



BESLUT

Datum för beslut:  
2025-01-17

Diarienummer:  
KTH-RPROJ-0276016

## Beslut om ett strategiskt initiativ, KTH Collaborative effort for Brain Health

Detta beslut har undertecknats elektroniskt.

### Beslutet

KTH:s vicerektor för forskning beslutar att:

- Finansiera *KTH Collaborative effort for Brain Health* med 1 mnkr centrala medel under 2025.
- Utse Arvind Kumar , EECS-skolan, som ansvarig forskningsledare för satsningen.
- Återrapportering enligt utvärderingskriterier, för dialog om fortsatt bidrag ska vara Forskningsberedningen tillhanda 15 januari 2026.

### Ärendet

KTH:s initiativ för forskningssatsningar inrättades enligt förslag från Översyn av KTH:s särskilda forskningssatsningar (Dnr: KTH-RPROJ-0276016). Förslaget innebär att centrala medel ska kunna användas till direkt finansiering av tre- till femåriga forskningsinitiativ med det huvudsakliga målet att dra in externa forskningsanslag.

Under föregående år har Forskningsberedningen arbetat vidare med att konkretisera förslaget, och kommit fram till ett antal kriterier för ett KTH Strategiskt initiativ samt kriterier för utvärdering (Protokoll 10/2024):

*Kriterier för KTH Strategiskt initiativ:*

- Strategiska forskningsinitiativ är ett sätt för KTH att kraftsamla inom områden där det krävs nya samarbeten som är viktiga utifrån KTH:s vision och mål. Det kan dels vara att förstärka ett område som redan finns eller utveckla ett nytt.
- Strategiska forskningsinitiativ ska kunna initieras av både forskare, KTH:s ledning och forskningsberedningen.
- Strategiska forskningsinitiativ är satsningar med central finansiering på 0,5 - 3 mnkr per år i max fem år.
- Målsättningen för en beviljad satsning är att generera betydande externa bidrag till KTH om totalt minst 100 mnkr. Det kan vara externa bidrag från flera olika finansiärer som

tillsammans stärker området för forskningsinitiativet. Utväxlingen blir den viktigaste indikatorn som följs upp årligen.

*Kriterier för utvärdering av beviljat KTH Strategiskt initiativ ska ske efter ett år enligt nedan:*

- Projektansökan – En eller flera projektansökningar.
- Kraftsamling - Vilka PI' s är med i projektansökan/ansökningar?
- Förberedelsearbete inför utlysningar.
- Exempel på nya forskningssamarbeten.

Till Forskningsberedningens möte den 22 november inkom förslaget KTH Collaborative effort for Brain Health, med lektor Arvind Kumar, EECS-skolan, som ansvarig forskningsledare, se bilaga 1.

Baserat på Forskningsberedningens diskussion rekommenderas Vicerektor för forskning att stödja att förslaget beviljas sökt budget, 1 mnkr för år 2025. En utvärdering ska ligga till grund för diskussion om fortsatt finansiering och i vilken omfattning. (KTH-RPROJ-0276016 Protokoll 9/2024).

**Detta beslut** har fattats av vicerektor för forskning Annika Borgenstam efter föredragning av forskningsrådgivare Johan Schuber.

Kungl. Tekniska högskolan



Annika Borgenstam, vicerektor för forskning KTH



Johan Schuber, forskningsrådgivare, avdelningen för forskningsstöd inom Verksamhetsstödet

Bilaga 1: projektförslag

---

## Sändlista

### För åtgärd:

Arvind Kumar, EECS-skolan

### Kopia till:

Skolchef EECS-skolan

Controllergruppen, [controller@kth.se](mailto:controller@kth.se)

Chefen för avdelningen för forskningsstöd Maria Gustafson

Tf Kommunikationschef Gunilla Iverfelt

Anna Aminoff

Sanna Pehrson, avdelningen för forskningsstöd

Expeditionsdatum:

2025-01-17

## KTH Strategic Research Initiative:

### **KTH collaborative effort for Brain Health**

#### **PI:**

Arvind Kumar, Assoc. Professor, EECS and Scillfe Labs

#### **Co PIs**

Jeanette Hellgren-Kotaleski, Professor, EECS and Scillfe Labs

Erik Fransen, Professor, EECS and Scillfe Labs

Wojciech Chachólski, Professor, Science School

Saikat Chatterjee, Assoc. Professor, EECS

Lucie Delemotte, Professor, Science School.

