Artificial intelligence in Denmark

Potentials and barriers

This analysis was prepared in collaboration with LEAD Agency
“The best way to predict the future is to invent it”

– Alan Kay
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You do not have to be particularly interested in technology nor an expert to appreciate that artificial intelligence is one of the most widely discussed current topics within the world of technology. And rightly so, as it is an area of rapid development. We are witnessing a comprehensive digitalisation of our society, and the new technological advances and perspectives will eventually change the basic conditions of the way we live and work. And artificial intelligence plays a central role in this.

Nevertheless, artificial intelligence is probably one of the areas of which only very few people fully understand the potential and possible consequences. And that is no wonder, as you can neither touch nor see artificial intelligence. Perhaps you do not know that you are using artificial intelligence - probably every day. Every time you make a search on Google, use the GPS in your car, use Microsoft Translator to understand a foreign language, or when Siri helps you turn off the lights at home, the actions are based on algorithms and use large amounts of data.

But the potential of artificial intelligence is greater than our daily digital needs. Artificial intelligence is already used in cancer research, where algorithms analyse huge amounts of data to identify suitable and individual treatment regimes. Artificial intelligence forms the cornerstone of the driverless cars, which are expected to populate the roads in just a few years. Artificial intelligence is also used in the business of, for example, Carlsberg, that uses the modern technology to ‘taste’ the beer and, thus, find new flavour nuances when developing new types of beer.

Notwithstanding the above, artificial intelligence also causes concerns which ought to be addressed and taken seriously. At Microsoft, we work in accordance with six ethical principles that we think ought to be the framework for our development and application of artificial intelligence - and which we need to consider when incorporating artificial intelligence into the context of our society.

The common denominator of these principles is that human beings are at the centre of development - not technology.
There is a need for us to discuss how best to use the potential of artificial intelligence while simultaneously taking into consideration the concerns that many people have: Is my personal data safe? Do we dare to enter the driverless vehicle and, not least, what will happen to our jobs once digitalisation leads to an increased automatization of the workplace?

Artificial intelligence is not a scenario of the future. It is already part of our daily lives to a greater or lesser extent. In other words, the technology is relatively mature; however, what is the position of our society and culture?

We need a dialogue on how we wish to use artificial intelligence in Denmark. How are we to provide a political foundation for artificial intelligence? Which actors must be involved? And how do we ensure a responsible and ethical approach to artificial intelligence while at the same time ensuring an innovative R&D environment, which will be able to create new breakthroughs to the benefit of all?

We do not hold all the answers. However, we would like to raise the questions in this analysis, in which we have interviewed several politicians, experts and opinion leaders on the potentials and barriers of artificial intelligence in Denmark.

We hope that this may inspire a broad debate on the role to be played by artificial intelligence in our society.

Happy reading!

Marianne Dahl Steensen, CEO, Microsoft Danmark

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The six principles comprise:

1. **Fairness**: When AI systems make decisions about medical treatment or employment, for example, they should make the same recommendations for everyone with similar symptoms or qualifications. To ensure fairness, we must understand how bias can affect AI systems.

2. **Reliability**: AI systems must be designed to operate within clear parameters and undergo rigorous testing to ensure that they respond safely to unanticipated situations and do not evolve in ways that are inconsistent with original expectations. People should play a critical role in making decisions about how and when AI systems are deployed.

3. **Privacy and security**: Like other cloud technologies, AI systems must comply with privacy laws that regulate data collection, use, and storage, and ensure that personal information is used in accordance with privacy standards and protected from theft.

4. **Inclusiveness**: AI solutions must address a broad range of human needs and experiences through inclusive design practices that anticipate potential barriers in products or environments that can unintentionally exclude people.

5. **Transparency**: As AI increasingly impacts people’s lives, we must provide contextual information about how AI systems operate so that people understand how decisions are made and can more easily identify potential bias, errors and unintended outcomes.

6. **Accountability**: People who design and deploy AI systems must be accountable for how their systems operate. Accountability norms for AI should draw on the experience and practices of other areas, such as healthcare and privacy, and be observed both during system design and in an ongoing manner as systems operate in the world.
Contributors

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Public Speaker, Author and
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To many people, artificial intelligence is still something that belongs in sci-fi movies, and which often involves robots and scenarios that reduce man to a by-product of the machine. However, artificial intelligence is much more than, and anything but, robots – and, in any case, most people agree that technology cannot replace man.

Nevertheless, neither the challenges nor potentials of artificial intelligence should be underestimated. As several of the persons interviewed for this report have stated: We tend to overestimate new technology in the short term and underestimate it in the long term.

Expectations and knowledge
The expectations of both experts and politicians of artificial intelligence are high. All of 87 percent of respondents consider the effect that artificial intelligence is expected to have on Danish society as positive or extremely positive. At the same time, 78% believe that artificial intelligence is not given enough priority, politically.

Most people think that our elected representatives suffer from a knowledge gap – or, at least, the lack of a qualified discussion of the real potential of artificial intelligence in Denmark.

“Politicians speak too little of artificial intelligence and we risk getting behind the trend [...] It has never been a political focus because there has been no conflict in the area,” says Christian Hannibal, Functional Manager in the Confederation of Danish Industry, who is calling for a qualified and concrete debate on how artificial intelligence may be used to solve e.g. the challenge posed by the lack of so-called ‘warm hands’ in the public sector.

He is backed by Ida Auken, Spokesperson on IT (The Social Liberal Party/RV) and one of the originators of the SIRI Commission: “There has been a lack of political focus. It is slowly changing”. However, Lisbeth Bech Poulsen, Spokesperson on IT (The Socialist People’s Party/SF) believes that there is a need for a more general skills upgrade amongst politicians: “I do believe that the biggest problem is that there are too many at Christiansborg who know very little or nothing at all about artificial intelligence. There is a need for an immense skills enhancement amongst politicians, also considering the rapid development in the area held against the slow pace of democratic decision-making.”

Legislation and regulatory framework
There is agreement that the business community should be provided with the right regulatory framework to permit the exploitation of the potential of artificial intelligence. Several also em-
“It is unreasonable to expect that all political decision-makers should have a thorough understanding of artificial intelligence. They are difficult waters to navigate – more difficult than many others”

– Thomas Bolander, PhD and Associate Professor, DTU Compute, Technical University of Denmark.
phasize the paradox of legislating in this area, as regulation and legislative processes are, by definition, time-consuming and do not match the speed of the technological development including artificial intelligence. “We must be careful not to use a sledgehammer to crack a nut. There is no need for advance legislation, without providing options or solving problems,” says Kasper Støy, PhD and Professor at IT University in Copenhagen. Neither does Hanne Shapiro, the proprietor of Hanne Shapiro Futures, see political anchoring and legislation as a crucial prerequisite for artificial intelligence: “Actually, Denmark has a really good regulatory framework – it is more a question of the companies and their strategies driving development forward – strategies that do not only have to do with savings and efficiency.”

