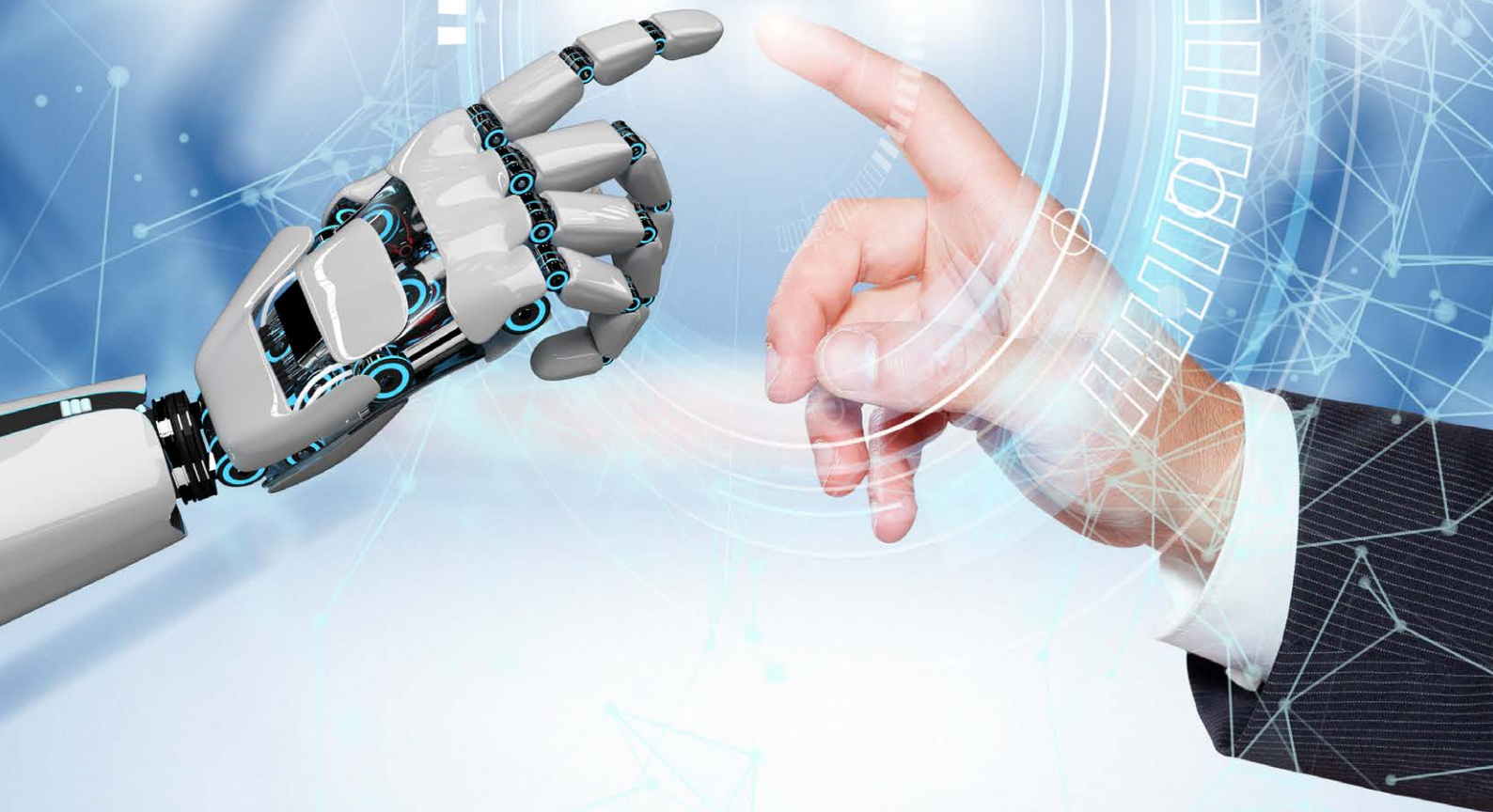


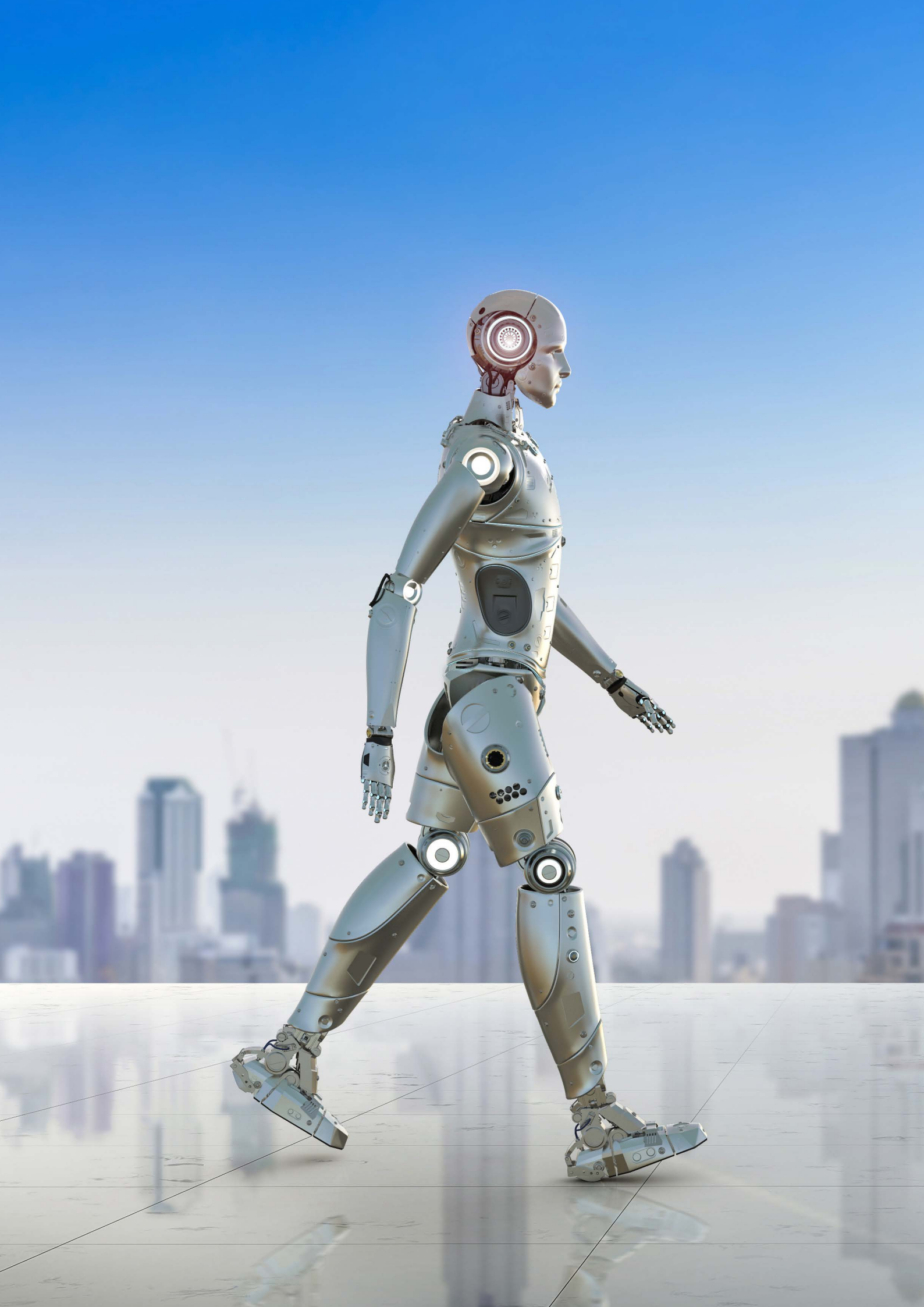
AI Beyond the Hype

– 5,000 MANAGERS ABOUT THE USE OF AI IN SWEDISH COMPANIES AND ORGANISATIONS



ledarna

SWEDEN'S ORGANIZATION FOR MANAGERS



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Change Requires Leadership

In times of significant changes in work and society, we need leaders with the right competence, mandate and resources to stand firm, listen and be supportive so that their organisation can be developed in the best possible way. With the ongoing technological development – digitalisation, automation of processes and production, implementation of AI solutions – leadership is of utmost importance.

The challenge to maintain Sweden's competitiveness is to a large extent dependent on the country's collective development and innovation capabilities. Managers and leaders are needed who can create the best foundations for team members at all levels to participate in the transformation process. It is very much about leadership that can communicate and create participation.

