How Denmark Can Strengthen the Use of Artificial Intelligence in Research and Innovation

Denmark has, over a number of years, invested heavily in infrastructure and initiatives that support artificial intelligence (AI) in research and innovation. These investments have strengthened the Danish ecosystem and have created opportunities to expand the use of AI across the research and innovation system. However, AI is still used cautiously in academic research, and collaboration between educational and research institutions and companies on AI remains limited. DFIR highlights some of these unrealised potentials below and presents a set of recommendations.

AI is reshaping and accelerating large parts of the research and innovation process. It is crucial for the international position of Danish research and innovation environments that researchers engage actively in the development and use of AI in a scientifically and ethically responsible way, and that investments are made with attention to energy and climate impacts. Over the past two years, DFIR has held a series of debates and commissioned a background report with analyses of the Danish ecosystem for AI in research and innovation[1]. DFIR summarises the main conclusions here and provides recommendations for future initiatives.

The Danish ecosystem
A healthy ecosystem for AI in research and innovation rests on four elements. It requires access to large datasets, computer infrastructure, competencies within AI and application areas that fit the AI tools. In addition, the interaction between these elements is essential. The individual components of the Danish system are described below.

Data. Denmark has a long tradition of collecting and maintaining large public datasets. In recent years, work has been done to improve the accessibility of public data, for example through datavejviser.dk. Significant investments have also been made in the development and use of health data, for example through the National Genome Center.

Computer infrastructure. Extensive private and public investments have been made to strengthen researchers' access to computing power, for example UCloud under the Danish e-Infrastructure Consortium (DeiC) and Denmark's connection to the European supercomputer LUMI, as well as investments in high-capacity infrastructure, especially the AI supercomputer Gefion funded by the Novo Nordisk Foundation and the Danish Export and Investment Fund. Danish researchers also purchase access to computing power from a range of commercial providers.

Competencies. Significant investments have been made in recent years in building competencies within AI. These investments have been driven by private foundations, for example the Danish Data Science Academy, the Pioneer Centre for Artificial Intelligence and AI-themed calls from Innovation Fund Denmark, Independent Research Fund Denmark and private foundations. A number of initiatives have also been launched at individual educational and research institutions.

Application. Several of the major investments aim both to raise the level of AI competencies and to strengthen their practical use. Digital Research Centre Denmark, the national research and innovation centre for advanced digital technology, works to strengthen collaboration between public research and innovation environments and companies. The National Center for AI in Society focuses on the use of AI in public authorities, while the Pioneer Centre focuses on collaboration between computer science and other research fields.

Overall, substantial investments have been made in AI for research and innovation over the past five years from public and private foundations. These grants have primarily supported frontier research through major infrastructure projects and research centres. It is essential that the investments work together and that AI is adopted more broadly across Danish research and innovation.

Danish strengths and unrealised potentials
There are several strengths in the Danish ecosystem. This includes, in particular, the major investments in computing power, which give Danish elite environments privileged access. Large investments in computer science research from both public and private funders are also a strength. Between 2013 and 2023, public R&D full-time equivalents in computer science doubled from 371 to 754[2]. Finally, the wide range of initiatives at individual institutions is also a strength. Many activities are already underway, and they generate valuable experience and results.

However, there are also two unrealised potentials in the Danish ecosystem. First, AI is still used cautiously in most Danish research and is primarily applied to more routine tasks such as literature searches, drafting and rephrasing text. Relatively few researchers use AI for analytical tasks such as identifying research questions, hypothesis and theory development, research design, experiments or data analysis. Most researchers at Danish universities nevertheless assess that AI holds considerable potential in almost

all application areas without compromising research integrity[3]. DFIR's impression is that part of the explanation for the cautious use of AI is the continued opaque and administratively burdensome access to computing power, a lack of competencies and uncertainty about the legal and ethical framework.

Second, despite initiatives under, for example, the GTS institutes and DIREC, there is unrealised potential in collaboration between public research institutions and private companies on AI. This includes, for example, ensuring that companies have access to computing power.

Ways forward

DFIR assesses that initiatives are needed in several areas. A central focus should be to integrate AI into everyday work in more research and innovation environments. Three specific proposals to support this are a technology radar, an AI competency portal and an AI task force.

A technology radar is a digital portal containing reviews of current AI technologies for research and innovation, including descriptions of the technical requirements for using the technology, its effectiveness and user friendliness and the provider's approach to data protection. Researchers could be given the option of commenting on and sharing experiences with the listed technologies.

An AI competency portal for research and innovation should support the mapping of AI competencies within a given group or institution and gather descriptions of relevant AI continuing education courses. This would make it possible to coordinate and collaborate on the development of AI competencies. Several similar activities have already begun, for example DTU's work on a national forum for continuing and further education and DDSA's overview of PhD courses in data science and AI.

An AI task force should advise research groups on the choice of AI tools, GPU resources and data. The task force should serve as a first point of contact for researchers in computer science who are frequently approached by researchers from other fields with ideas for how AI could be used within their specific research area. The task force could conduct an initial screening, advise on selecting AI tools, guide in structuring data and provide access to GPU resources for initial testing.

There is also a need to ensure more AI specialists and broader IT competencies in companies and research environments. The supply of study places and guidance for prospective students should therefore be strengthened and adjusted so the IT programmes demanded by companies and research environments do not end up with unfilled places, and Denmark can strengthen the international recruitment of AI specialists and researchers.

Public and private foundations should maintain a continuous focus on developing funding instruments that support collaboration between research environments and companies in AI, and experience can be drawn from DIREC and recent calls from Innovation Fund Denmark and Independent Research Fund Denmark. Special attention is needed regarding access to computing power since it is experienced as a bottleneck, and it is crucial to develop flexible, low-bureaucracy access points that improve the utilisation of existing resources. It may also be beneficial for researchers to become more accustomed to applying for funds specifically for computing power, and to allow a broader group of public research institutions, including university colleges, sector research institutes and regional research units, in addition to GTS institutes and companies, to access public computing capacity.

Finally, DFIR believes that resources should be allocated so one of the key actors can take on a more coordinating and cross-cutting role in the Danish ecosystem. There is a need to bring together universities and other public research institutions, GTS institutes and companies, facilitate collaboration with European partners and ensure Danish access to international AI initiatives. In the coming years, it will be a major task to support competency development and access to AI infrastructure, ensure scientifically critical and ethically responsible use of AI, communicate guidance on regulation and data security and promote the development of energy and climate responsible AI.

Further information:

Frede Blaabjerg
Chair of DFIR
Phone: 21 29 24 54
E-mail: fbl@et.aau.dk

Steffen Bohni
Head of DFIR's analysis of AI In research and innovation
Phone: 61155366
E-mail: sbn@nfa.dk

Notes

[1] DFIR-project (2025): Kunstig intelligens i forskning og innovation
[2] Danmarks Statistik (2025) www.statistikbanken.dk/FOUOFF07
[3] CFA (2024). Rapport: Cases, potentialer og risici kunstig intelligens i forskning og innovation

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