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# Welcome

The Copenhagen Center for Health Technology (CACHET) is an interdisciplinary research center with a vision to promote and support healthy living, active ageing and chronic disease prevention and management through personalised health technology. CACHET has been founded as a strategic partnership between the Technical University of Denmark, the University of Copenhagen, City of Copenhagen and the Capital Region of Denmark.

Our activities in research training, industrial innovation and healthcare innovation rest on a solid foundation of world-class research.

## Excellent research

CACHET hosts and initiates a wide range of interdisciplinary research projects at the intersection of the technical and medical sciences, all of which take their outset in specific healthcare challenges in the Danish society. By coupling a user-centered research and innovation process with solid academic knowledge, the research focuses on application and impact.

## Research training

The CACHET PhD programme funds and trains the health technology researchers of the future. Our competitive PhD programme is designed to foster problem-oriented, inter-

disciplinary and entrepreneurial research. Be it in academia, industry, society in general or in the clinic, these researchers will be the frontrunners in developing the technology-based healthcare model of the future.

## Industrial innovation

Most of CACHET's research is done with our more than 25 industrial partners. There is a strong focus on translating research into more than new technologies and products for commercial growth in the Danish life science industry. The CACHET innovation programme helps companies to work with top-class researchers in a flexible and pragmatic way.

## Societal and healthcare innovation


By addressing major health challenges in the Danish society, CACHET research starts and ends with social innovation. CACHET works to translate research into new technologies and healthcare services for the benefit of patients and the Danish healthcare system.

This booklet is made in order to provide an overview and status of the research, training and innovation of CACHET as it was at the beginning of 2019.

Enjoy the reading.

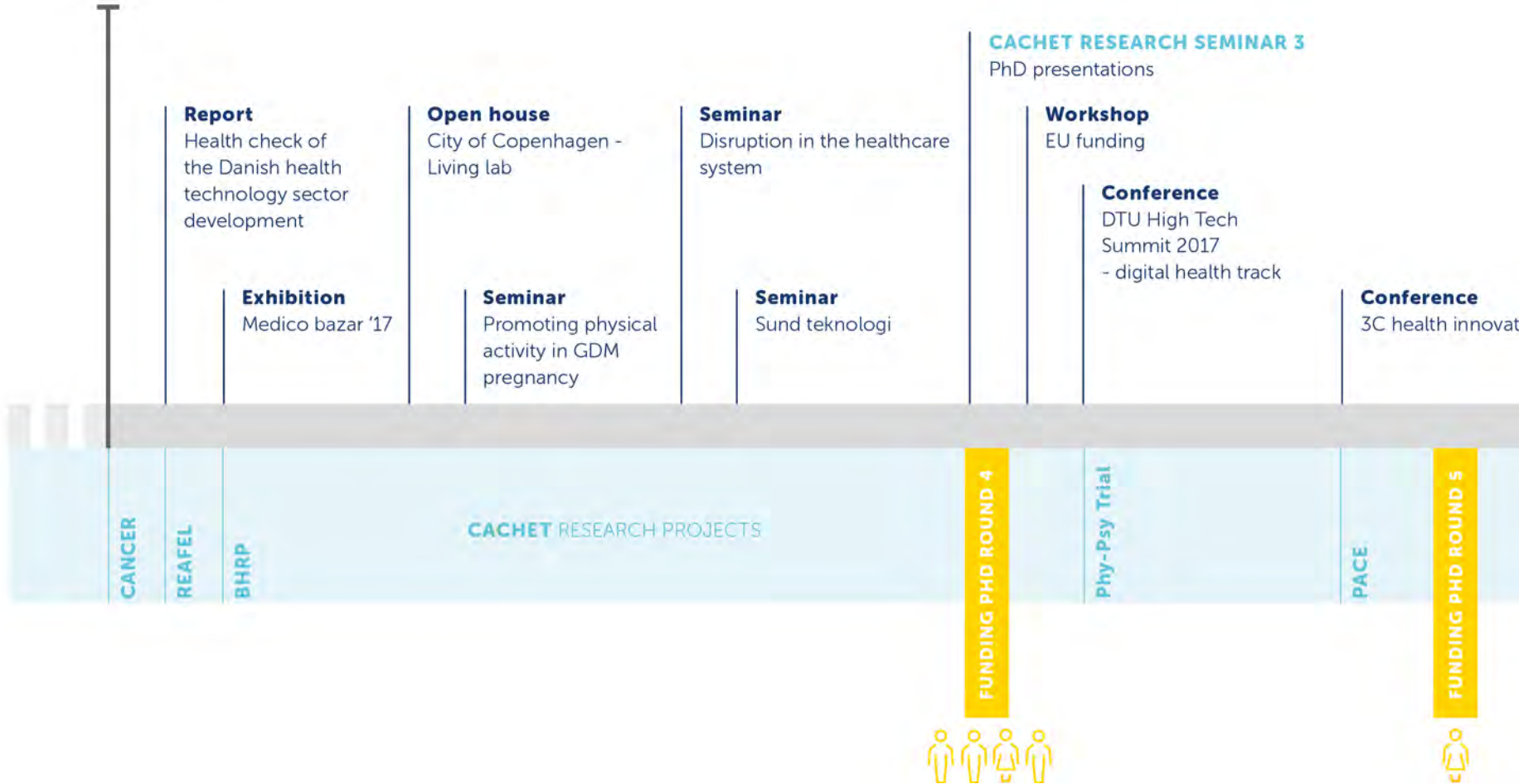


Jakob E. Bardram, MSc, PhD  
Director, Professor

A photograph of a wooden ladder with metal rungs extending from the bottom towards the top of the frame. The railings of the ladder are wrapped in thick, colorful knitted rope. The left railing features a sequence of colors: light blue, red, pink, yellow, red, and white. The right railing features: light blue, pink, red, dark purple, green, pink, and green. The ladder is positioned over a body of water with small, white-capped waves. In the background, a hazy coastline with mountains is visible under a sky with soft, orange and pink clouds, suggesting a sunset or sunrise.