This report outlines responses from 5,000 managers about how businesses and organisations are embracing AI and how common it really is to use tailored AI solutions. The respondents are managers from different industries and organisations at all levels – from vision and strategy to the shop floor and day-to-day activities. The report makes it clear that Sweden's managers happily rise to the AI challenge, and they recognise the opportunities it offers as well as the obstacles that need to be overcome.

The results confirm to a certain extent what earlier surveys about "AI maturity" in the workplace have shown, but they also provide a new and more nuanced picture. It looks like we can stop worrying about the digital evolution leading to hundreds of thousands of lost jobs. Certain tasks will of course be transformed and automated, but at the same time new ones will be created.

However, it is important to stress that no future emerges out of nowhere. All change is driven by people and in all change there are leaders who can influence the direction of the development.

The survey shows that managers in general recognise that AI may lead to productivity gains and streamlining, but also reduced workloads and opportunities for business expansion. At the same time it should be pointed out that half of the managers think a lack of competence is an obstacle in the development of AI activities at their place of work. Shortcomings in the IT infrastructure is also mentioned as an obstacle.

A crucial part of leadership in the ongoing transformation therefore concerns competence development – not least for the managers themselves – and competence strengthening as well as time and resources for implementation.

The survey also shows that there is a gap between top level management and managers closer to production. Managers at executive level are of the opinion that they have made further progress than what first line managers experience in their day-to-day activities. Reducing that gap is a big challenge for managers at all levels where more communication and participation are important tools.

Our study provides support for three relatively clear conclusions:

- First of all, use of AI in Swedish companies and public organisations is at a considerably lower level than what has been suggested in earlier studies. AI will very likely be a crucial factor for the competitiveness of companies and the efficiency of public organisations in the future, but the implementation cannot be expected to happen overnight. The importance of this observation is not that the implementation of AI is at a low level, but rather that it must be allowed to take time.
- Secondly, the organisational work concerning the implementation of AI is not only necessary, but also significant for how the work progresses. AI is not just about technology, it is also about the ability of the organisation to benefit from the technology.
- Thirdly, managers are needed at many levels in order for the technology to become fully integrated in the organisation. The conditions and circumstances that the managers have to work with will also have a noticeable influence on the development. This also places demands on the managers' competence and competence development. Managers don't have to become AI experts, but they need to understand the technology and in particular how it can be used. For that reason, it is also highly relevant to ask oneself what lifelong learning for managers should look like in the future.

We regard this report, commissioned by Ledarna and written by Joakim Wernberg, Ph.D., Swedish Entrepreneurship Forum, as a welcome contribution to the discussion about AI in the workplace and what role unions and management, politics – and not least managers – play in this.



ANDREAS MILLER,
GENERAL SECRETARY, LEDARNA
– THE ORGANISATION FOR MANAGERS IN SWEDEN

Introduction

Future AI adoption is about more than technology

Taken together, managers at different levels and across all sectors of the economy have a unique perspective on the future as it unfolds. They deal with it daily as they translate top down strategies into practical work, but they also encounter it in the emergence of bottom-up organisational cultures and behavioural changes in the workplace. They perceive the future as it is taking shape, rather than a stand-alone science fiction story of what could be. Even more so, managers play a key part in driving change at their places of work. That is why Ledarna's members make up an exceptional panel of experts to describe both the current situation and the current direction of change. This report is based on the responses from 5,446 managers about how artificial intelligence (AI) is used within their organisations and what role AI may come to play in the future. The results provide insights concerning both Swedish AI adoption and the role leadership and management will play in realising the new technology's potential.

We are currently in the middle of an ongoing process of fundamental structural economic and social change, catalysed in no small part by technological advances. Some even goes so far as to describe digitalisation and developments within the field of AI as a new industrial revolution.¹ Despite this hype, or perhaps because of it, it is proving hard to get an overview of the actual ongoing development. There is no shortage of trend spotting and predictions aimed at what the future might look like. Some of the predictions are fundamentally dystopian in nature and for instance assert that robots will take over all our jobs, while others are utopian but instead warn those too reluctant to get on the latest bandwagon that they might be left behind. One thing that brings most of these descriptions of the future together is that they share a sentiment implying that this time it is different, change will happen quickly, and the world will never be the same again. For example, this sentiment fuels the intuition that the pace of change is accelerating and everything moving faster, but at a second glance things are not that simple.²

In 2015, the magazine *The Economist* published an article, which examined if activity in the American economy actually had accelerated.³ The results indicated that the overall pace on the economy was not accelerating even if certain activities have picked up pace. However, because managers receive increasingly more emails about the same activities, their perception is that there is more going on than before. To quote the concluding remarks in the article, this risks "putting a veil

of hyperactivity on companies". When certain activities move faster it is easy to get the impression that everything is accelerating. But looking at the whole economy it becomes evident that it is not about *speed of change*, but rather *breadth of change*. That is to say, a wide variation of changes are happening simultaneously.⁴ To understand these ongoing changes, it is at least as important, if not more so, to pay attention to *how* we put new technologies to use as it is to keep up with new tech trends.

Another common denominator for many predictions about the future is their lack of connection to the present. Every futuristic outlook worth attention should at least attempt to answer this one seemingly simple question: How do we get from here to there? A description of a future that is detached from the present just depicts what a potential future *could* look like but skips the hard part that makes change hard to predict, like trade-offs, differing incentives, conflicts of interests or simply inertia and resistance to change. These are the things that ultimately determine what the change that brings us from now into the future will look like.

Unfortunately, predictions and horizon scans about AI tend to exhibit two traits: a lack of connection to the present and an assumption that the coming change will be disruptive and fast. In light of this, it is easy to get the impression that getting a competitive advantage is all about investing in the latest technologies and trends, but the bigger challenge lies in integrating new technologies into existing processes and organisations in a way that benefits them.⁵ This may also promote an incorrect image of what the AI maturity in other companies and organisations looks like based on a number of advertised pilot cases rather than the general uptake of the new technologies. This may risk amounting to something like an "AI stress", in which getting AI is more important than what the technology actually gives back to the organisation in terms of productivity benefits. Everyone is worried about falling behind, because they believe everyone else is ahead even though they are not. To understand how AI may affect the economy, it is more relevant to focus on two aspects that most predictions tend to omit: How widespread is the uptake of AI solutions today and how far have these organisations come in integrating AI into their day-to-day activities? As it turns out, managers in Swedish companies and public organisations are well-positioned to answer these questions.

1. Schwab, K. (2017). *The fourth industrial revolution*. Crown Business, New York, USA.

2. Friedman, T. L. (2017). *Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations*. Penguin Random House UK.

3. *The Economist* (2015), "Creed for speed – is the pace of business really quicker", Print edition December 5th, 2015, <https://www.economist.com/briefing/2015/12/05/the-creed-of-speed>

4. Wernberg, J. (2018), "Går allt verkligen fortare? – Teknologisk förändring, entreprenörskap och experiment" in Swedish Economic Forum Report 2018: Navigera under osäkerhet – Entreprenörskap, innovationer and experimentell policy, Martin Andersson and Johan Eklund (red), Swedish Entrepreneurship Forum 2018

5. Cederling-Ångström, R. (2019). "What I Learned About AI in Womens' Magazines", Ericsson blog July 16th 2019: <https://www.ericsson.com/en/blog/2019/7/ai-narrative-analysis-media>



Managers at different levels and in different sectors of the economy collectively provide a unique perspective on how change occurs, from abstract strategies at executive levels to tangible production and service activities on a day-to-day basis. Moreover, they play a key role in facilitating and enacting the actual change throughout their organisations. They are responsible for operationalising strategies, follow-up and evaluating projects and, last but not least, exercise the leadership that is necessary to achieve durable change. These managers are not AI experts, but it would be impossible to implement AI solutions into their organisations without them.

This report is based on survey responses from more than 5,000 managers at all levels in the private and public sectors who were asked about the uptake of AI in their organisations as well as their expectations about what role AI may play in their sectors in the future. Taken together, their answers provide a new, more in-depth picture of the use of AI in the Swedish economy. The results suggest that the overall AI maturity is much lower than indicated by previous surveys and reports, but also that the level of AI stress is exaggerated. One explanation for these results is that AI's effect on the economy and society at large is about far more than new technologies.

