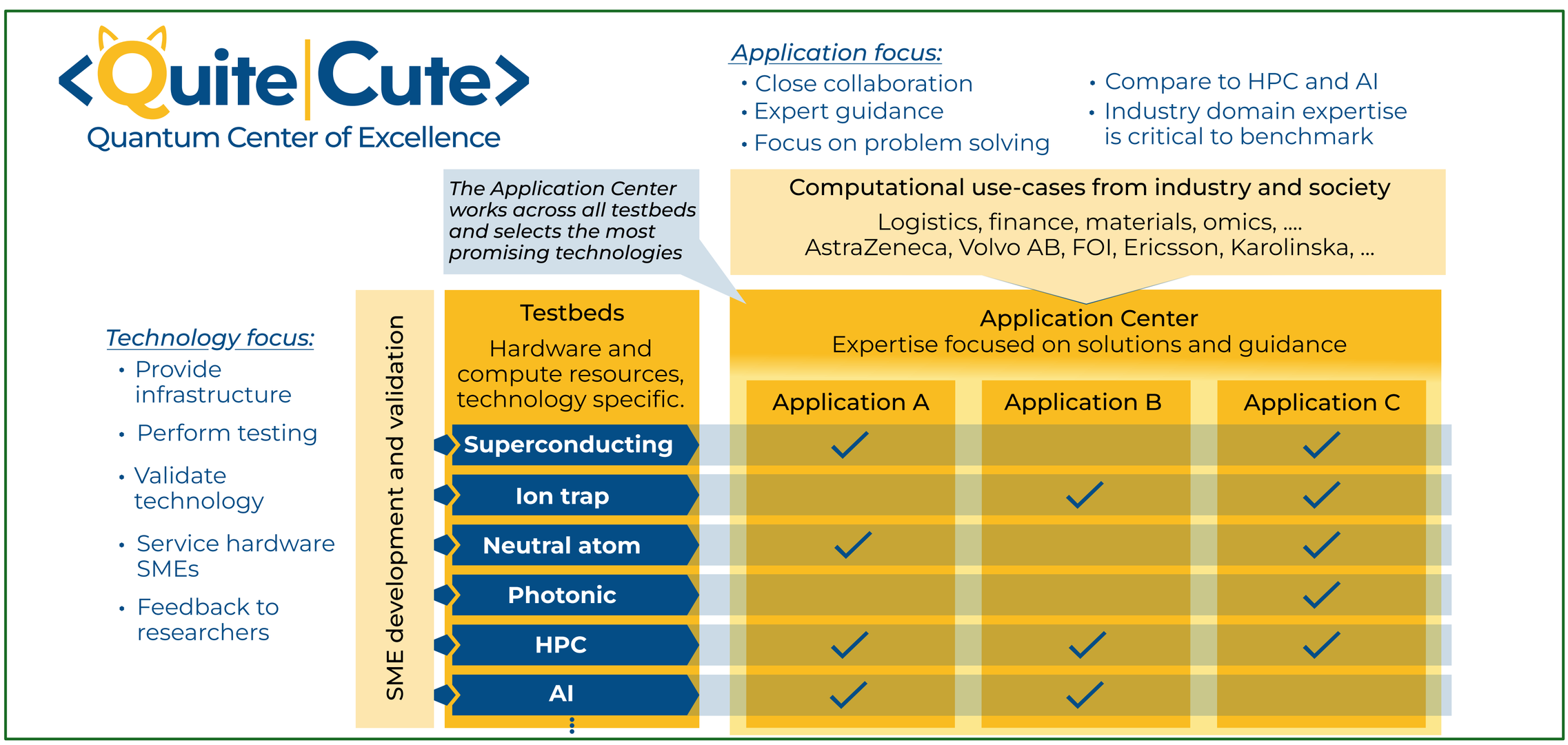
QuiteCute – Quantum Computing Excellence

QuiteCute builds the vision for Swedish quantum computing excellence. The QuiteCute cluster will provide access to world-class expertise and infrastructure:

- leading quantum computing specialists
- diverse range of quantum platforms
- integration with HPC, Artificial Intelligence (AI), and comprehensive testing facilities.

The leading words are *ease of use*, making it easy for industry, SMEs, public bodies and other actors to explore, evaluate, adopt, and develop solutions using quantum computing. The cluster will provide the level of support needed to get started – and eventually excel at – using quantum technology.

Focus areas



Interest in collaboration and exchange

We are very interested in collaborations and exchanges with other initiatives and players. We are particularly interested in:

- Quantum Technology
- High-Performance Computing (HPC)
- AI/ML

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 500 000 SEK

Project leaders:
Mårten Skogh, Chalmers Next Labs

Funded by:
Vinnova

Want to learn more? Contact Mårten Skogh or visit www.quitecute.se.

Project partners and other (place logos here)

CHALMERS UNIVERSITY OF TECHNOLOGY
NATIONAL QUANTUM FEDERATED FOUNDRY SINGAPORE
Karolinska Institutet
CHALMERS NEXT LABS
LINKÖPING UNIVERSITY
CHALMERS INDUSTRITEKNIK
AstraZeneca
Lindholmen Science Park
AI SWEDEN

Radar2035 - From Science to Sovereign Capability

Vision 2035: Sweden is a global leader in radar and multifunctional RF systems (MFRFS), setting international benchmarks in performance, sustainability, and interoperability.

Core idea: Reconfigurable, software-defined MFRFS that combine radar, communications, and electronic warfare in adaptable architectures for civil, industrial, and defense use.

Strategic impact: Enabling safe autonomy, resilient infrastructure, and real-time environmental insight – from autonomous transport to climate monitoring and defense.

Technology drivers: Advanced semiconductors, digital antenna arrays, distributed architectures, AI, and new materials/production methods.

Ambition for the cluster: Build a sovereign, scalable technology base – from drones to large platforms – that strengthens Sweden's competitiveness and strategic autonomy and offers a natural collaboration hub for aligned excellence clusters.

Focus areas

- **Multichannel & distributed digital radar**
  Architectures from monostatic to multistatic for detecting small, stealthy, swarming, and hypersonic targets in contested and environments.
- **Advanced RF/analog front ends**
  Wideband, energy-efficient PAs, LNAs, synthesizers, and converters using novel materials and chiplet integration for coherence and robustness.
- **Scalable, secure digital platforms**
  Element-level digitization with heterogeneous computing and high-throughput interconnects, designed for real-time, cyber-resilient operation.
- **Adaptive low-level processing**
  Beamforming, STAP, MIMO, and distributed processing that compress data while preserving weak targets and resisting clutter and jamming.
- **AI-enabled tracking & fusion**
  Machine-learning–based detection, tracking, classification, and multi-radar fusion in dense, cluttered, and urban scenarios with uncertainty awareness.

Kick-off Radar2035 workshop on 6 November 2025, gathering more than 50 participants from 28 organizations across five countries.