Experts do not entirely agree on whether artificial intelligence should be more politically anchored. But what do the politicians say? Christine Antorini, Chairperson of the Higher Education and Research Committee (The Social Democratic Party/S) states: “You can create both good and lousy legislation; however, we are bound to somehow having to decide on the security aspect.” Troels Lund Poulsen, Minister for Employment (The Liberal Party/V) adds: “We must ensure that the legislation which forms the base of our society is technology neutral. This ensures that new products and new ways of working are not stigmatised before they are even introduced.” Lisbeth Bech Poulsen clarifies: “It is always easier for some, if all legislation in an area is repealed; however, the legislation relating to this area also ensures that our citizens are not monitored unnecessarily, for example. And it is important to hold on to that.”

**Concerns and challenges**

Jan Damsgaard, Professor and Head of Department of Digitalization at CBS, mentions that his greatest fear in relation to artificial intelligence is the opinion of the population. “If artificial intelligence is not properly addressed so that people know what they are talking about, the knee-jerk reaction may be that artificial intelligence will lead to increased monitoring, redundancy of work, etc. Unfortunately, “bad is stronger than good”. In other words, if there is just one example that a driverless car has hit a person, then the technology is banned for a further 10 years, all the while thousands of people are killed in traffic every year.” This view is backed by Christina Egelund, Spokesperson on Political Affairs (Liberal Alliance/LA): “We must prioritise an increase in the knowledge of and education on artificial intelligence - starting in primary school so that we can dispel the myths and discuss how artificial intelligence may really contribute”.

The concerns among the interviewees regarding artificial intelligence in Denmark focus on, amongst others, the risk of personal data leaks, amongst others. 48 percent mention this - amongst others, some of the cases on leaks experienced in a few municipalities and in companies. 57 percent worry about the challenge of training and retraining the workforce so that they are ready to adapt to a changing labour market. 26 percent are concerned that artificial intelligence may be used as a tool in cybercrime.

“The advantages which will be gained require an adjustment of some of the things we do today. In this case, it is our understanding of data, individuality and privacy and ethics. And that is really a tall order”

– Anders Hvid, Co-Founder of Dare Disrupt and Member of the SIRI Commission
Will artificial intelligence take over a number of job functions, which today are handled by people? The answer is likely yes, but maybe not the functions we think and maybe not at the rate we fear. And maybe more jobs will actually be created than lost due to artificial intelligence. This is the assessment of the international management consulting firm McKinsey, which has mapped the possible consequences of increased digitalisation of the Danish labour market, amongst others ¹.

¹ Shaping the future of work in Europe’s digital front runners. McKinsey, 2017
McKinsey thus estimates that 470,000 jobs will be replaced by 2030; however, during the same period, 495,000 new jobs will be created – that is a net gain of 25,000 jobs, which are created primarily as a result of automatization and robots. However, at the same time, it is emphasised that this creation of jobs will not happen on its own accord. McKinsey estimates that 320,000 of the new jobs will be created because of increases in productivity in society while 165,000 will be entirely new job types. However, there are strong indicators that this growth will not be created automatically and that the potential can only be released if we prioritise planning and adapting our business and industry, education and training and, not least, our workforce to a changed labour market. And the education and retaining of the workforce are issues about which Mette Reissmann, Spokesperson on Higher Education and Research (The Social Democratic Party/S), feels particularly strongly about: “We simply do not retrain and raise sufficient generations to follow, who have the required knowledge and understanding of the potentials of artificial intelligence.” She continues: “I cannot cut short the year and push children through school quicker or young people through their university degrees quicker – it takes the time it takes. However, how on earth do we retrain the existing workforce quickly enough? This really weighs heavily on my mind.”

McKinsey has also found a connection between the high digital preparedness of Denmark and our view on automatization, robots and artificial intelligence. 82 percent of Danes are thus very or relatively positive towards artificial intelligence, amongst others. This is supported by a Eurobarometer investigation from May 2016. It states that 81 percent of Danes feel that they are sufficiently prepared to handle another and future job because of the technological development.\(^2\)

However, this does not change the fact that parts of the population still have concerns, which it is important to take seriously and address. It is also important to recognise that this fourth industrial revolution – like the previous three – may create imbalance and maybe even inequality, on which it is our great responsibility to take a position.

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\(^2\) Attitudes towards the impact of digitisation and automation on daily life, The European Commission, May 2017
Where is the potential?

There is general agreement that artificial intelligence has the greatest potential within particularly the health and welfare technology sectors. However, more people estimate that, especially in this area, we face major challenges in relation to access to health data, in particular. Ida Auken proposes: “I believe that Sundhedsdatastyrelsen, the Danish Health Data Agency, should be given a clear mandate to gather all health data in one place. That way, citizens may access their data through an approved app, and businesses may purchase health data analyses from the Agency while accepting the political responsibility.”

And exactly the schism between data, privacy and development is an important discussion to many people. Thomas Vestskov Ternye, public speaker, author and expert in artificial intelligence says: “It is not artificial intelligence that cures cancer - it is patient data on cancer. That is why it is so crucial to have access to that data - at the moment, we have to go through an extremely cumbersome process.”

In innovation, growth and entrepreneurship, the potential for artificial intelligence is also considered to be considerable, notwithstanding the fact that the majority of those interviewed recognise the risk of having a few global companies dominate the market in this area, which may reduce the chances of start-ups really positioning themselves in the artificial intelligence market.

In a recent analysis, the management consulting firm, McKinsey, has concluded that those sectors that are already implementing artificial intelligence are also likely to invest further in the future, cf. model 1. According to McKinsey, there will be a significant gap between the sectors which become leaders in relation to artificial intelligence and those who fall behind.

Model 1 – Leaders in the adoption of AI also intend to invest more in the near future compared with laggards

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While we speak a lot about artificial intelligence, it is already used in concrete projects

**CASE 1**
"The Beer Fingerprinting Project"

... is the name of the project that arose with Jochen Förster from the Carlsberg Laboratory. He saw a need to measure flavour aromas using sensors in support of his work to develop new yeast cultures that will ultimately result in new beers. Although tasting several beers every day sounds like the ideal job, it is impossible to taste the difference between the 1,000 different flavours that are developed daily in the Carlsberg Laboratory. The idea for a collaboration between Carlsberg Laboratory and iNano, Aarhus University, developed at a research event at Carlsberg. In addition to Carlsberg, DTU Chemical Engineering participates, which adds expertise in reactor parallelisation and integration and data processing to the project. Microsoft provides the most advanced technical solutions within the field of artificial intelligence, while the Innovation Fund provides the financial backing. The goal now is to validate and develop the technology and make it useful in the assessment of new yeast cultures.