Digitalisation, artificial intelligence and structural change

This section gives a short background and introduction to digitalisation and AI. In economics research, digitalisation is described as a *General Purpose Technology (GPT)*.^{6,7} A GPT is a technology which has been widely integrated across sectors in the economy and can be employed in a wide variety of different ways which may vary across sectors. Not unlike how Lego bricks can be used to build a multitude of different things ranging from space robots to pirate ships, digitalisation holds a large potential for innovation through imitation, adaptation and recombination. There are three common denominators that give digitalisation its general purpose nature: Computational capacity, decentralised networks and software. A growing computational capacity, or processing capacity, enables computers to carry out increasingly harder operations, while networks connect people and give rise to flows of data. Software, in turn, is what makes computers programmable and reprogrammable. It is what makes it possible to create specific programs that draw on processing capacity and data to build new services or create entirely new business models.

With respect to the impact of technological development on society and the economy, AI is software and it is part of digitalisation. In other words, an organisation that is lagging in digitalisation is unlikely to be able to leverage AI successfully. The term AI can be described as an umbrella for software applications aimed at carrying out tasks (analytical and manual) that require adaptation and flexibility which we associate with cognitive capacity and which have historically been carried out by people. The term AI was introduced in the 1950s, but during the 2010s it has attracted renewed interest outside the field of computer science, mainly due to recent advances within the subfield of machine learning. Machine learning, in turn, includes algorithms that use statistical analysis to find patterns in large data sets associated to a specific type of activity and, based on these patterns, can suggest or perform actions. These algorithms adapt their behaviour in response

to changes in their environment such that these changes are reflected in the data they analyse. Put differently, the algorithms “learn” based on the patterns they identify in large data sets that can be collected in realtime. Machine learning applications have been used for all sorts of things, from search engines and recommendation algorithms in streaming services to self-driving cars and programs designed to play board games like chess or go.⁸

When used outside its own research field the term “artificial intelligence” is sometimes given a magnified and slightly exaggerated connotation. The fact that AI includes different technologies does not on its own imply that all of these technologies together form a coherent artificial intelligence that is on par with or superseding human intelligence. To avoid such misinterpretations, we start by summarising what AI is *not*.⁹

- AI and digitalisation are not mutually exclusive. Developing and implementing successful AI applications requires a high degree of digital maturity. For example, tailored machine learning applications require large data sets, which means the organisation must already be able to collect and analyse large sets of data based on its own activities.
- AI is not *one* thing, it is an umbrella term for different types of technologies. The different branches of AI could very well diverge more than they converge in future applications. For that reason, it is better to look at AI as a set of intelligent and cognitive tools rather than as parts of one coherent artificial intelligence.
- AI does not program itself. It is more like inverse programming, which allows the programmer to set conditions within which the program finds an optimal solution. This means that the programmer does not have to know *exactly* how the program will solve a particular task and will oftentimes not be able to find an explicit reason for the program's actions. It does not, however, mean that AI has an unrestricted ability to shape and reshape itself.

6. Bresnahan, T. F., & Trajtenberg, M. (1995). General purpose technologies 'Engines of growth?'. *Journal of econometrics*, 65(1), 83-108.

7. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.

8. Polson, N. G., Polson, N., & Scott, J. (2018). *AIQ: how people and machines are smarter together*. St. Martin's Press.

9. See for example: <https://www.di.se/debatt/robotarna-kan-inte-bli-smartare-an-manniskor/>

- AI use will not depend on supply only. It is easy to get the impression that as soon as a machine can carry out a certain task, it will fully substitute human work. If that were true, there would be significantly fewer baristas, barbers and bartenders, to name only a few occupations where there is a demand for human work. What the division of labour between man and machine will look like will depend heavily on demand, and demand is predominantly human for the foreseeable future.
- AI is not a substitute for human intelligence. Progress in AI research is often described as a threat to human intelligence, for example when Garry Kasparov was defeated at chess by the Deep Blue computer in 1997 or when Lee Sedol was defeated at go by AlphaGo in 2016. Yet, it is not really about intelligence at all, but rather about cognitive work. Even if Deep Blue and AlphaGo won, they carried out a different type of cognitive work than their human opponents. Cognitive work, and intelligence for that matter, is not measured on a one-dimensional scale where gains in AI are losses for human intelligence. Quite the other way around, AI and human intelligence are each other's complements.
- Today's AI will not turn into a superintelligence. The AI applications in existence today, as well as those that will come within the near future, are narrow and specialised intelligent tools. This is something completely different from an artificial general intelligence (AGI) or superintelligence. For this reason, discussions about AI's impact on the economy or AI ethics need to differentiate between these two categories of AI. For example, ethical guidelines for a superintelligence would need to be very different from those for a recommendation algorithm.

Against this backdrop we now turn our attention to how AI may affect the future of work. In economics, the increasingly accepted view is that the division of labour between people and machines follow the so-called *routinisation hypothesis*.¹⁰ This means that tasks which to a sufficient extent can be described by rules and routines can be carried out by a machine regardless of whether they are manual or analytical. As technology develops the scope for routinising tasks expands, meaning more complex tasks can be described *sufficiently* well to be performed by a machine for instance with the help of machine learning algorithms. The researchers who formulated the routinisation hypothesis used driving as an example of a task that could never be routinised, but today considerable advances have been made towards putting self-driving vehicles to work. While they may have been wrong about driving, their mistake further proves the validity of their core idea.

From this follows that machines will be able to perform increasingly complex manual and analytical tasks in both factories and offices in the future. Yet, this does not mean that the number of jobs will decrease. Rather than destroying jobs, the technological development contributes to a reorganisation

of work both in the individual workplace and within the entire economy.¹¹ This means that for most people the workload will increasingly shift from routine to non-routine tasks, including interactions with other people and tasks that require adaptation and flexible planning. For example, doctors and medical staff should be able to spend more time with patients while teachers should be able to spend more time with pupils and students.

Again, all this presumes that technology is used in an efficient way that generates some type of benefits and positive returns. In order for digitalisation and AI to lead to a widespread structural change in parity with the industrial revolution, more than just technology uptake is needed. Organisational adaptation is just as important in order to realise the potential of new technology for generating productivity and efficiency gains and thereby enabling new ways of organising work. In short, it is not possible to achieve structural change without changing any structures.

Thus, the so called AI transformation is not only about technology, but just as much about organisation and organisational adaptability. According to an article in *Harvard Business Review*, some of the crucial factors for integrating AI into a company's business are organisational culture, the use of cross-functional teams, and the ability to experiment with organisation as well as processes.¹² The authors specifically point out that even companies that have carried out cutting-edge pilot projects find it difficult to scale their AI applications if the overall organisational factors aren't in place first.

The managers in our survey not only report on whether their organisations have implemented AI or not, but also on the state and progress of organisational factors that are considered relevant for leveraging the benefits of the new technology. This gives nuance to the measure of AI maturity, but also highlights the role played by the managers in putting AI to work.

There is a wide array of other terminologies besides digitalisation used to describe the implementation of new digital technologies, for example digital transformation or more AI-centric terms like AI transformation or AI journey. While they may seem similar, some of these terms have picked up partially different meanings based on the disciplinary contexts they are used in. In order to avoid any confusion, this report adopts a narrow terminology even though most of its contents should be of interest also to practitioners who are more familiar with other terms and definitions.

Despite the huge interest in AI, it has been difficult to get a clear picture of how companies and public organisations currently relate to and work with AI applications. Insofar as there are estimates of AI use, they often paint a picture of a transformation well under way, but this picture needs to be challenged.

10. Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly journal of economics*, 118(4), 1279-1333.

11. Wernberg, J. (2019). Människor, maskiner och framtidens arbete. Report from Swedish Entrepreneurship Forum, Business Policy Forum report #22.

12. Fountaine, T., McCarthy, B., & Saleh, T. (2019). Building the AI-Powered organization. *Harvard Business Review*, 63-73.

Earlier surveys on Swedish AI Adoption

It is difficult to compile statistics about how companies use AI, not least because AI can comprise of many different technologies that can be applied in many different ways. In addition, the implementation of AI requires both technical resources, like big data analytics, and organisational resources.

MIT Technology Review has published a report, based on a global self-selected panel of 583 managers, stating that 71 per cent of the respondents in some way actively work with implementation of AI in their organisations.¹³ 42 per cent state that they carry out pilot studies while 21 per cent have adopted a central AI strategy and eight per cent use AI in their day-to-day activities. It should be pointed out that a self-selected panel may generate slightly skewed results, not least when it consists of managers who are attracted to a technical publication such as MIT Technology Review and to a panel which is marketed as “global thought leaders”.

In a another study, based on survey responses from 160 Nordic companies, it was found that 77 per cent of the respondents actively work with AI in some ways.¹⁴ 30 per cent carry out pilot studies, 22 per cent are moving from pilot activities to wider implementation and 25 per cent have implemented AI in their organisations.

