Uncovering AI in Finland

2018 field guide to AI

Microsoft

pwc

Contents

Foreword

In September 2017 when we launched our digital transformation study[1], I stated that we're living exciting times. This is still very much true. While digital transformation is often referred to more broadly when discussing the possibilities made available by new, advanced technologies, we're seeing artificial intelligence taking an important role in those discussions. As one area within digitalization, artificial intelligence covers many areas, topics and technologies, carrying very different meanings for different groups of people. This is what makes it so exciting, and full of opportunity.

Technical evolution is changing our world, bringing us a tremendous amount of opportunities. The first, powerful adoptions of artificial intelligence give us indications of what is to come: productivity tools suggest how to prioritize our time at work and collaborate better with our colleagues, a bot responds to our first queries at a customer service point, and companies use our data to offer us tailored services and experiences as their customers. Also, we see ways where technology and art can be united to create new experiences. Last year, approximately 27,000 people let artificial intelligence recognize and articulate their emotions at the ARS17 exhibition at the Museum of Contemporary Art Kiasma. AI is already here, and it is up to us to make the most of it.

For Finland, AI is of major importance. We're recognized for being among the most advanced countries in the world with our technical and digital capabilities, and Finland was named as one of the seven that stand out in terms of economic and digital innovation impact[2]. In May 2017, the Minister of Economic Affairs Mika Lintilä appointed a steering group to work on a proposal for Finland's artificial intelligence program. Finland intends to be at the forefront of AI development.

Now is the time to act to start capturing the opportunities presented by AI. With this study, we hope to give you inspiration by sharing some thoughts and ideas from the leaders interviewed, and encourage you to take the right next steps. Technology is only an enabler – we need to act together to change the world.

PEKKA HORO
GENERAL MANAGER
MICROSOFT OY

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[1] PwC and Microsoft, 2017. How Finland is embracing digital transformation – Digital challenges and successes showcased.
[2] World Economic Forum, 2016. The Global Information Technology Report 2016.

Executive Summary

Artificial intelligence is expected to become the emerging technology with biggest business impact over the near future[1]. At the same time, there is no shared understanding what the term AI actually means. During the past year, multiple projections have also been drawn on how new AI technologies will impact economic growth. However, it is evident that AI will significantly change the ways we run our businesses and perform our work.

In this study we put together a synthesis of recent desktop studies and research on AI impact on economy. We conclude that by successfully promoting and adopting AI, Finland can realistically reach a €20 billion boost in GDP (an additional 8%) by 2023. Finland has stated the ambition to become a forerunner in benefiting from AI, announcing a recent 160 million investment program to leverage the AI capabilities. At the same time, other countries are putting multi-fold monetary stakes in the play.

€20billion potential for Finnish GDP from AI is within reach.

€160million AI investment program has been launched by the Finnish government.

As a field study, we explored how the top Finnish companies and organizations are embracing AI opportunities in practice to capture this potential. We invited 20 organizations from 5 different sectors to in-depth interviews to unveil the state of our 'AI nation' for 2018. In this report, we discuss the role AI is currently playing in Finnish business and public scenes and dig deeper into the practical use cases and current best practices identified to set the pace for the AI journey.

We found that, for the most, the AI journey is still about to start for real. There are many pilots and a few groundbreaking implementations, but also multiple unexplored areas for turning the AI promise into tangible business benefits. We recommend for every organization to consider two 'no-regret' moves in order to turn the course from hype towards true business value:

- Increase data literacy at all levels
- Fix the issues around data management

> *AI is at the heart of our most critical business transformation initiatives at the moment.*
>
> **MINNA VAKKILAINEN**
> KESKO

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[1] PwC and Microsoft, 2017. How Finland is embracing digital transformation – Digital challenges and successes showcased.

We outline a number of thought-provoking examples on where to look for the value of AI. We offer you the top tips on how to get started, given by the AI pioneers already treading the path, and to-dos illustrating the steps to take to speed up the progress in your AI journey.

We strongly suggest that realizing the AI promise for Finland as a nation requires seamless collaboration between the different stakeholders involved: government, municipalities, academia, businesses and individuals. The time to act is now.

€2-3 million is the median AI investment of the interviewed companies.

We interviewed 20 Finnish organizations from 5 sectors:

🛒 Retail and consumer

⚕ Healthcare

🏭 Manufacturing

💰 Finance

🏢 Smart city

Amer	HUS	Stora Enso	Vero
Elisa	Kuopion keskussairaala, KYS	UPM	City of Espoo
Finnair	Mehiläinen	Wärtsilä	City of Helsinki
Kesko	KONE	OP	City of Oulu
Veikkaus	Metso	S-Pankki	City of Tampere
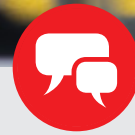
> **"** *If we want to help our children to grow to the future, we need to be interested in AI.*
>
> **JAMES WHITTAKER**
> TECH EVANGELIST, MICROSOFT

Why focus on AI?

For the past few years, artificial intelligence (AI) has been in the headlines daily, often characterized by hype of all-liberating disruption or impending doomsday scenarios. With the barrage of news items and reports, it is no wonder that AI often sounds like an overwhelming concept that will change everything – when *they* just flick it on. However, let's face it: when looking past the hyperbole and exaggerations, AI applications and technologies are already part of our everyday lives. In fact, Gartner predicts that by 2020, AI technologies will be a part of almost all new software products[1]. As they continue to become a reality for companies and consumers alike, exploring the opportunities and value they unveil should be on the to-do list of all decision makers. This is why we have put

together this study – to help leaders and organizations to take the first or next steps in making the most of AI.

This study has three main sections:

1. Quick overview on how AI is predicted to disrupt economies in the short-term globally and locally.

2. Summary of interviews of 20 Finnish forerunner organizations in the manufacturing, retail and consumer, health, finance, and public sectors to provide insight into their AI journey so far.

3. Field guide to AI with concrete steps and a practical guide on how to weave the best practices in AI into your organization and prepare your business to reap the benefits of the Fourth Industrial Revolution.

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[1] Gartner, 2017. How Enterprise Software Providers Should (and Should Not) Exploit the AI Disruption.

What is Artificial Intelligence?

Artificial intelligence (AI) creates many associations and is referred to by many definitions. As demonstrated by the word cloud below, the interviewed organizations also see AI in many different ways.