**CASE 2**
Data and robots on the Great Belt Bridge

In collaboration with Sund&Bælt and a number of partners, Microsoft contributes to boosting the technology of the Great Belt Bridge, which dates back to 1997. The purpose of applying new technologies such as big data, sensors, robots and artificial intelligence is to ensure a more efficient bridge maintenance. Every day, about 35,000 cars cross the Great Belt Bridge, and the number is expected to rise, which places great demands on operation and maintenance, including the more than 325,000-tonnes anchor blocks. The technologies may assist in indicating where and when elements of the bridge need repairs and replacement. This means, among other things, that drones can inspect the bridge and not people, who previously climbed around at staggering heights to investigate the condition of the concrete, to mention one example. Artificial intelligence is used to collect and categorize data from the thousands of sensors on the bridge and to help identify patterns that may be used in the maintenance of the bridge. Sund&Bælt estimates that digitisation will lead to an annual saving in maintenance of 2 percent over the next five years.
“As a society, we have no need to worry, but we will experience structural unemployment for certain groups, perhaps especially in relation to the trade of drivers if the development of self-driving cars continues,” says Kasper Støy, with reference to the fact that the development is advanced in relation to self-driving trucks. According to all respondents, the decisive factor will be the way we handle the changing labour market situation and our ability to allay fears and debunk misinformation.

It will be crucial to have a workforce equipped to assume new and changed job functions. A new or increased level of skills is not achieved over-night. It requires a targeted effort to ensure that both young and older are equipped to handle other types of jobs and tasks than those they handle today. Esben Østergaard, PhD, Co-Founder and CTO, Universal Robots, says: “Historically, technology has improved our lives, overall – however, the individual may experience a dip in quality of life. There will be people who no longer have the jobs they are used to - and if they cannot be retrained to perform new jobs, they risk being excluded from the labour market.”

According to Jan Damsgaard, a large proportion of those in the labour market have less than 1 year of seniority in their current jobs – thus, the turnover amongst employees in Denmark is high. However, this does not apply to Danish companies. "The largest companies in Denmark today are the same ones that were the largest 10 to 15 years ago. We have not been sufficiently capable of creating new, valuable companies in Denmark. The largest companies are almost all industrial companies that are more than 100 years old. In the United States, many of the largest companies are internet companies that did not exist 10 years ago. We do not have much of that in Denmark, and that worries me, “he says.
“Every time society has undergone great changes, this has led to a period of unrest, and then people have found safer, better and maybe even more enjoyable work. However, we must be aware that you cannot educate your way out of everything. The risk is under-employment and considerable inequality”

— Lisbeth Bech Poulsen
It is widely agreed that certain types of jobs will disappear – also, that it may be bad for, for example, a community that has focused on very few professions. However, there is also a consensus that technology can release resources which may be used to improve services in virtually all sectors – thus increasing the human interaction where this really matters.

Troels Lund Poulsen states on this: “The truth is that the more technology we introduce in Denmark, the richer we become, because technology means that the wage becomes a smaller part of the product value. This will make us more competitive internationally.”

And then there is the question of whether we lean into the development or fundamentally fear it and fear being disrupted. According to Anders Hvid, this is a paradox: “On the one hand, technological development will come to us at shorter and shorter intervals, and they will bring a lot of challenges and may lead to the automation of a variety of job types. Conversely, there has never been a greater opportunity to innovate and create new jobs. With new technology, we also have the opportunity to learn new skills faster.”

“There are not 2 million unemployed agricultural workers or seamstresses in central Jutland”
– Torsten Schack Pedersen

Was Denmark ready for Uber?
Several people also point out that our institutional and labour-policy systems will come under pressure if they cannot accommodate the technological development, including how to deal with artificial intelligence. Sørø Schultz Hansen, self-employed Research Scientist, External Lecturer at CBS, and author, says: “The amazing welfare system and tripartite model is a huge barrier. The Danish model is immensely challenged because systems and not networks are the focal point. We saw this clearly in the Uber case, where our system – i.e. the Danish Act on the commercial transport of persons in cars – comes up short when dealing with a network-based system like Uber. This despite the obvious positive benefits of using cars better and the much greater flexibility in a taxi transport solution like Uber. Our model must be reformed to embrace the new conditions that we will see in the labour market.”

“It is rarely the technology which is difficult to understand – it is what it does to our trades and sectors”
– Ida Auken

And Uber is specifically mentioned by several of the interviewees as an example of a company that established itself in Denmark before we really had a guideline for handling this type of network-based companies whose focal point is artificial intelligence and new technology. Troels Lund Poulsen explains: “We have been through a long and exhausting battle on the introduction of Uber in Denmark, where we have experienced the consequences of basically wanting to keep the technology out of Denmark. I think we should learn from this in future.”

Technological development thus leads to an array of new business models and services that politicians must deal with. Jan Rytkjær Callesen, Spokesperson on IT (The Danish People’s Party/DF) says in this context: “In the municipality of Sønderborg, we have 7,000 nights spent in Airbnb. How much of this do you think is reported to the tax authorities? We politicians are responsible for our welfare society. We need money for it all and so we must tighten up in places.”
Artificial intelligence in the public sector

Denmark is one of the most digitised societies in the world, and no other country has such a digitalised public sector. That, in itself, represents a huge potential for using and utilising new technologies, including artificial intelligence.

We are now undertaking the fifth joint-public digitalisation strategy preceded by almost 15 years of focusing on increasing digitalisation in Danish society. Again, the health sector is mentioned as an area of enormous potential, but also as an area where we, despite the large amount of data, need to work intensively on how to use and share data and which systems best support health professionals. “In fact, I think the Danish public sector has had foresight and is on the leading edge, so there are definite opportunities for releasing the potential,” says Søren Schultz Hansen. Others believe that the public sector should do even more to deliver solutions that could benefit all citizens: “We risk not harvesting the potential because our organisation, systems and operating structures do not leave room for innovation,” says Anders Hvid.

**Case administration in minutes?**
Among other things, there is a great potential for using artificial intelligence to release resources and reduce the amount of trivial administrative tasks and provide room for core functions in public health and education. Kristoffer Stensbo-Smidt, Postdoc at the Department of Computer Science, University of Copenhagen, says: “Imagine the potential in the public sector when thousands of documents can be summarised in a few seconds in a case administrative process.” In particular, it is emphasised that much registration and reporting may be done automatically, thus releasing more time for so-called ‘warm hands’. Others mention the significant potential of improving the dialogue between authorities and citizens, thus creating a better user experience. Natasha Friis Saxberg, Head of Technology, Maersk Growth, says, “Of course, we must continue to monitor decisions and any errors.

“Today, Apple can alert me if my pulse is erratic and my risk of a heart attack increased. I would not be surprised if, in future, Facebook would be able to offer a diagnosis based on my social data. In Denmark, we cannot work out how to share data between general practitioners and the rest of the sector. This is a challenge to the legitimacy of the sector”

– Anders Hvid
that may occur along the way, focusing on bias in data."

The fact that the efficiency of public sector systems and case administration may be enhanced by artificial intelligence is agreed by most. However, several parties put great emphasis on distinctions being made between processes in which an individual assessment is required and those in which completely standardised and objective criteria are applied to reach a decision. Janus Sandsgaard, Functional Manager of IT and Digitalization, the Danish Chamber of Commerce, states in this regard: "It is crucial to understand that if we train a machine in construction matters, then it becomes proficient in construction matters. This does not mean that we will suddenly leave the same machine to consider cases of forced removal. A piece of technology trained in something specific and the sci-fi world’s portrayal of a general artificial intelligence that "thinks" for itself are just miles apart. The machine is built by people and we control what it is able to do and what we want."