Interest in collaboration and exchange

We are open for dialog with excellence clusters that focus on fundamental research on groundbreaking technologies:

- semiconductor components and systems
- photonics
- antenna systems
- distributed sensing
- distributed computing
- communication networks
- integrated sensing and communication
- artificial intelligence
- non-RF sensing modalities
- quantum computing
- cyber resilience and cyber security
- satellite and space technologies

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1.5 MSEK

Project leaders:
Tomas McKelvey
Marianna Ivashina
Daniel Sjöberg
Fredrik Gustafsson
Maria Lanne
Johan Lassing
Amer Nezirovic
Monica Ringvik
Lars Ulander

Funded by:
Vinnova

Want to learn more? Contact Erik Ström at erik.strom@chalmers.se or Tomas McKelvey at tomas.mckelvey@chalmers.se.

Project partners

CHALMERS · LUNDS UNIVERSITET · LINKÖPINGS UNIVERSITET · CHALMERS NEXT LABS · FOI Totalförsvarets forskningsinstitut · SAAB · qamcom · sensrad

Remanufacturing Excellence Cluster

Sweden has the potential to lead the world in sustainable, data-driven, AI-supported production technology. Through this initiative, we aim to establish a national cluster that transforms Sweden into a global hub for large-scale, industrialized remanufacturing. Anchored in West Sweden's world-leading expertise in metal-based additive manufacturing, we are building a mission-oriented collaboration platform that unites industry, academia, technology providers, policymakers, and innovators. Together, we aim to accelerate circular value creation, strengthen industrial competitiveness, and drive the such transition. By creating shared R&D arenas, enabling industrial pilots, and fostering collaboration, we will turn fragmented capabilities into a coordinated national force.

With a "learn together, fail together" philosophy, we create the conditions for faster innovation, smarter adoption, and a resilient, sustainable circular future.

Focus areas

REC addresses the full value chain — from materials and advanced processes to automation, digitalisation, logistics, and inspection.

- **Smart & Sustainable Remanufacturing:** Advanced materials, AM-based repair, automated inspection, and optimized circular flows.
- **Digital & Automated Production Systems:** AI-driven decision support, digital twins, traceability, and scalable automation for industrialization.
- **Ecosystem for Talent, Innovation & Growth:** Shared R&D arenas, industrial pilots, startup collaboration, and structured competence development.

Interest in collaboration and exchange

- Unite fragmented expertise into a national force for circular production
- Co-develop shared R&D arenas and industrial pilots
- Accelerate tech transfer between academia, startups, and industry
- Strengthen capabilities in AI, automation, logistics, and data
- Collaborate on competence supply and talent matchmaking
- Drive system-level innovation for a resilient, sustainable future

By 2035, REC will be a world-leading cluster with a turnover of >100 million SEK in Sweden and exponential export growth

Facts

Start and end date:
11-2025 to 03-2026 prestudy, then scale up

Total budget:
1,5 MSEK prestudy

Project leaders:
Innovatum Science Park
RISE
Chalmers
Högskolan Väst

Funded by:
Vinnova

Want to learn more? Contact Peter Stavered peter.stavered@innovatum.se or visit https://innovatumsciencepark.se/projekt/rec-reman-excellence-cluster/

Project partners and other (place logos here)

innovatum science park
RI.SE Research Institutes of Sweden
CHALMERS
HÖGSKOLAN VÄST
With support from VINNOVA Sweden's Innovation Agency

Resilient agriculture through innovative use of plant polyphenols

Mika Sipponen[1], Leonidas Matsakas[2], Mona Nordström Högberg[3], Edouard Pesquet[1], Linnea Cederholm[1], Mark Rhinard[4]

[1]Stockholms Universitet, [2]Luleå Tekniska Universitet, [3]Sveriges Lantbruksuniversitet, [4]Utrikespolitiska institutet

The challenge:

Rising global population, climate change, soil erosion, and nutrient loss threaten food systems.

In Sweden, rising fertilizer and pesticide use—over **250 kt fertilizers** and **2.3 kt pesticides** yearly—cause major nutrient runoff to the Baltic Sea.

The Need:

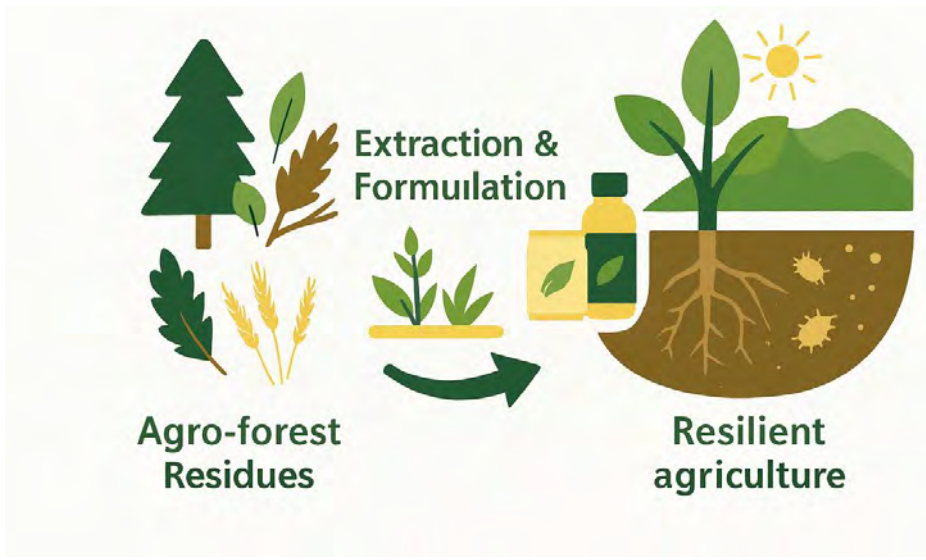
Sustainable intensification of agriculture to ensure food security while preserving soil health, biodiversity, and ecosystem resilience.

Our mission:

To establish Sweden as a global leader in polyphenol chemistry for resilient agriculture by transforming forestry and agricultural residues into sustainable, bio-based solutions that enhance soil health, rehabilitate degraded soils, boost plant growth and resilience to environmental stressors, and advance regenerative farming. This initiative supports the circular bioeconomy and resilient food systems, laying the foundation for future excellence clusters aligned with the EU Green Deal and the planet's ecological boundaries.

Focus areas:

1. Precisely controlled and tunable lignin extraction from waste biomass
2. Scalable development of polyphenol formulations to enhance soil health and plant growth.
3. Evaluate polyphenol-based materials in soil, including microbiome, and plant systems
4. Develop bioactive lignin components that enhance plant growth, stress resilience, and soil health
5. Environmental safety and regulatory compliance
6. Examine policy and governance conditions enabling bio-based innovations



Interested for collaboration:

We seek collaborations on AI/ML-based predictive modeling, including developing models that capture the molecular behavior of polyphenols throughout the production process.

Want to learn more? Contact Associate Prof. Mika Sipponen, mika.sipponen@su.se

Funded by:

Vetenskapsrådet

Partners: Stockholms universitet · Luleå Tekniska Universitet · SLU Sveriges Lantbruksuniversitet · The Swedish Institute of International Affairs

SecureAI

Towards a World-Leading Excellence Cluster for Secure and Trustworthy AI

Artificial Intelligence is rapidly becoming part of Sweden's critical infrastructure powering healthcare, mobility, logistics, defense, energy, everyday decision-making and more. With this reliance comes risk: AI systems are vulnerable to adversarial manipulation, data poisoning, model extraction, and privacy leakage. These threats can have severe consequences from compromised patient safety to disrupted supply chains or weakened defence systems.