AI as defined by the interviewees
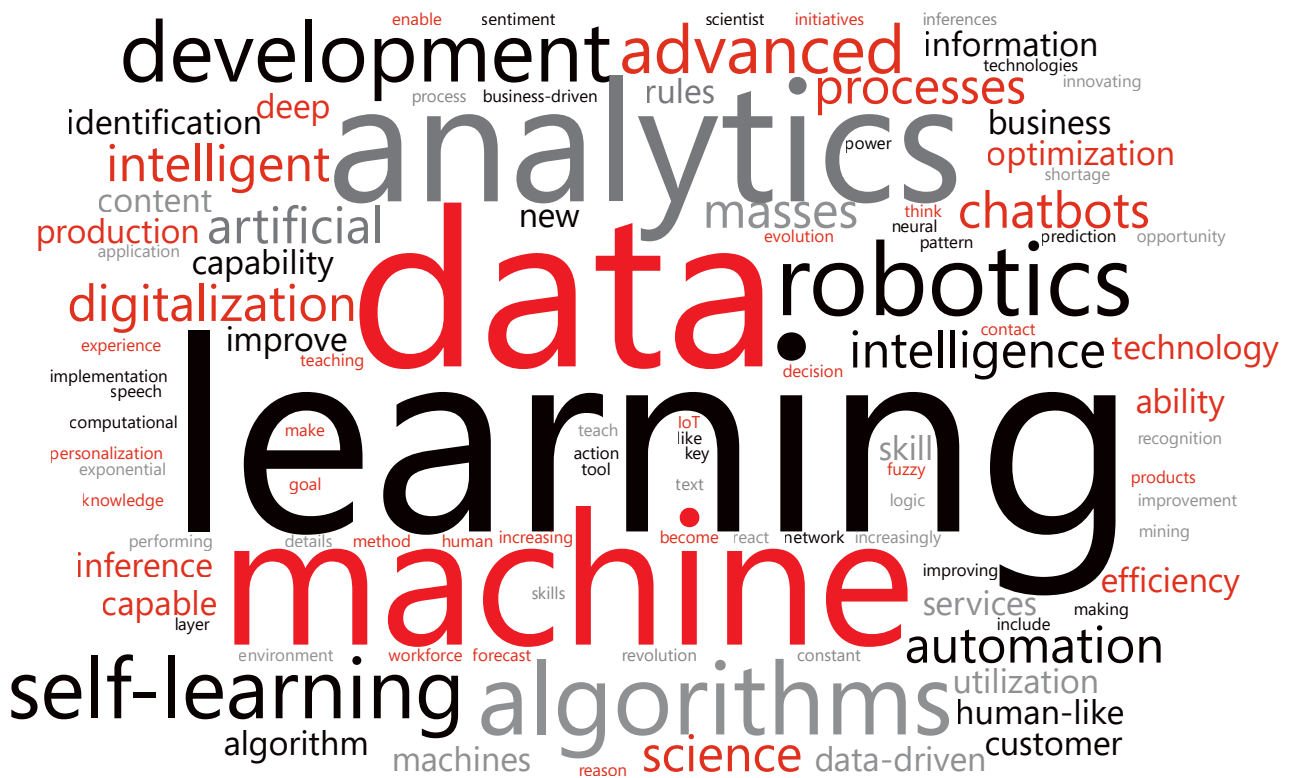
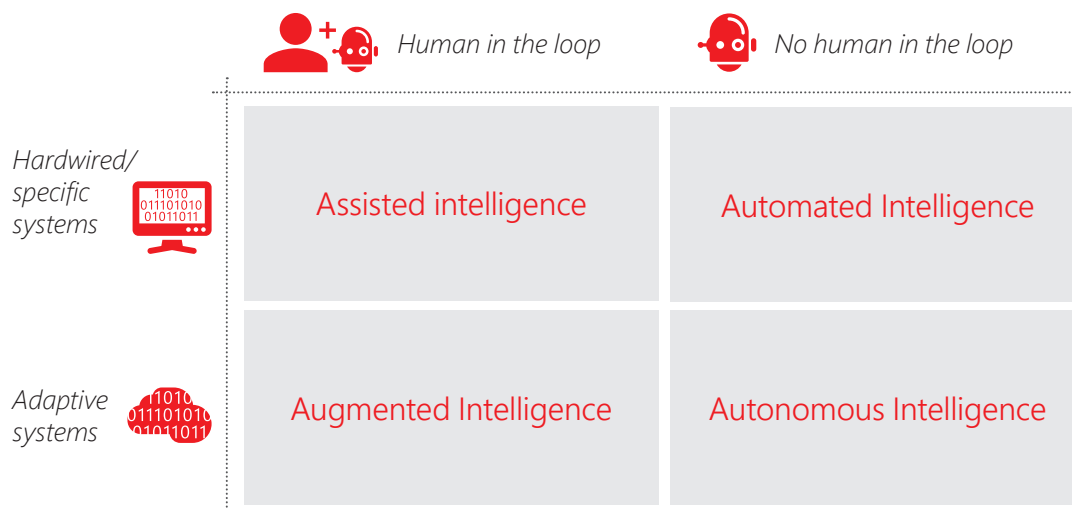In broad terms, AI refers to systems or applications that make decisions and take action without being explicitly programmed to do so, based on data collected, usage analysis, and other observations. AI is not one universal technology, rather it is an umbrella term that includes multiple technologies such as machine learning, deep learning, computer vision, and natural language processing (NLP) that, individually or in combination, add intelligence to applications.

There are different types and levels of artificial intelligence, some more mature than others, offering a wide range of effects: from local systems that assist end-users; for example helping you pick the next movie to watch, to global systems that make decisions and act without direct human involvement. For instance, over half of the trading in the Helsinki Stock Exchange OMX was already automated and controlled by algorithms in 2016[1].

Artificial intelligence technologies can be divided into four broad categories:

	Human in the loop	No human in the loop
Hardwired/ specific systems	Assisted intelligence	Automated Intelligence
Adaptive systems	Augmented Intelligence	Autonomous Intelligence

Assisted intelligence
- While AI techniques enhance the efficiency of activities across the business value chain, machines do not dynamically adapt to changing data.
- Data scientists, analysts, and researchers continue to work towards either assisting machines in generating the required output or continue to manually perform certain tasks.
- AI techniques can be employed by businesses to support a wider set of tasks involving thinking, analysis, and planning, they can help employees make better decisions.

Augmented Intelligence
- Computational algorithms will begin to adapt to changing data; machines will not automatically make decisions, they will put humans in the best place to make decisions.
- AI techniques can be employed by businesses to support a wider set of tasks involving thinking, analysis, and planning, they can help employees make better decisions.

Automated Intelligence
- First generation automation is designed for scale, process standardization, and effectiveness focused functionality.
- Main benefits in automating high volume, repetitive, rules-based tasks.
- New generation of automation is subscale, targeted.

Autonomous Intelligence
- AI techniques will be used by businesses to automate the decision making process with the absence of human intervention.
- Computational algorithms will automatically adapt to changing data; machines will be programmed to continuously learn.
- AI techniques can be used by businesses to automate the decision making process with the absence of human intervention.

[1] Leena Savolainen, Finnish Financial Supervisory Authority. In Osakeliitto news item, 2016.

City of Espoo

Predicting residents' service paths

Six largest cities in Finland have joined their forces in a strategic consortium called "6Aika". The objective of the 6Aika group is to develop more open and intelligent services for the city residents in order to develop new competencies, businesses and job opportunities in Finland. Espoo, being currently the second largest city and municipality in Finland with the population of ca. 275 000 residents, is one of the proactive members within the group driving the strategic agenda.

The vision of Espoo is to provide open the city-as-a-service for its key stakeholders: residents, RDI institutions, public organizations, businesses and NGO´s by fostering an open and collaborative culture framed with principles of fairness and democracy. Espoo's ambition and strategic intent is to cultivate such an ecosystem, which yields win-win-win-win scenarios for all the interest groups involved. Artificial intelligence with its numerous application opportunities has a key role to play in this act.

Espoo puts customer-orientation, operational action and fact-based knowledge at the very top of its AI agenda. As practical example, Espoo utilizes the leading edge approaches of design thinking in proactively developing the service journeys for the individuals using Espoo's services in different touchpoints across the different municipal sectors. Espoo operationalizes nearly half-a-billion rows of data through its data lake by applying Bayesian methods to predict the individual level service paths and identify needs for providing proactive guidance for the people. The primary goal of Espoo in this endeavor is to optimize and improve the quality and experience of public services from the customer's lifecycle standpoint, which also opens up opportunities for efficiency improvement and cost savings.

About City of Espoo
Espoo is the second largest city in Finland and is located next to the capital city of Helsinki. Espoo is a centre of international company headquarters and high-technology businesses, and known as a hub of know-how, research and development. Espoo wants to be a pioneer of municipal service development, and their digital agenda is a strategy through which they promote the digitalization of municipal services, utilization of new technology, bringing services online and adoption of new operating methods.

Source: Organisation's web page

To walk the talk, Espoo is intensively collaborating and sharing leading practices with the global communities of practice, including its sister cities Palo Alto in California, USA and Shanghai, China. Espoo also publishes a series of brochures describing its experiences, the practical tools used and lessons learned under the series tagged with #MakeWithEspoo. Espoo is the only Finnish municipality participating in the Finnish Center for Artificial Intelligence (FCAI), an academic research initiative for AI.

Perhaps most interestingly, at the time of publishing this study report, out of the 160+ applicants and as the only European city, Espoo has been chosen among the final top 7 cities pursuing for the prize of being recognized as the most intelligent city in the world 2018 in a competition run by the global Intelligent Community Forum (ICF) .