"When we are dealing with people, people must make the decisions – not machines" – Jan Rytkjaer Callesen

Experiments and trust
The prerequisites for releasing the potential of artificial intelligence in the public sector are, to many people, a greater willingness to innovate and experiment as well as the courage to change the culture. Ida Auken states: "We should simply experiment more - if we had a more experimental culture in the public sector, it could be really exciting." Others describe a strong "no-errors-permitted" culture in the public sector. Janus Sandsgaard: “If some of the big tech companies do something that really creates value to me, then this will be my benchmark and then I naturally expect that this is also the way the municipality works. It is a challenge for the public sector - that is, acting at the speed which we expect from it."

Another prerequisite is emphasised by Mette Reissmann: “I have no doubt that the Danes’ confidence in the processing of personal data must be safeguarded. We must not lose faith in the public sector processing our personal data correctly and ethically. Not least because the public sector is such a significant customer of the private sector. Things are connected. Unless we have a public sector, which enjoys the trust of its citizens, we do not create jobs nor sufficiently high levels of education and, thus, welfare."

Others emphasise that we, as citizens, have very high expectations of what the public sector must be able to offer us. Janus Sandsgaard: “If some of the big tech companies do something that really creates value to me, then this will be my benchmark and then I naturally expect that this is also the way the municipality works. It is a challenge for the public sector - that is, acting at the speed which we expect from it."

The Technology Alliance
The Technology Alliance should be mentioned as a step in the right direction. The Technology Alliance is a government initiative, the purpose of which is to create interest amongst young people for the digital and technological areas with a view to encouraging more young people to choose education and work within the industries. The initiative is taken in close collaboration with educational institutions and the business community, which is to contribute with concrete activities. According to several respondents, this is a really fine initiative; however, the ambitions could be even higher, says Lisbeth Bech Poulsen: “The government has introduced a strategy for the business community in terms of a technological boost, and that is really very good; however, the sum reserved is equivalent to DKK 10 to 20 per business. The scale of ambitions continues to be fairly low.”
Artificial intelligence ready to replace the Folketing, wrote the RokokoPosten (the Danish equivalent of the British “The Onion”) in November 2017. It is fun, but hardly the case. Nevertheless, artificial intelligence is an area on which our political elected representatives should actively take a position. How do you control artificial intelligence, and should you do it, at all? And does legislation affect the urge to innovate? Ethics provide reasonable guidelines; however, they are probably insufficient for enforcement in such a politically complex area as artificial intelligence. What tools are our decision-makers to apply to ensure that we exploit the potential of AI, reduce the risk of inappropriate behaviour and optimise the desire of companies, universities and other institutions to carry out research and develop new solutions?
Several people point to the fact that the barrier to exploiting potential of artificial intelligence fully is to define and delimit the term. Not least, efforts should be made to increase politicians’ knowledge on the subject so that they may achieve a deeper understanding of the problems we may actually solve with artificial intelligence, and where we have to keep an eye on the pitfalls: “At the present time, artificial intelligence is a form of garbage concept that we throw everything in,” says Janus Sandsgaard. And it makes the term difficult to understand and may lead to regulation that is too strict in areas that are completely harmless while simultaneously ignoring those areas that need a tighter regulatory framework.

Several people also indicate that knowledge and collaboration across sectors, authorities and researchers should be boosted. According to Natalie Schluter, Associate Professor and Head of Data Science BSc, IT University of Copenhagen, the above-mentioned collaboration is much more in focus abroad than it is in Denmark: “We need more openness and collaboration - barriers must be broken down. We cannot help each other until we learn to communicate with each other.”

Do you believe that our political decision-makers have sufficient knowledge of the potentials and challenges related to artificial intelligence?

<table>
<thead>
<tr>
<th>Opinion</th>
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<tr>
<td>Very much so</td>
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<tr>
<td>To a large extent</td>
<td>13%</td>
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<tr>
<td>To some extent</td>
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<tr>
<td>To a lesser extent</td>
<td>39.13%</td>
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<tr>
<td>Not at all</td>
<td>43.48%</td>
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<tr>
<td>Don’t know</td>
<td>4.35%</td>
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“Developing talent in Denmark will be crucial to managing the new job functions that McKinsey expects will be part of the Danish labour market already in 2030. Anders Kofod-Petersen, Deputy Director of the Alexandra Institute and Professor at NTNU, says: “The most important thing is to ensure that we have skilled people - and not just in the technical

“As a minimum, at EU level, we need a regulatory framework that works, but we must also cooperate globally, because there are giants in the United States that the regulation must also accommodate”

— Natascha Friis Saxberg
“I sometimes worry whether education and skills boosting are viewed as expenses and not an investment and that public research funding will be cut in future. It is as if the agenda for the future has been reversed; earlier the consensus was that research in areas in which we are traditionally strong – life science and green energy technology – was good. Now, the discussion centres on how much can be cut back”

– Christine Antorini
disciplines. The principle of the long haul applies here. What do we teach our children when they start 1st grade? Have we actually adapted the whole course of education to a new type of learning? The answer to this is, naturally, no. We have not done that yet.

Artificial intelligence and the EU

Members of the European Parliament have officially requested that the Commission proposes regulation for artificial intelligence and to “fully exploit economic potential and ensuring a certain level of safety and security,” while others do not believe it is a task for the EU. In Denmark, no real political framework for artificial intelligence currently exists, although several authorities, institutions and ministries are involved in different areas and to different extent. And although some bills, which include provisions on artificial intelligence, have been sent in consultation.

Several interviewees believe that international rules may be required in an area such as artificial intelligence. Troels Lund Poulsen says: “I think we should be very aware that if regulation is to be determined in relation to data ethical issues and the use of artificial intelligence, this is something that should primarily be done at European level. If Denmark starts to introduce a series of special laws and initiatives that limit the use of new technologies, Denmark will lose this agenda.”

“New technologies and data are global phenomena in flow, so we need to keep an overall view of it and a general will to co-operate on handling it. As a minimum, at EU level, we need a regulatory framework that works, but we must also cooperate globally, because there are giants in the United States that the regulation must also accommodate,” says Natasha Friis Saxberg. She is backed by Hanne Shapiro: “Generally, one cannot consider the regulation at only European level all the while most of the research takes place outside of Europe, in the USA and China.” Others emphasize that, although we should have international rules, this should not be an excuse for not moving quickly ourselves, as EU processes are often heavy and slow.

To regulate or not to regulate?

Opinions are divided amongst the interviewees as to whether legislation is a hindrance or a driver for development in artificial intelligence. And, of course, it would depend on the individual piece of legislation. In other words, legislation may both brake the speed of innovation and at the same time remove some of the existing barriers in the field of artificial intelligence. Basically, most people agree that legislation should not prevent us from developing, researching and experimenting with artificial intelligence, and that any regulation should not create a distorted competitive situation. The dilemma seems to be between ensuring safety and security and high standards on the one hand and, on the other hand, not putting obstacles in our way. Thomas Vestskov Terney puts it as follows: “The most important role of legislation is not being in the way. It is not about legislation paving the way for artificial intelligence - it just must not be an unnecessary encumbrance!”

