The Novo Nordisk Foundation
# Data Science

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Biomedicine & Health Sciences

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Senior Scientific Lead, PhD, Dr. Techn.
Natural & Technical Sciences

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Agenda

1	About the Foundation
2	Our commitment to data science
3	Research Funding in Open Competition
4	Danish Data Science Academy
5	Selected strategic projects in data science
6	Q & A

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Facts about the Novo Nordisk Foundation

#1
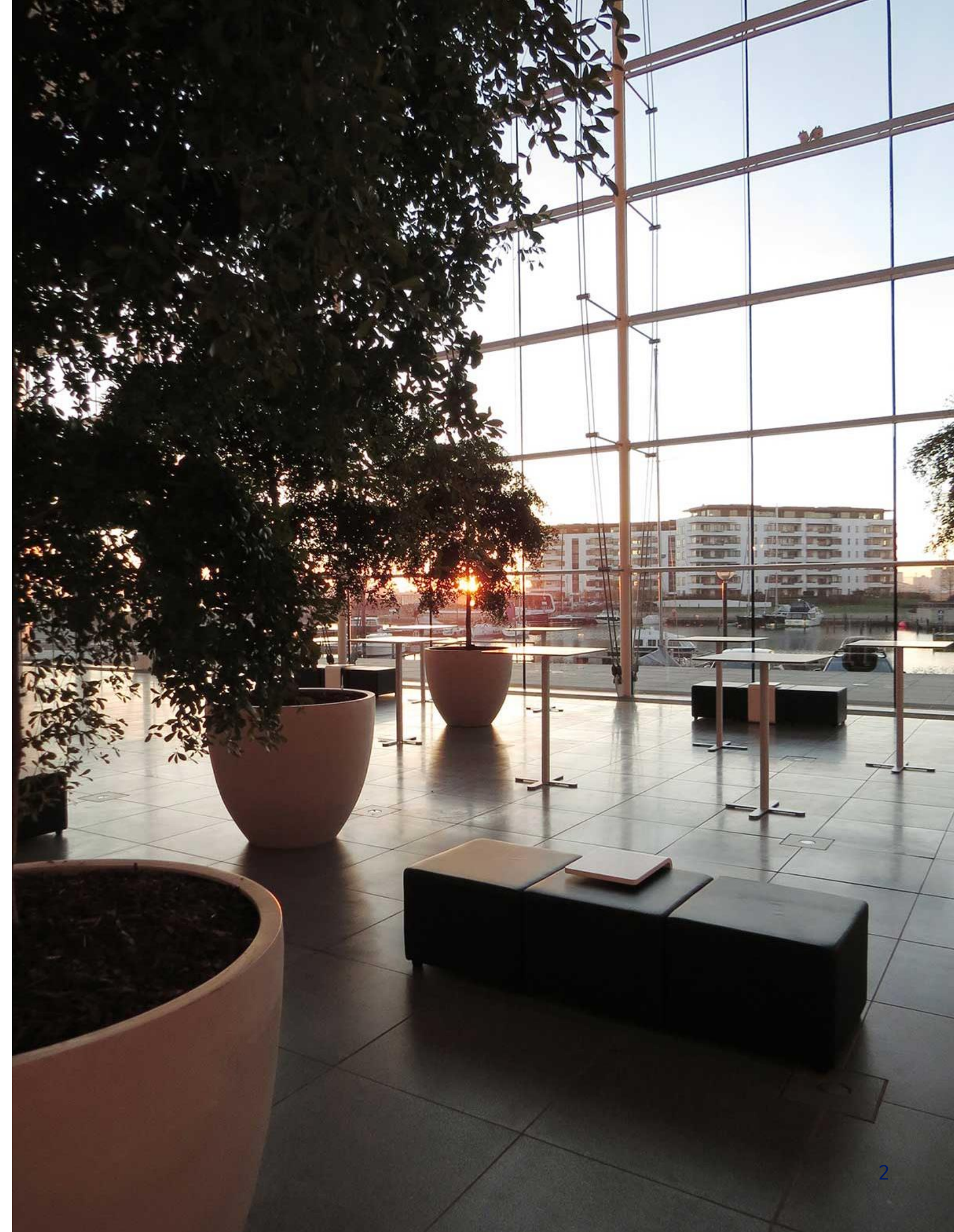
The world's largest Foundation measured in **assets**: DKK 619 billion*

(EUR 83 billion / USD ~**100** billion)

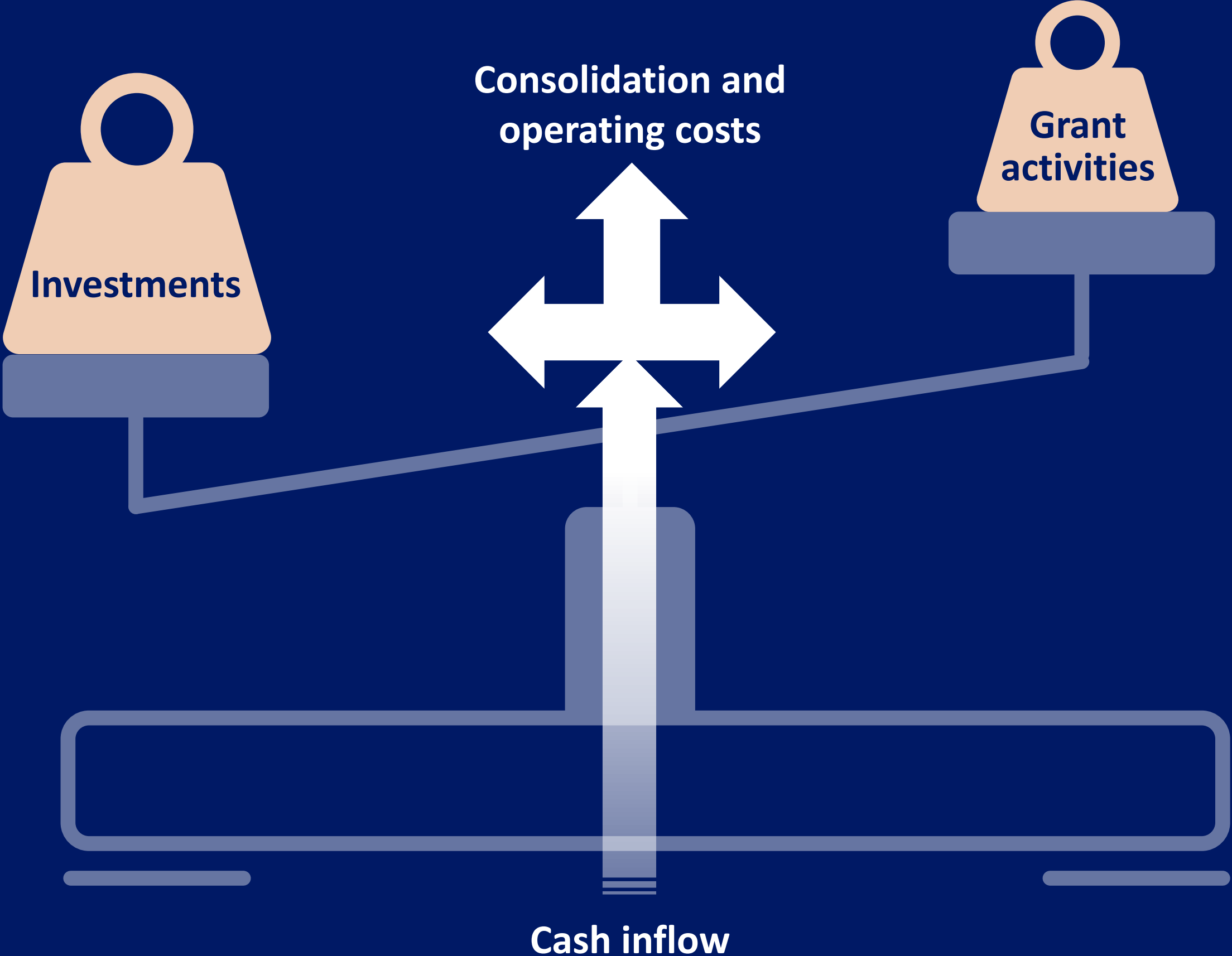* As of 31 August 2021. Including NN & NZ A-shares

#3

The world's 3rd largest Foundation measured in **grants**: DKK 5.54 billion

(EUR 745 million / USD **915** million) in 2020

Allocation of funds

Consolidation and operating costs

Grant activities

Investments

Cash inflow

novo nordisk **fonden**

The Novo Nordisk Foundation is an independent Danish enterprise foundation

novo nordisk fonden
Benefiting people and society

Dividends

100% SHARES

novo holdings
Investors in life science

Divicends

Grants

Awarded in 2020:
DKK 5.54 billion
(EUR 745 million)

Paid out in 2020:
DKK 4.63 billion
(EUR 623 million)

Focus areas

- Scientific research
- Diabetes treatment
- Innovation
- Education & outreach
- Humanitarian and social causes

Investments

Investment result in 2020:
DKK 29 billion
(EUR 3.9 billion)

Focus areas

- Principal Investments
- Growth Investments
- Venture Investments
- Seed Investments
- Capital Investments

Other investments

novo nordisk®
28.1% shares*
76.5% votes

novozymes®
Rethink Tomorrow
25.5% shares*
72.4% votes

CHR. HANSEN
Hummingbird Bioscience
Oxford Biomedica
ConvaTec
Galecto
Lysogene

*A-shares have 10 times voting power per share

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It began with insulin

THE CLINICIAN
H.C. Hagedorn

THE INVESTOR
August Kongsted

THE SCIENTISTS
Marie Krogh and August Krogh
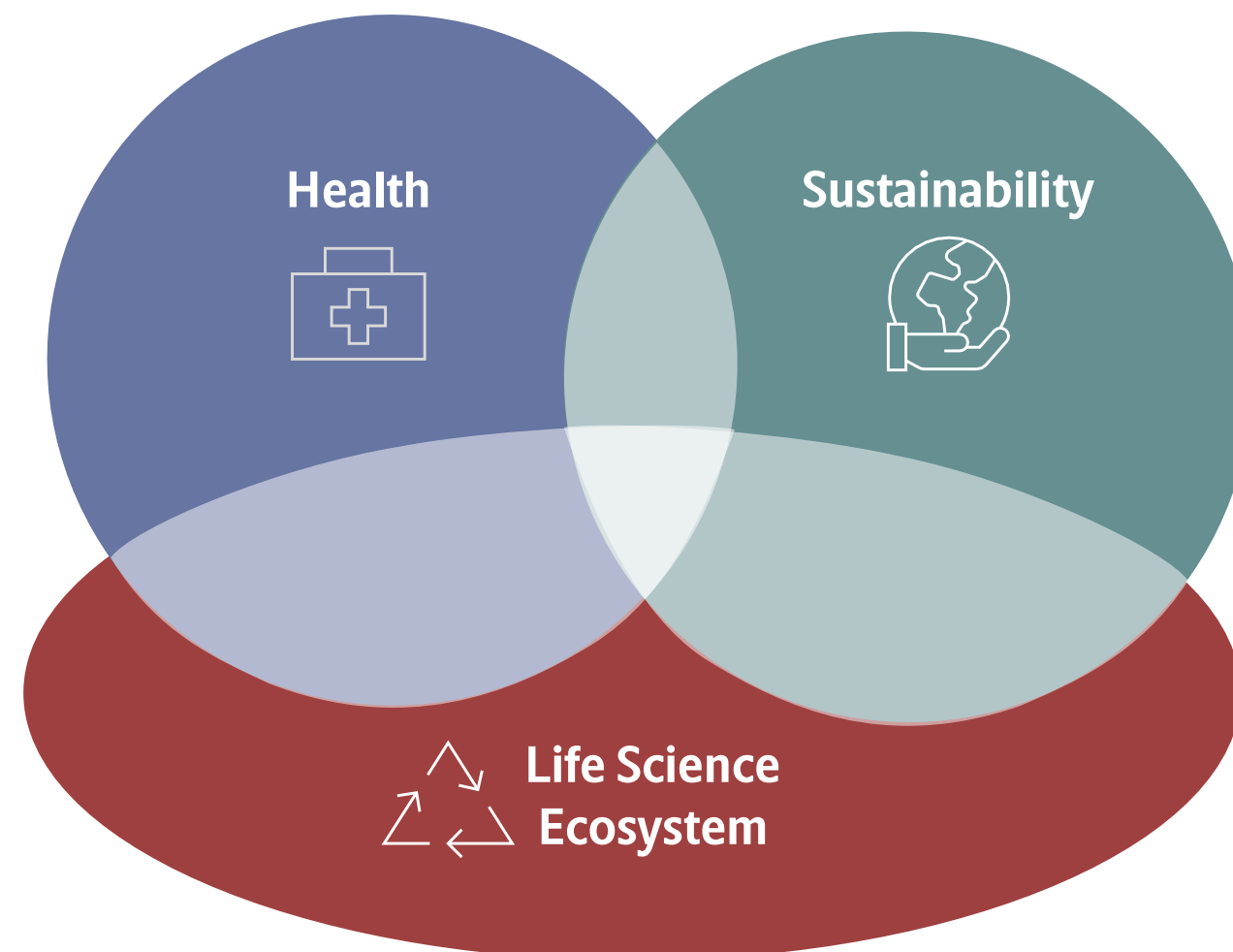
THE ENTREPRENEUR
Thorvald Pedersen

THE ENTREPRENEUR
Harald Pedersen

Our new 2030 strategy is taking shape

Vision

To contribute significantly to **research and development** that **improves the lives of people** and the **sustainability of society**

Focus areas and missions

Health

Sustainability

Life Science Ecosystem

Future perspectives

The Novo Nordisk Foundation will:

- have almost **unparalleled opportunity for impact**

- adapt a new paradigm of **active impact management, playing a catalytic role**

- **increasingly think in terms of international perspectives** and opportunities

- prepare for a **bigger portfolio of large, complex and strategic projects**

- **carefully consider its role in Denmark,** balancing our opportunity for impact with our continued centre of gravity

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During the coming five years alone, The Novo Nordisk Foundation expects to match the first century's grant level