The beauty of AI is in its ability to find causality between intuitively distinguished thoughts, without suffering from the burden of preconceived ideas.

PÄIVI SUTINEN
CITY OF ESPOO

Why is AI bursting right now?

Artificial intelligence is not a fresh innovation. The first modern AI approaches were already developed in the 1950s, followed by decades of promise, expectations and disappointments. So why are we now living the hype of this half-a-century old phenomenon? Here we name five reasons for this.

Firstly, in the 1990s, **computer central processing units (CPUs) started to gain in performance and decrease in cost**, enabling computers to challenge humans in brainwork-intensive tasks. In fact, the first computers beat the chess grandmasters in the late 1990s, followed by go-game champions surrendering to algorithms two decades later. The promise of the algorithms started to finally become a reality. Today, many of the imaginary scenarios pictured in sci-fi films of the 1980s and 1990s, such as self-driving cars, have hit the ground.

Secondly and surprisingly, the entertainment and gaming industry has played a key role in AI development, thanks to the **development of graphical processing units (GPU)**. These were initially developed for gaming consoles and gradually they outperformed the traditional CPUs, crushing the math behind the AI algorithms. As a result, the computer hardware industry has started to develop processing technologies specifically designed for AI algorithm computing tasks.

The world is being reduced to data and data will be king.

JAMES WHITTAKER
TECH EVANGELIST, MICROSOFT

Self driving cars were still science fiction in the 1980s and 1990s.

A third driver for AI development is **data in exploding volumes**. Around 2015, we reached the point where more data was created in two years than in the entire previous history of the human race. The exponential growth of data is predicted to continue for years to come. Simultaneously, cost for storing data has radically decreased, making it feasible to manage and maintain data at a more granular level and over longer periods of time. We now have more data available than ever to feed the algorithms for improved performance.

The fourth factor is the **transmission of data over mobile networks** thanks to rapid technology development. Following the launch of 3G networks in the early 2000s for basic mobile internet, 5G is now planned to be launched by 2020. 5G will be capable of handling, for example, high definition streaming of smartphone videos for augmented reality and virtual reality applications through its ultra-fast speeds and really low delays.

Finally, modern **cloud platforms are pulling all the above together**, accelerating AI. The cloud enables everyone, including businesses, academic research institutes, and even individuals, to run experiments and develop even more powerful algorithms for different use cases in a way we could have only dreamt about a decade ago. What used to be proprietary high-cost information technology is now available for everyone at a reasonable cost.

We believe that the technological tipping point to initiate a virtuous cycle for AI application development has now been reached. We are truly excited to see how organizations will transform to leverage the potential in the next five years and more.

Key drivers for "AI explosion"[2]

- Hardware
- Algorithms
- Data
- Connectivity
- Cloud

The current hype around artificial intelligence creates confusion and biases for the people. More emphasis should be put on building awareness on what AI really is and what it is not.

JOKKE RUOKOLAINEN
VEIKKAUS

Hype Cycle of AI[1]

AI

| Innovation trigger | Peak of inflated expectations | Trough of disillusionment | Slope of enlightenment | Plateau of productivity |
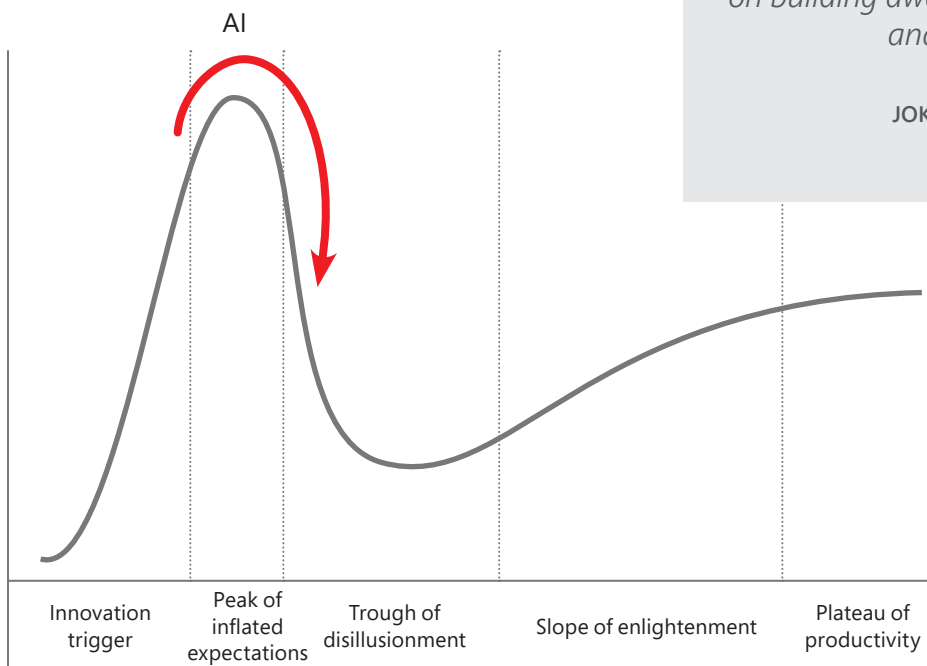
AI is passing the peak of inflated expectations towards the plateau of productivity.

[1] Adapted from Gartner, 2017. Hype Cycle for Artificial Intelligence.
[2] McAfee and Brynjolfsson, 2017. Machine, Platform, Crowd: Harnessing Our Digital Future.

€4,600 billion benefits for GDP from AI projected by 2023.

What is the AI impact globally?

In the last couple of years, we have seen a number of studies and market assessments on the potential and impact of AI. The most recent ones have projected AI market revenues for 2018 to already be somewhere between 6.6 and €400 billion[1, 2]. McKinsey estimates that AI could generate an additional €550 billion in digital front-runner countries' combined GDP by 2030[3]. Globally, AI is expected to boost the global GDP by 14%, or €13,000 billion by 2030[2].

AI impact on global economy

€ billion
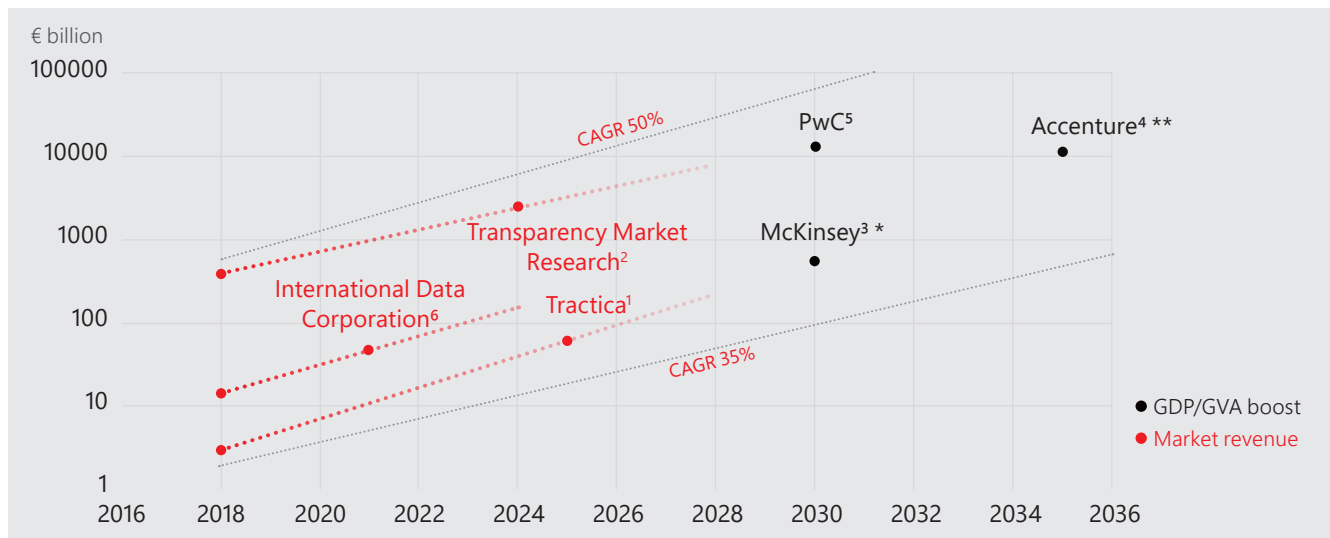
Estimates of AI market revenue and global AI influenced GDP/GVA growth

* McKinsey: GDP, 9 European digital front-runner countries: Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, Netherlands, Norway, and Sweden
** Accenture: GVA, across 16 industries in 12 countries. GVA is a close approximation of gross domestic product that accounts for the value of goods and services produced.