SecureAI addresses this challenge by establishing Sweden's first Excellence Cluster for AI Security. The cluster builds on five years of work at AI Sweden and partners, where infrastructure, international collaborations, and successful projects have already been developed. SecureAI will contribute to make AI systems developed and used in Sweden secure, resilient, and trustworthy.

Focus areas

Establish Sweden as a shaping force in global AI security standards and talent development.

- Provide organizations in Sweden with a global edge in secure AI products and services.
- Help safeguard national infrastructure and defense through robust and secure AI systems.
- Help build societal trust in AI applications across sectors.

Approach

- **Secure-by-Design AI** – embedding security and trustworthiness from the earliest design stages.
- **Rapid Response Capability** – a function to detect, analyze, and mitigate emerging AI threats.

Interest in collaboration and exchange

- **Define collaboration interfaces** for next stage development of excellence clusters.
- **Shared challenges** in securing AI systems across sectors such as mobility, healthcare, defense, telecom, and critical infrastructure.
- **Opportunities to co-develop methods and tools** for secure-by-design AI, threat detection, and resilience.
- **Exchange of expertise** on governance, standards, and compliance (EU AI Act, Cyber Resilience Act, export control, sector-specific needs).
- **Talent development partnerships** (graduate programs, exchanges, gender-inclusive pipelines).

Facts

Start and end date:
October 2025-March 2026

Total budget:
1.5 MSEK

Project leader:
Mats Nordlund

Funded by:
Vinnova

Want to learn more? Contact mats.Nordlund@ai.se or visit www.ai.se.

Project partners and other contributing organisations

SELMA – Sustainable ELectrical MAchines

We want to be the world-leading center in energy and material technology, pioneering the development, industrialization, and adoption of sustainable electrical machine technologies.

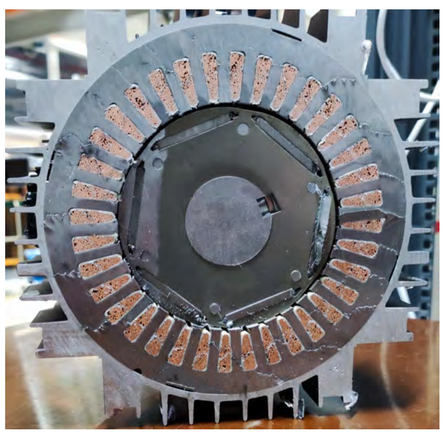
The future is electric, driven by global decarbonization targets. This transition is, however, very "mineral-intensive“, with problematic material supply-chain dependencies and their associated environmental and socio-economic impacts. We want to address this issue by rethinking electrical machines manufacturing and design.

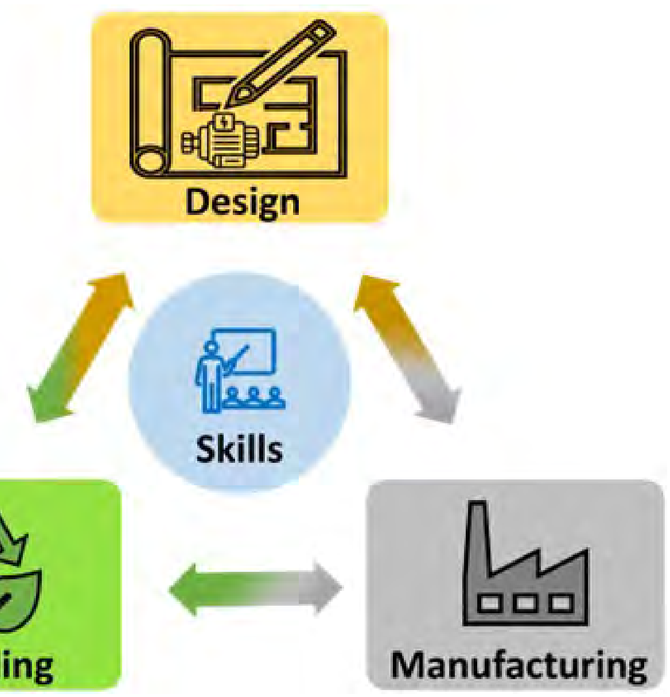
- **Electrical machines (EM) are a backbone technology: almost all generated electricity and >50% of consumed electricity goes through electrical machines.**
- **Electrical machines enable a multiplicative effect: more efficient machines allow huge energy savings, smaller batteries, lower power electronic requirements, easier thermal constraints. The key to sustainability!**
- **Everyone is affected: industry, generation, e-mobility, robotics, data center cooling, etc. No exceptions.**

Focus areas

SELMA entails a life-cycle approach from material science to recycling, passing through EM design.

- Reduce/eliminate reliance on rare-earth elements: How to achieve this goal? At what cost?
- What about copper, can its usage be optimized in EM design? And insulation/impregnation? Are there alternative materials?
- Design of EMs for reparation, reuse and recycle? What about reliable EMs?
- How can we reach electric power density and energy efficiency application targets?





Interest in collaboration and exchange

We are a strong team of electrical machine designers and material scientists, with a deep understanding of electrification. Yet, we need to know more.

Our competence in EM design, permanent magnets and copper is secured. We are looking for specialists from industry and academia to cover:

- **Insulation material:** Next-gen power electronics is making EMs suffer!
- **Impregnation techniques**: currently an obstacle for reuse/recycling!
- **Electrical steel characterization:** EU competence could be better.
- **Industry needs**: We have more industries in the pipeline, but we love to hear more: OEMs, EM suppliers, copper/magnet/electrical steel suppliers, mining & recycling.

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1650 kSEK

Project leader:
Luca Peretti, KTH

Funded by:
Vinnova

Want to learn more? Contact Luca Peretti (lucap@kth.se).

Project partners and other

Shaping the Future with Neuromorphic Technology (NEUTEC)

By 2035, Sweden will be globally recognized as a pioneer in next-generation intelligent systems with integrated neuromorphic technology for real-world interactions, enabling transformative products and services in automation, telecommunication, defense, healthcare and industrial systems.

- **The overall goals and expected results are a shared vision and a strategic plan that can shape the future of intelligent systems using neuromorphic technology as a catalyst.**
- **The aim is to foster challenge-driven, application-oriented collaboration between industry, academia, and research institutes in neuromorphic technology across the entire stack.**

Focus areas

The rising use of AI for real-time monitoring and autonomous real-world interactions in equipment and edge networks demands cutting edge technological advancements enabling scalable, low-power, wireless, low-latency, high dynamic range, adaptive and bio-compatible solutions.

Neuromorphic technology is a cross diciplinary field and includes

- Memristive devices and circuits
- Organic electronics
- Photonics and spintronics
- Neuromorphic sensors and algorithms
- Neuroscience and biological foundation
- Signal processing
- Cross-layer design optimization
- Autonomous systems
- On-chip adaptation and learning
- Edge AI

Interest in collaboration and exchange

We are open for collaboration in developing next-generation scalable intelligent systems, with integrated neuromorphic technology as catalyst.

Welcome to open workshops where we will identify flagship use cases, shared visions, and opportunities for adoption and impact.