**"CACHET** will support and promote healthy living, active ageing and chronic disease prevention and management through the design, development, evaluation and implementation of personalised health technology"

2017





# Research

Research activities and projects in CACHET are characterised by depth, innovation and impact. CACHET initiates, co-funds, hosts and takes part in a wide range of research projects in a cross-disciplinary research ecology that involves technology and medical researchers, clinicians and healthcare personnel.

As illustrated in the figure on page 9, CACHET research is double-sided. From a health perspective, CACHET dedicates focus to a core set of healthcare challenges, including chronic disease management, preventive health, regulatory demands and outcome-based healthcare business models. From a technological perspective, research focuses on developing personalised technologies, digitalization of healthcare solutions, wearable sensor technology and big data analysis.

CACHET projects are characterised by being:

- focused on the design, development and evaluation of personalised health technology
- interdisciplinary across the medical and technological sciences
- application-focused and grounded in end-user organisations like nursing homes or hospitals
- innovative by developing new solutions for the Danish healthcare system and new products and services for life science companies.

## Translational research

Technology transfer and health innovation based on research results are core to CACHET. We collaborate extensively with industrial companies and public health partners to move research, innovation and discoveries into use by clinicians, healthcare professionals, patients and citizens.

# 33

## PhD students

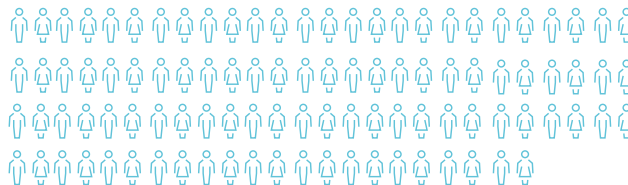
affiliated with CACHET

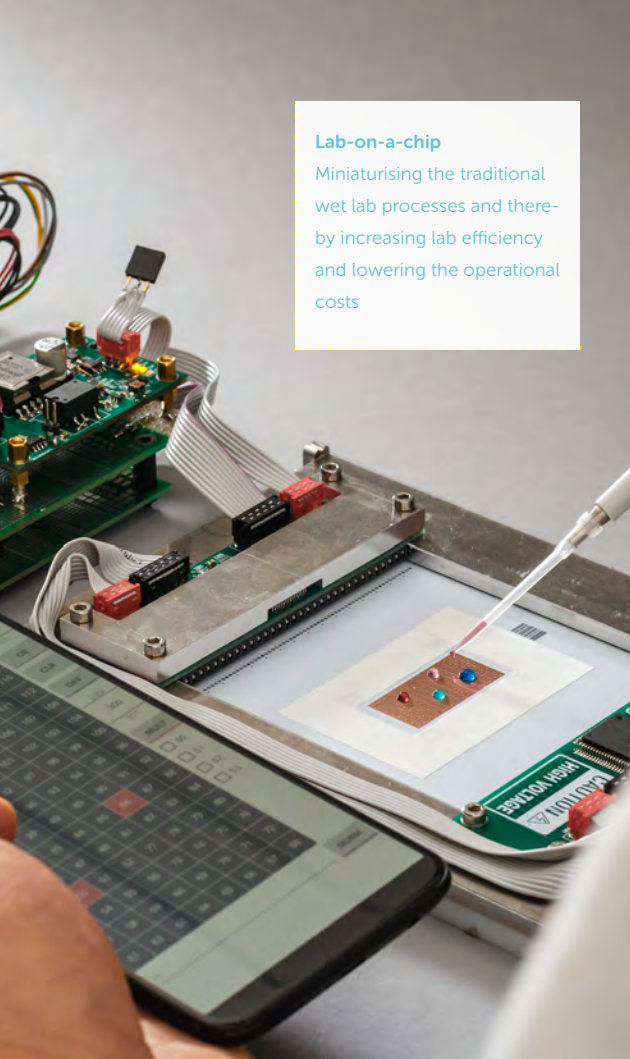


# 100+

## Researchers

affiliated with CACHET





#### Lab-on-a-chip

Miniaturising the traditional wet lab processes and thereby increasing lab efficiency and lowering the operational costs

## Healthcare Challenges



### Chronic disease management

Accounting for 2/3 of all healthcare spend worldwide – and increasing – chronic disease management is and will be the main focus of health



### Preventive and predictive health

Obesity, lack of physical activity and unhealthy lifestyle are the major factors of health problems and need to be addressed early



### Regulatory

Legal and regulatory demands for protecting patient privacy, data- and safety will be enforced heavily as digital and personalised health emerge



### Evidence & outcome-based health

New business models both for suppliers and vendors will be tied to clinical evidence and real-world patient outcome (efficiency)

## Technology Opportunities

### Personalised technology



Engaging, patient-centric- and participatory technology can deliver interventions tailored to the individual and sustain engagement "beyond-the-pill" outside traditional care settings

### Digitalisation



The ubiquity of digital health and communication technology drives new models for virtual and semi-automated doctor-patient contact

### Health IoT



Pervasive, mobile and wearable technology for sensing and engaging with patients creates a unique platform for personalised health delivery

### Big data analytics



Computing power and advanced analytics and learning algorithms drive insight and prediction of patient behaviour, treatment- and care costs

# Research training

The CACHET PhD programme is a unique interdisciplinary research training programme for early stage researchers. The goal is to train and educate a new cohort of young researchers who will become the thought leaders of the future transformation of a technology-based healthcare system.