As is evident from the differences in the forecasts, defining AI is not exactly a straightforward task. However, the bottom line of all the above papers is the same – **AI will be key in transforming and defining the future of work and productivity, and the opportunity is massive.** Furthermore, these numbers show a significant market growth rate: all assessments project the compound annual growth rate to be over 35%, and some expect it to reach 50% in the coming years.

Initially, economic growth is expected mainly due to increased productivity of work. Going forwards, consumer behavior is gaining importance as AI will stimulate consumer demand through a greater product variety and product enhancements such as increased personalization, attractiveness and affordability. In 2030, 40% of the added €13,000 billion will likely derive from increased productivity, while 60% of it will result from increased consumption. Wielding a pair of binoculars instead of a telescope, in 2023 the magnifying effect AI will have on global GDP is expected to reach €4,600 billion, nearly 70% of which will be through increased productivity[5].

Analysts forecast **35-50%** compound annual growth rates (CAGR) in AI market.

[1] Tractica, 2017. Artificial Intelligence Market Forecasts.
[2] Transparency Market Research, 2016. Artificial Intelligence Market - Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2016 - 2024.
[3] McKinsey, 2017. Digitally-enabled automation and artificial intelligence: Shaping the future of work in Europe's 9 digital front-runner countries.
[4] Accenture, 2017. How AI boosts industry profits and innovation.
[5] PwC, 2017. Sizing the prize.
[6] International Data Corporation, 2018. Worldwide Semiannual Cognitive/Artificial Intelligence Systems Spending Guide.

How is Finland approaching AI?

Globally, investing in AI is a no-brainer. But what does this all mean for Finland – as a relatively small economy, should we strive to be a driver in the Fourth Industrial Revolution, or take the passenger seat, sit back, and enjoy the scenery?

According to the World Economic Forum Global IT report 2016[1], Finland is one of the seven spearheading countries to benefit from innovation in the information revolution. Finland shows top marks in skills, infrastructure, and the ability to generate economic impact. On the other hand, the World Economic Forum views the Finnish government as promoting ICT less proactively than in the past: indicators for government procurement of advanced technologies, importance of ICT to government vision, and using ICT to boost government efficiency, have all been dropping.

In 2017, the Finnish government actually took a strong, proactive role in nurturing AI development in Finland. Mika Lintilä, the Minister of Economic Affairs, appointed a steering group to prepare a proposal for Finland's artificial intelligence program. The minister underlines that artificial intelligence has become a core element of digitalisation, and Finland intends to be at the forefront of this development in line with its Government Program. In October 2017, the Finnish Ministry of Economic Affairs and Employment published a guidebook on how to ensure Finland becomes an outstanding competitor in AI utilization, outlining eight key actions to take in striving for this ambitious goal[2].

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8 key actions for Finland to take

1. Enhancement of business competitiveness through the use of AI

2. Effective utilisation of data in all sectors

3. Ensure AI can be adopted more quickly and easily

4. Ensure top-level expertise and attract top experts

5. Make bold decisions and investments

6. Build the world's best public services

7. Establish new models for collaboration

8. Make Finland a frontrunner in AI

Source: Ministry of Economic Affairs and Employment of Finland, 2017. Finland's Age of Artificial Intelligence.

"We shouldn't neglect the significance of a vital and globally attractive AI ecosystem for our national competitiveness.

PEKKA ALA-PIETILÄ
FINNISH ARTIFICIAL INTELLIGENCE PROGRAM LEAD

€160 million AI investment program has been launched by the Finnish government.

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[1] World Economic Forum, 2016. The Global Information Technology Report 2016.
[2] Ministry of Economic Affairs and Employment of Finland, 2017. Finland's Age of Artificial Intelligence.

China just invested **€1.7 billion into a single initiative** – an AI innovation park outside Beijing.

In January 2018, Business Finland announced the new AI Business program, which will offer funding of €160 million for Finnish businesses' AI initiatives during the next four years. Closely linked to the work of the steering group appointed by Minister Lintilä and the artificial intelligence program, AI Business aims to make Finland the best place to research, develop and utilize artificial intelligence, and boost the country's competitive edge through building global ecosystems and attracting additional investment. With these plans, it is clear that Finland aims to be one of the leading AI countries, taking the driver's seat.

However, competition is fierce with other countries announcing similar programs with much larger investments. For example in China the government is investing €1.7 billion into an AI innovation park to be located outside Beijing[1]. France, in turn, has announced their national AI program with €1.5 billion funding[2]. Finland and its businesses need to use the benefits of being a smaller nation: agility, innovativeness and ability to learn fast.

We have to create the conditions for fair play also in the digital world, where AI is utilized. The goal is not to support the creation of more monopolies, but to find ways to improve collective well-being in the society.

PÄIVI SUTINEN
CITY OF ESPOO

[1] Politico, March 2018. Article titled *Europe's AI delusion*.
[2] Wired, April 2018. Article titled *Emmanuel Macron Talks to WIRED About France's AI Strategy.*

How will AI impact Finland?

In 2017, Finland managed to reach a GDP growth rate of 3.3%, faster than the EU and euro area averages[1]. However, this growth is expected to settle at around 1.50% by 2023[2]. If a successful AI strategy is actively advanced by both the government and businesses, by 2023, Finland could at least double that growth rate[3].

The estimated additional GDP potential from AI induced growth ranges from €5 to €24 billion (a 10% increase compared to projections for a more conservative approach) in 2023, depending on the timeline of AI adoption and maturity development. This increase comes as a result of both increased workforce productivity and enhanced product and service quality. The total cumulative increase in the most positive scenario would generate an additional €64 billion in to the national economy over the next five years.

The increase in GDP growth is likely to fall somewhere in between, as the race for the most successful evolution of society, regulation, and government and business agendas is still on, and AI adoption is not yet fully developed, but very much on the way. If the current national initiatives catalyze AI adoption as aspired, and Finland obtains the pole position for the AI era, we are fully poised and able to increase the Finnish GDP by €20 billion in 2023, generating a total cumulative economic boost of €47 billion. However, the only way to reach those numbers is to embark now, and do so collectively across all industries.

If Finland's AI initiative is successful, we can anticipate €20 billion increase in Finnish GDP in 2023.