Judging from these types of measurements, it is easy to get the impression that AI already has had considerable impact on approximately three quarters of all companies and, looking at international comparisons, that Swedish companies are falling behind competitors in other countries. However, there are several reasons why these types of results should be interpreted with some caution.

A government report, presented to the Minister for Digitalisation during spring 2019, summarises the findings from a test measurement of the use of AI amongst 250 small and medium sized Swedish companies in selected industries.¹⁵ The results indicate that 35 per cent of these companies work with AI in some ways and most of them state that they are in the start-up phase of the implementation process. In addition, larger companies in the survey report a much greater degree of activity than the smaller ones, suggesting across the entire economy (which consists of more small and medium-sized than large companies), AI activities are possibly lower than suggested by the survey results.

It is also relevant to consider possible differences between the private companies and public organisations in the uptake of AI applications. In 2018, Vinnova (Sweden's Innovation Agency) conducted a large survey collecting responses from 337 actors within the public sector. The results indicate that 36 per cent of the municipalities, 24 per cent of the regions and 22 per cent of government authorities and agencies have carried out some form of AI activities in their organisation.¹⁶

Looking at these different surveys, the latter provide a quite different picture of AI use than the former. If nothing else, this suggests there is a clear need for more data and research on this topic to provide a more nuanced picture. Especially, there is a need to map AI maturity in a way that distinguishes between AI uptake and the organisational work associated with AI implementation.

13. <https://mitsights.ai/gpaipoll/>

14. Boston Consulting Group (2018). Think Big, Start Small, Think Fast – The AI Success Recipe for Nordic Companies.

15. Swedish National Digitalisation Council (2019). Artificiell intelligens i Sverige - En nationell deskriptiv översikt av utvecklingen, Underlagsrapport i projektet "Data som strategisk resurs", Dnr 19-1259. The report contributed to the shaping of an commission from the Government to Statistics Sweden (SCB) with the aim of deepening research about AI in Sweden (I2019/01964/D): <https://www.regeringen.se/regeringsuppdrag/2019/08/uppdrag-att-kartlagga-anvandningen-av-artificiell-intelligens-respektive-analys-av-stora-datamangder-i-sverige/>

16. Andersson, C., Lindsjö, G., Hagberg, R. (2018) Artificiell intelligens i offentlig sektor – Hur realiserar vi potentialen? Report from Governo.





About this survey

The respondents in this survey offer a new and unique perspective of AI maturity in Swedish companies and public organisations for at least three different reasons. First, the survey is based on more than 5,000 responses, which is far more than in earlier Swedish surveys. Second, the managers' responses capture the relationship with AI at several different levels in the organisations, from vision and strategy at top management level to the shop floor and day-to-day activities. Third, the managers answered questions about both the presence of organisation-specific AI implementation and how far the organisational work following on from the implementation has progressed.

An important difference compared to earlier Swedish surveys is that the focus is on managers rather than organisations. This means that in theory several managers may be from the same organisation (especially among large organisations), but with a large amount of responses from a broad range of different types of workplaces and organisation sizes, that risk is at least somewhat countered. In addition, it is possible to isolate responses from managers at executive level, which gives a crude approximation of few or individual respondents per organisation.

The study was carried out by Novus on behalf of Ledarna and is based on online survey responses from managers across Sweden. The survey targeted a random selection of members of Ledarna and also members of Ledarna's panel of managers. Since the responses from both groups had highly correlated outcomes, the data sets could be combined to provide a larger base for the more in-depth analysis. A total of 5,446 interviews were carried out.

The respondents' profiles have been cross-checked against known parameters for Swedish managers in general, and the responses have been weighted to provide

a representative result regarding position, private/public sector, gender and age. The weights only have marginal effect on the results. In order to validate the survey results, a reduced version of the survey was carried out amongst managers from Novus's own national panel. These results corresponded well to the outcome from Ledarna's members, which indicates that the results from Ledarna's survey can be interpreted as representative for Swedish managers in general.

The managers in the survey are generally not AI experts, but that is by no means a disadvantage. They answer questions almost exclusively about to which degree different measures have been taken within their organisations in order to implement or work with AI. In other words, their answers provide an important indication as to whether measures have been taken in a way that has had a considerable impact on the organisation - or not. Furthermore, it is possible to isolate responses from managers at executive level in order to get an estimate that better captures the organisation's strategic work (i.e. measures that have not yet had an effect in the whole organisation). This also more closely matches the relationship of one respondent per organisation, which improves comparability with previous surveys conducted on firm level rather than individual level.

In the survey questions, the term AI has consistently been defined as robots and/or programs that can learn from and adapt their performance to changing conditions by using data. This fairly broad definition of AI is meant to decrease the risk of underestimations in the results because respondents think of AI as something highly advanced or very specific.

Swedish AI Adoption and Maturity

Swedish managers on the future of work

To begin with, a sample of just over 1,000 respondents in the study were asked to answer how they think AI will influence the Swedish employment market and economy in the future (see Figure 1A). This provides an important indication of the respondents' overall expectations of the development in AI and its future impact on the labour market as a whole. It constitutes a background against which results from the other parts of the survey can be interpreted.

Just under half of the respondents (48 per cent) believe that AI will have an effect on nearly all jobs in the future, but that only a small share of the jobs will disappear due to automation. Approximately one out of five managers believe that either AI will lead to automation of most jobs (18 per cent) or that most jobs won't be affected at all by AI (23 per cent). It is important to point out that the managers' answers cannot be used as a pretext for saying how many jobs will disappear or change in the future. These results capture what the respondents believe about the development on a macro scale, but as stated before the managers as a group are experts on neither AI nor labour market economics.

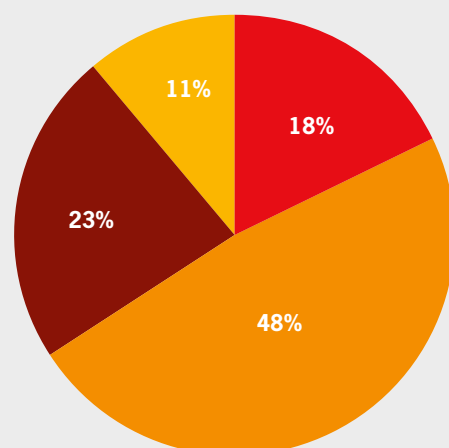
The increasingly accepted picture within academic research is that AI will affect individual tasks rather than whole jobs, which will lead to work being reorganised rather than jobs disappearing.¹⁷ The managers' responses are on the whole in line with indications from current theoretical and empirical research. This in turn suggests that their aggregated responses concerning the development within their own organisations should not be expected to be overly biased by either overestimation or underestimation of AI's impact on society.

It is possible to make a crude breakdown of the results by sector in order to clarify differences primarily between manufacturing and service sectors. A certain variation can be seen in the responses, but still the dominating picture is that AI will affect most jobs, but that few jobs will disappear completely or that AI will not affect jobs at all. None of these alternatives corresponds to an unreasonable overestimation of the effects of technology (see Figure 1B). Managers in the construction sector seem to have the lowest expectations of the impact of AI, while managers in the knowledge-intensive service sector are most prone to believe that AI will transform the employment market.

1A

How do you think artificial intelligence (AI) will affect the labour market and the economy in the future?

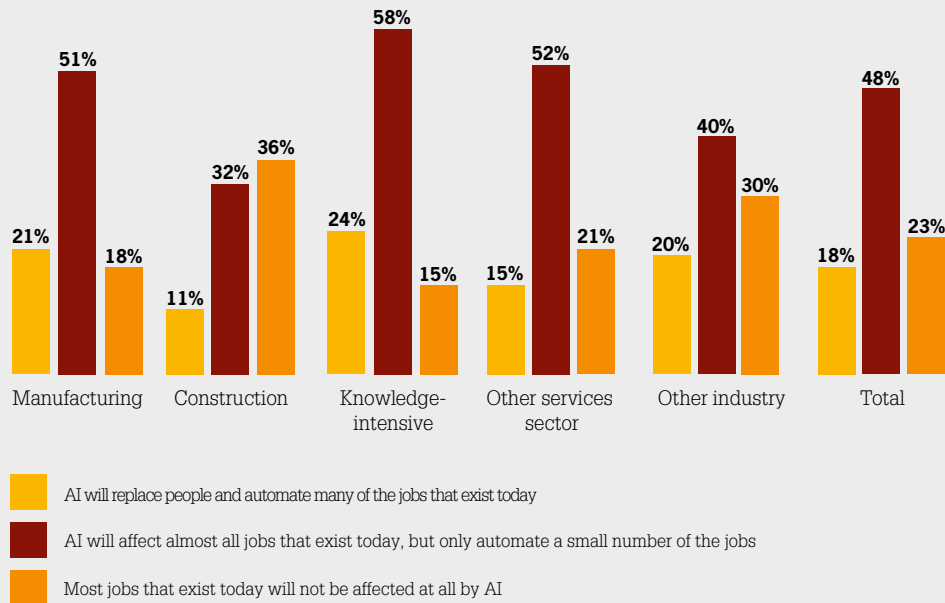
- AI will replace people and automate many of the jobs that exist today
- AI will affect almost all jobs that exist today, but only automate a small number of the jobs
- Most jobs that exist today will not be affected at all by AI
- Don't know



(N=1079)

17. Wernberg, J. (2019). Människor, maskiner och framtidens arbete. Report from Swedish Entrepreneurship Forum, Business Policy Forum report #22.