Besides funding, the CACHET PhD programme offers interdisciplinary supervision to ensure that each PhD student has both a technical and a clinical supervisor. Each PhD project applies a user-centered and problem-oriented research approach that is anchored in either a hospital clinic or the healthcare administration in the City of Copenhagen. Moreover, each PhD project has an innovative agenda, targeting either health innovation in a clinical setting or industrial innovation and product development in a company.

Currently, CACHET PhD students work on a wide range of exciting topics like:


- tracking lifestyle behaviour from wearable and mobile technology
- smartphone-based cognitive-behavioural therapy for depressive patients
- personalising hearing care
- brain-computer interfaces for neurorehabilitation of post-stroke patients

- mobile technology for asthma treatment in children
- methodology for establishing biological age
- biochip for diagnosis of thyroid gland disorders.

In total, 33 PhD students are affiliated with CACHET; of these, half (18) are funded by CACHET. A complete list of CACHET PhD students and their projects can be found on page 24.

**33**  
PhD  
students  
affiliated with CACHET



**3**   
Finalised  
PhD students

**19** at DTU  
**14** at UCPH

**18**  
Funded  
by CACHET 





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### INSTANTANEOUS ALLERGY TESTING IN THE SKIN (INSTAPATCH)

**PhD student:** Sheida Esmail Tehrani

**Partners:** DTU Health Tech,  
The Allergy Clinic at Gentofte Hos-  
pital, DTU Food, Cardiff University,  
Malmö University

Allergy is one of the world's most com-  
mon chronic conditions and caused  
by immunoreaction of the human  
body towards in principle harmless  
allergens. An increasing number of  
people is diagnosed as allergic towards  
insect stings, pollen, dust, animal  
dander, food or drugs. This project  
aims to develop, a novel miniaturised  
device - the InstaPatch - for instanta-  
neous and quantitative monitoring of  
allergic reactions in the skin.

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### DESIGN OF MONITORING SYSTEMS FOR CHRONIC BRAIN DISORDERS

**PhD student:** Mads Olsen

**Partners:** Stanford University,  
Rigshospitalet, DTU Health Tech

Chronic sleep disorders such as ob-  
structive sleep apnea is a significant  
health condition, which is time con-  
suming and expensive to diagnose.  
This project aims to design and clini-  
cally validate a simple monitoring  
system for chronic sleep disorders.  
Intelligent multi-modal biomedical  
signal processing, signal interpretation  
and machine learning algorithms will  
make this possible.

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### WIRELESS ASSESSMENT OF RESPIRA- TORY AND CIRCULATORY DISTRESS IN COPD PULMONARY DISEASE

**PhD student:** Mikkel Elvekjær

**Partners:** DTU, Bispebjerg Hospital,  
Rigshospitalet, Herlev-Gentofte Hos-  
pital

Among patients with chronic medical  
diseases, patients with exacerbation  
of chronic obstructive pulmonary  
disease (COPD) are among those with  
the poorest prognosis despite advances  
in medical therapy. This project ex-  
plores the use of continuous monitor-  
ing of vital signs for early detection of  
critical deteriorations in patients with  
exacerbation of COPD.

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# Innovation in society

Translational research and innovation in healthcare and society for the benefits of patients and citizens are the starting and ending points in CACHET.

## User-centered and participatory research design

In CACHET, the design, development and implementation of personal health technology take as a point of departure a deep understanding of patients' and citizens' everyday life and what it means to live with a disease. For example in the Phy-Psy Trial, ethnographic, clinical, public health and technical researchers work closely with patients in a participatory co-design process of novel treatment pathways and technology for shared care.