Finnish GDP projections in various AI adoption scenarios

Source: PwC analysis

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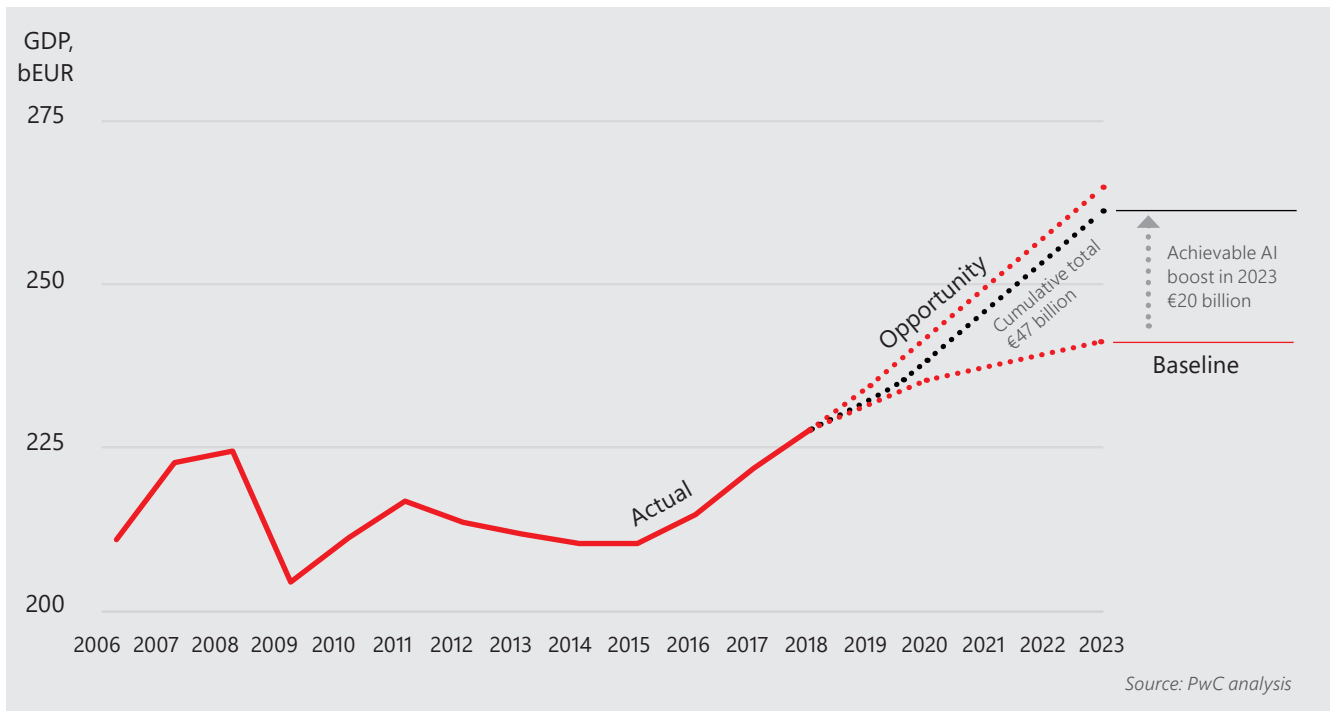
[1] European Commission, 2018. Winter 2018 Interim Economic Forecast.
[2] International Monetary Fund, 2017. World Economic Outlook.
[3] McKinsey, 2017. Digitally-enabled automation and artificial intelligence: Shaping the future of work in Europe's 9 digital front-runner countries.

How will AI impact Finnish industries?

The focus industries of this study cover retail and consumer, financial services, healthcare and manufacturing. Across these industries, there is variation in the drivers, feasibility and short- and medium-term impact of AI for the innovator companies. Drawing from the sector estimates of the PwC AI impact index[1], we estimate that by 2023,

individual industry sectors may increase their operating margins, i.e. how much of each euro of revenues is left over after both costs of goods sold and operating expenses are considered, by up to 60-100%. The difference in the industry specific 'AI boost curve' shapes reflect the impact of two different factors: 1) the speed how the industries are capable to adopt different AI applications and 2) the AI solution development to address the industry-specific business issues.

AI growth boost varies by industry

Source: PwC analysis
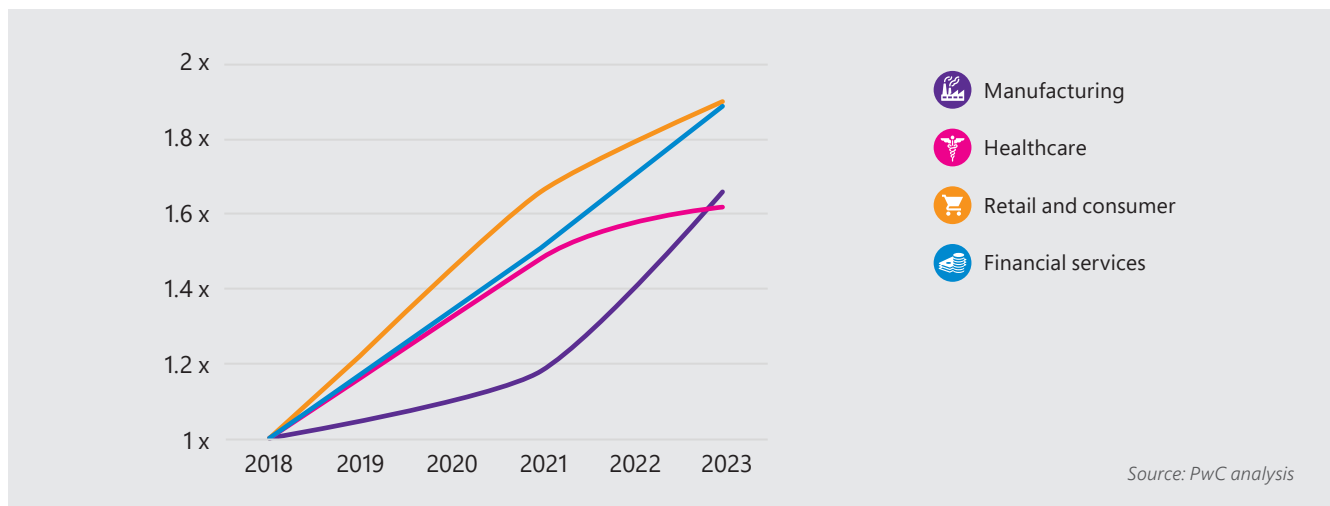
Assuming that AI adoption will start fully in 2018, the AI boost factor indicates the multiplying effect of AI over the estimated industry growth rate without AI.

Below we outline some of the industry-specific key drivers that are giving shape to the AI boost curves.

In manufacturing, short-term benefits are expected to come mostly from process automation and productivity-based solutions. In the mid-term, more complex processes can be automated, as intelligent automation offers considerable potential, and predictive maintenance and optimization applications further boost performance.

In healthcare, immediate productivity enhancements are being explored e.g. through intelligent scheduling. Data-driven diagnostics and assisted treatment decisions are undoubtedly on their way, but it may be some years until their full potential is available.

In financial services, the proliferation of robo-advisors and using AI for customer service will continuously

increase productivity. Consumption will likely be accelerated through customized options for customers who welcome solutions tailored individually for them.

In retail and consumer, recommendation engines are already increasing conversion by helping customers find what they want. In the near future we will see more customized products, which will further boost the consumption impact AI will have on the industry.

As emphasized in the guidebook published by the Finnish Ministry of Economic Affairs and Employment, the public sector will play a key role in setting and developing the foundation for the future. Overarching the whole economy, a successful national and local governmental approach to AI and its application opportunities will be crucial in creating an innovative environment that encourages investment in and adoption of AI in all sectors and industries.

KONE

24/7 Connected Services

KONE launched 24/7 Connected Services in February 2017. KONE uses an IoT (Internet of Things) platform and AI capabilities to monitor and predict the condition of elevator and escalator sensor data.

Sensors analyze important data to identify usage patterns, equipment condition and and potential faults that could develop. The data is processed in a cloud platform for advanced analysis. The AI used with KONE 24/7 Connected Services can learn to better predict when a breakdown is likely to occur and/or servicing is needed. In this way, facilities managers and building owners can dramatically improve the reliability and uptime of elevators and escalators, bring a better experience, shorten journey times and improve the flow of people in big cities.

With the current system, data from elevators and escalators is turned into understandable, visual information for KONE's technicians and customers through online apps and tools. KONE can also provide more information to customers by monitoring the safety and condition of the equipment 24/7. The benefits of this use-case for different stakeholders are significant. First of all, KONE's customers get a better visibility to their assets. KONE can provide much more information to its customers by predicting problems before they happen, taking action before breakage as well as monitoring the safety and condition of the equipment around the clock.

It is possible to bring more insight, more data and powerful analytics which ultimately meet customers'

About KONE

The mission of KONE is to improve the flow of urban life. As a global leader in the elevator and escalator industry, KONE provides elevators, escalators and automatic building doors, as well as solutions for maintenance and modernization, which add value to the life cycle of any building. Through more effective People Flow®, they make people's journeys safe, convenient and reliable, in taller, smarter buildings, and help cities to become better places to live in.