Grants awarded in the Novo Nordisk Foundation's first 100 years
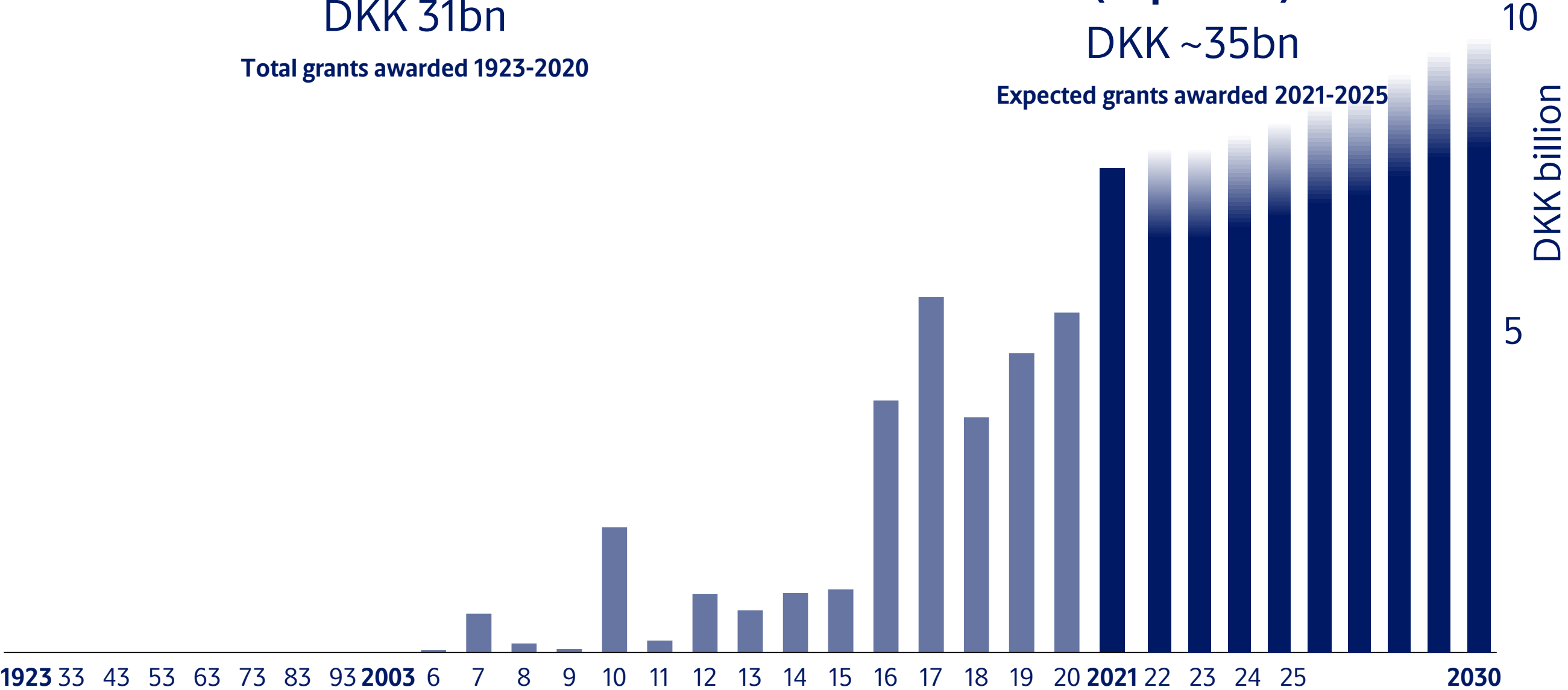
The first ~100 years

DKK 31bn

**Total grants awarded 1923-2020**

The next 5 years (expected)
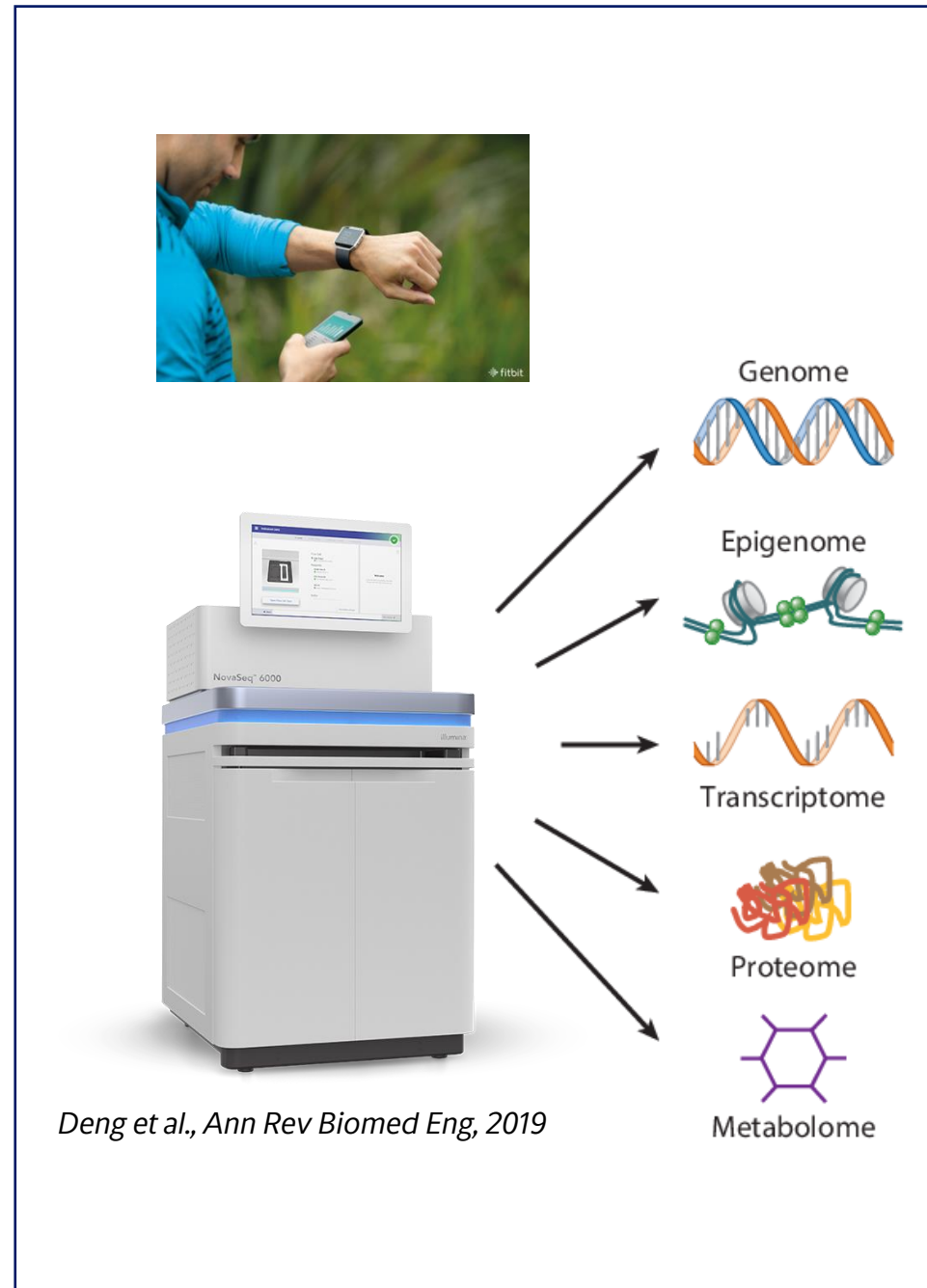
DKK ~35bn

Expected grants awarded 2021-2025

DKK billion

10

5

1923 33 43 53 63 73 83 93 **2003** 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 **2021** 22 23 24 25 **2030**

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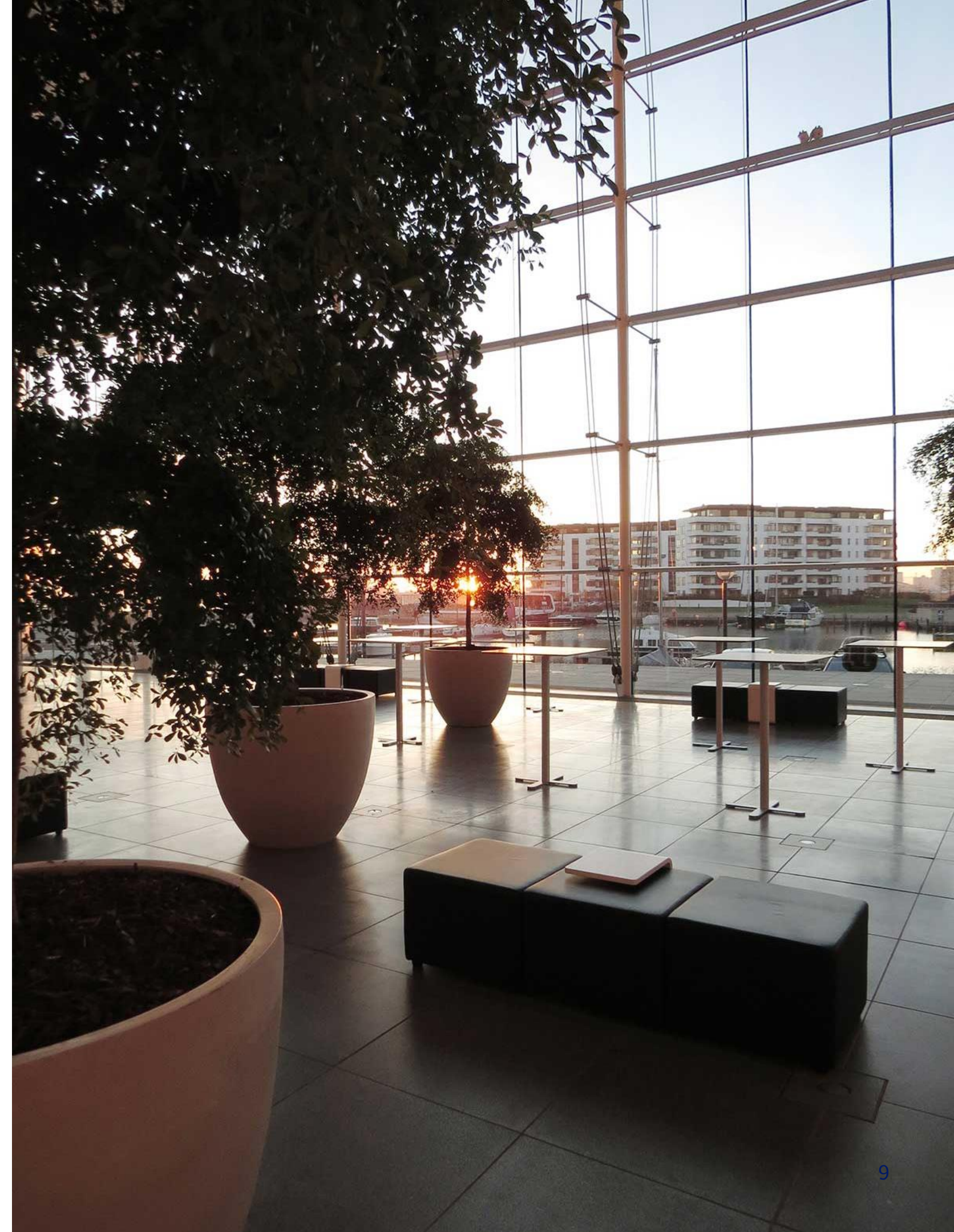
Data Science will fuel Life Science research and innovation

New Technologies (e.g., omics)

Deng et al., Ann Rev Biomed Eng, 2019

Data explosion **in biology and medicine**

Demands new skills and tools

Article
Highly accurate protein structure prediction with AlphaFold

NEWS | 20 February 2020
Powerful antibiotics discovered using AI

Machine learning spots molecules that work even against 'untreatable' strains of bacteria.

Medical research
AI shows promise for breast cancer screening

Etta D. Pisano

Could artificial intelligence improve the accuracy of screening for breast cancer? A comparison of the diagnostic performance of expert physicians and computers suggests so, but the clinical implications are as yet uncertain. See p.89

Denmark faces a capacity problem in Data Science and AI

AN AI NATION?

Harnessing the opportunity of artificial intelligence in Denmark

McKinsey & Company   Innovationsfonden
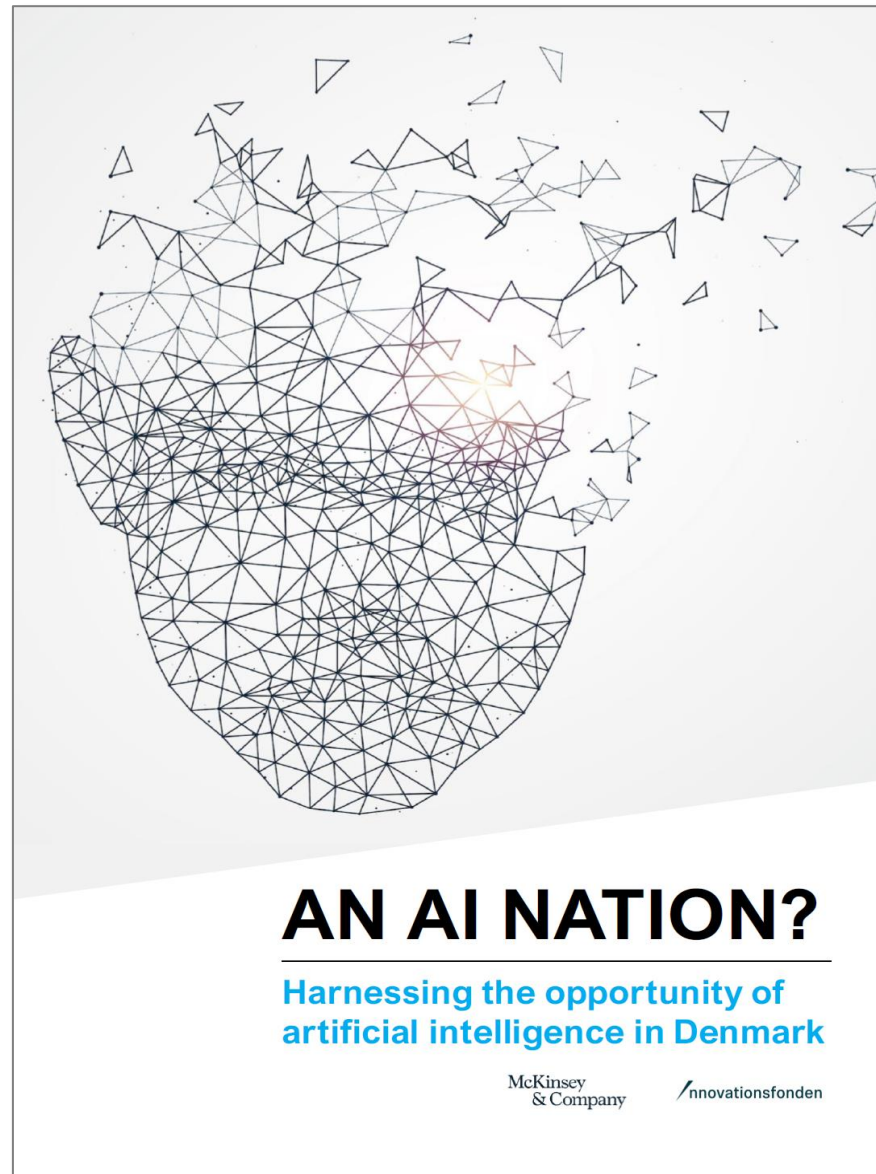
THE TALENT GAP FOR PEOPLE WITH DEEP ANALYTICAL SKILLS

Forecasted labor supply by 2030
Number of workers

Potential job creation by 2030
Number of workers

~125,000
~135,000
~150,000

70,000
~90,000
~110,000
~115,000

Forecasted 'as-is' supply 2030[5]

Micro-evidence[6]

Extrapolated demand growth[8]