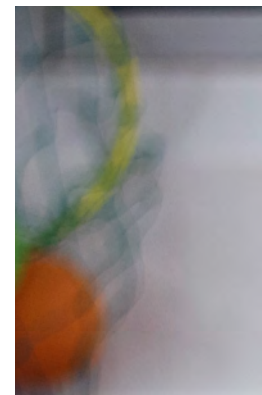
## Societal impact

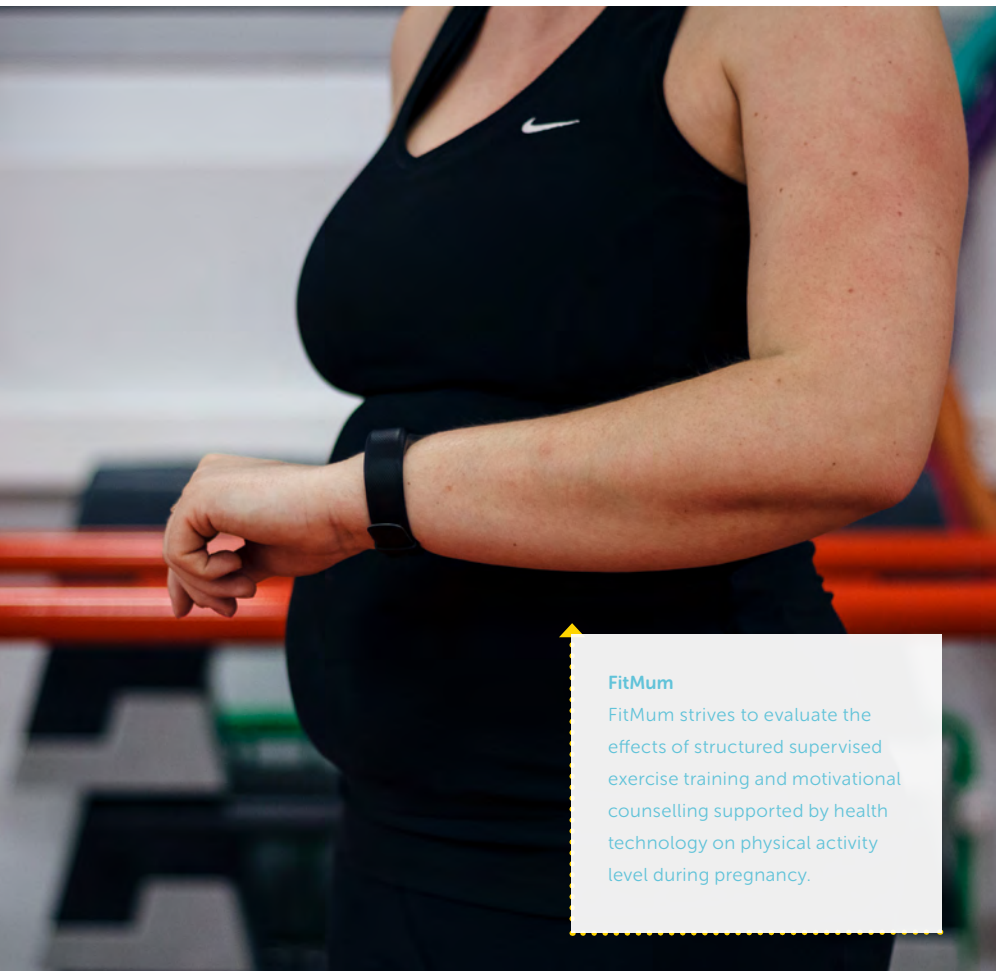
The core health research topics of CACHET are centered on prevention, treatment and self-management of chronic diseases like diabetes, cardiovascular diseases, dementia and mental illness. Chronic diseases now account for two-thirds of the Danish healthcare costs, and, according to WHO, chronic diseases make up the largest burden of disease. Most CACHET projects address these societal challenges. For example, the RADMIS project seeks to reduce re-hospitalisation of depressive patients by 50%, thereby

potentially saving more than DKK 100 million in Greater Copenhagen.

## Better treatment and quality of life for patients

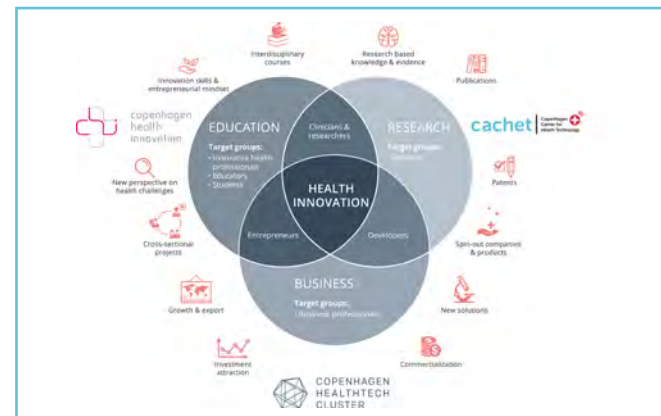
In the end, a core value of CACHET research is the impact on better patient treatment, more effective prevention and improved quality of life for patients and citizens. For example, the REAFEL project seeks to utilize a modern electrocardiogram (ECG) monitor for prevention of strokes. This solution can potentially prevent strokes for up to 600 patients in Greater Copenhagen alone.





#### FitMum

FitMum strives to evaluate the effects of structured supervised exercise training and motivational counselling supported by health technology on physical activity level during pregnancy.



### Greater Copenhagen Health Innovation

CACHET is part of the Greater Copenhagen Health Innovation ecosystem.

Copenhagen Healthtech Cluster (**CHC**) focuses on supporting companies and commercial growth in the health technology industry.

Copenhagen Health Innovation (**CHI**) focuses on developing competences and education in healthcare innovation.

CACHET focuses on building a strong research base for health technology development and for establishing clinical evidence.

# Supporting industry

Industrial innovation and commercial growth for life science companies in Greater Copenhagen are central to most of the research in CACHET. CACHET enables research-based innovation by establishing tight collaborations between researchers and the industry. Two-thirds of all CACHET research projects involve one or more industrial partners.

## Collaborations at different stages of technology development and evaluation

To accommodate the needs of industry, collaborations range from technology development, feasibility testing, and evaluation to clinical trials and studies to establish health evidence for the technology. For example, CACHET participates in 6 projects funded by the Innovation Fund Denmark in which both technical, health professional and clinical researchers work closely with industry over longer periods to make research and commercial innovation go hand in hand.

## Supporting innovation in small and medium-sized enterprises

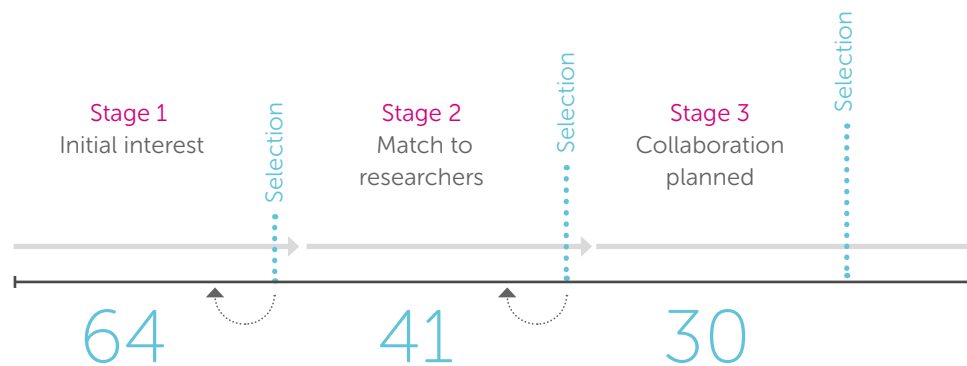
Through the Copenhagen Healthtech Solutions (CHS) programme, CACHET has over the past 3 years initiated 27 collaborative projects involving researchers, small and medium-sized enterprises (SME), municipalities and other healthcare centers. The aim of the CHS programme is to