Source: Company's web page

changing needs and expectations on speed, transparency and predictability for maintenance. For people using buildings this means being able to enjoy better services with less waiting time and a smoother experience.

Improved remote diagnostics and predictive maintenance can help technicians be better prepared when they arrive on site, and increase the speed of solving callouts. The service is not only about bringing more than 20,000 service technicians more tools and expertize. It is about KONE teams being able to help customers more, solve their problems and be in tune with their needs.

"
KONE has always been a very data and number centric organization – we have always carried out business decisions based on data. Now, AI and Big data gives us even more insight to make our decisions.

TUOMAS HEIKKILÄ

KONE

How will AI impact jobs?

Automation and AI have already, and will without doubt, continue to impact human employment. Currently, even in digitally-adept countries, it is estimated that with ready-for-adoption technologies, 6% of occupations could be almost completely automated. Moreover, 60% of employees spend 30% of their working hours on tasks that could be automated. Automation and AI are certain to influence all employees and the content of work.

According to the recent estimates, 26-35% of Finnish jobs will be at risk[1, 2]. For 7% the risk is seen as high. The risk varies by industry, with retail and consumer, and manufacturing projections reaching 40% due to automation potential. In financial services, 1 in 3 jobs are at risk of automation. For health and public sector employees the automation potential is in the range of 15-20%.[3]

On the other hand, Gartner estimates that by 2020, artificial intelligence could create more jobs than it eliminates[4]. The alleviating effect of new job creation will likely even cancel out the losses in some sectors, with the health sector enjoying the most positive outlook of continued increase in job demand. As there are very few occupations where all tasks could be given to machines, automating the mundane, repetitive tasks will often have only positive effects: it gives employees time to focus on the interesting challenges in their job, learn new skills, and remold their current job description to concentrate on more rewarding activities.

The outlook for Finland is anything but bleak. Topping the charts in a number of categories, like education,

skills and availability of the latest technologies[5, 6], Finland is a prime candidate for leveraging AI to increase well-being through economic impact and job satisfaction.

As the fifth key action "make bold decisions and investments" in the AI guidebook of the Finnish Ministry of Economic Affairs and Employment underlines, the AI revolution provides an unforeseen opportunity for the Finnish society to take the next leap in evolution towards the world of tomorrow.

Artificial intelligence could create more jobs than it eliminates by 2020.

7% of jobs in Finland fall into the high risk category.

60% of employees spend 30% of their working hours on tasks that could be automated.

> " *AI is not about replacing people with machines, it's more about changing the current ways of working and this requires a cultural change and an ability to adapt.*

MIKKO JOKIO
STORA ENSO

[1] McKinsey, 2017. Digitally-enabled automation and artificial intelligence: Shaping the future of work in Europe's 9 digital front-runner countries.
[2] Arntz, M., T. Gregory and U. Zierahn, 2016. The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis.
[3] PwC, 2016. Will robots steal our jobs?
[4] Gartner, 2017. Predicts 2018: AI and the Future of Work.
[5] World Economic Forum, 2017. The Global Competitiveness Report 2017–2018.
[6] World Economic Forum, 2016. The Global Information Technology Report 2016.
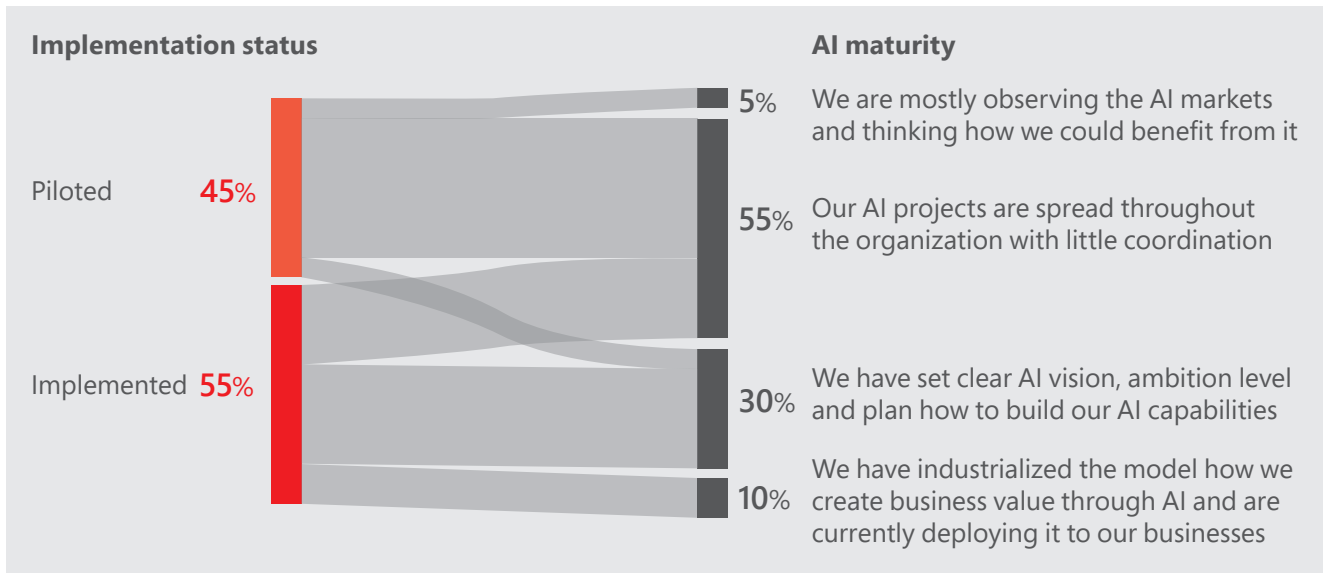
What is going on in practice?

As is succinctly put in the popular quote, often attributed to the Danish physicist Niels Bohr, "prediction is very difficult, especially if it's about the future." In the large volume of current predictions, the clear prevailing consensus is that AI and its sophisticated applications will, in the quite near future, transform the way we live, and how economies and businesses are run. Instead of creating yet another forecast of possible future scenarios, in this study we dive into the practicalities of AI solutions and applications.

We invited 20 industry leading organizations to elaborate on their current success stories in the realm of AI and point out the obstacles they have encountered. Leveraging the unique human capability of learning from the actions and experiences of others, we set out to collect a field guide of best practices, top tips from the Finnish trailblazers. We hope this will help you and your organization to also get started on AI, and find and master your own path to success with artificial intelligence.

What is the Finnish maturity level in AI?

Implementation status | **AI maturity**

Piloted **45**%

Implemented **55**%

5% We are mostly observing the AI markets and thinking how we could benefit from it

55% Our AI projects are spread throughout the organization with little coordination

30% We have set clear AI vision, ambition level and plan how to build our AI capabilities

10% We have industrialized the model how we create business value through AI and are currently deploying it to our businesses

Q: To what extent have you implemented AI within your company?

Q: Which of the following best describes the state of your current AI activities?

Over 50% of the interview respondents already had AI implementations in production, creating new actionable insights for their business. While most organizations have AI-enhanced solutions already in production, the majority of current AI efforts are focused on experimenting and learning. All of the interviewed organizations had run several pilot projects to learn and gain valuable experience about leveraging AI to answer their business needs.

To put the level of AI advancement of the invited forerunner companies into context, a recent study[1] outlines that 80% of Finnish industrial companies do not even have plans to leverage AI in their business.

Over **50%** of the interview respondents already had AI implementations in production.

AI endeavors in organizations are still often dependent on individual people driving them in their own business domains. With proven positive impact, business leaders are beginning to adopt new AI concepts into the short-term visions for the organizations, establish governance models and propagate these approaches as part of an organization-wide strategy. To date, only a handful of respondents recognized AI as a clear part of the roadmap for the company, and only a few reported having a formal model of how to mobilize AI within the organization as an integral part of everyday functions. Notably, a few respondents with implementations approached AI by leaving responsibility for and ownership of the projects at the hands of the individual business functions.