- *20-21 January, in Lund focusing on Telecom, Edge AI, Space, and Defence.*
- *3-4 February, Norrköping, focusing on Industrial systems, Automation and Robotics, Healthcare, and Wearables.*

Facts

Start and end date:
11-2025 till 04-2026

Total budget:
1 500 000 SEK

Project leaders:
Sabine Mayer
Fredrik Sandin

Funded by:
VINNOVA

Want to learn more? Contact sabine.mayer@ltu.se

Project partners and other contributing organisations

Sustainable Polymers and Fibers for Energy and Industrial Transition

VISION:

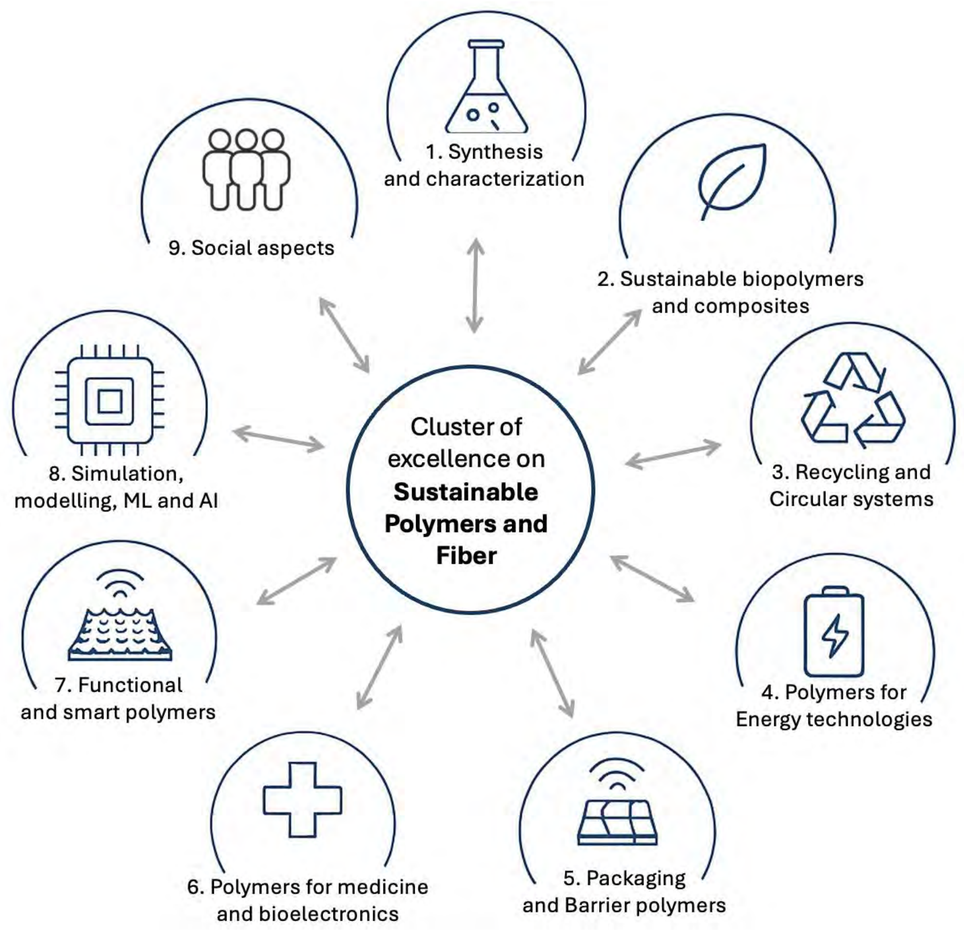
Polymer and fiber research supports innovation in renewable energy, healthcare, and sustainable packaging. Sweden has world-leading expertise in biopolymers, conducting polymers, fibers, and composites that are central for many industries. This excellence cluster will bring together universities and companies to speed up progress from research to real applications and strengthen Sweden's competitiveness, sustainability, and resilience.

GOALS:

- Developing circular, high-performance, sustainable polymers and fibers.
- New technologies, business models and spin-offs in areas and industries utilizing these materials
- Stronger global position for Sweden in sustainable materials.
- Support for national goals in climate neutrality and circular economy.

Focus areas

1. Synthesis and characterization of macromolecular systems.
2. Sustainable Biopolymers and Bio-based Composites; Renewable materials from cellulose, lignin, and other bioresources.
3. Polymer and Fiber Recycling and Circular Material Systems. Replacement of PFAS and halogenated compounds.
4. Conducting and Insulating Polymers for Energy Technologies for use in cables, batteries, supercapacitors, fuel cells, electrolyzers
5. Packaging Materials and Barrier Polymers.
6. Polymers and Fibers for Pharmaceutics and Bioelectronics.
7. Functional and Smart Polymer and Fiber Systems, 3D printing, Printed electronics, Fiber processing, Water purification,
8. Computational Materials Science, AI, ML for Polymers and Fibers.
9. Social aspects: The impact of plastic pollution in the context of climate change; effects of plastic on human and planetary health.



Interest in collaboration and exchange

Needs and Opportunities for Collaboration

We invite **industry and academic partners** to co-develop next-generation sustainable polymer and fiber materials. Key areas for collaboration include:

- Bio-based and recyclable composites and coatings
- PFAS-free and circular packaging solutions
- Conductive polymers for batteries, fuel cells, and printed electronics
- Digital and AI tools for material design and process optimization
- Shared pilot lines and testbeds for scale-up and commercialization
- Advanced recycling and chemical upcycling technologies
- Training and joint PhD programs and schools

Facts

Start and end date:
11-2025 till 03-2026

Total budget:
1 500 000 SEK

Project leaders:
Prof. Igor Zozoulenko,
Linköping University

Funded by:
VINNOVA

Want to learn more? Contact Prof. Igor Zozoulenko, igor.zozoulenko@liu.se

Project partners and other

Swedish Center for Spintronic Cognitive Technology (SPIN-TECH)

Build Sweden's world-leading **Excellence Cluster** on spintronics for ground-breaking artificial intelligence (AI) hardware and cognitive sensing technologies.

- Move beyond the von Neumann architecture by realizing spin-based integrated **memory-in-logic** and **neuromorphic AI hardware** with radical efficiency.
- Achieve **20× faster data processing speeds** with **100× lower energy** consumption than conventional AI.
- Invent **spin-based processors, memory, sensors, and stochastic computing** for ultra-low-power AI, edge-computing, and real-time learning.
- Enable emerging applications in robotics, autonomous systems, medical implants, and quantum–spin hybrid technologies.