support growth in SMEs. The programme serves as an opportunity for researchers and industry to engage in collaborations that allow the pursuit of innovation possibilities in a flexible manner and serve as a foundation for more intensive and extensive long-term partnerships.

## Part of a Greater Copenhagen Health Innovation ecosystem

As part of the CHS programme, CACHET works closely with Copenhagen Healthtech Cluster (CHC) who has the overall project management and recruits the participating SMEs. The programme is supported by the EU Regional Fund.

### Stages of the CHS programme – status of involved companies, January 2019:





#### Stage 4

Collaboration started

27

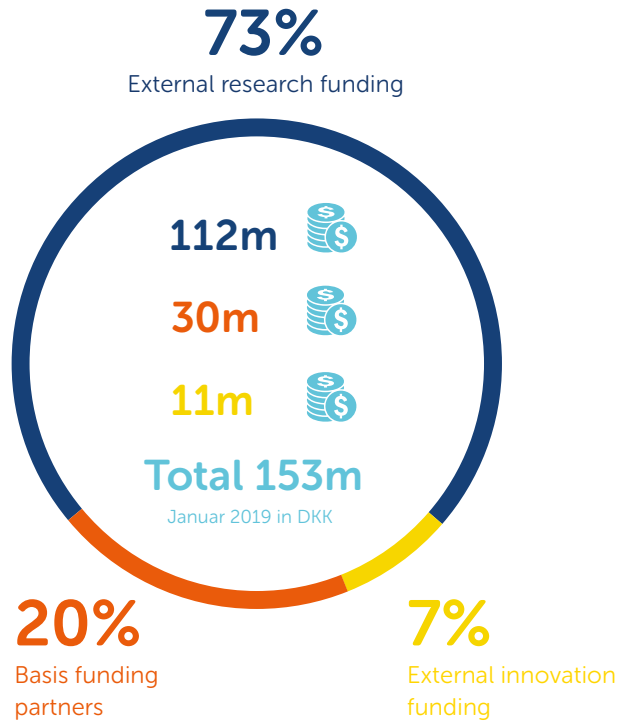
30

#### EEG-tDCS headset for treatment of depression

Based on the tDCS expertise within PlatoScience and the years of research experience with EEG at DTU Health Technology, the aim is to develop a new EEG-tDCS-headset for home-treatment of depression.

# Project funding

CACHET research and innovation projects are funded by a variety of private, national and international foundations and initiatives.



**novo  
nordisk  
fonden**



**TrygFonden**



**BEVICA**  
FONDEN



# Research projects

**CHS** Copenhagen Healthtech Solutions

**2016-2019 Funding:** EU Regional Fund

**GazeIT** Accessibility by Gaze Tracking

**2016-2019 Funding:** Bevica Foundation

**REACH** Responsive Engagement of the Elderly

**2016-2020 Funding:** EU Horizon 2020

**TEAM** Technology Enabled Mental Health for Young People

**2016-2020 Funding:** EU Horizon 2020

**RADMIS** Reducing the Rate and Duration of Readmission Among Patients With Unipolar and Bipolar Disorder

**2016-2020 Funding:** Innovation Fund Denmark

**CANCER** Detection of Mortality After Cancer Surgery

**2017-2020 Funding:** The Danish Cancer Society and The A.P. Møller Foundation

**BHRP** Biometric Healthcare Research Platform

**2017-2021 Funding:** Innovation Fund Denmark

**PACE** Proactive Care for the Elderly with Dementia

**2017-2021 Funding:** Innovation Fund Denmark

**REAFEL** Reaching the Frail Elderly

**2017-2021 Funding:** Innovation Fund Denmark

**Phy-Psy Trial** A cluster randomised, parallel-group, 5-year trial of coordinated, co-produced care to reduce the excess mortality of patients with severe mental illness by improving the treatment of their comorbid physical conditions

**2017-2024 Funding:** Novo Nordisk Foundation

**FitMum** Fitness for Good Health of Mother and Child

**2018-2021 Funding:** Independent Research Fund Denmark

**Q-EEG** Quantitative EEG in alzheimer's Diagnostics

**2018-2022 Funding:** Der Wissenschaftsfonds

**ARC-HUB** Research Hub for Digital Enhanced Living

**2018-2022 Funding:** The Applied Research and Communications Fund

**InstaPatch** Instantaneous Allergy Testing in the Skin

**2018-2022 Funding:** Independent Research Fund Denmark

**WARD** Wireless Assessment of Respiratory and Circulatory Distress **2018-2021 Funding:** The Danish Cancer Society and The A.P. Møller Fonden

For more information about CACHET research projects and opportunities or collaboration, please visit [www.cachet.dk](http://www.cachet.dk)

# Partners

CACHET collaborates with a range of different research institutions, public institutions, private companies and organisations.