Elena Gutierrez Farewik, Professor, Science School

Sebastiaan Meijer, Professor, CBH

Rodrigo Moreno, Professor, CBH and Scillfe Labs

Anna Månberg Researchers, CBH and Scillfe Labs

Peter Nilsson, Professor, CBH and Scillfe Labs

Martina Scolomeira, Assist. Professor, Science School

Ilaria Test, Assoc. Professor, SCI

Funding requested: 3M SEK

#### **Budget and activities**

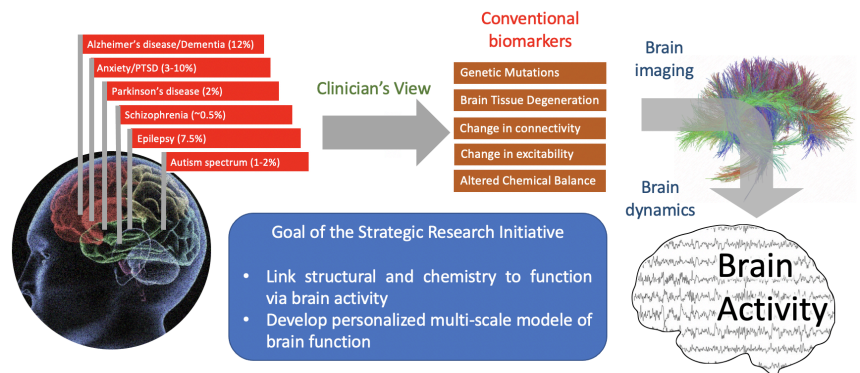
1M per year for 3 years.

	2025	2026	2027	Notes
Seed Funding	500K	500K	500K	2-3 pilot projects to collect prelim data for big grant applications
EU grant application preparation	200K	200K	200K	2-3 grants to PIs who are preparing EU grants
Thematic workshops and summer school	200K	200K	200K	To develop interdisciplinary collaborations and educate the next generation of researchers.
Seminar Series	100K	100K	100K	We will invite international guests for seminars. This will help for an international network
Total	1M	1M	1M	3M SEK for 3 Years

## Purpose

We will develop collaborations around a multi-scale and integrative approach to brain diseases to complement current neurological practices. To this end, we bring together a team of experts in neuroscience, biochemistry/proteomics, computational neuroscience, brain imaging, mathematics, and AI. Thus, we will combine data-driven methods with model-driven methods to identify causal links between the brain's chemistry/morphology and brain activity and thereby brain dysfunction. Our key achievements in the long run would be (1) data analysis/modelling pipeline for diagnosis and treatment of brain diseases and (2) a training program for next-generation brain health researchers. In the short term, we aim to develop multi-scale personalized computational models for the diagnosis and prognosis of selected brain diseases.

**The problem:** Brain health is a major concern in modern societies and represents both a vast amount of human suffering and a cost of 800 billion Euros per year, i.e., one-third of the societal costs for healthcare (due to the chronic nature of many of these disorders). Both psychiatric disorders and neurodegenerative diseases impair the quality of life of both patients and caregivers and reduce productivity in society. Our approach to mental health is often focused on finding the brain's genetics, structure (connectivity) and chemical imbalances underlying a mental condition. However, as the brain is a multi-scale complex system it has not been possible in general to link a specific mutation or local changes in the brain's structure to a specific mental health problem. In fact, in many psychiatric disorders, there is no visible change in the brain's chemistry and structure.



### What is missing in the current approach:

Structural and chemical changes occur at slow time scales (days/months). However, behavior is manifested at fast time scales. Motor and cognitive behavior are immediately linked to the brain's electrical activity. Surprisingly, in most cases brain activity is not even considered in the diagnosis (exception: epilepsy) or therapy (exception: Parkinson's disease) of brain diseases. However, as Norbert Wiener already noted (Cybernetics 1948), many brain disorders are disorders of improper brain dynamics and transfer of information.

**What ought to be done – develop a multi-scale approach to brain health:** To make progress towards brain disorders it is important to understand the link between the brain's genetics, chemistry, neural hardware, connectivity structure and brain activity. That is, we need an integrative approach. This demands an interdisciplinary collaboration between experimentalists and theoreticians in order to (1) convert the static data about chemical and structural change to dynamical information in terms of the electrical activity of the brain (2) define brain activity-based novel biomarkers to complement existing chemical biomarkers by leveraging machine learning and computational modelling expertise at KTH.