Opinions about the effects of AI on the labour market by sector



(N=1079)

AI in Swedish companies and public organisations

This section presents the results on AI maturity in Swedish companies and public organisations. Just under one in five (18 per cent) managers state that their workplace has implemented AI applications that are tailored to their specific organisation (see Figure 2A). This does not include off-the-shelf AI applications that are included for instance in smartphones or certain cloud services. A more conservative estimate can be reached by looking specifically at responses from managers at executive level (not in the figure). This group should to a higher degree be informed about the implementation of AI applications in their respective organisations. In this group, 81 per cent state there are no AI applications in their workplace, while only 15 per cent report having AI applications.¹⁸

An important general conclusion based on these results is that the uptake of AI applications that have been designed and/or adapted specifically for individual organisations is still fairly low. Specifically, it is considerably lower than what has been suggested in many earlier studies covering Swedish companies. This does not automatically mean that Swedish AI use is falling behind in an international comparison, since many of the existing comparisons rely on surveys similar to those indicating overestimations of the Swedish AI maturity. It is possible that both Swedish and internationally comparative statistics on AI use may be skewed towards early adopters, specific sectors or large companies.

The results can be disaggregated to explore differences between sectors in the economy (see Figure 2B). This shows that AI applications are most common in the knowledge-intensive service sector followed by the manufacturing sector. These results may reflect knowledge-intensive companies developing and selling services based on new technologies, but also a growing number of policy initiatives aimed at digitalising the manufacturing industries, e.g. smart industry and industry 4.0.¹⁹

There is also a clear distinction between the private sector and public organisations. Managers in the public sector report a considerably lower degree of AI maturity (14 per cent) than managers in the private business sector (20 per cent).

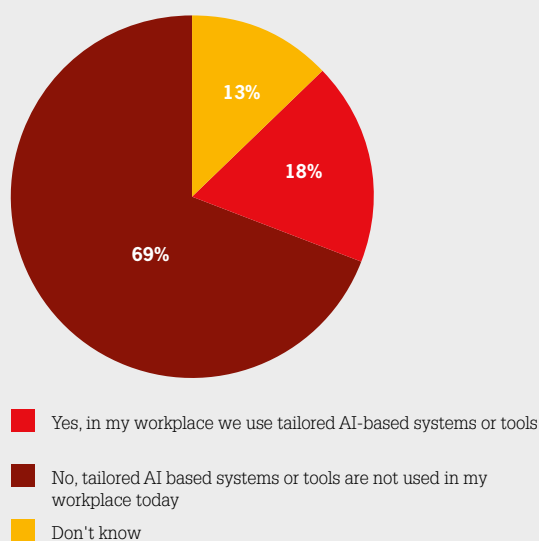
If the results are instead broken down according to organisation or company size, there is a clear difference in AI uptake between smaller organisations with 10-49 employees (nine per cent) and 50-199 employees (14 per cent) compared to the average (18 per cent). Among respondents from the largest organisations with more than 500 employees, 25 per cent report having tailored AI applications in their workplace. There is an increasing risk of several respondents reporting on the same organisation with growing organisation size and therefore these results should be interpreted with a certain amount

18. The result for No answers for managers at executive level is statistically proven in relation to the average, while the result for YES answers is not statistically proven.

19. See for example the Government's strategy: "Smart industry – a strategy for new industrialisation for Sweden": <https://www.regeringen.se/49a937/globalassets/regeringen/dokument/naringsdepartementet/pdf+genavgblock/smart-industry.pdf>

2A

Has your workplace got AI applications specifically tailored to your organisation?



of caution. Having said that, the results are also in line with the expectation that larger organisations have the resources to invest in new technology early on.

AI maturity is not just about the adoption of new technology. It is also very much about how the technology is implemented in the organisation.^{20 21} In order to get a better understanding of how well-prepared or far along different organisations are in their AI implementation work, managers were asked to consider seven different statements about the organisational work deemed necessary to introduce AI in their organisation.

The organisational factors that managers have been asked to report on are derived from *The AI Transformation Playbook* developed by Andrew Ng, one of the world's leading AI researchers and a former manager at Google Brain.^{22 23} The advantage of using an established framework, which emphasises the role of organisational factors, is that it provides a more stable foundation for interpreting the survey results. The framework in the AI Playbook consists of five activity categories:

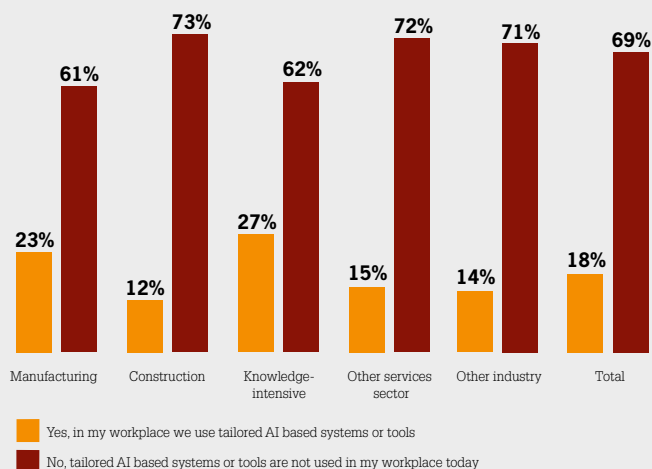
- Execute pilot projects to gain momentum
- Set up an in-house AI team
- Provide broad AI training for employees
- Develop a central AI strategy
- Develop internal and external communications

This has been translated into seven different statements and the respondents have been asked to state which of these statements hold true for their organisation. An additional factor was added to the list, namely if the organisation is conducting some type of big data analysis since this is a necessary condition for the implementation of tailored and activity-specific AI applications.

The results indicate that Swedish companies and public organisations are in general at an early stage of implementing AI in practice (see Figure 3). The most frequently occurring organisational factor appears to be big data analysis, which 17 per cent of the respondents agree fully or partially that their organisations are conducting. While big data resources on their own are not sufficient for implementing AI, this effectively puts a cap on AI maturity below 20 per cent (which is also in line with the results in previous section). 14 per cent of managers report that AI pilot projects are being conducted at their workplaces and eleven per cent report that there are personnel

2B

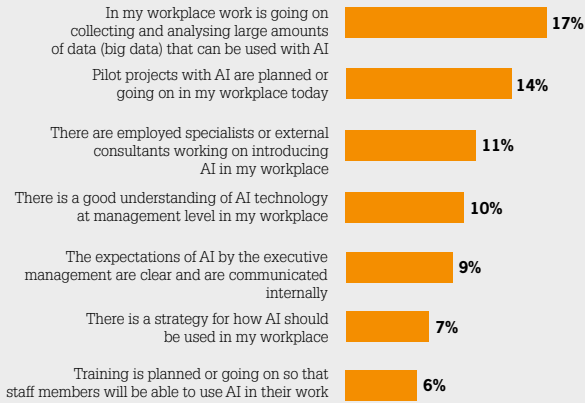
AI uptake by sector



20. Fountaine, T., McCarthy, B., & Saleh, T. (2019). Building the AI-Powered organization. *Harvard Business Review*, 63-73.
 21. Furr, N., & Shipilov, A. (2019). Digital Doesn't Have to Be Disruptive The best results can come from adaptation rather than reinvention. *Harvard Business Review*, 97(4), 94-103.
 22. <https://landing.ai/ai-transformation-playbook/>
 23. <https://medium.com/@andrewng/introducing-the-ai-transformation-playbook-58ccad4393e9>

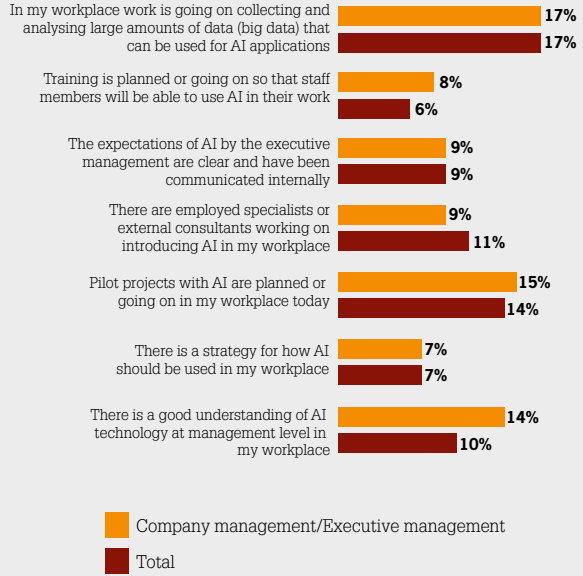
3

What work, if any, related to AI implementation is currently being done in your workplace?