## Private companies



Kullegaard



Medtronic

MOVESCA

neurescue



PHILIPS  
Healthcare



Research  
institutions

Stanford  
University

REGION SJÆLLAND  
SJÆLLANDS UNIVERSITETSHOSPITAL  
- vi er til for dig

AALBORG UNIVERSITY  
COPENHAGEN



Gillberg Neuropsychiatry Centre  
Sahlgrenska Academy

EPFL  
ÉCOLE POLYTECHNIQUE  
FÉDÉRALE DE LAUSANNE

TU/e

Technical  
University  
of Munich



Eriksholm Research Centre  
PART OF OTICON



ALEXANDRA  
INSTITUTE

Organisations

fnug\*  
FORENINGEN AF  
UNGE MED CIVT



COPENHAGEN  
HEALTHTECH  
CLUSTER



copenhagen  
health  
innovation

COPENHAGEN  
EU OFFICE

DTU Business  
Executive School of Business

VÆKSTHUS  
Hovedstadsregionen

MedTech  
Innovation



Danish  
Haemophilia  
Society

Municipalities  
and public sector



Dragør  
KOMMUNE



HILLERØD  
KOMMUNE



LYNGBY-TAARBÆK  
KOMMUNE



/ihTek  
/idencenter for hjælpemidler og  
reifeardsteknologi

# Events

Since 2015, CACHET has co-organised and hosted more than 30 seminars, conferences and workshops. Below are highlights from some of the major events in 2018.

## CACHET seminars

CACHET hosts research seminars each year focusing on knowledge sharing and inspiring new research and innovation initiatives. Topics like diabetes, dementia, motivating physical activity, under- or over-diagnosis and many other cross-disciplinary research challenges are being lively discussed.

## April 2018: Oi-X Health case competition

In cooperation with DTU Skylab, CACHET organised an Open Innovation X (Oi-X) case competition with over 90 students working on cases from Novo Nordisk, Lundbeck and Tryg Insurance.

## October 2018: DTU High Tech Summit – Digital Health Track

CACHET again hosted a Digital Health Track with support from MedTech Innovation during the two-day High Tech Summit at DTU. This year with two sessions, a workshop and a stand displaying research projects and results.

## November 2018: 3C conference on health innovation

In cooperation with our sister organisations Copenhagen Health Innovation (CHI) and Copenhagen Healthtech Cluster (CHC), CACHET, for the second year in a row, organised a

large conference on the state-of-art and future perspectives of healthcare innovation. The conference had more than 450 attendees.





# About CACHET

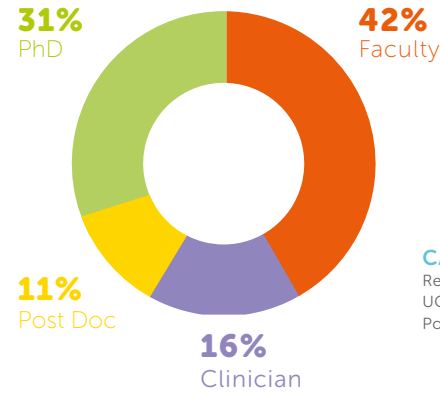
CACHET was founded in 2015 as a strategic partnership between the Capital Region of Denmark (CRDK), the City of Copenhagen (CCPH), the Medical and Health Faculty at the University of Copenhagen (UCPH) and the Technical University of Denmark (DTU).

The governance model of CACHET consists of a steering group as its highest authority, a director responsible for daily management and a management group for strategic development and management.

CACHET is a virtual research center. This implies that there is a very lean center staff consisting only of the center director and a programme manager. Research is done in collaborative research projects that span across a wide range of departments at the four partners. By the end of 2018, more than 100+ researchers were affiliated with CACHET.

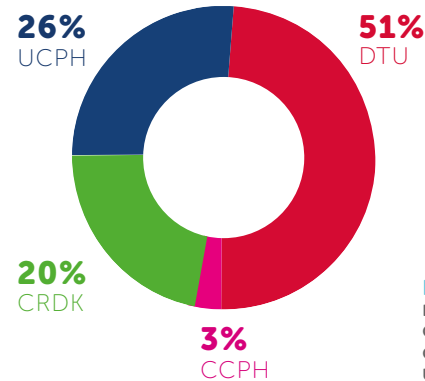
## Mission

CACHET will support and promote healthy living, active ageing and chronic disease prevention and management through the design, development, evaluation and implementation of personalised health technology.



## CACHET researchers

Researchers divided into university faculty members from UCPH and DTU, clinicians from the hospitals in CRDK, Post Docs and PhD students.