McKinsey (2017)[7]
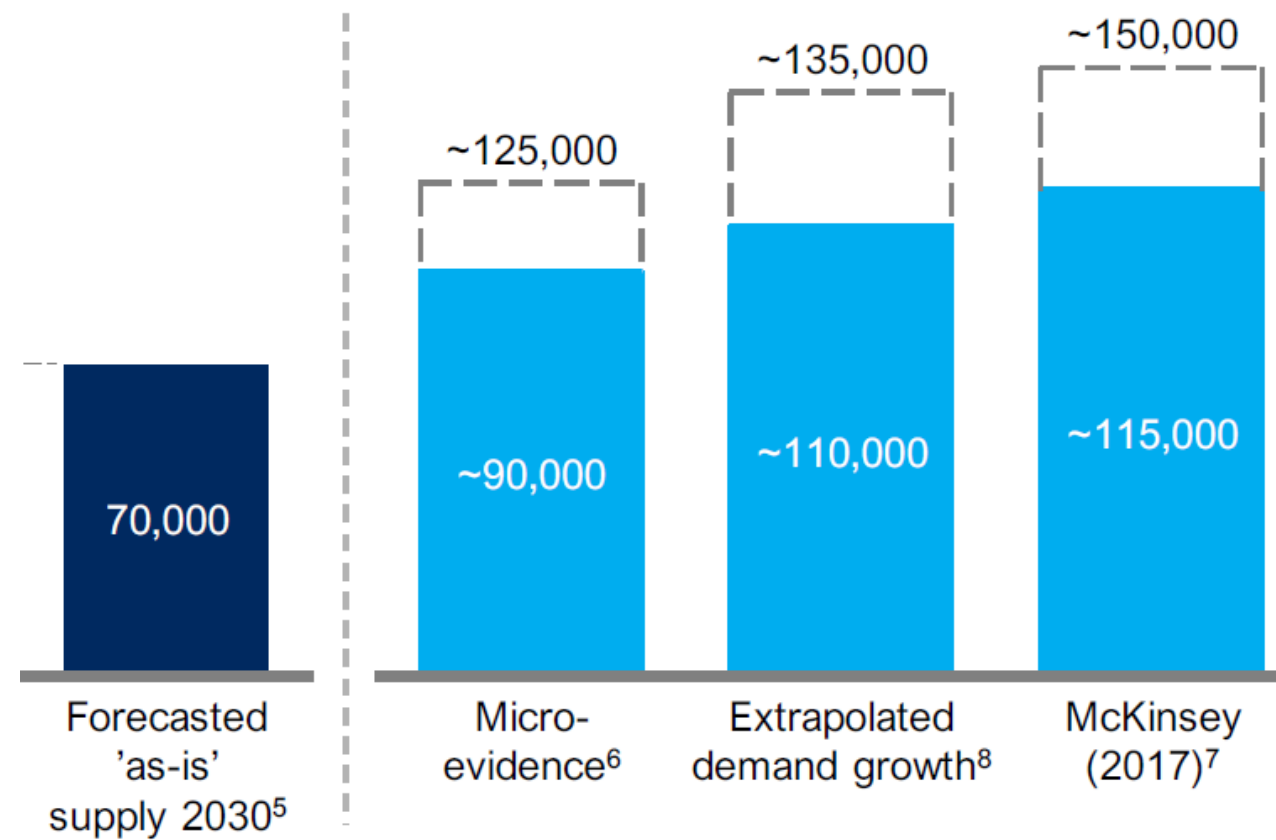
NNF's Data Science Initiative (launched 2019)

December 20, 2019

The Novo Nordisk Foundation allocates DKK 410 million for a new Data Science Initiative

Data scientists are in short supply due to an increasing demand in society. The Novo Nordisk Foundation is therefore launching a new Data Science Initiative that will support ambitious research programmes and national infrastructures, offer attractive career paths for data science researchers, and educate more specialists in this field.

410 mio. kr. fra Novos ejere til data-eksperter: "En julegave til Danmark"

De få, der bliver uddannet i datavidenskab, bliver revet væk. Nu skal en ny stor-satsning fra Novo Nordisk Fonden sikre, at Danmark ikke bliver kørt over på data-fronten.

Birgitte Nauntofte er direktør i Novo Nordisk Fonden. | Foto: Jeppe Michael Jensen/Ritzau Scanpix

FINANS

Relaterede

NNF Data Science Initiative

Purpose: build capacity within data science and artificial intelligence and to support education and training of the next generation of data scientists

Open competition

Stand-alone

Investigator Grants

Funding for excellent independent data science group leaders at different career stages

DKK 70 million/year

Collaborative Research

Grants for collaborative projects involving data science within the Foundation's focus areas

DKK 60 million/year

Research Infrastructure

Funding for shared super computers, hardware, GPUs, equipment, and "data as infrastructure"

DKK 40 million/year

Data Science Academy

Having a strong, visible, collaborative research environment needed to educate, attract, and retain the next generation of data scientists.

DKK 183 million over 5 years
NNF+Villum

Committee for Data Science, DKK 170 million/year

AI Pioneer Center

- State-of-the-art AI research
- Collaboration between DNRF, Villum, Carlsbergfondet, Lundbeckfonden, and NNF

DKK 352 million over 13 years

Intended impact of the NNF Data Science Initiative (2020-2022)

Quality of Research & Education

Strengthen Quality

Danish Data Science environment today

Increase Size

2025

Size of academic environment

- Large and excellent workforce within data science
- Strong Danish position in AI and data science
- Improved Healthcare
- Innovation for the benefit of society
- Steps taken towards a more sustainable society

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Recently funded projects and programmes (2017-2022)

■ Stand-alone Grants
■ Open Competition

NNF Center @ Broad Institute

300 MDKK

Synthetic health data

7.5 MDKK

Multigeneration Register

38 MDKK

DDSA
Danish Data Science Academy

153 MDKK

AI Pioneer Center

51.4 MDKK (NNF)

2018 and before	2019	2020	2021	2022	Future

CHALLENGE programme: Big data in Biomedicine

180 MDKK, 3 grants

DATA SCIENCE OPEN COMPETITION

138 MDKK, 12 grants

DATA SCIENCE OPEN COMPETITION

Budget : 170 MDKK

DATA SCIENCE OPEN COMPETITION

Budget : 170 MDKK

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Open Competition programs in data science (2017-2022)

2018 and before	2019	2020	2021	2022	Future

**CHALLENGE programme:
Big data in Biomedicine**

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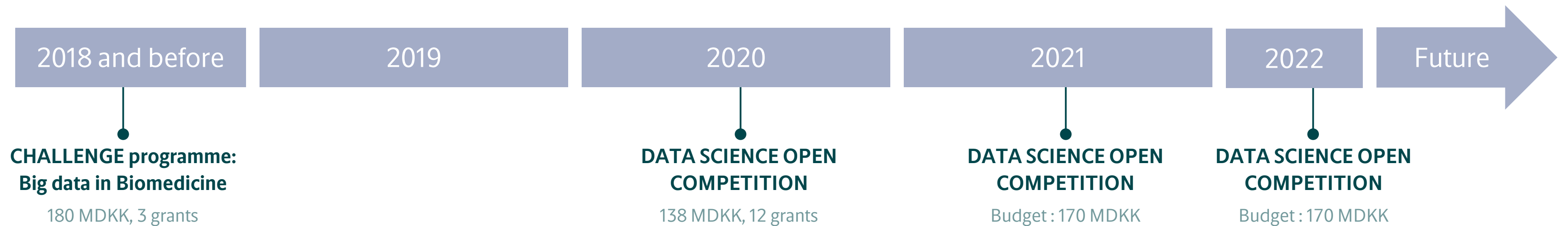
Addressing **relevant problems/questions** with **big data** and **data science methods**

Scientific Questions

Data Science Methods
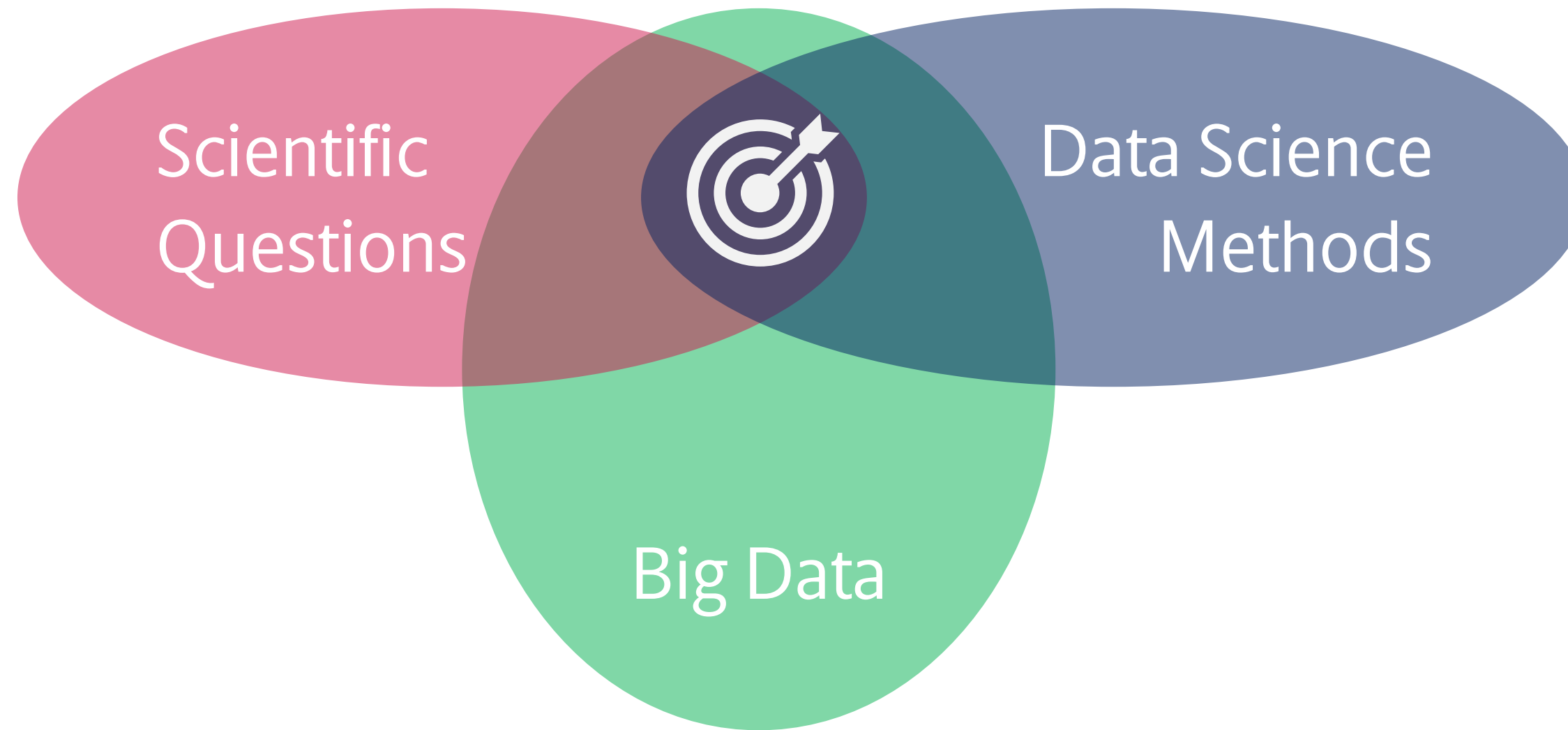
Big Data

Research scope
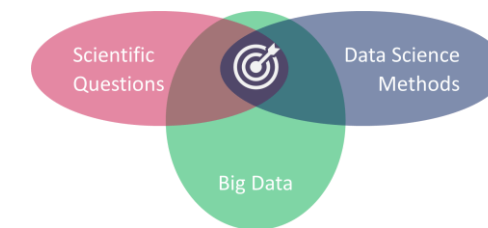
A. **Development of new algorithms, methods and technologies** within data science, artificial intelligence (incl. machine learning and deep learning), data engineering, data mining, statistics, applied math, computer science, big data analytics, etc.

B. **Applications of data science** within the Foundation's **scientific focus areas**

Biomedical & health sciences

Life science and industrial applications promoting sustainability
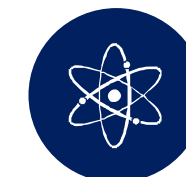
Natural and technical sciences

What is outside scope?

- *projects without potential future applications within the NNF's scientific focus areas*
- *projects with no novelty in terms of development or application of data science methods*

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Advice: It must be clear from your application how your projects fits the research scope!

Methods development-oriented projects

Application oriented projects

Projects concerned with data science methods development, should remember to argue/show the relevance for potential future application and impact within life science, health science, biotechnology, etc.

Projects which have their primary focus on application of data science methods must describe and explain the novelty and impact of their data science approach, be it development of novel methods or novel applications of existing methods.

See the written guideline (on-line) for details...

Guidelines for Applicants

DATA SCIENCE COLLABORATIVE RESEARCH PROGRAMME

Information and guidelines for applicants 2020

**The Novo Nordisk Foundation's scientific focus areas**

Biomedical and Health Sciences supports basic research in biomedicine that paves the way for advances in translational medicine and innovative clinical applications. Among the key topics are: basic biomedical research, translational biomedical research and technologies, clinical research, health-related data science infrastructure and applications, and research in patient-centred healthcare and treatment systems.

Life Science and Industrial Applications Promoting Sustainability addresses the escalating global sustainability challenges and the potential to make a positive impact for the environment. The research areas that are supported are within industrial biotechnology and environmental biotechnology, plant science, agriculture and food biotechnology as well as ecosystems research related to these areas. Basic research, platforms, and technologies enabling research on sustainability are included.

Natural and Technical Sciences supports fundamental research within the natural and technical sciences, including, e.g., physics, chemistry, mathematics, data science, and technical sciences. The research must have potential interdisciplinary application in biomedicine, health sciences, or biotechnology; this application need not be in the project period but could be beyond. Focus areas include interdisciplinary research, quantum technologies with potential application in the life sciences, data science, and health- and med-tech.

INVESTIGATOR GRANTS

Data Science Investigator Grants
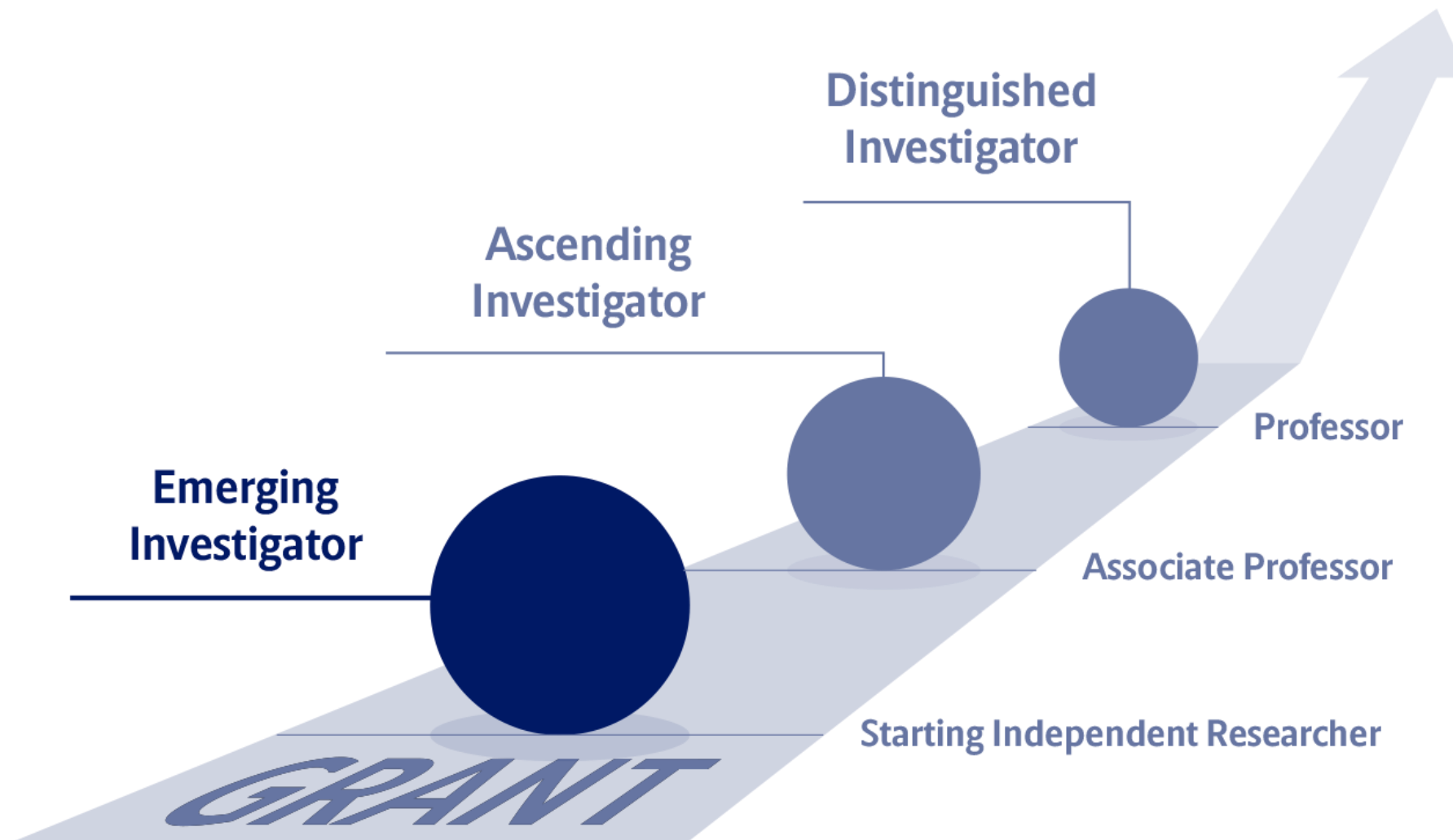
Distinguished Investigator