***SPIN-TECH** unites Sweden's national strengths in **spintronic research and infrastructure** to create intelligent, sustainable hardware systems based on the electron's spin. The long-term goal is to develop an international institute for innovative spin cognitive technology in Sweden.*

Focus areas

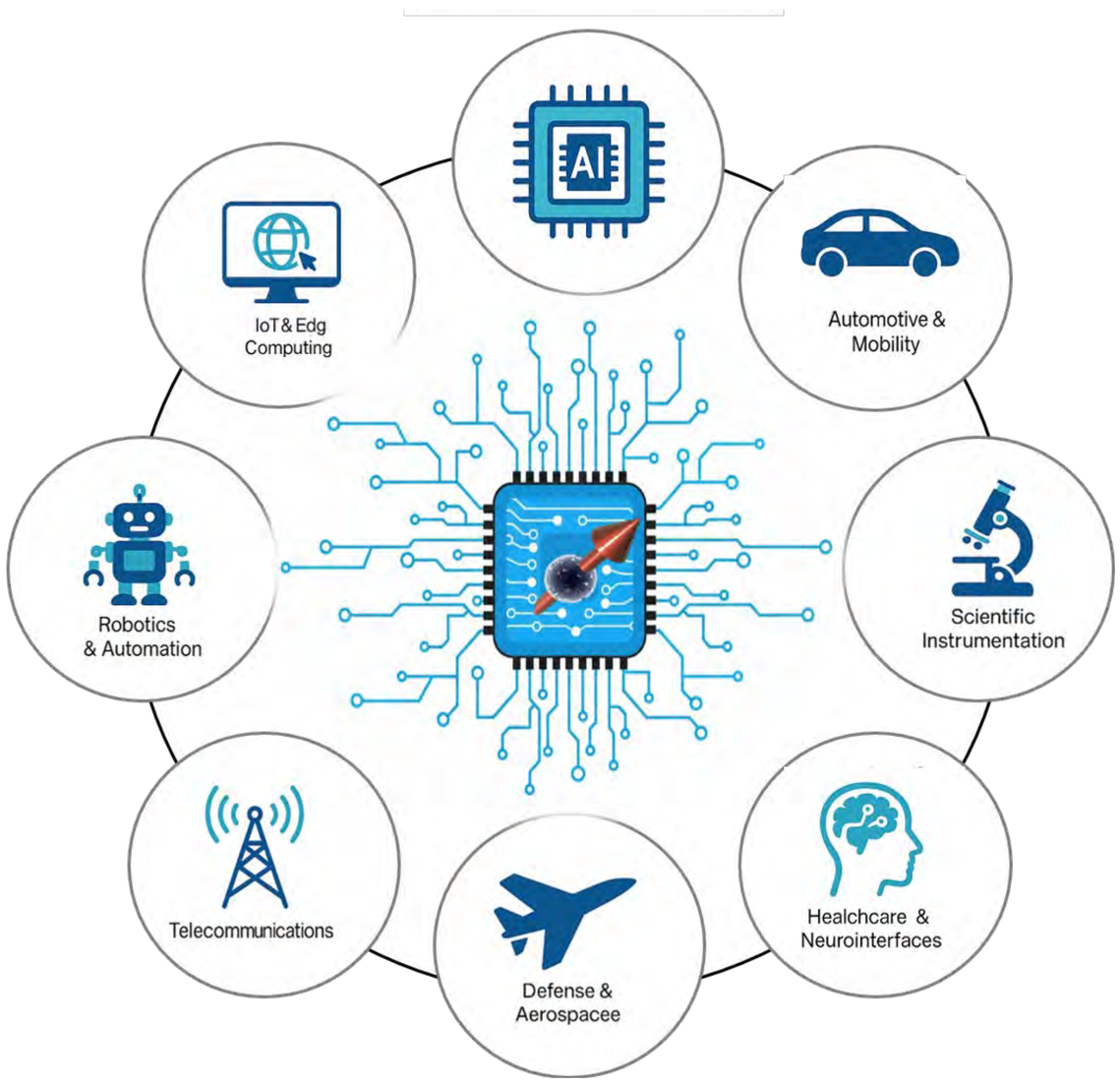
Spin Materials: Advanced nanomagnets, topological quantum materials, altermagnets, orbital systems, 2D materials, and moiré superlattices.

Spin-based Phenomena: Energy-efficient spin current and spin wave communication, ultrafast femtosecond spin dynamics, spin-ordered phases, THz generation, novel spin–orbital textures for memory and computing.

Spin-Based Memory & Logic: Magnetic random access memory (MRAM), multi-level Magnetic tunnel junctions (MTJs), spin-based memory in logic, domain-wall & skyrmion synapses and neurons.

Neuromorphic & Stochastic Computing: Spin-torque oscillators, magnonics, Ising and Heisenberg machines, Brownian probabilistic computing.

Spin sensing for Medical Implants and robotics: Ultra-low magnetic field sensors at room temperature, muscle/brain activity mapping, intelligent prosthetics.



Interest in collaboration and exchange

- The cluster is aligned with national infrastructures, e.g. **myfab**, and large-scale facilities, **Max-IV** and ESS
- Partnerships with companies in **AI hardware, memory and computing, robotics, automotive, sensors, and semiconductor manufacturing**.
- Joint development of **spin-based cognitive sensors** for IoT, health, and autonomous systems.
- Co-design of **materials, devices, circuits, and system architectures** with industry and academic partners.
- Engagement with **ethics, policy, and societal impact** communities for the responsible deployment of sustainable information and communication technologies.

Facts

Start and end date: 01/2027 till 12/2036

Total budget: 80 MSEK per year

Project leaders:
Johan Åkerman (GU)
Saroj Dash (Chalmers)
Venkata Kamalakar Mutta (UU)
Anna Delin (KTH)
Olof Karis (Max-IV)
Danica Kragic Jensfelt (KTH)
Gustaf Arrhenius (IFFS)

Funded by:
Swedish Research Council (VR)

Want to learn more? Contact: Johan Åkerman (johan.akerman@physics.gu.se), Saroj Dash (saroj.dash@chalmers.se) Anna Delin (annadel@kth.se), Venkata Kamalakar Mutta (Venkata.mutta@physics.uu.se)

Project partners

GÖTEBORGS UNIVERSITET · CHALMERS UNIVERSITY OF TECHNOLOGY · Institute for Futures Studies · MAX IV · UPPSALA UNIVERSITET · KTH VETENSKAP OCH KONST

Swedish Centre for Resilient, Adaptive & Secure Critical Infrastructure Systems (ReSAS- Lab)

Vision in brief: The future of critical infrastructure (Water, transport , energy and communication systems) requires a paradigm shift from reactive, proactive, and predictive maintenance toward ***prescriptive, anticipatory, and adaptive systems that are self-optimizing and capable of withstanding rapid change***. We envision a future where maintenance is a shared societal value, embedded in policy, education, and finance not just a technical afterthought. The infrastructure of the future is not just a technical system but a living social contract between institutions and the communities they serve.

Strategic objectives:

- Counteracting technological obsolescence and operational inefficiencies by advancing cutting-edge research.
- Reducing fragmentation and improving system responsiveness through the intelligent design of next-generation infrastructure assets.
- Bridging the research–practice gap by translating advanced scientific knowledge into deployable, tested solutions.
- Strengthening institutional adaptability and foresight

Focus areas

- Circular economy & advanced materials
- Nexus research – Integrated water–energy–transport–communication planning that optimises resource use, reduces trade-offs and delivers co-benefits for resilience and sustainability.
- Anticipatory, prescriptive planning, maintenance, and management of critical infrastructures using AI & autonomous decision support systems, advanced sensing and quantum edge computing
- Cyber-physical-human resilience & crisis preparedness
- Self-sensing & condition intelligence

Interest in collaboration and exchange

- Municipalities, utilities and infrastructure
- National agencies and regulators interested in aligning policies, standards and investment signals with a system-of-systems perspective.
- Companies: Technology, engineering, construction, consulting and financing actors who want to test and scale solutions (e.g. sensors, AI, digital twins, advanced materials, robotics) in real environments.
- International centres and networks on critical infrastructure resilience for comparative studies, staff exchanges and joint proposals.
- Research community**:** Swedish and international researchers involved various aspects of critical infrastructure systems/ networks