## Researchers divided into primary affiliation

DTU: Technical University of Denmark

CCPH: City of Copenhagen

CRDK: Hospitals in the Capital Region of Denmark

UCPH: University of Copenhagen

Steering group

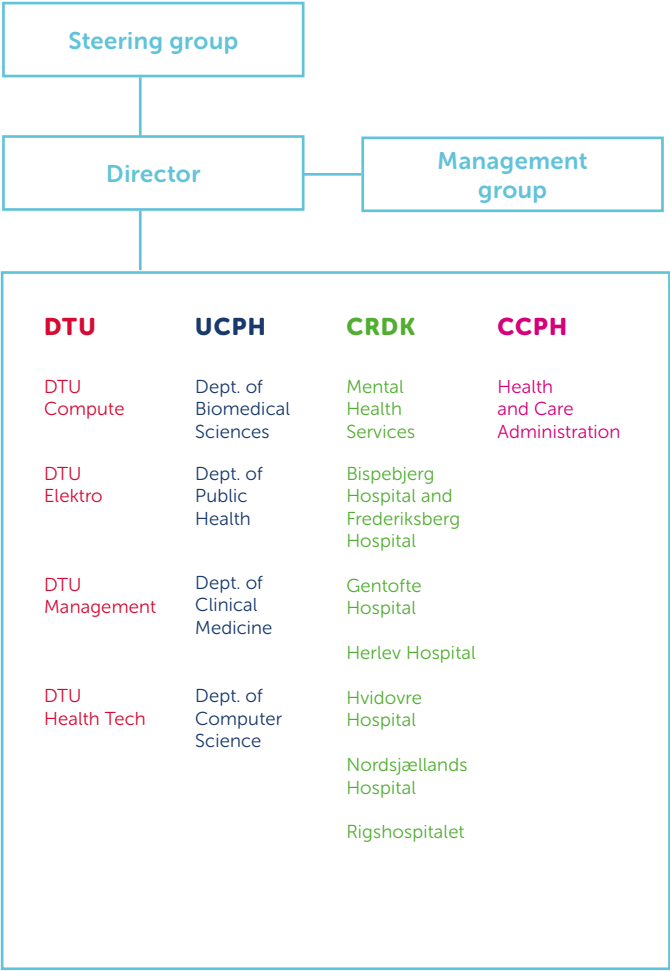
**Ulla Wewer**, Dean, Faculty of Health and Medical Sciences, University of Copenhagen  
**Rasmus Larsen**, Provost, Technical University of Denmark  
**Katja Kayser**, Director, Health and Care Administration, City of Copenhagen  
**Mads Monrad Hansen**, Head of Unit, Department of Regional Development, Capital Region of Denmark

Director

**Jakob E. Bardram**, Director, Professor, Technical University of Denmark and Faculty of Health and Medical Sciences, University of Copenhagen

Management group

**Jan Madsen**, Professor, Department of Applied Mathematics and Computer Science, Technical University of Denmark  
**Tine Alkjær**, Associate Professor, Department of Biomedical Sciences, University of Copenhagen  
**Helge B. D. Sørensen**, Associate Professor, Department of Electrical Engineering, Technical University of Denmark  
**Anders Lundbergh**, Senior Advisor, Department of Regional Development, Capital Region of Denmark  
**Steffen Loft**, Professor, Department of Public Health, University of Copenhagen  
**Monica Andersen**, Head of Department, Health and Care Administration, City of Copenhagen  
**Annemette L. Nielsen**, Special Consultant, Health and Care Administration, City of Copenhagen  
**Anja Maier**, Professor, Department of Management Engineering, Technical University of Denmark  
**Ruth Frikke-Schmidt**, Clinical Associate Professor, Department of Clinical Medicine, University of Copenhagen



# PhD projects

## Vital signs monitoring and interpretation for critically ill patients,

Annan Vilic, Department of Electrical Engineering, Technical University of Denmark. **Supervisor:** Helge B.D. Sørensen.

## Engineering systems design in healthcare: Smart mobile and wearable technology for support and monitoring in dementia rehabilitation,

Julia Rosemary Thorpe, Department of Management Engineering, Technical University of Denmark. **Supervisor:** Anja Maier.

## Monitoring and modelling of behavioural changes using smartphone and wearable sensing,

Simon Due Kamronn, Department of Applied Mathematics and Computer Science, Technical University of Denmark.

**Supervisor:** Jakob Eg Larsen.

## Personalising hearing care and enhancing user experience by adapting devices to the changing mobile context,

Benjamin Johansen, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Jakob Eg Larsen.

## Behavioural design – from analysis to intervention to real world impact,

Camilla C.K. Nielsen, Department of Management Engineering, Technical University of Denmark. **Supervisor:** Philip Cash.

## Adaptive smartphone-based behavioural activation for treating depression,

Darius Adam Rohani, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Jakob E. Bardram.

## Open-access data platform for behavioural monitoring and visual analytics for mental health,

Giovanna Nunes Vilaza, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Jakob E. Bardram.

## Person-centric and device-agnostic activity-based integration in personal health technology,

Devender Kumar, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Jakob E. Bardram.

## Portable diagnostic laboratory to diagnose thyroid gland related disorders,

Georgi Plamenov Tanev, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Jan Madsen.

## Patient training for gaze-controlled telepresence,

Guangtao Zhang, Department of Management Engineering, Technical University of Denmark.

**Supervisor:** John Paulin Hansen.

## Machine learning for smartphone-based monitoring and treatment of unipolar and bipolar disorders,

Jonas Busk, Department of Applied Mathematics and Computer Science, Technical University of Denmark.

**Supervisor:** Ole Winther.

## Healthcare design for patient engagement and collaborative care,

Julie Falck Valentin-Hjorth, Department of Management Engineering, Technical University of Denmark. **Supervisor:** Anja Maier.

## Design of monitoring systems for chronic sleep/brain disorders,

Mads Olsen, Department of Electrical Engineering, Technical University of Denmark.

**Supervisor:** Helge B.D. Sørensen.

## Development and implementation of high-dimensional normal behavior areas for citizens with dementia, in proactive care at nursing homes,

Maxim Khomiakov, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Anders Stockmarr.

## Adaptive, context-aware cognitive therapy for young mental health,

Pegah Hafiz, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Jakob E. Bardram.

## Visualization design for heterogeneous data in personal health records,

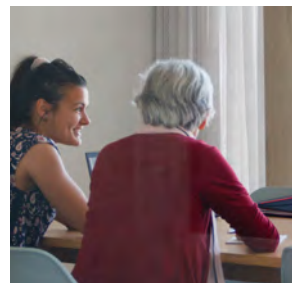
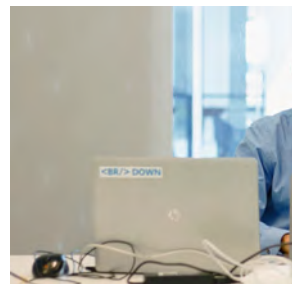
Raju Maharjan, Department of Applied Mathematics and Computer Science, Technical University of Denmark. **Supervisor:** Jakob E. Bardram.