**How we will do that:** We are convinced that individual research groups at KTH have the necessary expertise to deal with brain science problems at a specific scale e.g., protein expression changes. Through this SRI we aim to create an interdisciplinary environment to pool together these individual expertise. What is needed is to have some instruments that facilitate goal-directed (i.e. funding) interactions among different expert groups. Therefore, we organize thematic workshops, hackathons, support pilot projects and creation of databases and benchmarks. Crucially, we will create a seminar series to host international experts to develop a bigger international network which is essential for EU and other such funding and placing KTH at a prominent place in this field.

**Vision:** We aim to bring at the forefront of brain health diagnosis and care by developing technology to complement existing clinical approaches with personalized computational models of the brain. To this end, through this SRI we will create an environment that fosters interactions among different research groups at KTH through the common goal of improving brain health.

**How is it related to identified skills needed in society / industry:** With growing longevity brain disorders (both psychiatric and neurodegenerative) will only increase. We urgently need a novel approach as existing neurology is clearly not prepared to handle the complexity of brain function.

**How is it connected to development of educational offerings:** If neurology has to transform to a level where personalized computational models of the brain become integral to diagnosis and treatments then the next generation of clinicians, industry and other stakeholders should be well informed about computational approaches to brain function and how to understand multi-scale interactions. Therefore, we will develop courses and summer schools to train the next generation of researchers and clinicians.

### Why at KTH

*What strengths are already in place at KTH in the form of established environments, strong collaborations and research infrastructure - synergies?*

There is no single method, instrument or perspective on the brain's structure and function that gives a comprehensive understanding of the healthy or diseased brain, but computational approaches and data science are rapidly becoming increasingly crucial (Amunts et al. 2024). At KTH several environments, currently not collaborating much, contribute with important approaches. The purpose of this project is therefore to build bridges between these environments to create impact and visibility.

At KTH we have expertise in computational modelling, brain imaging, molecular biology, AI-based data analysis and high-performance computing. We will also exploit the close ties with SciLIFE Labs, DDLS, WASP and strategic initiatives such as StratNEURO, and Digital Futures.

Recently, KTH has become the coordinator of EBRAINS-Sweden, a national node among 10 others (see [ebrains.se](http://ebrains.se)). EBRAIN is evolving towards a 'one-stop-shop' for researching the multi-scale and dynamic brain, with data, atlases, models, software, etc.

A lot of groundwork for this initiative was built through the Digital Futures project [dBRAIN](#).

Thus, KTH has the complementary expertise to develop this research field.

### Describe and relate to the competition in the field (local/regional, national, international).

Within Sweden, we are not aware of any concerted effort to use computational modelling for the integration of multi-scale brain data for brain diseases. KTH is unique in this sense. Most of the work nationally is done at the level of biochemistry and proteomics.

Internationally, there are small efforts in this direction. The groups of [Petra Ritter](#) (Berlin Germany) and [Viktor Jirsa](#) (Marseille, France) are leveraging computational models of the brain to drive diagnosis and therapies of brain diseases such as epilepsy and treatments like deep brain stimulation. Other than these two groups we are not aware of any such initiatives. There are several groups who are now using decision-making theories for modeling psychiatric conditions (e.g. group of [Peter Dayan](#), Germany) and the [Max Planck Institute of Computational Psychiatry and Ageing Research](#). Computational psychiatry is indeed growing but what is clearly missing is an approach to tie together different scales of brain function (from molecules to decision-making). And we envision KTH to take the lead in this direction.

### Research team

[Arvind Kumar](#) (EECS): Network dynamics [[Link to short CV](#)]

[Jeanette Hellgren Kotaleski](#) (EECS): Neuron and synaptic biophysics [[Link to short CV](#)]

[Erik Fransen](#) (EECS): Synaptic dynamics, AI [[Link to short CV](#)]

[Lucie Delemotte](#) (SCI) Molecular dynamics simulations [[Link to short CV](#)]

[Wojciech Chachólski](#) (SCI): Topological data analysis [[Link to short CV](#)]

[Saikat Chatterjee](#) (EECS): Machine Learning for Health care [[Link to short CV](#)]

[Elena Gutierrez Farewik](#) (SCI): Motor behavior [[Link to short CV](#)]

[Rodrigo Moreno](#) (CBH): Brain imaging [[Link to short CV](#)]

[Sebastiaan Meijer](#) (CBH): Data driven health [[Link to short CV](#)]

[Peter Nilsson](#) (CBH): Proteomics [[Link to short CV](#)]

[Anna Månberg](#) (CBH): Proteomics [[Link to short CV](#)]

[Martina Scolomeira](#) (SCI): Topological data analysis [[Link to short CV](#)]

[Iliaria Testa](#) (SCI): Superresolution imaging [[Link to short CV](#)]