Christina Egelund believes that we should avoid too much regulation in the area: “We must make sure that we do not - out a misunderstood regard to existing industries and old professions - regulate new technology away from the country. Then Denmark will miss out on big winnings.”

Technological high speed and democratic slow pace

One of the concerns about the lack of political anchoring of artificial intelligence, is expressed by Natasha Friis Saxberg: “Technological development will always be far beyond our ability to respond to it. Therefore, new systemic set-ups are required that can support the agility needed in a digital age. Frameworks and ambitious goals should be expressed politically, while innovation must be handled by the business community so that we ensure growth delivered by the most competent players that may accelerate the development of our society without encountering systemic brake pads. The fourth industrial revolution does not stop just because we are not ready to support it. So instead of keeping the digital development waiting outside the door, as last seen with Uber’s arrival in Denmark, we must instead get ready. Get ready for a time of driverless cars and artificial intelligence that complements us as human beings, and aug-

To which extent do you worry whether Denmark will lag behind if we do not politically anchor the responsibility for artificial intelligence?

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<th>Option</th>
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<tr>
<td>To a great degree</td>
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<tr>
<td>To large degree</td>
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<tr>
<td>To some degree</td>
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<tr>
<td>Neither/or</td>
<td>13.04%</td>
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<tr>
<td>To a lesser degree</td>
<td>8.70%</td>
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Do you believe that artificial intelligence is given enough political priority?

Yes 17.39%
No 78.26%
Don’t know 4.35%

The concern that a forbearing institutional system stands in the way of releasing the potential of artificial intelligence is backed by Anders Hvid: “We have a certain conservatism built into our policy that makes us add on and see how far we can extend our existing world with the new technologies instead of pausing and returning to the problem we want to solve. Drastic technological development also means that something that once was no longer should be – we are incredibly poor at that.”

Several agree that actual legislation is difficult to imagine at the present time, because we simply cannot regulate something of which we do not know the extent. The fear is that we are doing something wrong because the market is so volatile and immature. Instead of legislation, several of the interviewed experts propose policy frameworks and certifications as a means of regulating the area: “For example, you can imagine criteria and requirements for suppliers when the public sector invests in solutions that include artificial intelligence for critical infrastructure use such as finance or energy - what requirements and standards must suppliers fulfil?” suggests Hanne Shapiro.

The office of artificial intelligence?
The majority of those asked believe that the priority given to an area increases when it is rooted in the political system. Janus Sandsgaard elaborates: “There are some places where data handling has received a lot of love because there was a steering committee, an office or a department and, thus, a structure has been provided. Major technology projects typically go wrong if there is an unclear division of responsibilities.” However, there is a broad consensus that it is hard to imagine an Office of Artificial Intelligence - that is, to place the responsibility for artificial intelligence in one place. Instead, Søren Schultz Hansen suggests: “What you should do is to have a number of fast-working groups that deal with very specific cases and do not treat artificial intelligence as anything general.”

Troels Lund Poulsen is among the interviewees who do not believe that artificial intelligence can be anchored in one board or one ministry: “What makes the difference is that you can conduct cross-disciplinary collaboration in the area and think it broadly into governmental work. And precisely in this area, initiatives and strategies across the board are needed. This agenda is about future opportunities and therefore cannot be rooted in one place but must be anchored across ministries.” Christian Hannibal also shares that view: “Artificial intelligence is such a big deal that it does not belong in only one place. Technological achievements change things, time and society, and the individual ministries will have to consider how they fit into this development.”

This does not mean that there should be no framework within which companies can act. The first steps have been taken by Sophie Lehde, Minister for Public Sector Innovation, who has made a proposal that all parties in the Folketing have agreed on: By summer 2018, all new laws must be supported digitally. The Minister herself calls the initiative “one of the most important contributions to de-bureaucratization we have seen for many, many years.” It is emphasized that the purpose is to release resources that may be used on core areas of welfare instead of administration. And according to Torsten Schack Pedersen, Spokesperson on IT (The Liberal Party/V), this proposal is an example of one ministry addressing a task, which must subsequently be anchored in the entire central administration.

“As legislators, we can never compete with digital development”

– Mette Reissmann
Accountability is a basic aspect when working on new technology of which we do not yet know the extent, the consequences or the full potential. Accountability for us working together in the interests of society and the general public and for artificial intelligence being used to create solutions and opportunities that benefit all and not only the lucky few. This means that we talk about what we strive to achieve in our society, the issues we want to solve and how we can use the technology to help us. For some, technological development may feel like being on a train whose destination we do not really know. And where nobody talks about whether to hit the brake, the accelerator or try to get the train to change direction. Accountability for technological development implies that we discuss solutions, opportunities and engage in the conflicts and disagreements that will naturally follow in the aftermath - even if we do not know the destination of our train.
THEME III

The global tech-race has started

One element in a responsible approach to artificial intelligence is ensuring the greatest possible transparency and openness in the way we apply the technology in different contexts from case administration processes to welfare technology. Another is to work towards as many players as possible having the opportunity to develop and use artificial intelligence to avoid the technology ending on too few hands and, thus, not benefiting everyone. The latter was pointed out by several of the interviewees.

Do you worry that a few, large and global businesses will dominate the market of artificial intelligence?

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<tr>
<td>No</td>
<td>33.33%</td>
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“I see trends that indicate that tech companies are growing larger and they are absorbing new ones that are established. That is economy of scale, but I see some problems in that - also political. It can become a democratic problem when companies become that large,” says Lisbeth Bech Poulsen. Troels Lund Poulsen also shows some concern: “I may worry that very large private monopolies are created, which basically will have so much knowledge and so much decision-making power that they may affect nation states’ ability to conduct their own policies. We must take that seriously.”

Many believe that we are already seeing that few, large companies gain significant control of the field of artificial intelligence, invest massively, and buy smaller entrepreneurship in something similar to a tech race. A summary from CB Insights shows how many start-up companies focusing on artificial intelligence have been acquired from 2013-2017:

As shown in Model 2, 301 start-ups, primarily working with AI algorithms, have been acquired since 2013. 115 acquisitions took place in 2017 alone, and according to CB Insights, eight acquisitions were made in the first two months of 2018. There were a handful of large companies behind the acquisitions. Anders Hvid summarises: “If you have potential, you will be eaten.” The concentration of innovation concerns some of the respondents, including the concentration of research. Kristoffer Stensbo-Smidt explains: “One of the problems is that the large companies suck knowledge and researchers out of universities so that the greatest authorities in artificial intelligence are no longer working at universities but for the private giants. This brain drain is unfortunate because universities were put in the world to produce open knowledge accessible to all.”

On the other hand, it is emphasised that many of the solutions that are being developed...
are freely available to all and, thus, there is a democratisation taking place which benefits many and not only the lucky few. As the technology becomes cheaper, several people estimate that a larger market will emerge which will allow smaller companies to be increasingly able to create a position for themselves. In addition, Jan Damsgaard mentions: “The digital services scale tremendously and that indicates that even smaller businesses may create the next app that goes global and that they can reach very widely and not just a limited group of people.”