## InstaPatch: Instantaneous allergy testing in the skin,

Sheida Esmail Tehrani, Department of Micro- and Nanotechnology, Technical University of Denmark. **Supervisor:** Stephan Sylvest Keller.

## Communication keyboards for people with special needs,

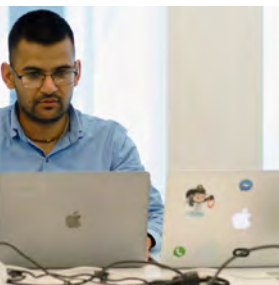
Tanya Bafna, Department of Management Engineering, Technical University of Denmark. **Supervisor:** John Paulin Hansen.



## Gender



45%



**FitMum: Fitness for good health of mother and child**, Caroline Borup Andersen, Department of Biomedical Sciences, University of Copenhagen.  
**Supervisor:** Bente Merete Stallknecht.

**FitMum: A process evaluation of the FitMum intervention: Motivation and maintenance of physical activity during pregnancy**, Signe de Place Knudsen, Department of Gynaecology & Obstetrics, Nordsjællands Hospital, Hillerød.  
**Supervisor:** Bente Merete Stallknecht.

**FitMum: Validity of tracker on physical activity and sleep, physical activity effect on sleep and one year of physical activity level after birth**, Saud Abdulaziz Alomairah, Department of Biomedical Science, University of Copenhagen. **Supervisor:** Bente Merete Stallknecht.



**Systematic approach to vulnerable patients with mental illness in general practice. Needs, barriers, opportunities and expectations**, Christina Svanholm, Department of Public Health, University of Copenhagen.  
**Supervisor:** John Brodersen.

**eHealth with minors living with a chronic illness**, Claudia Bagge-Petersen, Department of Public Health, University of Copenhagen.  
**Supervisor:** Henriette Langstrup.

**The everyday life of people with severe mental illness and physical comorbidity**, Iben Emilie Christensen, Department of Public Health, University of Copenhagen. **Supervisor:** Susanne Reventlow.

**Motivational technologies for preservation of physical function in elderly**, Rasmus Tolstrup Larsen, Department of Public Health, University of Copenhagen. **Supervisor:** Henning Langberg.

**Biological age; refinement and implementation**, Karina Louise Skov Husted, Department of Biomedical Sciences, University of Copenhagen.  
**Supervisor:** Jørn Wulff Helge.

**WARD-SURGERY: Wireless assessment of respiratory and circulatory distress**, Camilla Haahr, Department of Anaesthesiology, Rigshospitalet.  
**Supervisor:** Eske Kvanner Aasvang.

**WARD-COPD: Wireless assessment of respiratory and circulatory distress in chronic obstructive pulmonary disease**, Mikkel Elvekjaer, Department of Anaesthesiology and Intensive Care, Bispebjerg and Frederiksberg Hospital.  
**Supervisor:** Christian Sahlholt Meyhoff.

**RADMIS: Reducing the rate and duration of Re-ADMISSions among patients with unipolar disorder using smartphone-based monitoring and treatment**, Morten Lindbjerg Tønning, Mental Health Services, Capital Region of Denmark.  
**Supervisor:** Lars V. Kessing.

**Smartphone-based electronic biomarker in patients with bipolar disorder, relatives and healthy individuals**, Sharleny Stanislaus, Mental Health Services, Capital Region of Denmark. **Supervisor:** Lars V. Kessing.

**Smartphone-based electronic biomarkers in adolescents with unipolar disorder and bipolar disorder, their healthy siblings and healthy control individuals (BIO YOUNG)**, Sigurd Arne Melbye, Mental Health Services, Capital Region of Denmark. **Supervisor:** Lars V. Kessing.

**Development of continuous non-invasive monitoring system for early detection and prevention of serious morbidity and mortality after abdominal cancer- surgery**, Rasmus Munch Olsen, Department of Health Technology, Technical University of Denmark. **Supervisor:** Helge B.D. Sørensen.

**Biomedical signal processing for improved diagnosis of sleep disorders and brain diseases**, Alexander Neergaard Olesen, Department of Health Technology, Technical University of Denmark. **Supervisor:** Helge B.D. Sørensen.

**Design of knowledge-driven and data-driven algorithms for neurodegenerative diseases**, Matteo Cesari, Department of Health Technology, Technical University of Denmark. **Supervisor:** Helge B.D. Sørensen.

**Improving diabetes treatment outcome by utilizing CGM and insulin injection data for machine learning based decision support**, Ali Mohebbi, Department of Health Technology, Technical University of Denmark.  
**Supervisor:** Morten Mørup.

**Improving pharmacological treatment in patients with severe mental illness**, Catrine Bakke, Department of Public Health, University of Copenhagen.  
**Supervisor:** Niels de Fine Olivarius.

balance



55%

18 PhD students are funded by the CACHET PhD Programme. 33% of all CACHET affiliated PhD students are internationals.

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Stephansen JB, Olesen AN, Olsen M, et al. **Neural network analysis of sleep stages enables efficient diagnosis of narcolepsy.** *Nature Communications*. 2018;9

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# Strategic Partnership

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CACHET is inaugurated as a strategic partnership between the Capital Region of Denmark, the City of Copenhagen, the Medical and Health Faculty at the University of Copenhagen and the Technical University of Denmark.

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