Facts

Start and end date:
11-2025 till 04-2026

Total budget:
1,339,125 SEK

Project leaders:
Lars Thell Marklund
Emmanuel Okwori

Funded by:
Vinnova

Want to learn more? Contact: Lars Thell Marklund, email: lars.thell.marklund@ri.se

Project partners and other contributing organisations

Swedish Cluster of Excellence on Emerging Photovoltaics

Next-generation photovoltaic (PV) technologies are lightweight, flexible, and often made of abundant materials, enabling scalable, low-energy manufacturing. Their implementation is currently tempered by major scientific challenges, addressing which require coordinated, multidisciplinary efforts. By consolidating resources and expertise, the Cluster of Excellence will unify materials design, device architecture, environmental assessment, energy systems research, and societal integration, all within a single coordinated framework. Our goals and vision:

- **Addressing challenges for big breakthroughs on emerging PVs**
- **Sweden is recognized as a world-leading country in the breakthroughs for emerging PVs**
- **Sweden leverages its leading research into a commensurate global market share in emerging PV technologies**
- **Swedish public policy is well-adapted to support the clean energy transition**

Focus areas

We have preliminarily identified five core pillars for the cluster as the starting point for the planning grant:

- tackling fundamental scientific challenges to define the research focus
- advancing cutting-edge R&D with innovative approaches like AI-driven discovery and exploring new PV technologies
- developing groundbreaking technologies for diverse applications
- leveraging state-of-the-art facilities like stability testbeds
- fostering talent development via a graduate school and attracting top researchers

Interest in collaboration and exchange

We look forward to collaborations and discussions on the following topics:

- **New PV materials**: the development of new materials which can transform the PV research.
- **Advanced characterisations**: the technologies which can help to understand the fundamental working mechanisms of PVs.
- **New applications**: Applications where emerging PVs can make a difference, including niche applications
- **AI**: AI as a tool to help develop materials, devices and also understand the mechanisms.

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1,2 M SEK

Project leaders:
Feng Gao, LiU
Magnus Borgström, Lund
Olof Hjelm, LiU
Ellen Moons, Karlstad
Christian Müller, Chalmers
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Harald Rohracher, LiU

Funded by:
VR

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Project partners and other contributing organisations (place logos here)

LINKÖPING UNIVERSITY · LUND UNIVERSITY · UPPSALA UNIVERSITET · KARLSTADS UNIVERSITET · CHALMERS

Swedish Excellence cluster for CCUS

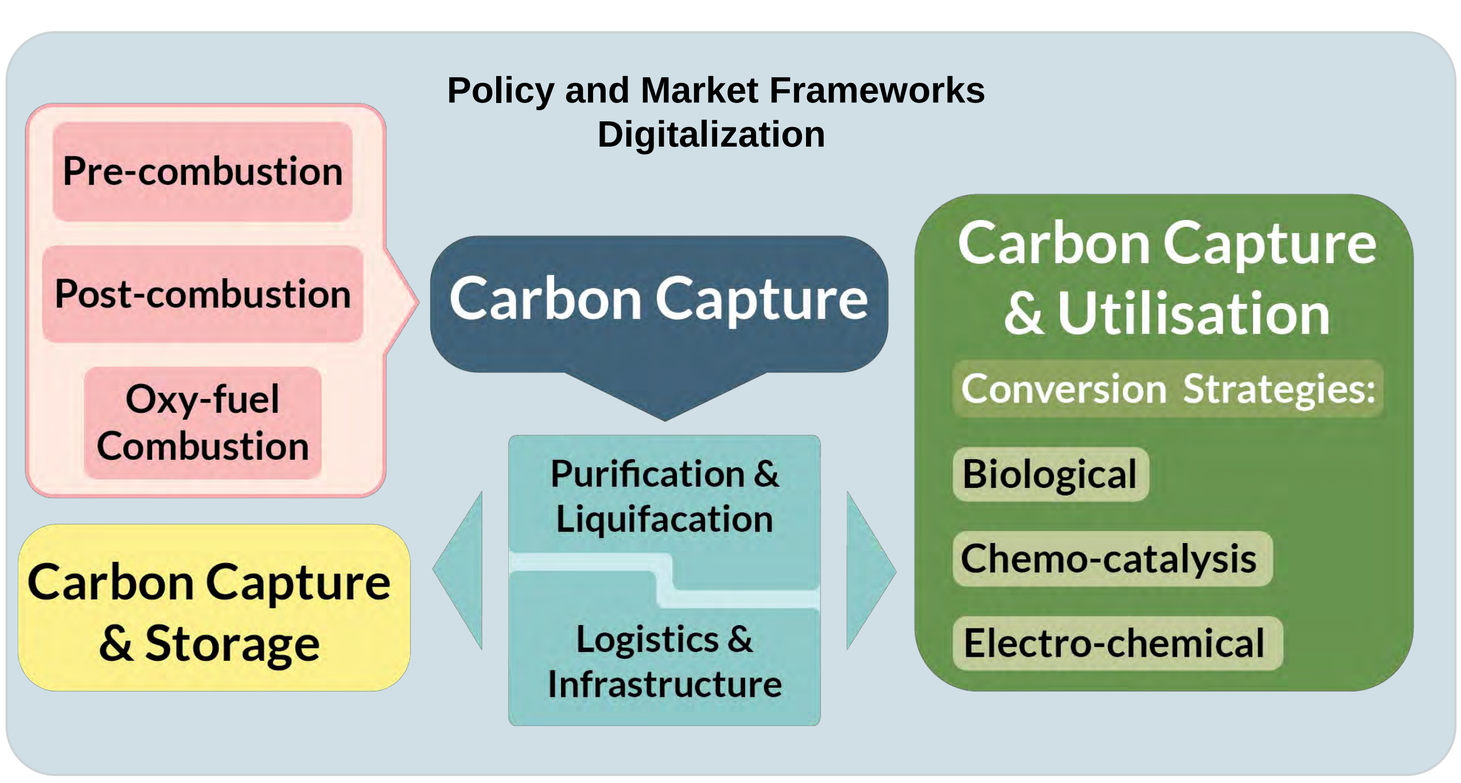
By 2035, Sweden has the potential to be Europe's leading hub and a global pioneer for sustainable carbon-based value chains — driving the transition to a circular economy. We are developing a national excellence cluster for CCUS, creating the platform for innovation, scale-up, and policy that will secure Sweden's position as a world leader in sustainable and circular carbon value chains. The overall goal is to:

- **Advance CCUS Innovation**
  Develop technologies for CO_2 capture, transport, purification and liquefaction, utilisation, and storage
- **Build Complete Value Chains**
  Facilitate scale up and implementation of CCUS solutions for circular carbon value chains, and negative emissions.
- **Shape Policy & Markets**
  Create regulatory and market frameworks to accelerate adoption and competitiveness
- **Leverage Sweden's Strengths**
  Use renewable energy, bio-based resources, and strong industry to deliver global impact.