#### *External collaborators*

**National:** Joana Pereira, Daniel Ferreira, Grégoria Kalpouzou, Eric Westman, Miia Kivipelto (Alzheimer's disease), Per Svenningsson (Parkinson's disease), Kristoffer Månsson (Anxiety disorders), Gilad Silberberg (Parkinson's disease), Tobias Granberg (Neuroradiology) from the Karolinska Institutet and Karolinska Hospital, Armita Golkar (Anxiety disorders) from Stockholm University

Brain imaging data: Daniel Lundqvist (NATMEG), Rita Almeida (SUBIC)

Angela Cenci (Movement disorders), Lund University

#### **International:**

All the PIs are part of diverse international research communities. Here are a few examples: Seth Grant, University of Edinburgh, UK, Nicolas Mallet, CNRS, Bordeaux, France, Hagai Bergman, Hebrew University, Israel, several EBRAINS linked national nodes and many more.

#### **Describe the quality of the research team.**

All the PIs and participating researchers are successful researchers leading their own research groups at KTH. Individually they have stellar publication and funding records as can be seen in their CVs (see links above). A subset of the research team has already collaborated in the Digital Future project flagship project dBRAIN [[See joint publications here](#)].

#### **Budget and activities**

1M per year for 3 years.

Activities include Seed Funding for pilot studies, EU grant application preparation, organization of thematic workshops and summer school and a seminar Series involving international speakers.

#### **Strategy for funding**

Each of the research environment at KTH is already well funded, and we foresee that a better integration between our activities with a focus on brain health will create a platform for significant additional funding. In the short term we will target EU grants such as the synergy grant and JPND style calls and other international funding agencies such as Nova Nordisk Fonden, Chan-Zuckerberg Initiative and Michael J. Fox Foundation. [Mental health is on top of the EU funding agenda](#) and we expect to tap into that recourse. In 2-3 years we apply to get a Marie Skłodowska-Curie Actions - Doctoral Networks. Finally, as the opportunities will come, we will apply for VR interdisciplinary research environment calls.






# KTH internt beslut med e-signatur: kth-proj-0276016\_Beslut om ett strategiskt initiativ, KTH Collaborative effort for Brain Health

Slutgiltig revideringsrapport

2025-01-17

Skapad:	2025-01-16 (Centraleuropeisk tid)
Av:	Johan Schuber (jschuber@kth.se)
Status:	Signerat
Transaktions-ID:	CBJCHBCAABAAzwaQ5CmmT240pyr2MNxnUAtZbOLjshDf

## ”KTH internt beslut med e-signatur: kth-proj-0276016\_Beslut om ett strategiskt initiativ, KTH Collaborative effort for Brain Health” – historik


-  Dokumentet skapades av Johan Schuber (jschuber@kth.se)  
2025-01-16 - 12:42:43 GMT+1– IP-adress: 83.249.235.114
-  Dokumentet skickades med e-post till Johan Schuber (jschuber@kth.se) för signering  
2025-01-16 - 12:42:51 GMT+1
-  Dokumentet har e-signerats av Johan Schuber (jschuber@kth.se)  
Signaturdatum: 2025-01-16 - 12:43:18 GMT+1 – Tidskälla: server– IP-adress: 83.249.235.114
-  Dokumentet skickades med e-post till Annika Borgenstam (annbor@kth.se) för signering  
2025-01-16 - 12:43:19 GMT+1
-  E-postmeddelandet har visats av Annika Borgenstam (annbor@kth.se)  
2025-01-17 - 00:25:10 GMT+1– IP-adress: 146.75.181.83
-  Dokumentet har e-signerats av Annika Borgenstam (annbor@kth.se)  
Signaturdatum: 2025-01-17 - 12:10:10 GMT+1 – Tidskälla: server– IP-adress: 217.213.112.18
-  Dokumentet skickades med e-post till Johan Schuber (jschuber@kth.se) för ifyllnad  
2025-01-17 - 12:10:12 GMT+1
-  E-postmeddelandet har visats av Johan Schuber (jschuber@kth.se)  
2025-01-17 - 14:37:19 GMT+1– IP-adress: 83.249.235.114




KTH Sign

Powered by  
Adobe  
Acrobat Sign



 Formuläret har fyllts i av Johan Schuber (jschuber@kth.se)

Datum för ifyllnad av formulär: 2025-01-17 - 14:37:31 GMT+1 - Tidskälla: server- IP-adress: 83.249.235.114

 Avtal har slutförts.

2025-01-17 - 14:37:31 GMT+1



KTH Sign

Powered by  
**Adobe**  
**Acrobat Sign**