Ascending Investigator

Emerging Investigator

Professor

Associate Professor

Starting Independent Researcher

GRANT

Data Science
Investigator Grants

Funding for excellent independent data science group leaders at different career stages

Grant budget in 2021

- up 60 million DKK

Grant sizes

- Up 10 million DKK over 5 years

Key Information

- Emerging Investigator
  Senior post-doc or Assistant Professor level

- Ascending Investigator
  Associate/assistant Professor level

- Distinguished Investigator
  Full Professor level

Data Science Investigator Grants
– an extension of the NNF research leader programme

Østerbro svømmehal, source: minby.dk

Distinguished

Ascending

Emerging

Data Science
Investigator Grants

Funding for excellent independent data science group leaders at different career stages

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Grant sizes
- Up 10 million DKK over 5 years

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- Ascending Investigator
  Associate/assistant Professor level

- Distinguished Investigator
  Full Professor level

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https://researchleaderprogramme.com

2021 Data Science Investigator grant recipients

DISTINGUISHED	ASCENDING	EMERGING

Providentia: Privacy-driven Trust in Algorithms

Rasmus Pagh, University of Copenhagen

Read more about the project

Novel methods to model mutational processes in germline and cancer

Søren Besenbacher, Aarhus University

Read more about the project

First principal models, neural networks and functional graphical models for Defining metabolic capacity as a Tool for Personalized nutrition (FOODTOP)

Morten Arendt Rasmussen, University of Copenhagen

Enhancing statistical methodology for toxicophenomics: High-throughput and high-dimensional data for ecotoxicological risk assessment

Signe M. Jensen, University of Copenhagen

Islet Cartography – Multi-layered mapping of islets of Langerhans in health and disease

Jesper Madsen, University of Southern Denmark

Read more about the project

Efficient, high-resolution approaches for integrative sequencing analysis of complex diseases

Shilpa Garg, University of Copenhagen
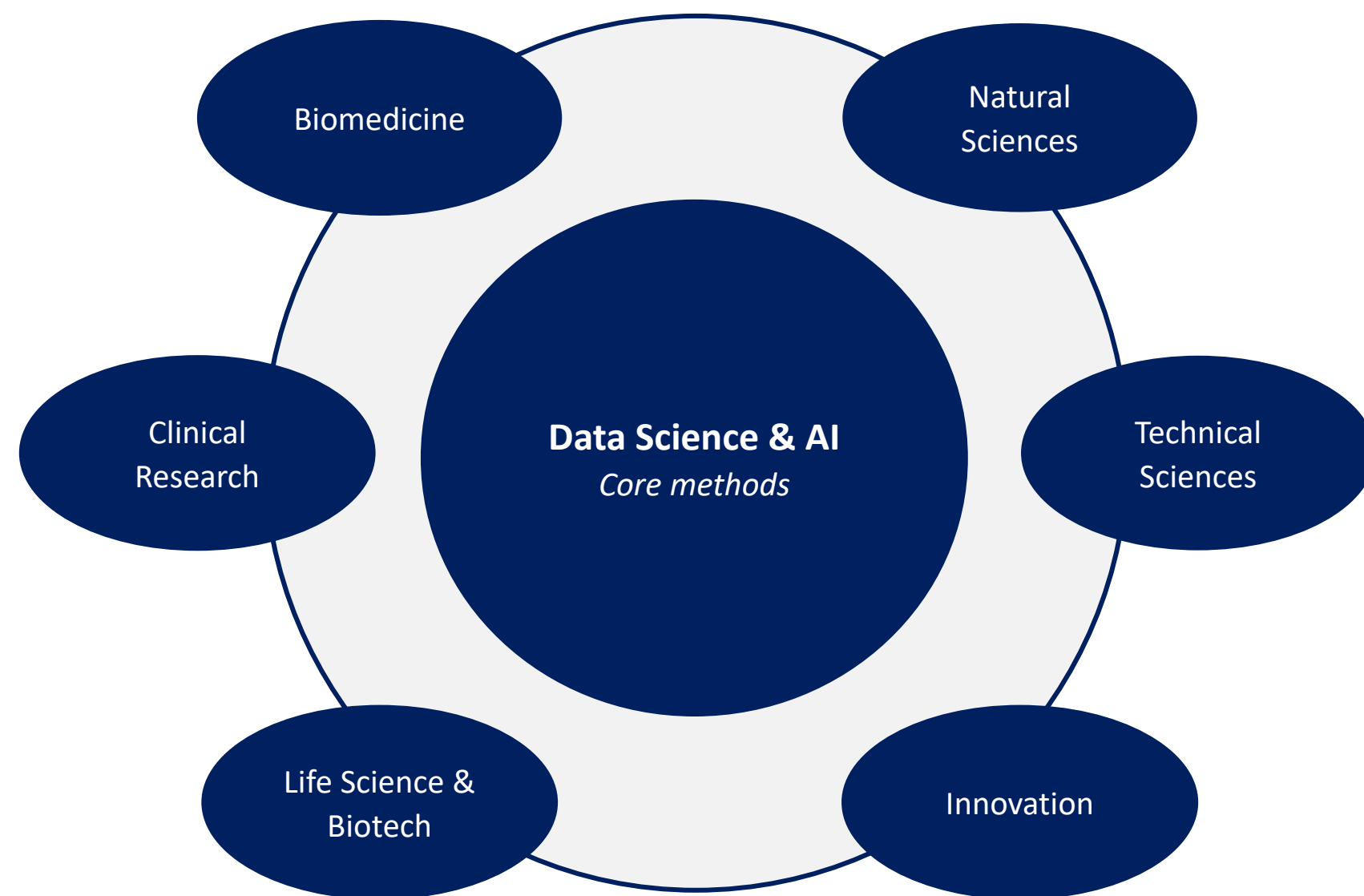
Read more about the project

CausalBiome: Developing a unified statistical framework for analyzing microbiome data

Niklas Pfister, University of Copenhagen

Read more about the project

COLLABORATIVE RESEARCH PROJECTS

Data Science Collaborative Research projects

Data Science & AI
Core methods

- Biomedicine
- Natural Sciences
- Clinical Research
- Technical Sciences
- Life Science & Biotech
- Innovation

Data Science
Collaborative Research Projects

Funding for collaborative projects involving data science within the Foundation's stategic focus areas

Grant budget in 2022

- up to 60 million DKK

Grant sizes

- up to 25 million over 5 years

Key Information

- Research collaborations between data scientists and domain experts (medical doctors, basic scientists, etc.)
- At least one co-applicant must be a Danish-based data science group. Consortium call be all data scientists.
- International partners are welcome but not as main applicants

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Data Science Collaborative Research projects
Inspired by Challenge, Synergy, Tandem, etc.

Prof Hansen, MD

Prof Jensen, Data Scientist
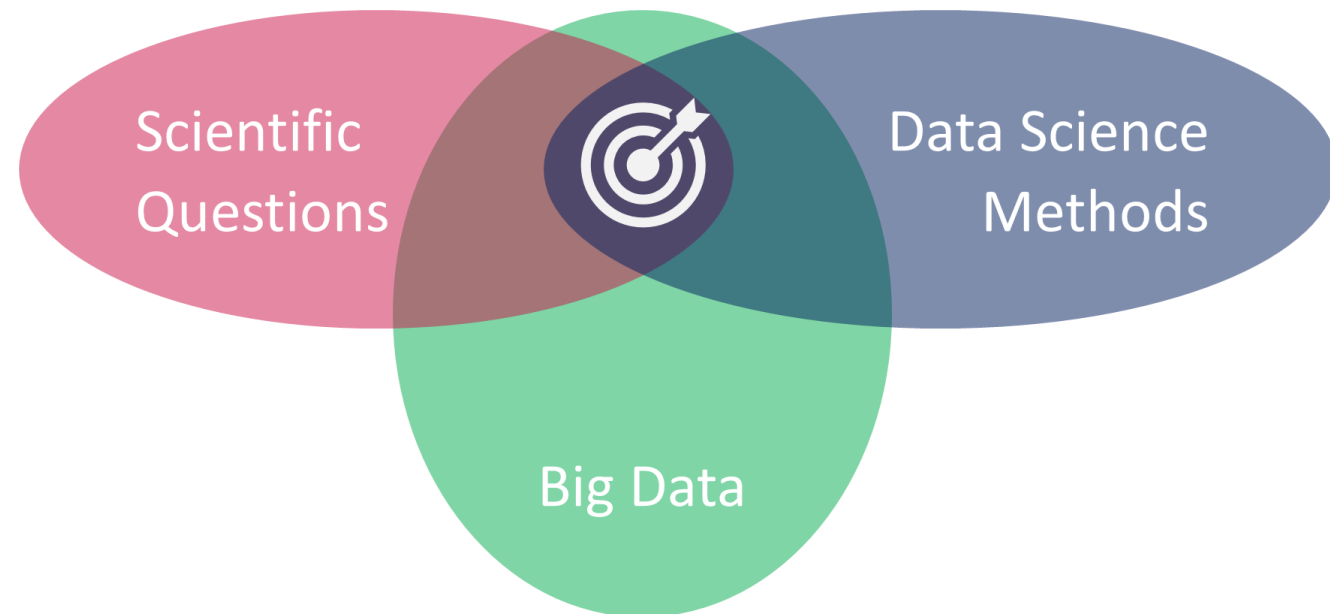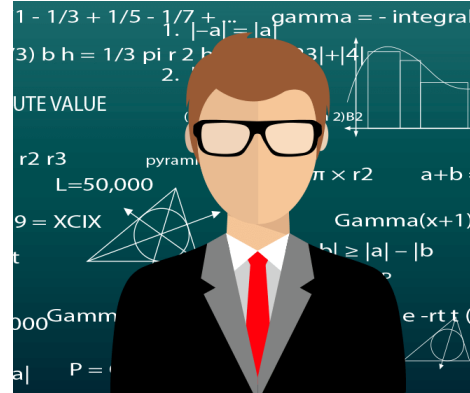
Collaboration

Scientific Questions

Data Science Methods

Big Data

Data Science
Collaborative Research Projects

Funding for collaborative projects involving data science within the Foundation's stategic focus areas

Grant budget in 2022

- up to 60 million DKK

Grant sizes

- Up to 25 million over 5 years
- Extra 5 million over 5 years for infrastructure

Key Information

- Research collaborations between data scientists and domain experts (medical doctors, basic scientists, etc.)
- At least one co-applicant must be a Danish-based data science group. Consortium call be all data scientists.
- International partners are welcome but not as main applicants

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Data Science Collaborative Research Projects: The 2020 Grants

Center for Basic Machine Learning Research in Life Science (DKK 29,984,002)

Development of fundamental machine learning algorithms and methods tailored to Life Science applications, such as protein engineering and optimization, sequence variation, genomics, medical imaging, drug discovery, etc.

Name	Title	Department
Ole Winther (PI)	Professor @ KU/DTU	Biology / Applied Mathematics and Computer Science
Aasa Feragen-Hauberg	Professor @ DTU	Applied Mathematics and Computer Science
Søren Hauberg	Professor @ DTU	Applied Mathematics and Computer Science
Jes Frellsen	Assoc. Professor @ DTU	Applied Mathematics and Computer Science
Anders Krogh	Professor @ KU	Computer Science & Health Data Science (SUND)
Wouter Boomsma	Assoc. Professor @ KU	Computer Science

## Machine Learning Methods for Data-driven Discovery of Antibiotic Resistance Plasmid Dissemination and Evolution (DKK 14,983,392)

Develop and apply deep learning methods to discover and monitor bacterial plasmid dissemination and evolution in massive sequencing data sets, with the aim of finding new ways to study and combat antimicrobial resistance.

Name	Title	Department
Søren Sørensen (PI)	Professor @ KU	Department of Biology
Simon Rasmussen	Associate Professor @ KU	NNF Center for Protein Research
Alexander Sczyrba	Professor @ Bielefeld U, Germany	Center for Biotechnology

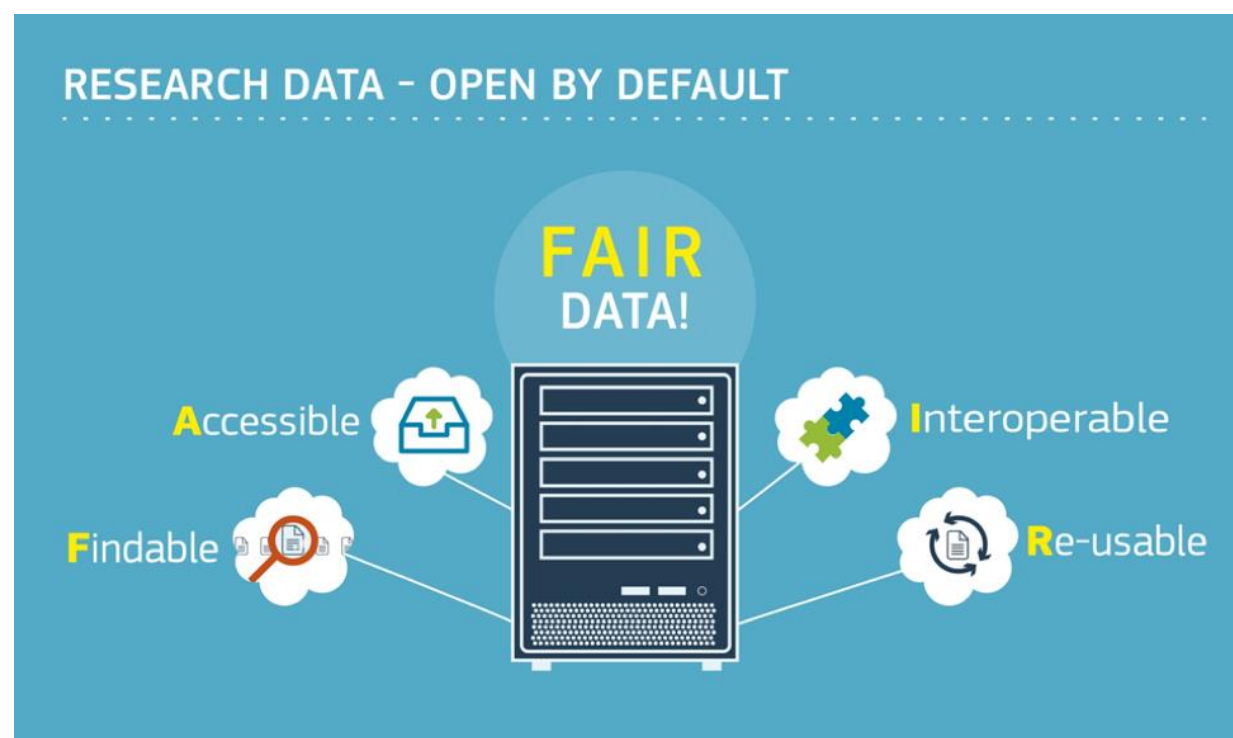novo nordisk **fonden**

RESEARCH INFRASTRUCTURE

Supporting that which enables excellent data science...
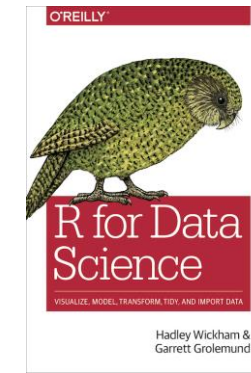
Clean data   Encode data

QC data   Engineer data

Access data   Organize data

Find data   Reformat data

Generate data

Data Science Research Infrastructure program

RESEARCH DATA – OPEN BY DEFAULT

FAIR DATA!