Focus areas

- ***CO_2 Capture****: Advanced pre-, post-, and oxy-fuel technologies, including novel solvents and membranes.*
- ***CO_2 Utilization****: Catalytic, electrochemical, biological conversion to fuels, platform chemicals and food.*
- ***Transport & Storage****: Infrastructure planning and Swedish storage site development.*
- ***Integration & Scale-Up****: Pilots, industrial implementation, commercialization.*
- ***Policy & Markets****: Regulatory frameworks and market creation*
- ***Digitalization & AI:*** *digital twins, advanced process modeling, and AI-driven optimization*

*The cluster will cover the **entire CCUS value chain**; from advanced CO_2 capture technologies to utilization, transport, and storage. It will combine **cutting-edge research on technologies** with **system-level innovation**, **policy development**, and **market creation.***



Interest in collaboration and exchange

The project is Looking for partners in Academia, the private and public sectors and the civil society to reach a quadruple helix consortium. Specific areas of collaboration include, but are not limited to:

- ***Industry Insights:*** *Identify technical and policy challenges in CCUS value chains.*
- ***Joint Innovation:*** *Co-develop scalable capture, utilization, and storage solutions.*
- ***Policy Dialogue:*** *Shape frameworks for markets and negative emissions.*
- ***Digitalization & AI:*** *Explore smart monitoring, optimization, and predictive modeling for CCUS systems.*
- ***Shared Infrastructure:*** *Partner on pilots and testbeds.*

Facts

Start and end date:
11-2025 to 04-2026

Total budget:
1 500 000 SEK

Project leaders:
Konstantinos Chandolias
Filippa Andersson

Funded by: VINNOVA Sveriges innovationsmyndighet

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RI. SE · KTH Vetenskap och Konst · Chalmers · Luleå Tekniska Universitet · Lindholmen Science Park

Swedish Photonics Excellence Cluster

Photonics is a key enabler across all areas of innovation.

Sweden has strong photonics capabilities, and much of the value appears when these technologies are applied in areas such as quantum, digital infrastructure, sensing, life science, manufacturing, energy, space and defence.

Our cluster focus on **photonics-enabled innovation**: working across sectors and clusters to translate real industry needs into shared challenges that photonics can help solve. This strengthens both photonics and the sectors that rely on it.

We combine two directions:

- accelerating photonics-enabled innovation through sector-specific Knowledge Hubs, and
- strengthening the Swedish photonics ecosystem: companies, researchers and infrastructures.

We welcome dialogue on how closer links to photonics can strengthen technology development and increase value creation across the innovation landscape.

Focus areas

- **AI and Autonomous systems**
  Photonics provides the high-resolution imaging, LiDAR, hyperspectral sensors and fibre-based data links required by autonomous vehicles, drones and robots. Photonic sensors supply the trustworthy, high-quality data that AI systems depend on. Optical interconnects ensure high-performance transmission in datacentres and AI accelerators.
- **Advanced Digital Technologies**
  Photonics is central to digital infrastructure. Lasers and optics enable semiconductor manufacturing through lithography and wafer inspection. Silicon photonics and optical interconnects move data at high speed and low energy in processors and computing. Long-distance fibre networks form the backbone of 5G/6G, while optical technologies enhance cybersecurity at the physical layer.
- **Quantum**
  Photonics is essential to quantum communication, sensing and computing. Single-photon sources, integrated photonic circuits and ultra-stable detectors underpin quantum information systems and precision metrology. Lasers and optical control systems manipulate cold atoms and quantum states with extreme accuracy.
- **Energy**
  Photonics drives photovoltaics, high-efficiency LED lighting, advanced optical sensing and quality monitoring in energy systems. Optical methods support emissions monitoring, combustion control, hydrogen processes and safe operation of new energy technologies.
- **Materials and Production**
  Photonics underpins manufacturing through laser-based cutting, welding, additive processes and in-line metrology. High-performance spectroscopy and imaging support non-destructive testing, process optimisation and advanced material characterisation at the nano- to micro-scale.
- **Biotechnology**
  Biomedical imaging, spectroscopy, biosensors and lab-on-chip systems rely heavily on photonics. Optical methods enable non-invasive diagnostics, personalised medicine and high-precision tools for pharmaceutical and life-science innovation.
- **Space, Security, Defence**
  Photonic instruments enable secure communication, navigation, Earth observation and environmental monitoring from space. Advanced optical technologies support surveillance, situational awareness, missile warning, and high-robustness systems for defence and critical infrastructure.

Interest in collaboration and exchange

We welcome discussions on how photonics can complement and strengthen your cluster's initiatives.

- Can links to photonics accelerate innovation in your sector?
- How might your ecosystem benefit from sector-specific Knowledge Hubs in an enabling technology?
- Opportunities for joint use of national testbeds and research infrastructures.
- Skills development, capacity building and shared training across sectors.
- Collaborative projects where photonics strengthens Sweden's long-term strategic capabilities.

Facts

Start and end date:
October 2025 to March 2026

Total budget:
1 500 000 SEK

Project leader:
Åsa Claesson, RISE and PhotonicSweden

Funded by:
Vinnova

Want to learn more? Contact Åsa Claesson (asa.claesson@ri.se) or visit www.photonicsweden.org.

Project partners and other

PhotonicSweden
The Swedish Technology Platform in Optics and Photonics

RI.SE Research Institutes of Sweden

With funding from:
VINNOVA
Sweden's Innovation Agency

Swedish Spatial AI and Positioning Cluster

The developments in machine learning have given us astonishingly powerful tools, especially for interpretation and generation. However, it has been surprisingly difficult to translate these methods into positioning. We are now on the brink of a corresponding revolution in navigation, where Sweden can take a leading global position. Within the cluster, we bring together world-leading expertise on a wide range of sensors, in both technical and biological navigation. The area is of great importance to Swedish industry and society.

Our questions include:

- advance spatial AI by creating methods and architectures that enable deep learning to solve geometric mapping and navigation problems
- unravel the rules and mechanisms used by insects to navigate
- understanding how swarms function in nature
- explore and leverage the possibilities created by new sensor technologies

Focus areas

Mapping and positioning is a strategic capability for both defense and industry. The field spans algorithms, sensor fusion, and systems that estimate geometry, motion, and uncertainty from heterogeneous signals, for example video, audio, radio, magnetic, and inertial and deployed on individual or swarms of platforms ranging from handheld devices and robots to vehicles. The humanist and social scientific perspectives will deal with aspects of possible implementations and use and also with governance and fairness in development.

- Working on GPS denied navigation in an extremely broad range of settings – with broad range of sensors
- Combined communication and sensing
- Bio-inspired technology for reduced energy consumption

Interest in collaboration and exchange

Collaboration within academia: now Lund, Linköping and Chalmers – expansion to other groups possible.

Collaboration with industry: automotive, aeronautic, maritime navigation, mobile communication, gaming, agriculture, and forestry industries.

Collaboration with society: Health care, defence, security, resilience.

Global reach: academia, industry and public bodies.

Interests in collaboration include areas such as sensors, quantum sensors, communication, health care,

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 200 000 SEK

Project leaders:
Åström (PI), Dacke, Davies, Felsberg, Gustafsson, Haeger, Hendeby, Kahl, Larsson, Tufvesson, Warrant, Wymeersch,

Funded by:
The Swedish Research Council

Want to learn more? Contact Kalle Åström and Melvyn B. Davies, Lund University.