**Show it don’t tell it**

Transparency is mentioned by many of the respondents as a concern related to artificial intelligence - transparency in case administration and transparency as a prerequisite for citizens feeling confident and assured of artificial intelligence. For Christine Antorini, the concern is whether the large private companies keep the information to themselves: “Simply put, knowledge is developed which is in the public interest - where and how are the limits of transparency?”

To many of the respondents, transparency is showing how and to which extent artificial intelligence contributes to our society. Søren Schultz Hansen says, “When you find that technology makes your everyday life easier and better, you are more willing to accept taking the next step. Because we are already giving away a lot of information every day, so apparently that is not what we are scared by. I do not think we can be convinced in a better way than by seeing how well artificial intelligence works in different contexts.”

**Turn down the hype**

In other words, attention must be drawn to the areas where artificial intelligence contributes positively both at the individual level and at that of society: How is productivity created which allows more room for the individual and human qualities such as empathy, emotion and sympathy. “For example, if we can see from statistics that diagnostic testing through artificial intelligence leads to fewer medication errors or that driverless cars reduce the number of fatal accidents on the roads, I think that may change people’s perception,” says Thomas Bolander.

Others believe that we should turn down the hype on artificial intelligence and, generally, be much more precise about what technologies we are actually talking about - because artificial intelligence comprises many technologies and not just one. Hanne Shapiro elaborates: “Virtually every week, when I am out and about giving seminars, there is a perception of technology being much more advanced than is actually the case and that artificial intelligence is something that is just added on. There is a lack of understanding of the training required, of the requirements of the quality of data needed.” And Hanne Shapiro is not the only one who believes there is a need for a clarification of the underlying concepts and a demystification of artificial intelligence. At the same time, it is clear that there is an interest in the field: Two years ago, 80 students were enrolled on the Business Data Analytics line, last year it was 180, and this year there are 300 students⁴.

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⁴ [http://studieordninger.cbs.dk/2015/minor/140](http://studieordninger.cbs.dk/2015/minor/140)
“In 2000, the debate was on whether e-commerce might be a mayfly, driven on by people with a particular technical enthusiasm. We did not feel entirely convinced that the parcel from the book seller Amazon would really arrive. Today, we receive our pork roast in the post – and it is organic. We have found out that it is good and does not make us sick, and then we are ready to do more online shopping. Artificial intelligence will go through a similar development”

– Janus Sandsgaard
“A system should be able to rationalise its behaviour. Transparency and information is the key”

– Anders Kofod-Petersen

The law is already in place

Many have heard the classic example; In an unforeseen situation, the driverless car must choose between injuring the passengers in the car or a person on the road. Where to place the responsibility for that decision? The same discussion applies to a number of other cases involving artificial intelligence. And while the persons interviewed for this analysis consider it both a relevant and interesting discussion, most people also agree that many of the regulatory mechanisms in place today can be applied to this type of issue. Ida Auken says, “We need not think that we have to reinvent the wheel. The legal provisions already exist, and many are useful. Sometimes we behave as if we do not have many, many years of legislation to lean on. Because we do, and we should hold to the fact that much of it may also be applied to a digital world.” She is backed by Christine Antorini: “It is clear that technology raises new issues regarding safety and ethical questions on responsibility - and those questions will continue to arise. However, that dilemma we have experienced throughout the 20th century – the only difference is the type of technology.”

Others emphasize the fact that the accountability consists in people having control of the technology, and technology acts on the data fed to it. In other words, people are very much responsible for data being of the right quality to avoid so-called bias (distortions) in data and, thus, in the recommendations that artificial intelligence may contribute in e.g. a case administration process. Kasper Støy exemplifies: “People should not end up having their creditworthiness assessed by the bank on the basis of their religious affiliation or ethnicity.”

Overall, however, the Danish population is comfortable with the technological development and the opportunities it brings. This is apparent from a number of analyses. Kasper Støy expounds: “Contrary to the impression you could get from the debate, it actually appears that the majority of the Danish population are positively minded. Also, there were no mass demonstrations after the security checks at the airport were automatized.” Others believe that we may not be able to take the feeling of confidence to 100 percent; however, over the next generations, who will, naturally, view data sharing in an entirely different way, we will get used to it.

“The generations born into a period of development will have an easier time living with it than those of us who have a leg in both eras and are trying to understand the future from a past set-up,” says Natasha Friis Saxberg.
“I’m not afraid of new technology - I’m afraid of old technology,” says Christian Hannibal. Nevertheless, the ethical and moral considerations associated with new technology in general and artificial intelligence in particular have dominated. And rightly so. Because there are many and important discussions that should be had: How can and will we apply artificial intelligence to warfare, for example; how do we ensure that artificial intelligence does not discriminate based on gender, ethnicity and sexuality in case administration processes; and how do we develop a basic confidence in the population that the data shared is kept safe and used only for the purpose for which they are intended.
Already in 1942, sci-fi novelist Isaac Asimov stated three universal laws which were to apply to robots and which have since operated as broad, ethical milestones in discussions on how to ensure that robots and artificial intelligence work in the cause of good.

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm

2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law

3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws
“The risk is that the discussion on artificial intelligence is derailed before we even start applying the technologies for real because we have a distorted view on what artificial intelligence is and can. It is not like it is portrayed in a Steven Spielberg film”

– Janus Sandsgaard

Natasha Friis Saxberg agrees that it is reasonable to have some ethical milestones for the use of artificial intelligence, however, she emphasises that it should be in interaction with the developers of the technology. “Both the European Parliament and the tech giants of Silicon Valley are looking at the ethical guidelines that must be present in the area. The interaction is important to avoid us ending up with a tangle of guidelines that do not match the ethical challenges of the real world.”

However, how are such guidelines translated into concrete actions that lead the way on how artificial intelligence should be used? An important parameter is control. People have control over technology that does only what we tell it to do. Artificial intelligence may, thus, be viewed as a tool and not as equal to humans. If that premise is acknowledged, artificial intelligence is in itself no different than the other tools we use and build to assist people in their everyday lives – it is just that the potential is greater.

I’m driving my car and need to go straight, but my GPS says I should turn left. I think that I know better than the system, because I drive this stretch of road every day, so I continue going straight and end up in a massive queue. I then sit there swearing because I failed to follow the GPS. Next time, I turn left, as indicated by the GPS, simply because I acknowledge that it has access to better data than I do, and so I obey it. That does not mean that it is wiser than me, but I let it control me anyway

– Anders Hvid

The interaction between man and machine is already a fact and several interviewees believe

What worries you in relation to artificial intelligence?

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<thead>
<tr>
<th>Concern</th>
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<tbody>
<tr>
<td>The lack of a regulatory framework for artificial intelligence in Denmark</td>
<td>13%</td>
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<tr>
<td>The risk of leaking of personal data and, thus, breaches of data safety</td>
<td>48%</td>
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<tr>
<td>That artificial intelligence will lead to the loss of more jobs than jobs created</td>
<td>9%</td>
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<tr>
<td>That artificial intelligence will lead to greater inequality in society</td>
<td>39%</td>
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<tr>
<td>That artificial intelligence will lead to a lack of transparency in e.g. case administration processes, etc</td>
<td>43%</td>
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<tr>
<td>That we will not be able to educate and retrain in time and, thus, ensure that our labour force and educational institutions are ready to make full use of the potential</td>
<td>57%</td>
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<tr>
<td>That artificial intelligence may be used as an asset by those engaging in cyber crime</td>
<td>26%</td>
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4 http://www.etiskraad.dk/etiske-temaer/optimering-af-mennesket/homo-artefakt/eksisken/isaac-asimovs-robotlove
that we will hand rationale and intuition to the system sooner than we might think because it basically has access to better data and, in this context, ethical dilemmas may arise that we need to consider.