Accessible

Interoperable

Findable

Re-usable

SDU eScience
DeiC National
HPC Centre, SDU

Data Science
Research Infrastructure

Funding for shared super computers, hardware, GPUs, equipment, and "data as infrastructure"

Grant budget in 2022

- up to 40 million DKK

Grant sizes

- 5 - 15 million over 5 years

Key information

- Infrastructure must be open and shared

- Promotion of FAIR principles

- Can fund staff position to run the infrastructure

- "Data as infrastructure" projects may include data collection, curation, engineering and management

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Data Science Research Infrastructure: the 2020 grants

National Health Data Science Sandbox for Training and Research
(DKK 17,764,483)

This national collaboration will establish a shared national sandbox environment with data, tools and infrastructure for training students and researchers in analyzing health data, without compromising the privacy or rights of patients.
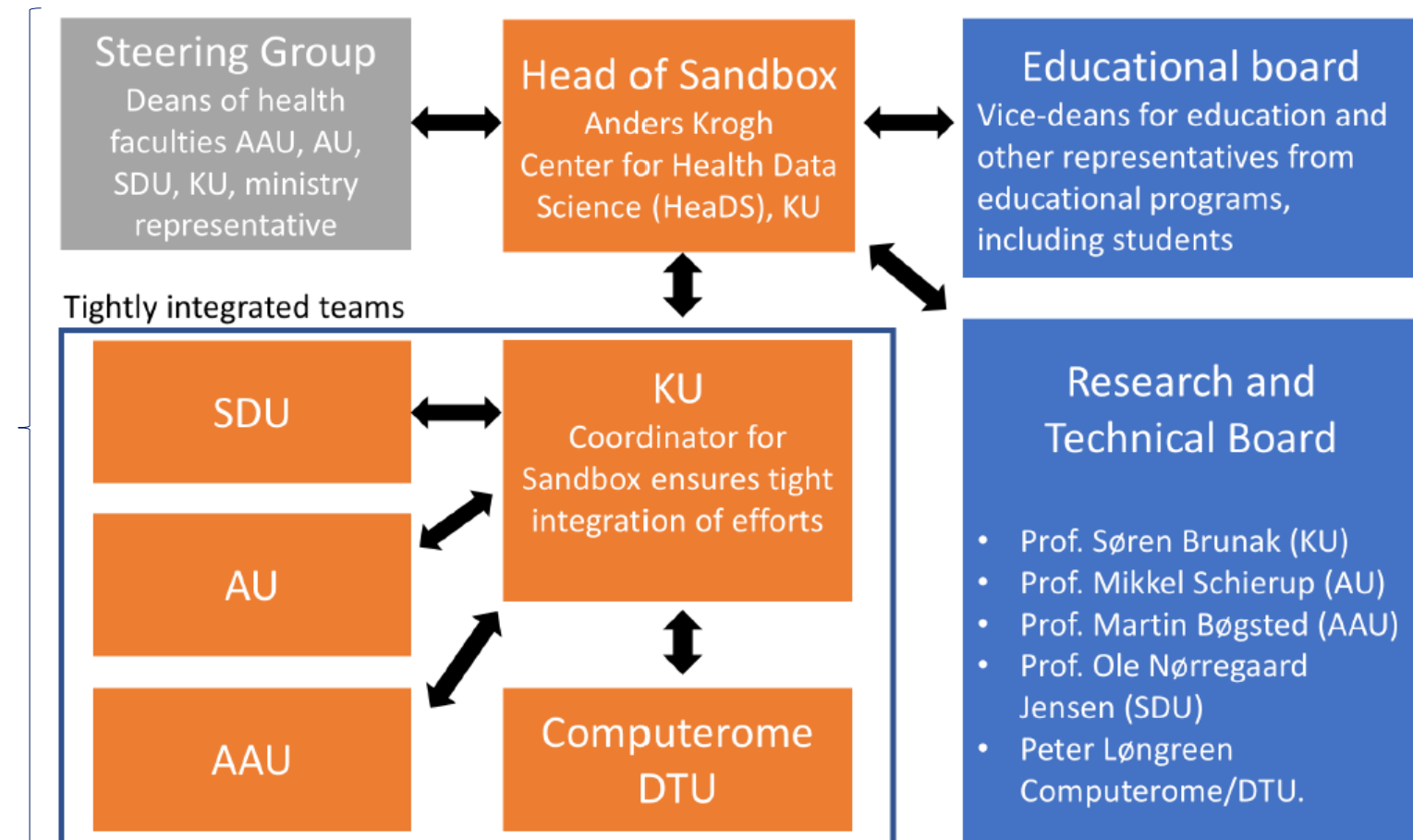
Anders Krogh, Professor @ Center for Health Data Science, University of Copenhagen

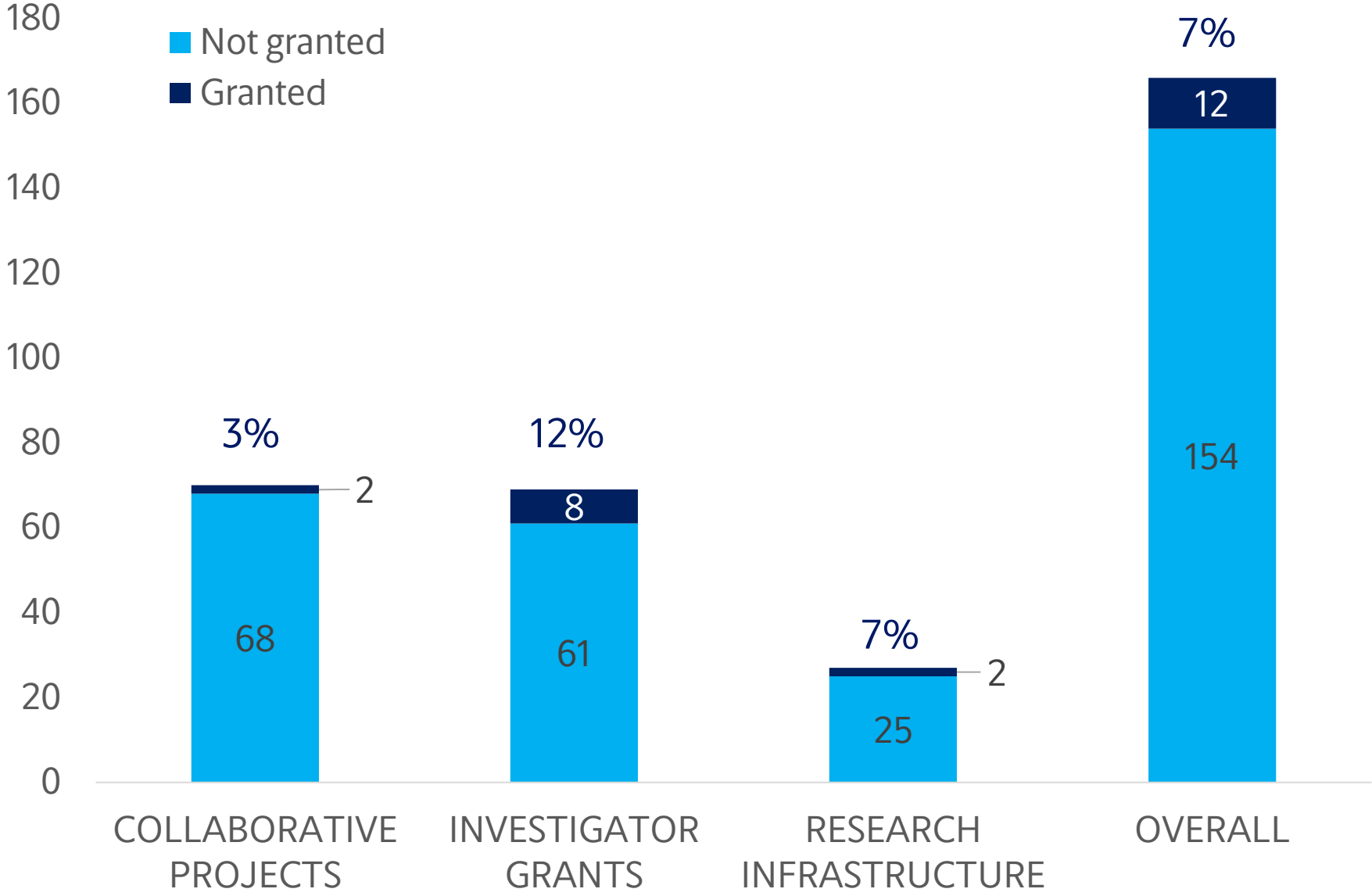**The OpenNeuroPET Archive – A Molecular Neuroimaging Archive**
(DKK 10,144,473)

The project will establish an open-access database and platform for sharing and analyzing brain imaging data (PET). It will enable researchers worldwide to share data to advance brain research and medical imaging technology.

Gitte Moos Knudsen, Professor @ Neurobiology Research Unit, Rigshospitalet

Steering Group
Deans of health faculties AAU, AU, SDU, KU, ministry representative

Head of Sandbox
Anders Krogh
Center for Health Data Science (HeaDS), KU

Educational board
Vice-deans for education and other representatives from educational programs, including students

Tightly integrated teams

SDU

AU

AAU

KU
Coordinator for Sandbox ensures tight integration of efforts

Computerome DTU

Research and Technical Board
- Prof. Søren Brunak (KU)
- Prof. Mikkel Schierup (AU)
- Prof. Martin Bøgsted (AAU)
- Prof. Ole Nørregaard Jensen (SDU)
- Peter Løngreen Computerome/DTU.

The statistics

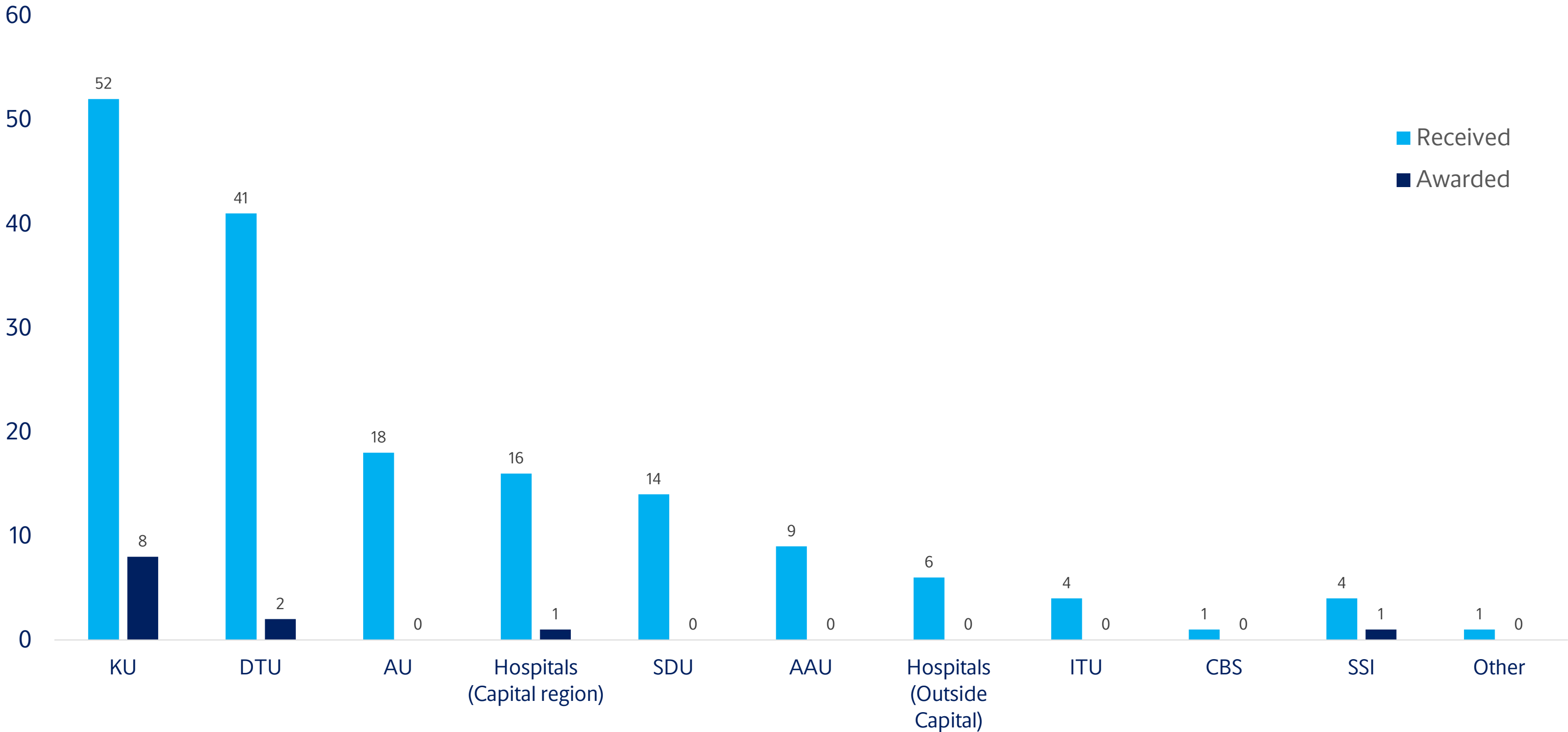# 2020 Data Science Open Call statistics

Applications received

Total:

- 168 applications
- 16% female applicants (main)