As the first point of understanding AI in the interviewed organizations, we asked about the AI agenda: 75% of the organizations interviewed had one. In most organizations, this agenda was a responsibility of the management team or senior leaders. 24% of the interviewed organizations stated that their AI agenda is regularly a discussion topic for the Board of Directors,

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[1] Strategy&, 2018. Global industry 4.0 study.

and another fifth of the organizations considered their CEO as the primary authority for AI in their organization.

As important as having an agenda, is acting upon it. Most commonly, the responsibility to drive and manage the AI initiatives is with the management team. Only one organization reported that the CEO has a hand in the actual AI projects, whereas in 50% of the organizations, AI portfolio management is in the hands of the management team, and in 44% projects are the responsibility of the business leaders.

Board members and CEOs have a role in driving the AI mission, but practical execution is usually delegated to level three leaders and further.
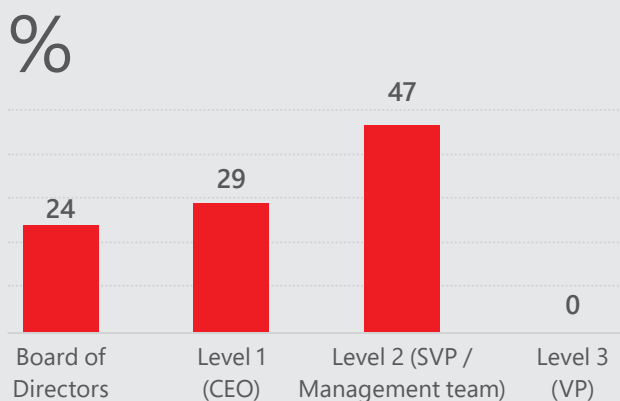
"
Many of the best AI applications have been born from the curiosity and tenacity of a single individual. Sometimes all it takes is that one person.

JARI KÄHKÖLÄ
HUS

75% of the interviewed organizations had a defined an AI agenda.

AI ownership
%

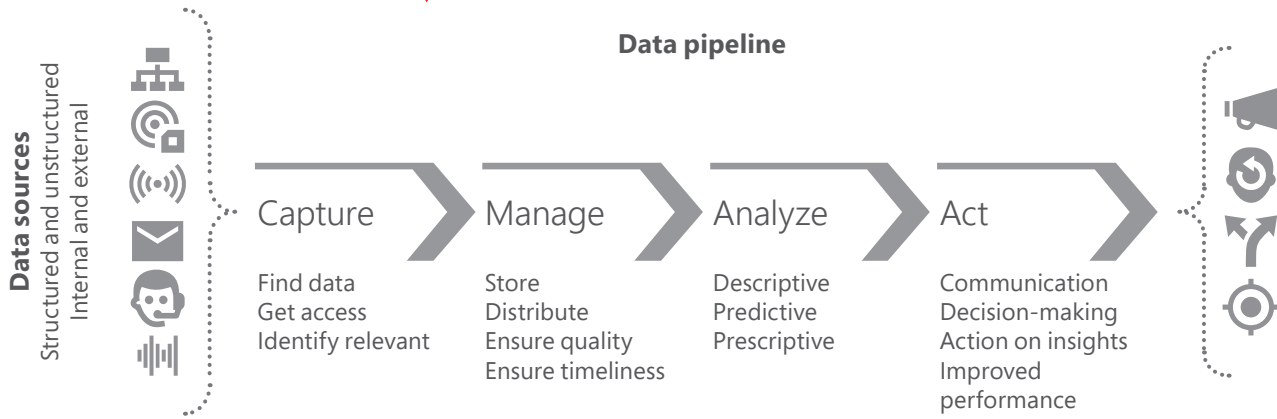| Value	Category
24	Board of Directors
29	Level 1 (CEO)
47	Level 2 (SVP / Management team)
0	Level 3 (VP)

Q: At what level is the AI agenda primarily anchored in your organization? (set direction, initiatives, plan and ensure execution)

AI execution
%

Value	Category
0	Board of Directors
6	Level 1 (CEO)
50	Level 2 (SVP / Management team)
44	Level 3 (VP)
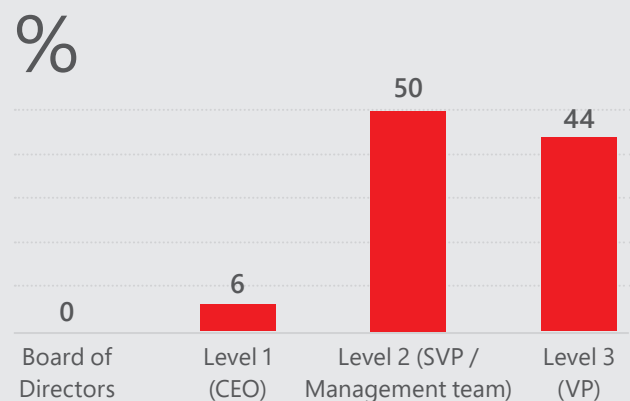
Q: Who drives the AI initiatives in your organization? (owns budget, manages portfolio, sets projects)

How solid are the foundations for AI?

Data sources
Structured and unstructured
Internal and external

Data pipeline

Capture
Find data
Get access
Identify relevant

Manage
Store
Distribute
Ensure quality
Ensure timeliness

Analyze
Descriptive
Predictive
Prescriptive

Act
Communication
Decision-making
Action on insights
Improved
performance

In order to succeed on their AI journey, organizations need to be able to source, manage and take action on data, which is the primary value driver for AI. We took a four-step approach to investigate how solid are the foundational capabilities to enable building AI capabilities.
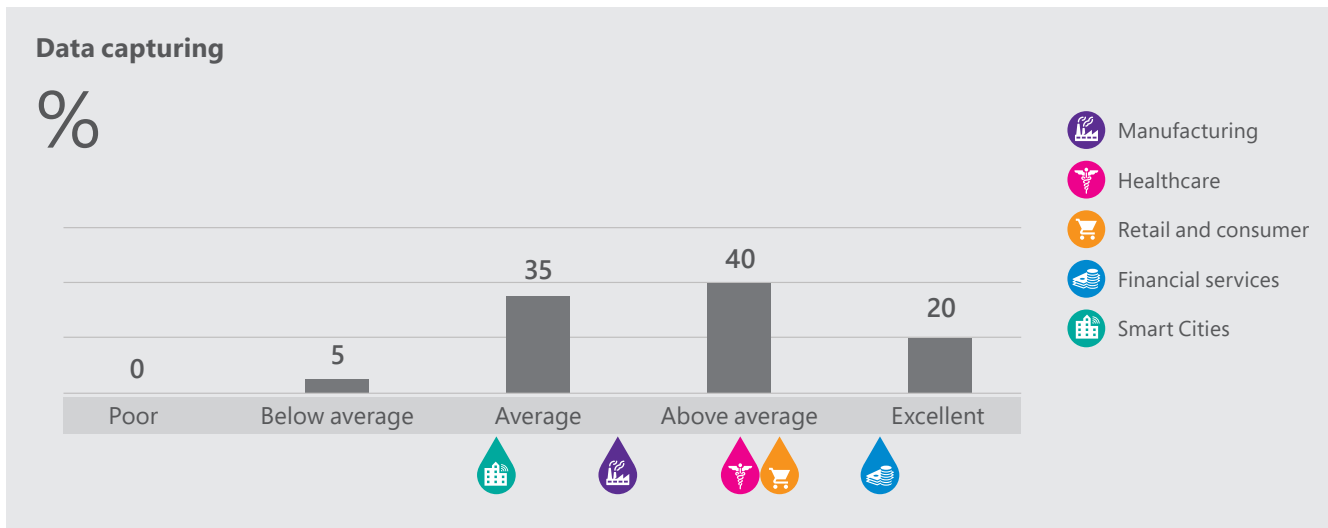
Overall, the interviewed organizations are most confident in the first stage of the data lifecycle: capturing data. Financial services respondents in particular have an excellent foundation, partly as a result of regulation and reporting which they have been able to build on. Retail and consumer sector respondents also have high trust in their ability to collect the relevant data about their customers and products.

Public sector's ability to increasingly provide open data for secondary use is crucial for our national economy, industrial sectors and start-up scene.