Democratic development
It is emphasised that because the new technologies scale tremendously while marginal costs are low, the democratisation of them will mean that many people now have access to technology that improves their standard of living, e.g. in the fields of knowledge and health. Jan Damsgaard elaborates: “When I had my first communion, I received a one-volume encyclopedia called Focus. If you were to buy the Great Danish Encyclopedia, it cost about DKK 30,000 - and it was outdated the moment it hit the press. And Wikipedia has turned this situation completely upside-down. Access to knowledge has become democratised and there is no reason to believe that the same will not apply to artificial intelligence.”

Others predict a revolution in the area of health that will allow us to diagnose illnesses faster, better and cheaper, thus treating far more people of diseases, which is emphasised as a prerequisite for equality within a society. At the very least, few people view digital development as an elite project, however, that does not mean that there is not a risk that technology is used incorrectly, manipulated or used to the contrary of what is appropriate – namely, to assist in solving some of the greatest challenges we face today. Ida Auken adds: “We need to be aware of whether A and B teams are created in relation to health and the labour market and being fully aware that it is man who rules the computer - not the other way around. Generally, it is important to realise that when something is converted from analogue to digital, responsibility must follow.”

Lisbeth Bech Poulsen says: “What is important is what we can agree on. What are our values? What can we rally around, whether we are politically to the right or the left, what kind of society do we really want?”

The cohesion of society
“New technology may pose a challenge to our societal cohesion. However, I believe that we, in Denmark, will solve that as we basically want a society where everyone is doing well,” says Esben Østergaard. The coherence touched on by Esben Østergaard is also emphasised by Natasha Friis Saxberg: “We are influenced by the interfaces we meet in our society. When you call a support centre, you may doubt whether you are speaking to a person. This development may affect our society.”

Anders Hvid continues: “We humans are very quick to attach feelings and human qualities to machines. When we watch a YouTube video of a robot that is kicked, we feel sorry for it. Many also develop a close relationship with Siri and other digital personal assistants. In other words, we develop relationships with machines, although they are machines. This we must keep an eye on - it’s an exciting ethical issue.”

How do you assess the effect that artificial intelligence is anticipated having on Danish society?

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<tr>
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<td>Negative</td>
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<tr>
<td>Very negative</td>
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<tr>
<td>Do not know</td>
<td>4.3%</td>
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Danish society is often admired for its openness, its low power distance, our creativity and the way we are naturally curious and critical. These characteristics are no less important in a digital society. Lisbeth Bech Poulsen believes that Danish society is generally well-equipped for the fourth industrial revolution, precisely because we have a strong tradition of being both adaptive and critical at the same time. Characteristics that may be used constructively in the many current and future ethical and moral discussions that artificial intelligence and the general technological development will lead to. Jan Rytkjær Callesen adds: “However, we must be careful not to let artificial intelligence take over our humanity – that is important.”

The Danes are ready – but still worry about safety
A study carried out by Norstat on behalf of the online paper Altinget indicates that Danes are comfortable sharing health data; however, they worry about the handling of this data ⁶.

Only one in four Danes expresses the view that the authorities are able to handle the safety of the citizens’ personal data. The dilemma is interesting, say several respondents in this analysis. Christine Antorini believes that an open and public debate – to include problems and concerns - is crucial: “If an indefinable fear exists, then let us lay it out on the table, talk about it and find out if it is a real fear and, if so, what we can do about it”.

Mette Reissmann also finds the intersection between the philosophical and ethical discussion on data gets a lot of attention in our society; however, at the same time, he emphasises that it is not necessarily about artificial intelligence: “I do not see data-sharing, in itself, as being the greatest problem. With the new data regulation, we have acquired a clear set of rules. It is the storing and handling of data of which we need to be aware. It is about taking protective measures that ensure that all data is not available on one server in one place, as we have seen it before.” Lars Frelle-Petersen predicts that digitisation may sometimes slow down because we need to focus on making data handling more secure. For Troels Lund Poulsen, it is crucial that there is now a greater political focus on data safety: “If we do not have data protection in place, this may undermine the trust in the digital society of Denmark,” he says.

Christina Egelund believes that because we have a digital society, we are also vulnerable to leakage and abuse. “We, as authorities and companies, must become better able to handle data. And to a greater extent divide personally sensitive information into sectors, to minimize the risks of leaks.”

The General Data Protection Regulation enters into force in May 2018
The objective of the EU Regulation is strengthening and harmonising the protection of personal data within the EU. The new EU data protection regulation comes into force in May 2018 and sets out several new, sharpened requirements for European companies on how to process and handle the personal data of customers and employees. Amongst others, the regulation requires companies to designate a Data Protection Officer (DPO) if the main activity of the business includes the extensive processing of sensitive personal data. In addition, requirements are made of data storage, and the regulation cements the data subjects’ right to be deleted (the right to be forgotten) for special reasons. The regulation applies not only to private companies. Following pressure from organisations and experts, Søren Pape Poulsen, Minister of Justice (The Conservative Party/K) presented a bill in October 2017, which means that public authorities may also be fined if they do not safeguard citizens’ data.

Note: The survey on Dane’s attitude was carried out on behalf of Altinget by Norstat’s internet panel comprising 3,073 respondents forming a representative section of the population over 18 years of age. The data is weighted according to the most recent average of polls by Altinget, which means that it is also representative from a political aspect. The survey was carried out in the period 15 November – 19 November 2017.

⁶ Altinget 4.12.17: Nye tal: Vi vil dele vores sundhedsdata, men stoler ikke på myndighederne (“New figures: We are happy to share our health data, but do not trust the authorities”)
Conclusion

This analysis was carried out on the basis of 23 in-depth interviews with leading Danish experts, opinionmakers and politicians. The purpose has been to gather perspectives, insights and suggestions on how we can and should handle artificial intelligence in Denmark - what potentials may be released and of what challenges we should be aware of. Thus, the goal has not been to identify a final result or a single truth that everyone may rally around.

Because the truth is that there are many attitudes to artificial intelligence. From how the area should be anchored politically to how to ensure that everyone enjoys the benefits of the technological development and what barriers may exist to this development.

Despite the many differing points of view – both amongst the respondents in this analysis and amongst citizens and politicians generally, many common denominators still become apparent. These common denominators indicate that there is agreement to and support for continued work on especially these four themes:
Knowledge

There is a lack of knowledge and insight amongst policymakers on the potentials of and barriers to artificial intelligence in Denmark. Despite a number of promising initiatives, such as the Technological Alliance, the SIRI Commission, the Disruption Council and a number of other initiatives, there is still a demand for very concrete projects that can help make known the possibilities of artificial intelligence in Denmark.