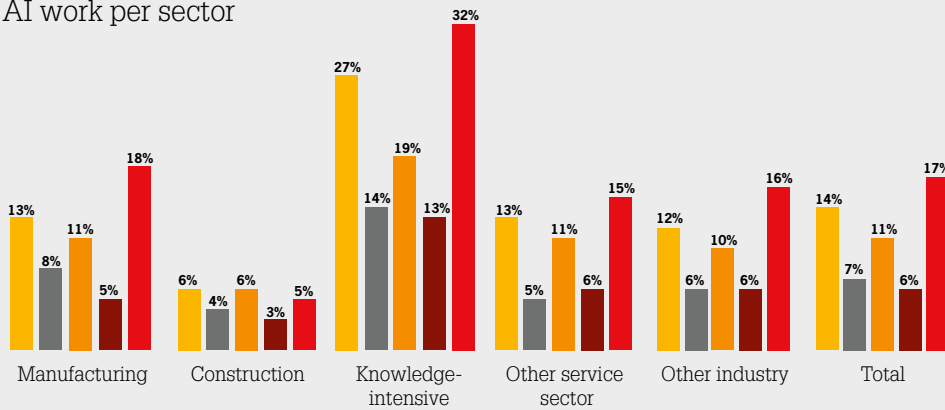
4

Top management on AI maturity



5A

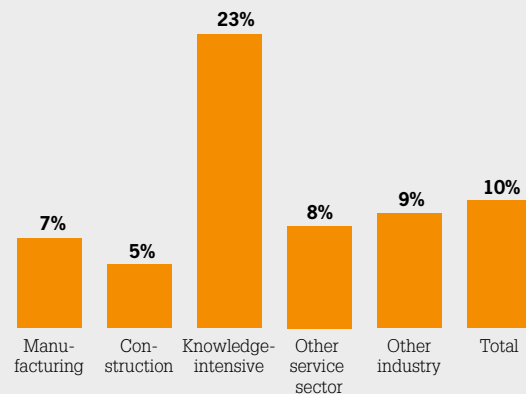
AI work per sector



- Pilot projects with AI are planned or going on in my workplace today
- There is a strategy for how AI should be used in my workplace
- There are employed specialists or external consultants working on introducing AI in my workplace
- Training is planned or going on so that staff members will be able to use AI in their work
- In my workplace work is going on collecting and analysing large amounts of data (big data) that can be used for AI applications

5B

AI savviness per industry



dedicated to working with AI implementation in their organisations. Only seven per cent report having adopted a central strategy for AI work.

Because most if not all of the organisational factors could be expected to be cleared at executive level, responses from managers at this level can again be used as a more conservative approximation which overall supports the general findings (see Figure 4). Top management are marginally more prone to report that action is being taken on several of the organisational factors except for the presence of dedicated personnel working with AI implementation. Moreover, managers at executive level are more likely to report that top management in their organisation has a good understanding of AI. One possible interpretation of this particular result is that executive management is indeed considering issues related to AI implementation, but that their efforts have yet to be communicated and put into practise in the organisation as a whole.

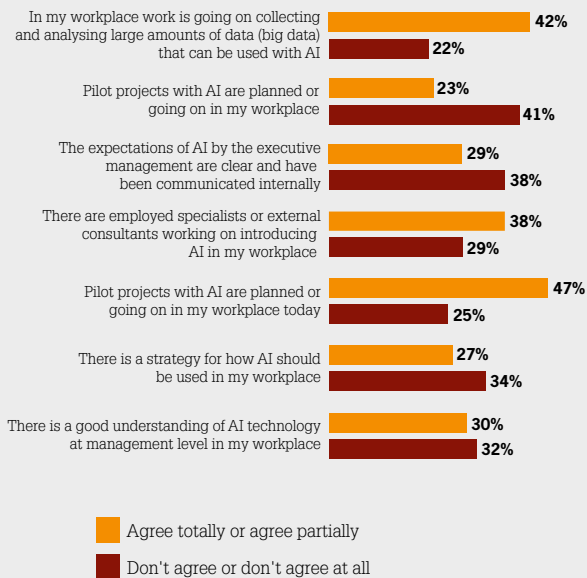
Focusing on the organisational factors that are associated with the most tangible output and breaking down the results on sectors provides a somewhat more nuanced overview of differences in AI maturity across the economy (see Figure 5A). The relationship between different organisational factors is more or

less preserved across sectors, but there are pronounced differences in overall magnitude. Managers in knowledge-intensive business sectors to a greater degree report that their organisations are engaged with AI implementation, while managers in the construction sector are least likely to report ongoing AI work. Corresponding patterns emerge in the managers' opinion about the executive managements' understanding of AI (see Figure 5B). There are corresponding differences in the share of managers who believe top management has a good understanding of AI.

Amongst the managers who have confirmed that their workplaces have implemented tailored AI applications, the reported activities associated with organisational factors are overall considerably higher. This indicates that the Playbook framework captures a relevant share of the organisational adaptation necessary to fully leverage AI. At the same time, far from all workplaces with reported AI applications fulfil all the parts of the framework (see Figure 6). This further supports the notion that AI implementation within many organisations is still at an early stage.

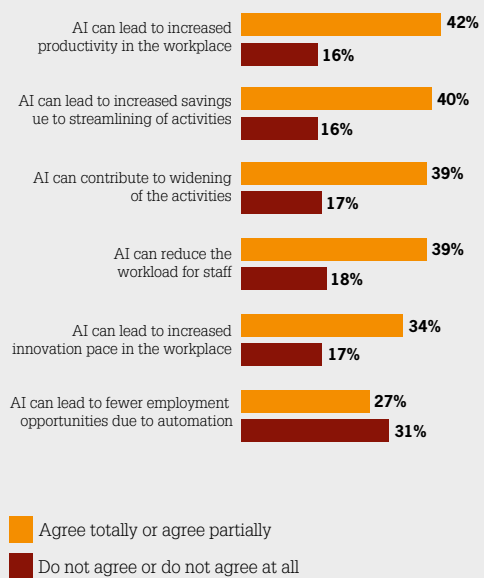
6

AI work among AI users




7

Expectations for the impact of AI in the workplace



A company may need AI experts in order to introduce new technology in the business, but managers at many levels will be needed for technology to be fully integrated within the organisation.





Managers expect
first of all that AI will
contribute to improving
the existing business.

Expectations and obstacles

The previous section provided an overview of the AI maturity in Swedish companies and organisations. Using that as a backdrop, this section summarises the managers' expectations about how AI may impact their workplaces in the future and what the obstacles to implementing and leveraging the new technology are. This complements the information on current AI uptake with an indication of what direction the ongoing development in companies and public organisations is currently taking.

Because AI is a part of a general purpose technology (GPT), it is associated with different applications in different sectors and lines of business. This means that perceived benefits and obstacles may vary considerably between organisations and parts of the economy, ultimately affecting the conditions under which AI is being implemented. A ranking of the managers' aggregated expectations of how AI may affect their different workplaces shows that productivity gains (42 per cent) and streamlining (40 per cent) are the most common expectations (see Figure 7). This suggests that managers primarily think of AI applications as a means to improve existing operations. This is tightly followed in the managers' ranking by the possibility for business expansion (39 per cent), reduced workload for employees (39 per cent), increased innovation pace (34 per cent) and finally, increased automation that leads to a reduced number of jobs (27 per cent).