Grants awarded

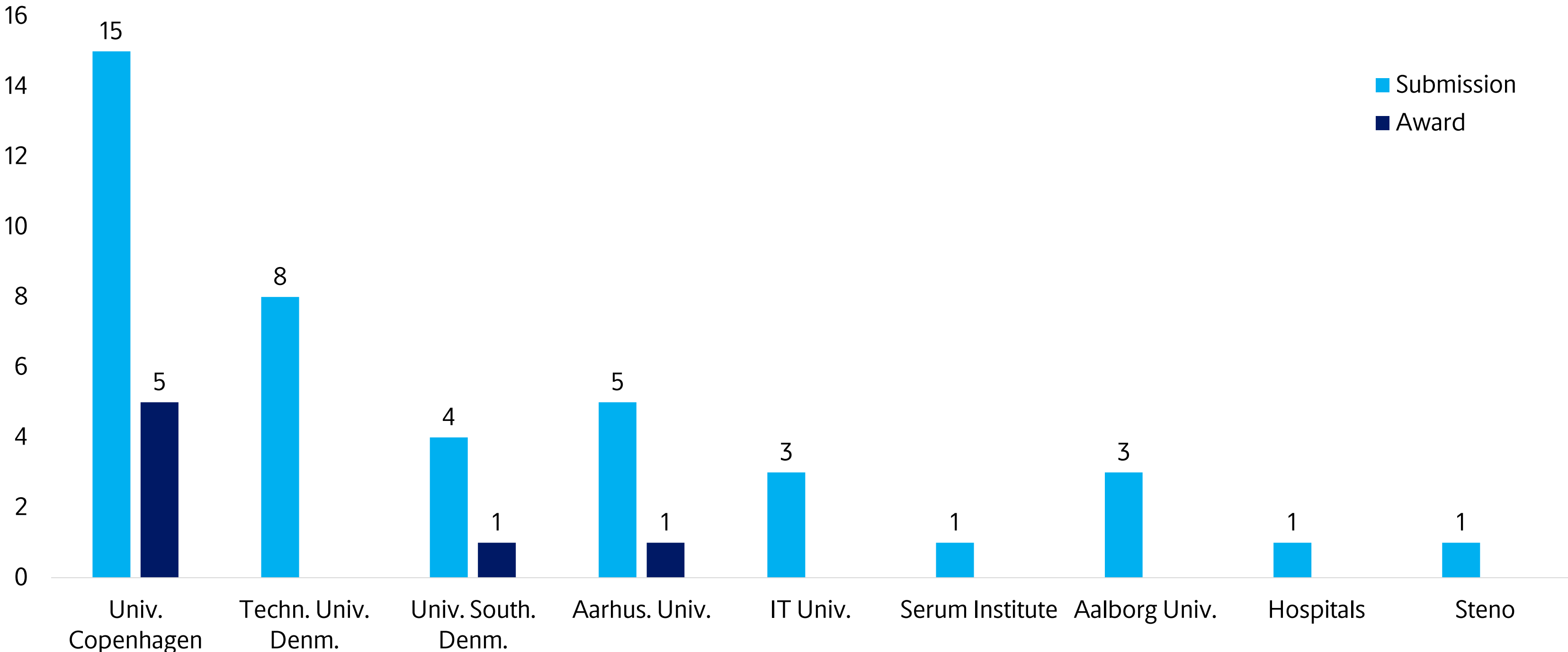Total:

- 12 grants awarded (7%)
- 25% female grant recipients

Where did the applications come from?

- 2020 stats of **all Data Science programmes**

Chart legend: Received (light blue), Awarded (dark blue)

Institution	Received	Awarded
KU	52	8
DTU	41	2
AU	18	0
Hospitals (Capital region)	16	1
SDU	14	0
AAU	9	0
Hospitals (Outside Capital)	6	0
ITU	4	0
CBS	1	0
SSI	4	1
Other	1	0

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Where did the applications come from?

- 2021 stats of Data Science **Investigators**

APPLYING IN 2022

All the details are on our homepage!

Initiative page

Specific call pages

Guidelines for Applicants

https://novonordiskfonden.dk/en/projects-and-initiatives/data-science-initiative/
https://datascience.novonordiskfonden.dk/

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Timeline for 2022 open calls

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

Investigator grants

Call is open | Committee review | **M** | Final Decision | **A**

Collaborative Research projects

Call is open: Phase 1 | Committee review | **M** | Phase 2 | Comm. review | **M** | Final Decision | **A**

Research Infrastructure

Call is open | Committee review | **M** | Final Decision | **A**

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M Committee meeting   **A** Announcement of grant recipients

Committee for Data Science (2021)

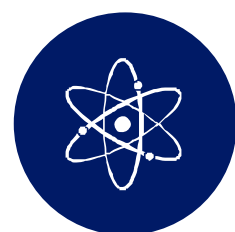| Member	Profile	Country	Title and affiliation
Gunnar von Heijne	Physics, chemistry, bioinformatics	Sweden	Professor in Biochemistry, Department of Biochemistry and Biophysics, Stockholm University
Daniel Cremers*	Machine learning, computer vision	Germany	Professor in Informatics and Mathematics, Chair of Computer Vision and Artificial Intelligence, Center for Machine Learning, TU Munich
Fredrik Kahl*	Machine learning, medical imaging	Sweden	Professor in Computer Science, Computer Vision Group, Department of Electrical Engineering, Chalmers University of Technology
Chris Holmes*	Biostatistics	United Kingdom	Professor in Biostatistics, Departments of Statistics & Nuffield Department of Medicine, University of Oxford
Alfonso Valencia*	Bioinformatics, HPC	Spain	Professor, Director of Department, Computational Biology, Life Sciences Department, Barcelona Supercomputing Center
David T Jones	Bioinformatics, machine learning	United Kingdom	Professor in Bioinformatics, Department of Computer Science, University College London
Nataša Pržulj*	Bioinformatics, network biology	Spain	Professor in Biomedical Data Science, Integrative Computational Network Biology, Life Sciences Department, Barcelona Supercomputing Center and Dep. of Computer Science, University College London
Detlef Weigel*	Plant biology, molecular evolution	Germany	Professor in Molecular Biology, Director, Max Planck Institute for Developmental Biology, Tübingen
Markus Ralser	Microbiology, metabolism, bioinformatics	Germany	Professor of Biochemistry, Head of Department, Molecular Biology of Metabolism Laboratory, Francis Crick Institute, United Kingdom and Charité - Universitätsmedizin Berlin
Alexandre Tkatchenko	Theoretical physics	Luxemburg	Professor in Theoretical Condensed Matter Physics, Faculty of Science, Technology and Medicine, University of Luxemburg
Olli-Pekka Kallioniemi	MD, precision medicine, omics, cancer	Sweden	Professor in Molecular Medicine, Director, SciLifeLab, Karolinska Institute, FIMM
John Danesh*	Epidemiology, medicine, public health	United Kingdom	Professor in Epidemiology and Medicine, MD, Head of Department, Department of Public Health and Primary Care, University of Cambridge
Isabel Rocha	Systems biology, metabolic models, innovation	Portugal	Pro-rector for Innovation and Entrepreneurship, Instituto de Tecnologia Química e Biológica António Xavier, NOVA University Lisbon, Portugal

* New member in 2021

https://novonordiskfonden.dk/en/committees/committee-for-data-science-2021-2/

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Good Advice from us

- Read the guidelines carefully ☺

- Familiarize yourself with the Foundations application system "NORMA"

- Do not submit your application on the last day...2 minutes before deadline ☺

- Explain

  ✓ How your project/idea/methods are new/different/better than the current state-of-the-art

  ✓ How your project/idea fits into the national landscape (particularly infrastructure)

  ✓ What methods you will use? What you mean by "Machine learning"?

  ✓ The wider impact of your work on the Danish data science community

  ✓ Your contribution to teaching and sharing of data, code, tools, etc.

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Questions about the Data Science open calls?

Signe Rømer Holm
Grant Manager

Thomas de Bang
Scientific Manager, PhD

Morten Bache
Senior Scientific Lead, PhD, Dr. Techn.

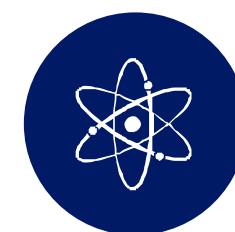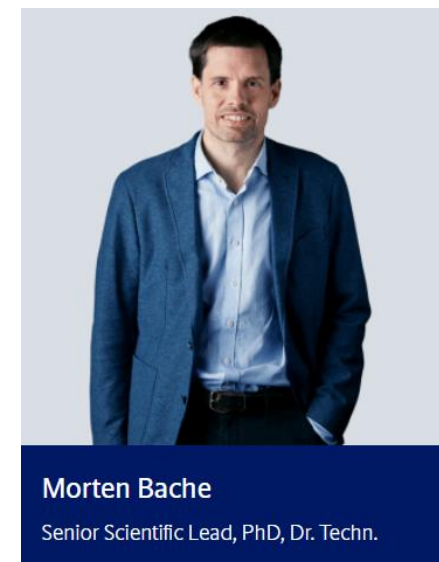**Ulrik Nicolai de Lichtenberg**
Senior Scientific Manager, PhD

GRANT MANAGEMENT

Grant Applications and Administration

BIO-TECH

Life science research and industrial applications promoting sustainability

NAT-TECH

Natural and technical science research and interdisciplinarity

BIO-MED

Biomedical and health science research and applications

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Agenda

1	About the Foundation
2	Our commitment to data science
3	Research Funding in Open Competition
4	Danish Data Science Academy
5	Selected strategic projects in data science
6	Q & A

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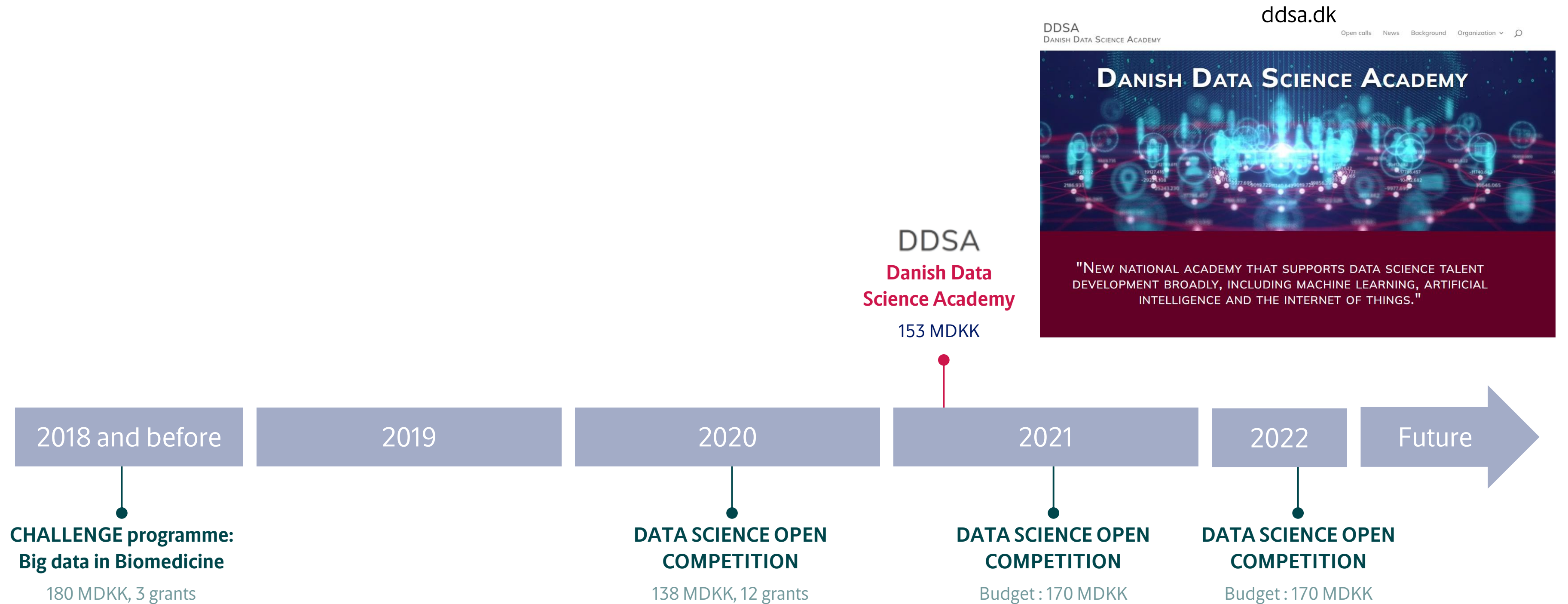# Recently funded projects and programmes (2017-2022)

■ Stand-alone Grants
■ Open Competition

ddsa.dk

DDSA
DANISH DATA SCIENCE ACADEMY

Open calls   News   Background   Organization

DANISH DATA SCIENCE ACADEMY

"NEW NATIONAL ACADEMY THAT SUPPORTS DATA SCIENCE TALENT DEVELOPMENT BROADLY, INCLUDING MACHINE LEARNING, ARTIFICIAL INTELLIGENCE AND THE INTERNET OF THINGS."

DDSA
Danish Data Science Academy
153 MDKK

| 2018 and before | 2019 | 2020 | 2021 | 2022 | Future |

CHALLENGE programme:
Big data in Biomedicine
180 MDKK, 3 grants

DATA SCIENCE OPEN COMPETITION
138 MDKK, 12 grants

DATA SCIENCE OPEN COMPETITION
Budget : 170 MDKK

DATA SCIENCE OPEN COMPETITION
Budget : 170 MDKK

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45
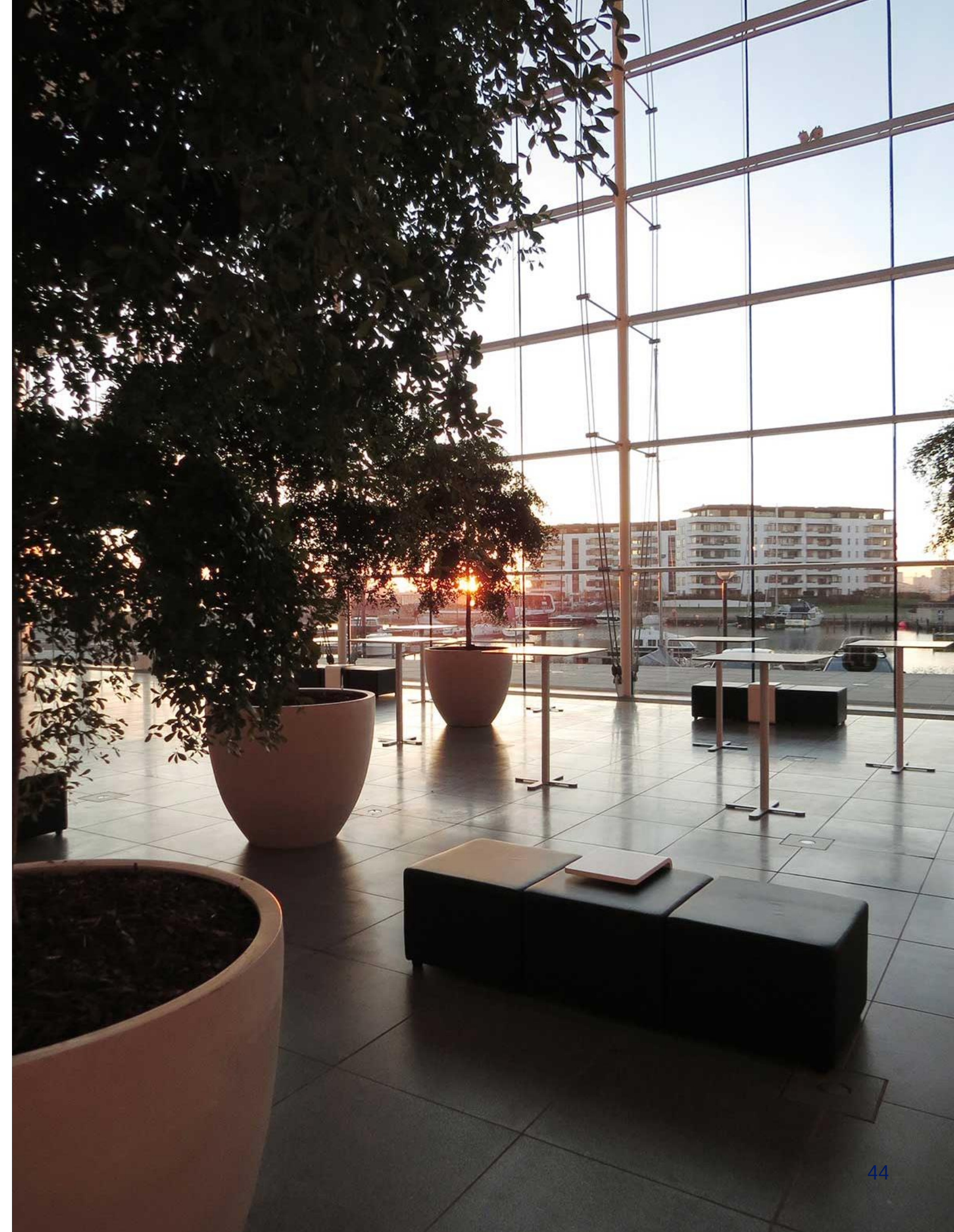
Danish Data Science Academy