The projects do not necessarily require political anchoring. The point is precisely that the most important factor in releasing the potential of artificial intelligence in Denmark is to create an interaction between the public and the private spheres. For example, by setting up pilot projects, experiments, and collaborations across sectors and disciplines as well as amongst researchers, authorities, organizations, the business community and politicians.

Not only do politicians need an increased degree of understanding and knowledge of artificial intelligence. The Danish citizenry, too, should be better informed on what artificial intelligence is and can. Information is crucial for putting an end to myths and prejudices based on, amongst others, sci-fi movies that are hardly promoting trust in technology.

Cause for reflection:

Information is the key

Information is crucial for taking an active position on how we want to apply artificial intelligence - and how we, as a society, release the potentials that the technology offers. How do we ensure that the Danish population and our elected representatives become more aware of what artificial intelligence is, how it is used today and its long-term perspectives? And which actors are responsible for providing this information? Only through the provision of information can we end myths and discuss the real potentials.

Systematic learning across the public and private sectors

If we wish to accelerate the projects and the learning that will form the basis for our use of artificial intelligence in the future, we need to share knowledge across stakeholders. We also need to reconcile the efforts we make. The government initiative Digital Hub Denmark is a good first step. Can we create a framework for a more structured exchange of knowledge? And is there a basis for making more systematic use of public/private partnerships?
Potential

The potential for artificial intelligence in Denmark is great; the fear is generally comparatively small. Although there are concerns about e.g. periodical structural unemployment, the overall attitude is that the benefits and potentials outweigh the disadvantages. This applies to both the private and the public sector. Particularly, the potential for artificial intelligence is assessed as being very high in the public sector.

However, in this context, several interviewees stress that it requires that the savings arising from increased automation and increased use of artificial intelligence are used to create value for the citizens: Closer and more contact between carers and patients, between teachers and students and between case managers and citizens. An increased degree of human interaction as requested by many government employees. Not least, it is considered that artificial intelligence may optimise and streamline energy consumption, reduce processing times and ensure a more secure and efficient infrastructure.

Cause for reflection:

**We must avoid the blind spots**

Particularly, the health and welfare technology sectors and transport and infrastructure sectors are considered to have the greatest immediate potential in terms of artificial intelligence. However, there is no doubt that artificial intelligence will affect our entire society and, thus, all our sectors. Should we accelerate our learning by focusing on the sectors where we see the greatest potential in the short term? Or should we focus broadly and think across the entire labour market? How do we ensure that we do not have blind spots when making decisions about our focus of development?

**Fast-track schemes as accelerator**

In our dialogue with the contributors to this analysis, several have pointed to the so-called fast-track schemes as an opportunity to accelerate our knowledge of artificial intelligence and the potentials of the technology. Should we consider establishing this kind of cross-sectoral arrangement allowing us to quickly decide on specific projects and ensuring rapid implementation?
Regulation

It is necessary to carefully assess the type of legislation and the regulatory framework that are to apply in the field of artificial intelligence. There must be a balance between legislating too strictly and inflexibly leading to a deterioration in competition, on the one hand, and regulating too loosely and easily leading to inadequate protection of the personal data of individual citizens and society’s need to secure against cybercrime, on the other hand. Several participants also consider that, to a great extent, our existing legal framework may be applied extensively in the field of artificial intelligence. Finally, it is pointed out that international rules are crucial because the technology is a cross-border issue. It is thus stressed that, although EU legislation may be relevant, international guidelines are equally important as many global companies are located in the US and China.

Cause for reflection:

**Over-regulation vs. lack of protection**

It is essential that companies, authorities, experts and politicians maintain a continuous dialogue on the real need for regulation in the area of artificial intelligence. The risk of a lacking dialogue is over-regulation on the one hand and the lack of protection of citizens and businesses, on the other hand. How do we ensure the framework for this dialogue? How do we ensure that all parties contribute?

**Regulation based on test environments**

Several contributors to this analysis point to systematic “sandbox schemes” as an interesting solution that may also enlighten us on the need for regulation. The idea is a scheme in which smaller start-ups and entrepreneurs can experiment with artificial intelligence under regulated conditions and across the public and private sectors. Can we test concrete projects - and thus the possible consequences - through these sandbox schemes and, thus, test the basis for regulation?
Accountability & ethics

Ethics and moral dilemmas in relation to artificial intelligence are in focus in the media. And it is important to discuss these dilemmas. Not necessarily because we can legislate our way out of them – a minority of those interviewed held this view - but because, by discussing the many different aspects and perspectives of artificial intelligence we also discuss what kind of society we want and how technology can help us move in the right direction. That discussion is essential. Not only in terms of artificial intelligence, but quite generally in relation to the changes that our community and many other communities face.

Only a few believe that artificial intelligence will lead to a polarised society, where only a small elite gains access to the benefits of technological development. However, most people also agree that it will require an effort to get everyone to board the technology train; that it will require education and a general increase in knowledge. This responsibility must be undertaken by both companies, authorities and politicians for the benefit of present and future generations.

Cause for reflection:

We can learn from each other’s experiences
Artificial intelligence is about trust. Confidence that, with this technology, we can create a better every day and a better life through technological development. But it is crucial that we, who work with the technology and gains this experience, remain open about our experiences. We must share the good examples of how artificial intelligence improves our lives; how technology contributes to increased flexibility, knowledge, democracy, health or something entirely different. However, we must also dare to share the examples where we are challenged by the technology. How do we create an environment that invites openness about our experiences? And how do we ensure that we each accept that we have a share in the responsibility for our joint learning?

We should all contribute to the ethical framework
If we are to place our trust in artificial intelligence, this also requires a high degree of transparency. As citizens, we must know how and in which context our data is used, and we must feel confident that data storage is carried out in a safe and secure manner. We should also have insight into the basis on which artificial intelligence acts, so that we may better understand the implications and dilemmas we will have to relate to in the future. Here, it is crucial that we handle the ethical dilemmas jointly - and contribute to the creation of the common framework. But how do we create a wide interest in contributing? How do we ensure that it is not just the technologically initiated who create the framework on behalf of society as a whole?
The authors of the analysis

The analysis on the potentials and barriers of artificial intelligence in Denmark has been undertaken by Microsoft and LEAD Agency.

LEAD Agency is a full-service communication agency that works with strategic communication within areas such as branding, campaigns, PR and PA. LEAD Agency assists people, organisations and businesses in setting agendas and reaching objectives through communication. We challenge the status quo, develop new contexts and create dialogues which leaves an impression. Our advice is based on knowledge, professionalism, an understanding of society and high ambitions. Therefore, we always deliver in an area where strategic thinking and idea leadership meet creativity and focused execution. And then we believe that the best solutions are created in good company.

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Lean more on our perspective on artificial intelligence here: news.microsoft.com/futurecomputed
“The companies and countries that will fare best in the AI era will be those that embrace these changes rapidly and effectively. This is because new jobs and economic growth will come to those that embrace the technology, not those that resist or delay adopting it”

Brad Smith & Harry Shum
Colophon

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