While more than one in four managers expect the development of AI to lead to fewer jobs in their workplaces, a significantly larger share of respondents (31 per cent) oppose this

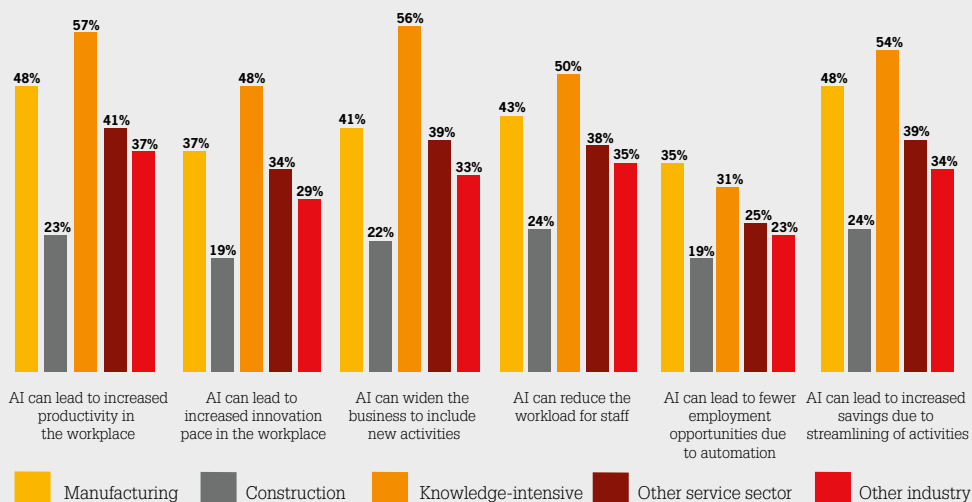
statement. This indicates some polarisation in views between managers concerning the division of labour between man and machine. This may also have implications for advancing the organisational factors highlighted in the previous section.

Breaking down the answers for each statement on sectorial level provides an overview of the variation in expectations (see Figure 8). For example, it is clear that managers in the knowledge-intensive service sector to a larger extent than others agree with all statements, while managers in the construction industry appear to hold the overall lowest expectations for AI. Managers in the construction sector have consistently been the most sceptical when it comes to estimating the impact and worth of AI. These results could reflect different degrees of interest in AI, but also expectations about different types of applications in different sectors.

If the answers are instead broken down according to different management levels, the expectations are on average higher among top management than among managers closer to the day-to-day work (see Figure 9). This illustrates the need to establish and maintain a connection and continuous feedback between the strategic and operative levels of the organisation. Remember also that only approximately one manager in ten believes that the executive management at their workplace has a good understanding of AI, or that the executive management's expectations of AI technology are clear and have been communicated to the whole organisation (see Figure 3 in the previous section).

8

AI expectations per sector



Turning our attention towards experienced obstacles associated with implementing AI in the organisation, there appears to be more of a consensus among managers (see Figure 10). As the share of respondents who agree with a specific statement falls, the share who oppose the statement in question rises.

Half of the managers think that the lack of skills needed to work with AI is an obstacle in the development of AI work in their workplace, followed by shortcomings in the IT infrastructure (39 per cent), needs for organisational changes (29 per cent) and costs (21 per cent). If the reported lack of skills is related strictly to technical skills (i.e. working directly with AI), the obstacle may prove to be even larger if skills related to organisational adaptation (working indirectly with AI) are included.

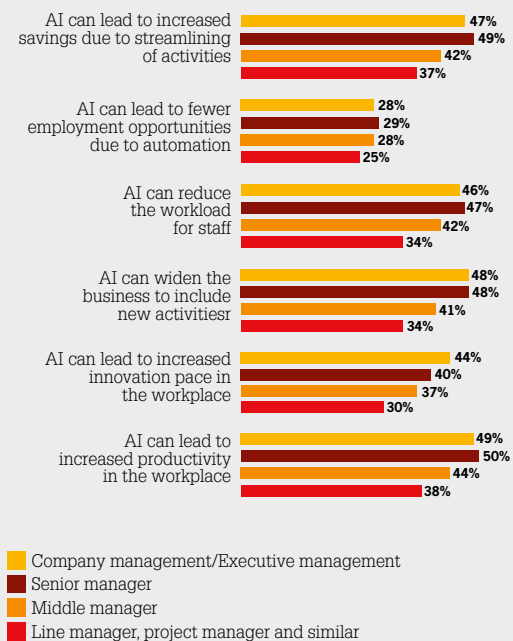
A relatively small share of the respondents (17 per cent) report that current laws and regulations are an obstacle for implementing AI in their organisations. At the same time, this is a type of obstacle that may become more evident as the implementation work progresses. For instance, regulation of data collection and management will affect many types of AI applications, but only 17 per cent of the respondent's report having big data resources in their organisations today (see Figure 3).

Only 14 per cent of the responding managers believe that AI will not be able to generate any positive returns to their organisation. This suggests that many managers see a clear potential in the technology, even if their expectations still differ.

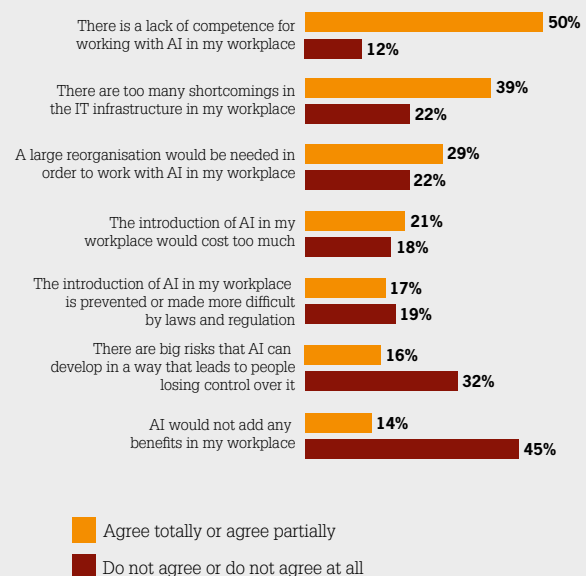
The consensus between managers concerning obstacles appears to hold fairly well across sectors (see Figure 11). Respondents in other service sectors and the manufacturing industry are more concerned about IT infrastructure, while managers in manufacturing and construction industries worry least about laws and regulations obstructing the use of AI. Costs associated to AI implementation do not seem to be a primary worry in any of the sectors, but managers in construction industries are most prone to believe that AI will not bring any value to their organisations.

The variation between different management levels is small, but managers at executive level are more prone to report a lack of skills needed to work with AI (56 per cent), but also that implementation of AI may prove to be too costly (27 per cent).

AI expectations across management levels



Obstacles to the implementation of AI

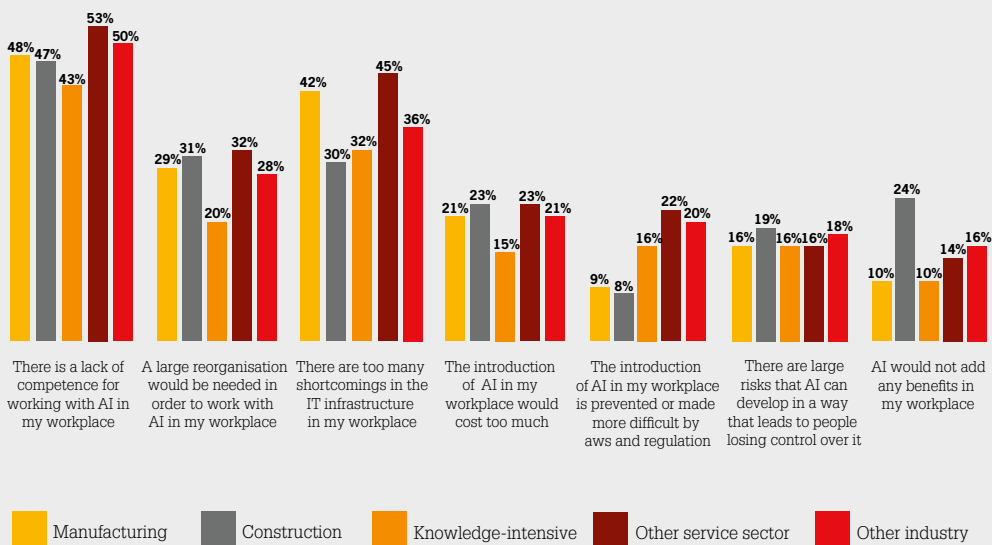


A fairly small share of respondents, but still a considerable number in absolute terms, believe that AI may develop beyond human control and become a liability. Taken to its extreme, this statement is in line with the so-called Terminator scenario in which a superintelligence becomes a threat to humanity. In the context of this survey, however, such notions should be interpreted as a mix-up between the narrow AI applications in use today and superintelligences. On the other hand, this result could also be taken as an indication of insecurity or uncertainty associated with the performance of AI applications that essentially act as “black boxes” to a lot of people who may come to depend on them in their workplaces. There are several

examples of how machine learning programs have generated unwanted or unintended results, not least because of flaws in the data that has been used to train them. This type of uncertainty amounts to a very real risk for companies and organisations that are held responsible for how their AI tools act.