The Challenge
- **A strong, visible, collaborative research environment is needed** to educate, attract, and retain the next generation of data scientists

The opportunity
- Create a collaborative community that **unites universities with the private and public sectors**
- Support education of the **next generation** of data scientists
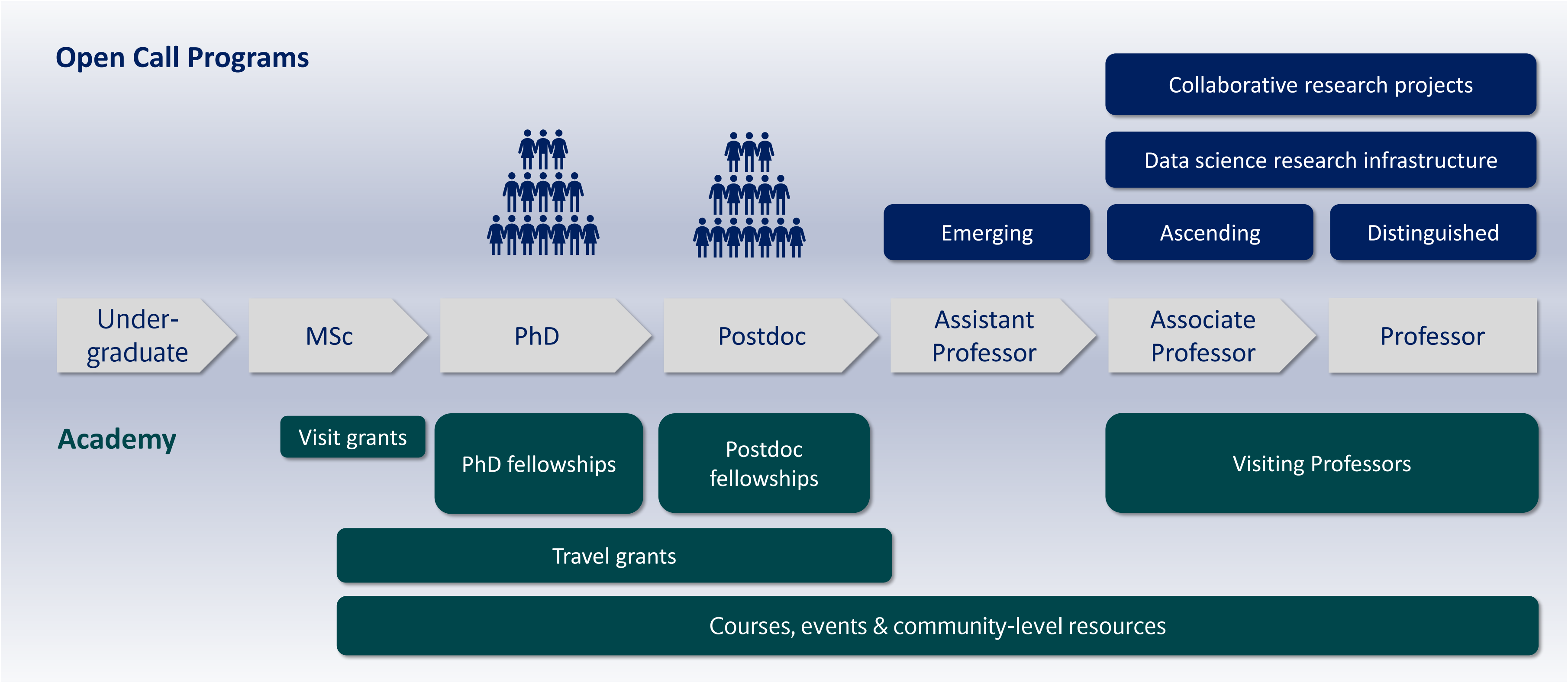
The Solution

The Danish Data Science Academy is a self-governing national network that
- Awards **PhD and postdoc fellowships** in open competition
- Supports and develops **training and education initiatives**
- Stimulates **networking, community-building and collaboration** between academic research groups, hospitals, companies, and public institutions
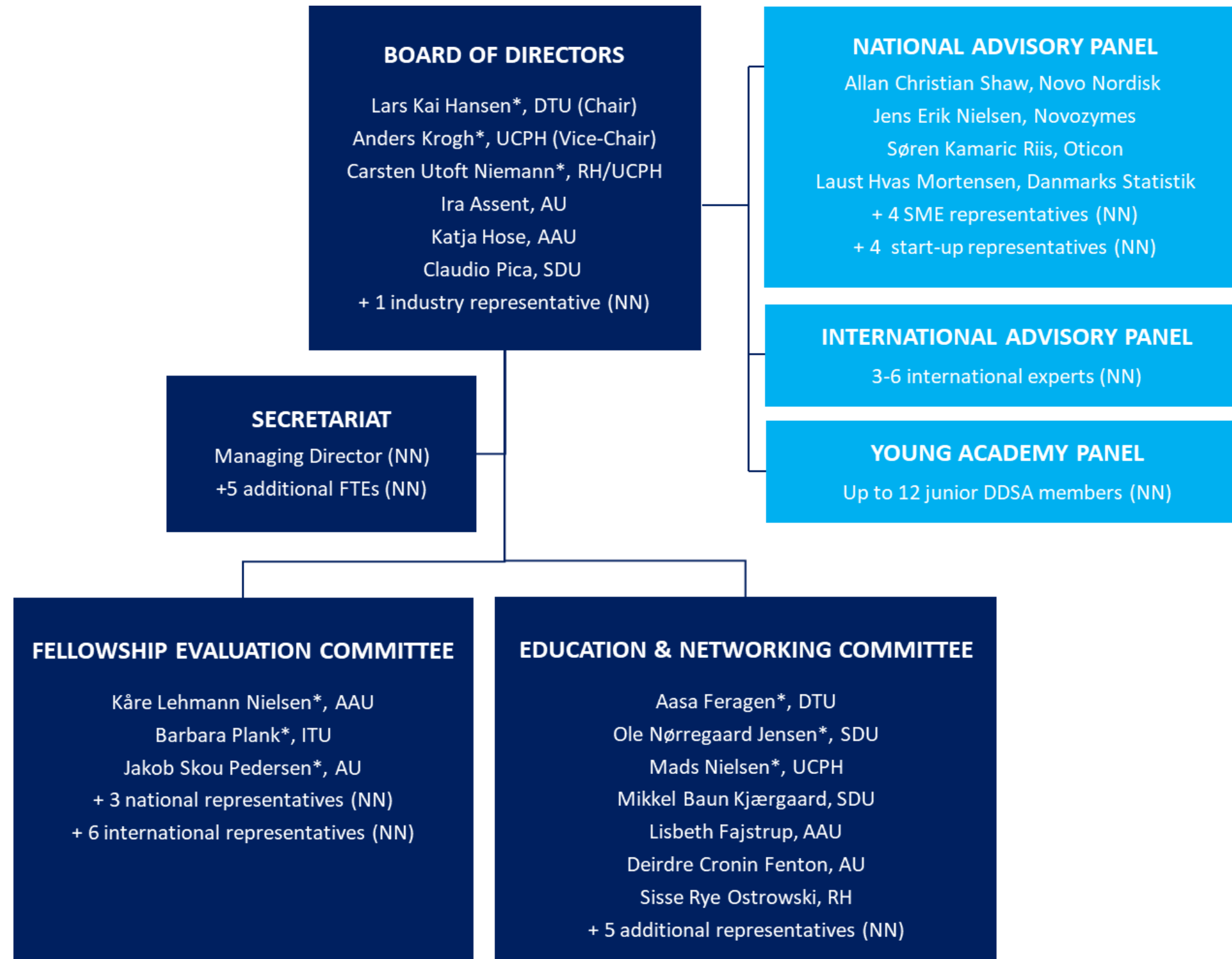
The details
- Budget: 184.3 million DKK (ca. 25 Million EUR)
- Duration: 2021-2026
- Funders: Novo Nordisk Foundation (152 MDKK) & VILLUM Foundation (32 MDKK)
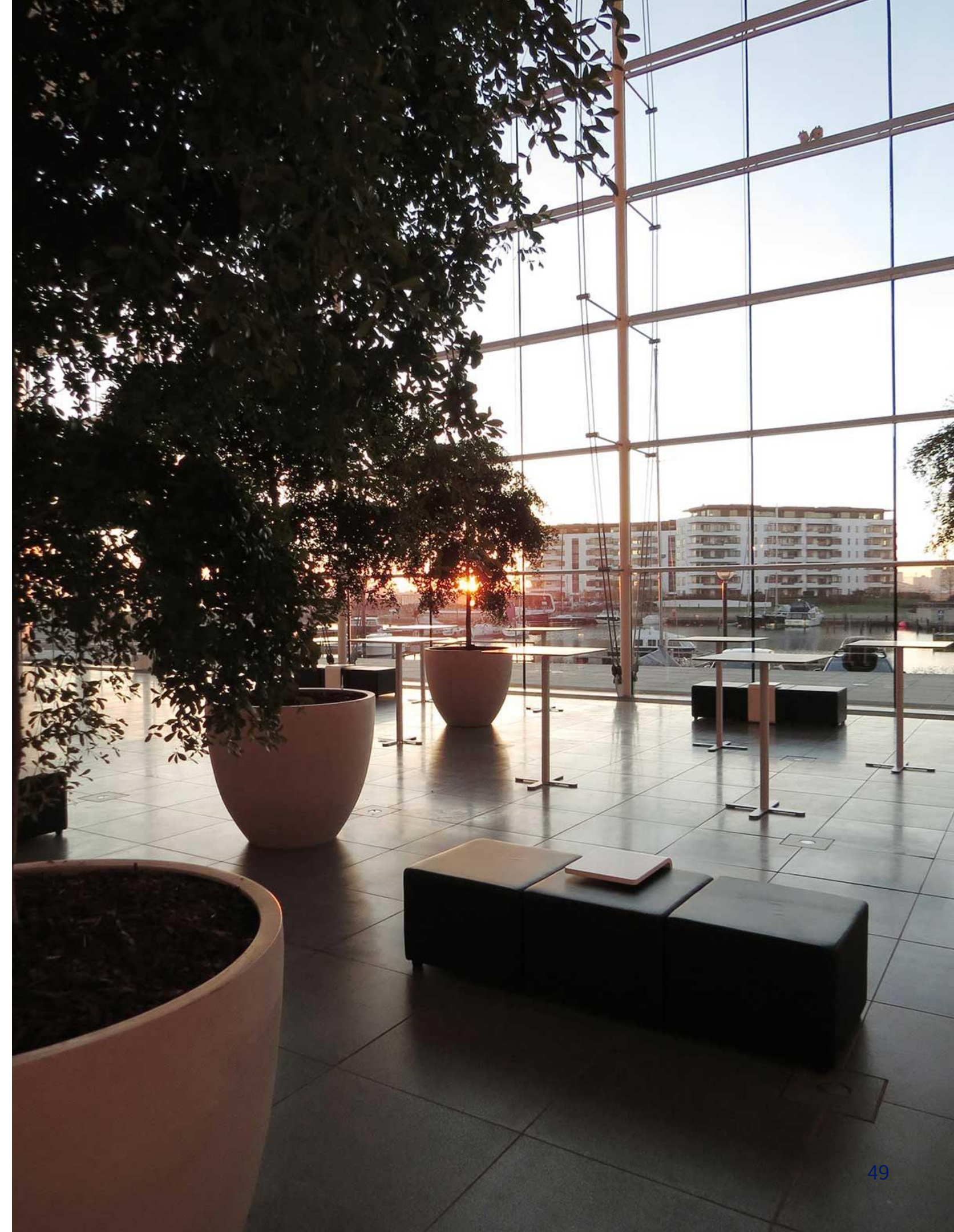- Governance: Universities, industry and public sector

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Synergy between Open Call programs and DDSA

Open Call Programs

Collaborative research projects

Data science research infrastructure

| Emerging | Ascending | Distinguished |

| Under-graduate | MSc | PhD | Postdoc | Assistant Professor | Associate Professor | Professor |

Academy

Visit grants

PhD fellowships

Postdoc fellowships

Visiting Professors

Travel grants

Courses, events & community-level resources

Governance structure

BOARD OF DIRECTORS

Lars Kai Hansen*, DTU (Chair)

Anders Krogh*, UCPH (Vice-Chair)

Carsten Utoft Niemann*, RH/UCPH

Ira Assent, AU

Katja Hose, AAU

Claudio Pica, SDU

+ 1 industry representative (NN)

NATIONAL ADVISORY PANEL

Allan Christian Shaw, Novo Nordisk

Jens Erik Nielsen, Novozymes

Søren Kamaric Riis, Oticon

Laust Hvas Mortensen, Danmarks Statistik

+ 4 SME representatives (NN)

+ 4 start-up representatives (NN)

INTERNATIONAL ADVISORY PANEL

3-6 international experts (NN)

YOUNG ACADEMY PANEL

Up to 12 junior DDSA members (NN)

SECRETARIAT

Managing Director (NN)

+5 additional FTEs (NN)

FELLOWSHIP EVALUATION COMMITTEE

Kåre Lehmann Nielsen*, AAU

Barbara Plank*, ITU

Jakob Skou Pedersen*, AU

+ 3 national representatives (NN)

+ 6 international representatives (NN)

EDUCATION & NETWORKING COMMITTEE

Aasa Feragen*, DTU

Ole Nørregaard Jensen*, SDU

Mads Nielsen*, UCPH

Mikkel Baun Kjærgaard, SDU

Lisbeth Fajstrup, AAU

Deirdre Cronin Fenton, AU

Sisse Rye Ostrowski, RH

+ 5 additional representatives (NN)

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Recently funded projects and programmes (2017-2022)

■ Stand-alone Grants
■ Open Competition

NNF Center @ Broad Institute

300 MDKK

Synthetic health data

7.5 MDKK

Multigeneration Register

38 MDKK

Danish Data Science Academy

153 MDKK

AI Pioneer Center

51.3 MDKK (NNF)

2018 and before	2019	2020	2021	2022	Future

CHALLENGE programme: Big data in Biomedicine

180 MDKK, 3 grants

DATA SCIENCE OPEN COMPETITION

138 MDKK, 12 grants

DATA SCIENCE OPEN COMPETITION

Budget : 170 MDKK

DATA SCIENCE OPEN COMPETITION

Budget : 170 MDKK

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2017 NNF CHALLENGE Program: Big Data in Biomedicine (2018-2023)

Big Data Centre for Environment and Health

Grant recipient: Clive Sabel (AU)

Co-applicants
- Ole Hertel (AU)
- Torben Sigsgaard (AU)
- Carsten Bøcker Pedersen (AU)

60 Million DKK

Big life-course data analytics for understanding disease initiation and progression in diabetes and its complications

Grant recipient: Søren Brunak (KU)

Co-applicants
- Henrik Ullum (KU)
- Laust Hvas Mortensen (Statistics DK)
- Ewan Birney, EMBL-EBI, UK

60 Million DKK

Harnessing the Power of Big Data to Address the Societal Challenge of Aging

Grant recipient: Rudi Westendorp (KU)

Co-applicants
- Niels Ploug (KU)
- Thomas Kirkwood (KU)
- Lene Juel Rasmussen (KU)

60 Million DKK

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Multigeneration Register: AI will transcribe Danish family relationships

The project

26 NOV 2020

38 million DKK awarded for a consortium led by the Danish National Archives to create a database (register) of family relations among all Danes born since 1920.