Project partners and other contributing organisations

Trusted Autonomy – Sweden's Vision for World-Leading Connected AI and Autonomous Systems

• Trusted Autonomy – laying the foundation for Sweden's excellence cluster in AI & autonomous systems.

• Starts from mobility, but expands across energy, industry, healthcare, logistics, agriculture, and autonomous code/software generation.

• Led by AstaZero, Lindholmen Science Park (MobilityXlab, Drive Sweden, AI Sweden) and University of Gothenburg.

• Develops a bold vision and a roadmap to 2035 for a world-leading Swedish cluster.

• Builds on Sweden's unique strength in test-before-trust, safety, connectivity, and collaborative innovation.

• Mobilizes national actors and strengthens international links (EU, Denmark, Singapore, global clusters).

• Positions Sweden as the global hub for safe, reliable, ethically aligned autonomous systems.

• By March 2026: a shared vision, roadmap, and partner constellation ready for the next phase of cluster establishment.

Focus areas

- **Trusted, transparent, and generative AI** for autonomous decisions and code/software generation
- **System-of-systems validation & safety assurance**
- **Connected autonomy**, 5G/6G, edge/cloud AI, and digital twins
- **Cybersecurity, resilience, and robustness under real-world conditions**
- **Societal trust, ethics, and regulatory compliance**

Interest in collaboration and exchange

- Open to collaboration across **industry, academia, public sector**, and **startups**.
- Seeking partners to co-develop **safe and trusted AI & autonomous systems**.
- Interested in exchange with **international clusters** in Europe, the US, Singapore, and Denmark.
- Welcoming actors working in **mobility, energy, industry, health, logistics, agriculture**, and **autonomous software generation**.
- Open to joint work on **testing, validation, digital twins, and trustworthy AI frameworks**.
- Keen to explore **EU program collaboration** and opportunities for shared infrastructures and joint investments.

Facts

Start and end date:
Oct 2025 till Mar 2026

Total budget:
1.500.000 SEK

Project leaders:
- Victor Jarlow (AstaZero)
- Ahmed Ouaddani (LSP/MobilityXLab)
- Malin Andersson (LSP/Drive Sweden)
- Mats Nordlund (LSP/AI Sweden)
- Christian Berger (Göteborgs Universitet/Chalmers)

Funded by:
Vinnova

Want to learn more? Contact Victor Jarlow (AstaZero), victor.jarlow@ri.se

Project partners and other (place logos here)

AstaZero
RI. SE
Lindholmen Science Park
AI SWEDEN
mobilityXlab
DRIVE SWEDEN
CHALMERS UNIVERSITY OF TECHNOLOGY
GÖTEBORGS UNIVERSITET

What are Hilbert's 23 problems of AI?

- Hilbert's problems were one of the *main drivers* for the field of mathematics during the 20th century. They are a good example that asking *scientific questions* is an efficient way to leverage progress and *consolidation of a scientific field*. The idea of this initiative is to achieve a similar effect to AI.
- This consolidation of AI methodologies is a topic that is *less attractive to corporate research* and needs to be covered mostly by academic research. Its blue-sky nature implies the need for basic research funding, but the field needs some structuring. The present initiative aims to *drive this structuring process by means of scientific questions, similar to Hilbert's problems* in mathematics that shaped the area during the past century.
- *The cluster of excellence will advance AI as a scientific field beyond an application-driven technology by formulating the fundamental problems and making an attempt to their solutions, while incorporating societal, ethical and security dimensions.*

Focus areas

- Hilbert formulated 23 problems in mathematics in 1900
- Until today are
  - 9 problems fully solved
  - 9 problems partly solved
  - 3 problems unresolved
  - 2 problems too vague (plus 24th problem)
- Gray, J. J. et al. The Hilbert Challenge (Oxford University Press, 2000)

- Why the problems need to be formulated for AI:
  - Failure of AI might lead to violation of Asimov's laws of robotics
  - Commonly accepted incorrect responses might threaten democracies
  - AI for Science requires explainability, certainty, and trustworthyness
- Why the applied perspective to AI is not enough: It is not an academic luxury!
- The quest for answering the problems will lead to groundbreaking findings

Interest in collaboration and exchange

The team of PIs was complemented from the start by

- Virginia Dignum (UMU) – aspects from humanities and social sciences
- Mike Winnerstig (FOI) – aspects from international security research
- Thomas Schön (UU)
- Marcus Liwicki (LTU)

Additional researchers are to be added

Relations to existing initiatives

- WASP, WASP-HS
- SRAs (ELLIIT, SeRC, Digital Futures, …)
- ELLIS Sweden (pending)
- AI4X CoE at LiU

Activities

- Kick-off October 20th
- Seminar by Nicklas Berild Lundblad
- Upcoming meetings (4/12, 6/2)

Facts

Start and end date:
10-2025 till 03-2026

Total budget:
1 200 000 SEK

Project leaders:
Michael Felsberg (LiU), Danica Kragic Jensfelt (KTH), Amy Loutfi (ÖRU,LiU), Alexandre Proutiere (KTH), Fredrik Heintz (LiU), Fredrik Johansson (CTH), Fredrik Lindsten (LiU)

Funded by:
VR

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Project partners and other

Wireless Beyond Standardization

How fast can an AI system learn on-the-fly communication invariants?

Standardization is the backbone of communication systems. It ensures global interoperability and economy of scale, but it leads to slow innovation cycles. In contrast, AI is developing rapidly, posing the question to which degree learning systems can substitute the standardization process. Fundamentally, we want to know how much invariants must be known before communication - and how much can be learned on the fly?

Key motivating questions:

- **What will networks be based on in 10 years? Which role will be left to standardization?**
- **Can GenAI automate networks allowing semantic communications at scale?**
- **Which theoretical pre-conditions exist? How are they influenced by HW/SW constraints?**

Focus areas

- Trade-offs in communication, computation, and energy regarding learning convergence: What limits exist? How do biological 'systems', human language and technical systems compare?
- Distributed/asymmetric inference systems: Leveraging inference, what is the minimum possible communication requirement?
- Semantics and Intent: Capturing the relevance and importance of the traffic properties, can we develop an end-to-end schemes that scale and are energy efficient?
- Autonomous improvement of networked systems: Can we devise representations and ML architectures that lead to research agents developing new theory in communications?
- Agentic AI for network stack generation: Primed by semantics or intent, can we generate network parameters, functional code or even inference structures to realize optimized networking? How can these agents be made functionally correct?
- Hardware architecture for future transceivers: How can large models be reduced to practical HW environments? How can asymmetric HW set-ups be leveraged?
- Social-economic aspects of rapidly evolving agentic systems

Interest in collaboration and exchange

- **Socio-economic aspects:** What is the role of IP and innovation in future communication systems? Is interoperability even possible at all?
- **Evolution of language in biology:** How is intent and communication medium related to language evolution? How is it related to species?
- **Hardware design for AI systems:** How can neuromorphic computing contribute to lower energy requirements? How are AI architectures impacted by this?
- **AI architectures for self-learning systems:** How can standard architectures for AI for science approaches be leveraged in the context of comm and networking research?

Facts

Project leader:
James Gross (KTH)

Project Co-Pis:
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Giuseppe Durisi (Chalmers)
Gabor Fodor (KTH)
Ayca Özcelikkale (Uppsala)
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Funded by:
VR

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Project partners and other contributing organisations

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