If obstacles are assumed to be related to different stages of AI maturity, the aggregated ranking of obstacles could possibly be read as an alternative indicator of how far AI implementation has progressed, based on which obstacles or bottlenecks are seen as most important at the moment.

AI obstacles divided by sector





Concluding Remarks

Taken together, the survey results point to three main conclusions. And each of these contribute in their own way to a more nuanced understanding of what the AI maturity looks like today, how AI is implemented into economic and social organisations and what a future with AI may look like.

AI maturity is low but AI stress is exaggerated

First, the use of AI in Swedish companies and public organisations is at a considerably lower level than what has been suggested in earlier reports. This applies both to the uptake of tailored AI applications and the progress organisational work related to AI implementation. The managers in the survey are generally not AI experts, but they are experts on the state of their own workplaces and therefore they provide an important perspective on how new technology is integrated into existing organisational settings. Put differently, if these managers do not see any progress or upside related to their organisations' AI implementations, then AI maturity may in fact not be that high. It needs to be emphasised that this does not necessarily mean that Swedish AI implementation is falling behind other countries in international comparisons, since that depends on how data on AI maturity was collected in these other countries as well.

The most important thing about this outcome is not that AI maturity is low, but rather that AI implementation must be allowed to take time. In some ways it would have been easier if an "AI transformation" had happened in the form of a revolution, a fast transition from black to white and a process with a clear before and after. It is considerably harder to organise and manage a workplace that is constantly changing a little bit at a time. AI will very likely play a crucial role in the competitiveness of companies and the efficiency of public organisations in the future, but the implementation cannot be expected to be disruptive or happen quickly. In a way AI implementation is better described as a marathon than a sprint run.

AI is about organisation

The second concluding observation based on the survey results is that organisational adaptation is not only a necessary condition for AI implementation, but that organisational work also affects how the new technology can be put to work in the future. Organisations that reportedly have tailored AI applications also exhibit considerably more progress on the organisational factors in the Playbook framework, although many of them still have more work to do.

The fact that the organisational work plays an important role in the future impact of AI on the economy is further strengthened by the fact that managers believe that productivity gains and streamlining are the biggest expected benefits of AI, while also indicating that lack of skills, IT infrastructure and organisational adaptation are the biggest obstacles. AI's impact on business and public services is not just about technology, but also about each organisation's ability to reap the benefits of that technology. It is this organisational adaptation that shapes the future of work.

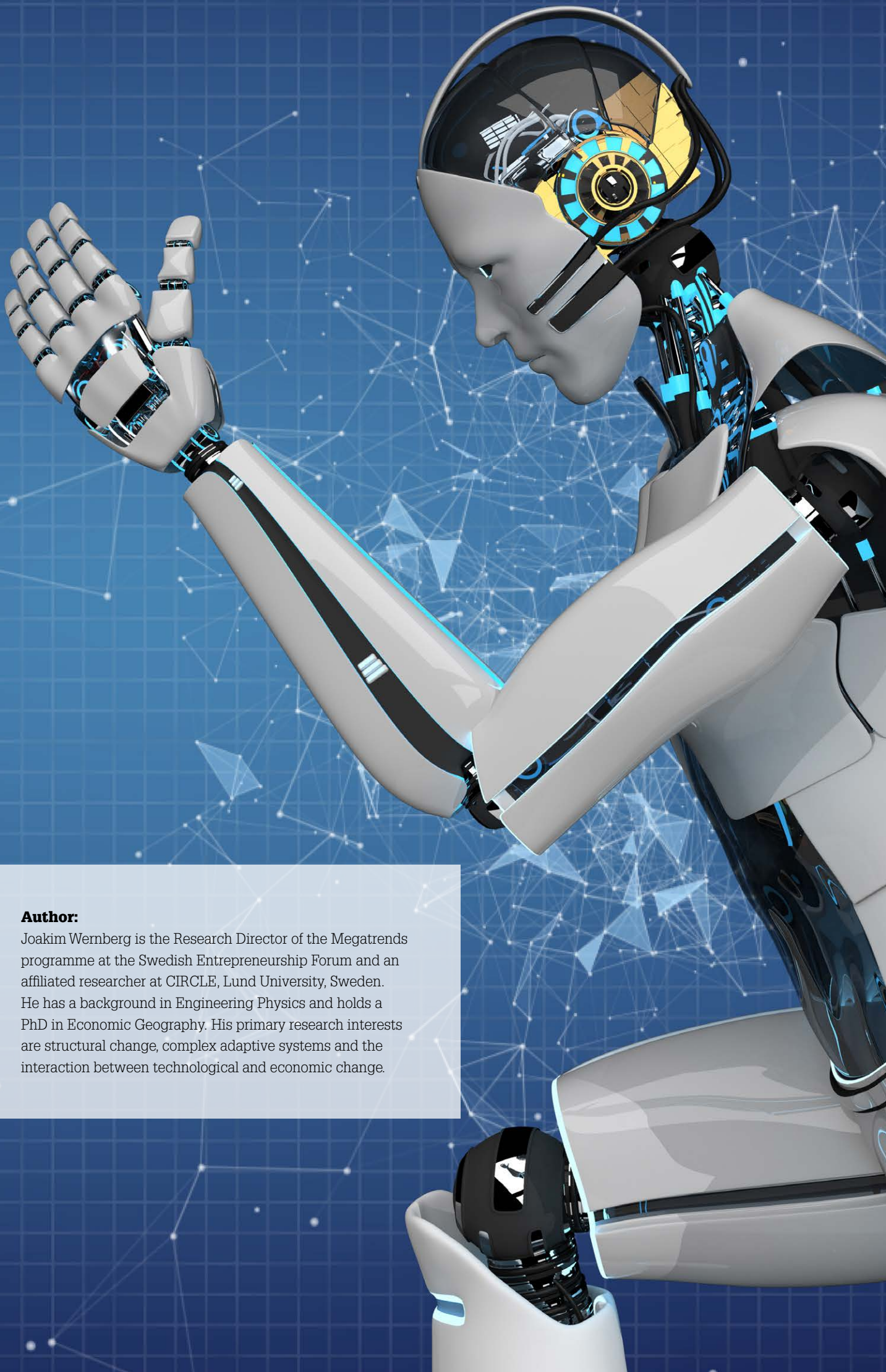
Competence development for managers

The third and final concluding remark is built on the previous two and concerns the role of leadership in the future impact of AI in individual workplaces as well as on the whole economy. Managers at all levels in their organisations don't just offer a unique perspective on current AI developments. They also play a key role in facilitating and governing the ongoing, albeit slow-moving, process of change in their respective organisations. Any organisation may need AI experts in order to adopt a new technology, but it needs managers at all levels in order to adapt to, scale and make the most of the new technology's full potential.

Consequently, the terms and conditions under which managers work matter for the outcome of AI implementation. This calls for initiatives aimed at managers on all levels, for instance focusing on skills and skills development related to

AI use. While initiatives such as cross-functional teams, pilot studies or experiments are often highlighted in AI implementation, leadership makes up the least common denominator that is needed to carry out such initiatives. Not all managers have to become AI experts, but they need to understand the technology, and in particular how it can be used, well enough to enable, coordinate and operationalise the process leading from strategy to action.

Finally, it is important to remember that managers have a dual role in skills development: They need skills development themselves to become up to date with development in the organisation and at the same time they are often responsible for employees' skills development. This means that there is more than one reason to consider how to promote lifelong learning for managers on all levels in all parts of the economy.



Author:

Joakim Wernberg is the Research Director of the Megatrends programme at the Swedish Entrepreneurship Forum and an affiliated researcher at CIRCLE, Lund University, Sweden. He has a background in Engineering Physics and holds a PhD in Economic Geography. His primary research interests are structural change, complex adaptive systems and the interaction between technological and economic change.



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