Partners:

- Danish National Archives
- KU (AI researchers at DIKU)
- AU (Registry researchers)
- Statistics Denmark (will host the register)

The problem
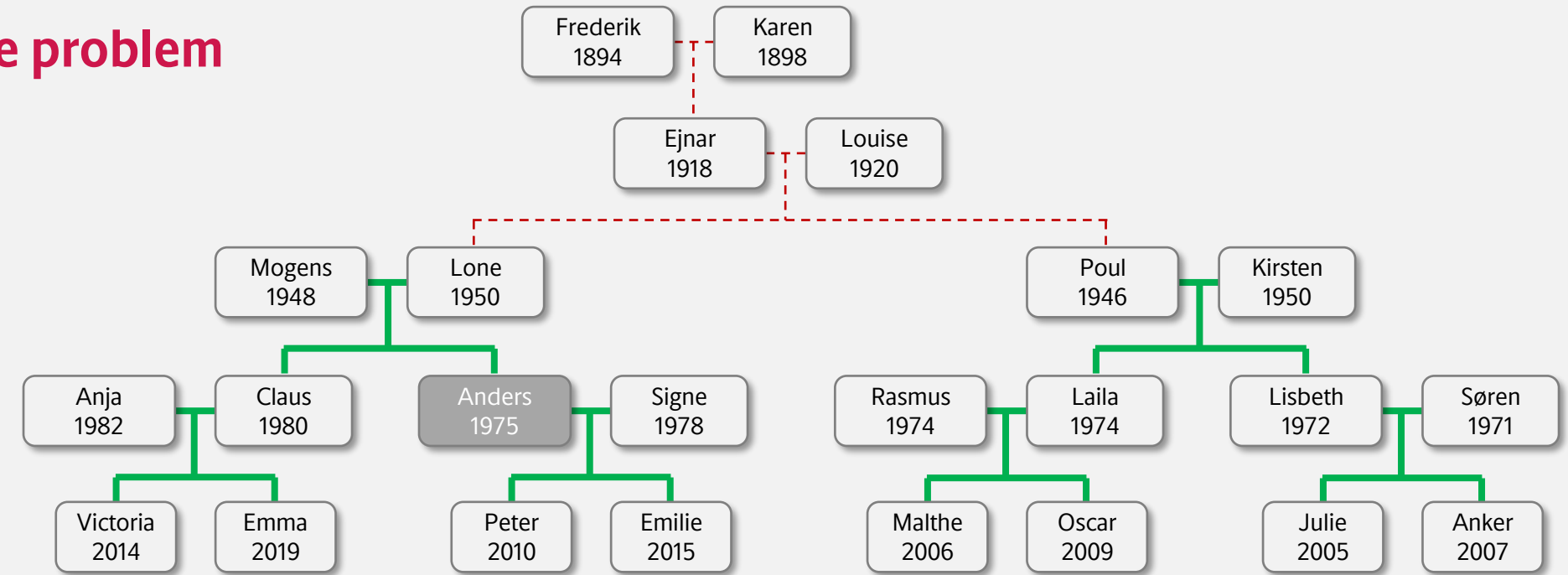
The solution
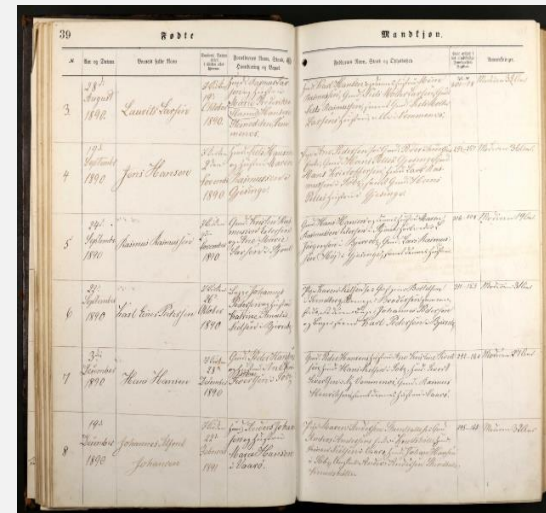
AI models read names, dates and places from scanned parish registers
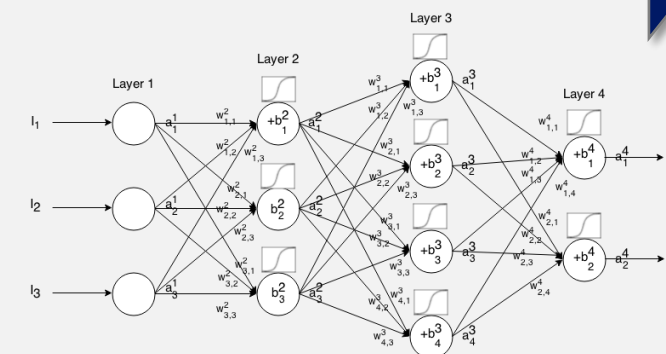
National **database** of family relations for all Danes born from 1920 to today

The Synthetic Health And Research Data (SHARED) Project

The project
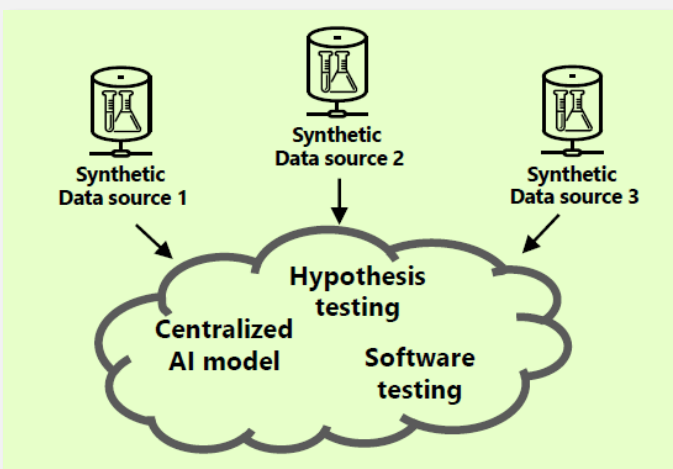
7.5 million DKK awarded in 2019 for a project to explore and develop algorithms for creating synthetic health data.

Partners:
- Professor Henning Langberg (KU, Rigshospitalet)
- Finnish computer scientists

Real patient data

Jacob 23 years   Josefine 55 years   Jesper 67 years

The real patient data with sensitive health information.

Pseudonymisation

#1 23 years   #2 55 years   #3 77 years

Names and personal information removed or encrypted
Still subject to GDPR

Synthetic data

Morten 45 years   Stine 20 years   Thomas 74 years

Generated fake patient populations who simulate real ones
Excluded from GDPR

A few use cases enabled by synthetic data

- Accelerate software development and research
- Centralise data from multiple data sources
- Increase AI performance by augmenting the real data with synthetic data
- Accelerate hypothesis testing
- Secondary purpose research as it is fully anonymised
- Test software pipelines
- Share data for educational purposes, hackathons, etc.

NNF Center for Genomic Mechanisms of Disease at the Broad Institute

Leadership	**Todd Golub** — Director of the Broad Institute	**Kasper Lage** — Managing Director of the NNF Center

NOVO NORDISK FOUNDATION CENTER FOR GENOMIC MECHANISMS OF DISEASE AT BROAD INSTITUTE

Research Focus

- Conduct **large-scale omics experiments** to measure the **effect of genetic variation** on transcription factor binding, co-factors, gene regulation and transcription using cell types of relevance to diabetes and obesity (e. g. beta-cells, adipocytes, etc.)

- Use the resulting big data sets to develop **machine learning models** to understand the **mechanisms of gene regulation and explain/predict the effects of genetic variation**

Budget

- Ca. **300 MDKK** (2021-2026)

Seeding partners

- **Denmark:** KU, AU, SDU

- **USA:** Broad Institute (Harvard and MIT)

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AI Pioneer Center – starting up as we speak

7 April 2021

Leading American researcher and DKK 350 million will take Danish artificial intelligence research to new heights

ARTIFICIAL INTELLIGENCE A new pioneer center for artificial intelligence research will be opening in Copenhagen at the end of 2021. Headed by world-leading American AI researcher, Serge Belongie, and with DKK 350 million to back it, the center will conduct world-class artificial intelligence research focusing on societal challenges, people and design, while putting Denmark at the international forefront.

The pioneer center will work extensively on the ethical aspects of AI and how to design technologies built on artificial intelligence in such a way that they are accepted and understood by those who need them. Photo: Getty

30 August 2021

How bird's species made new Professor Serge Belongie world-famous within Computer Vision

NEW PROFESSOR New Professor at the Department of Computer Science and coming Director of Denmark's new Pioneer Center for artificial intelligence, Serge Belongie, allows himself and his students to think big. He recently moved from New York to Copenhagen to take Danish AI research to new heights.

The new pioneer center for artificial intelligence that Serge will be heading is the most ambitious investment in artificial intelligence research ever on Danish soil.

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AI Pioneer Center

Challenge

AI has the potential to transform nearly all aspects of human daily and professional life. It is essential that academia take a leading role in developing AI to balance out the influence of other interests.

There exists a large un-met need to establish AI expertise in Denmark.

Vision

Creation of an internationally highly competitive centre that will develop into an international flagship, setting a human centric direction in the global landscape of AI centres

Mission

Carrying out state-of-the-art AI research that is both interdisciplinary as well as intersectoral, transforming fundamental findings to solve societal challenges

Centre leader prof. Serge Belongie:
- AI, focus on machine learning and computer vision
- "Shape Context", object recognition, image segmentation
- Metric learning, assistive technology
- Interdisciplinary application of AI
- Co-founder of several AI start ups

Leadership: Assoc. dean of Cornell Tech, NYC (since 2019)

2018: Honorary professor at DTU

July 2021: Professor at KU

Citations chart (total and annual citations, years 1995–2025)
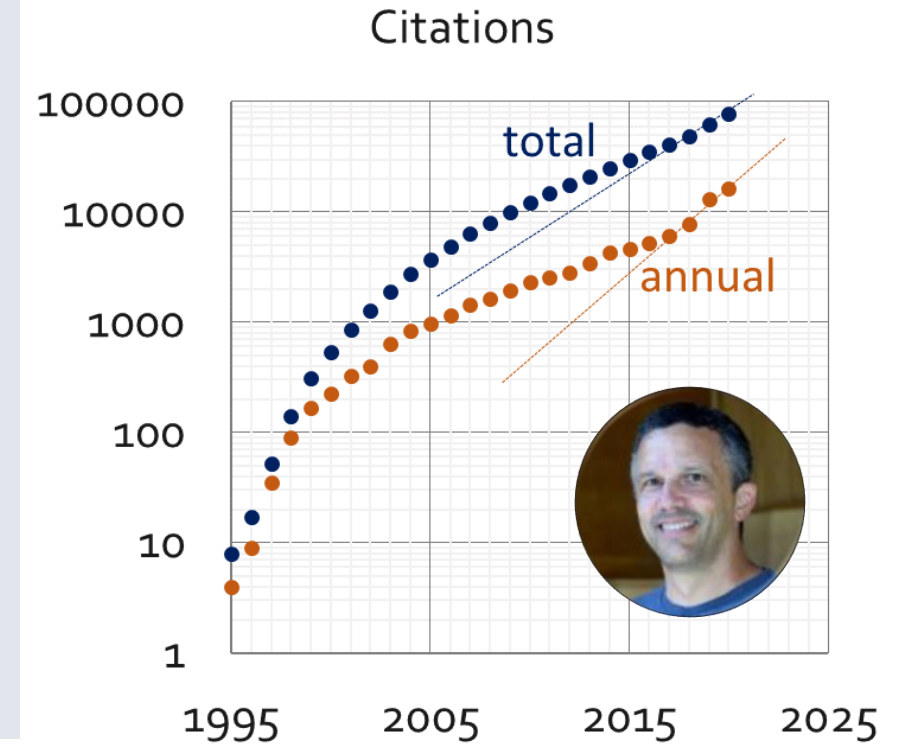
Key method areas in the centre:
- Causality & explainability
- Extended reality
- Fine-grained analysis
- Learning theory and optimisation
- Signals and decoding
- Speech and language
- Networks and graphs

Chart: DKK millions per Year (1–13), Total and NNF part
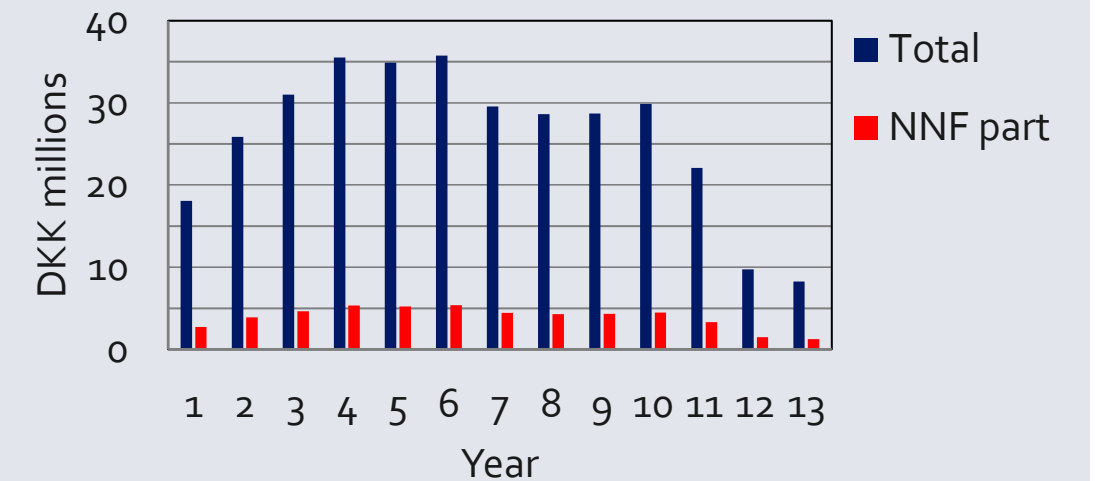
AI PC Budget: 352 MDKK (13 years), NNF part 15% (54 MDKK)
- 3:3:1:1:1 split between KU:DTU:ITU:AAU:AU

https://datascience.novonordiskfonden.dk/

https://datascience.novonordiskfonden.dk/

Agenda

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