PEKKA ALA-PIETILÄ
FINNISH ARTIFICIAL INTELLIGENCE PROGRAM LEAD

Data capturing
%

Manufacturing
Healthcare
Retail and consumer
Financial services
Smart Cities

Poor	Below average	Average	Above average	Excellent
0	5	35	40	20

Q: How do you see your organization's current capability in efficiently and effectively capturing relevant data?

Data diversity

	Currently used	Planned to be used
New purpose-built sources relevant to the use case (e.g. new sensoring)	28%	
Internal structured data sources (e.g. ERP, CRM, BI system data)	100%	
Internal unstructured data (text, images, videos, etc)	33%	28%
External structured data	44%	11%
External unstructured data		11%
Open data	17%	11%
2nd party data from business partners	6%	6%
3rd party data commercially acquired	6%	

Q: Which data sources are you utilizing in your AI use cases?

Companies are confident in their ability to collect data, but the data they currently utilize is mainly structured internal and external data, as well as internal unstructured data. This approach is rather narrow and there are additional opportunities and value to be gained by utilizing a broader range of different data, e.g. open data, partner data and 3rd party data.

As a natural first step, all respondents base their AI applications primarily on internal structured data, while half of them also use structured external sources. Some organizations, mainly in the manufacturing sector, have developed new, purpose-built data sources like sensors answering the needs of AI applications.

Internal unstructured data sources are increasingly planned to be included as inputs to AI applications. In the piloting phase, organizations are first targeting their own data sources, and as the AI solutions start bringing

insight and value, the approach is both expanded and refined through potential value-adding external sources.

Note: The EU General Data Protection Regulation, GDPR, (to be enforced May 25th 2018) requires companies to demonstrate that all personal data on EU citizens is collected with the consent of the data subject. Furthermore, the data can only be used for the purpose it was collected for. Failure to comply with the regulatory requirements can lead to sanctions up to 4% of global annual turnover.

There is untapped opportunity in utilizing 3rd party data.

Data management

%
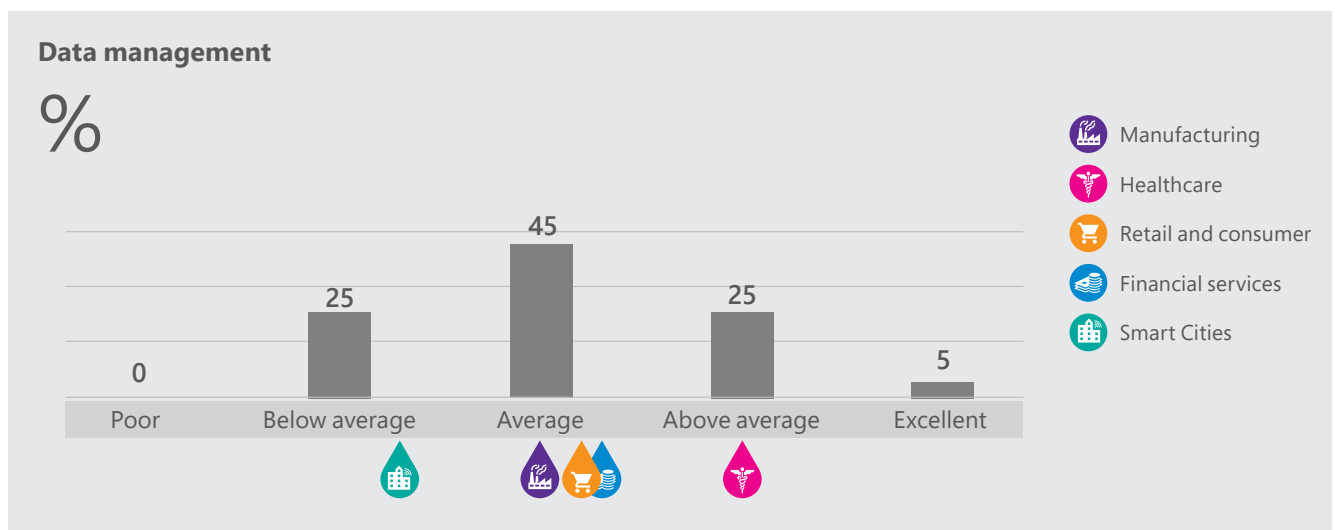
Q: How do you see your organization's current capability in data management, e.g. storing, ensuring the quality, and governing data as an asset?

The area where the respondents seem to lack confidence in their capabilities proved to be data storage and management. Here, the health sector respondents are the standout performers, since data quality, accessibility, and accuracy have always been vital for health care. As data fluxes continue to grow exponentially, it is easy to understand that organizations may be struggling to set up their data estates, and prioritize the data that is and will be most important.

Data storage and management, including data quality and governance, clearly pose the greatest challenge and opportunity for companies. It is the basis for all AI development efforts and a clear sweet spot for companies to focus on.
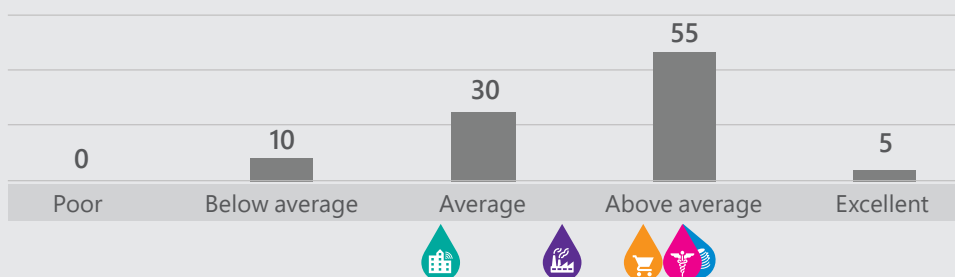
> *Data quality is the biggest challenge. 80% of time is spent on cleansing data. If the data is in a good shape, the modelling process becomes very smooth.*
>
> **HE ZHANG**
> WÄRTSILÄ

Data analytics

%

	Poor	Below average	Average	Above average	Excellent
	0	10	30	55	5

Manufacturing
Healthcare
Retail and consumer
Financial services
Smart Cities

Q: How do you see your organization's current capability in turning data into information and insights through basic and advanced data analytics and data visualization?

The second most trusted area of expertise for the organizations is analytics, with 60% of respondents fairly or very confident about their skills. Demand for data scientists is booming, and competition for talent is getting fiercer. To ensure adequate skills and people for their analytics needs, organizations are often both actively recruiting talent as well as offering internal development programs and incentives to encourage their personnel to answer the requirements of the near-future[1]. Yet, only one of the organizations rated their current capability level in analytics as excellent.

It is important to note, however, that analytics is a very broad term. While companies are confident in their ability to create insights with descriptive analytics, there is still a huge need for development, when it comes to fully leveraging advanced, e.g. predictive and prescriptive analytics.

[1] PwC and Microsoft, 2017. How Finland is embracing digital transformation – Digital challenges and successes showcased.

Elisa

Improved targeting for telemarketing

Outbound telemarketing has traditionally been a good and effective sales channel for Teleoperators in Finland. The hypercompetitive market has required an active outbound strategy to defend and expand the market share against competitors. Elisa uses telemarketing to both converting prospects to customers as well as targeting the current customers with relevant up- and cross sell offers. Telemarketing is effective but also has higher cost-per-order than for example online sales channel.

Elisa uses advanced analytics and machine learning to improve the quality of the target prospect- and customer lists for telemarketing. Elisa's machine learning algorithms identifies the most promising targets and timing for successful outbound offers. The model continuously learns from the successes and failures improves its accuracy over time.

The data for the targeting model comes from various sources across Elisa. Basic subscription and product data comes from operational systems, but increasingly also other non-traditional data sources are utilized. Elisa aims to get a clear understanding of the consumers' needs, preferences and motivations and to find windows of opportunity for timely up- and cross-sell interventions.

Improving target list quality and making personalized offers naturally increases revenue with more successful sales calls. When telesales hit rate grows, it also significantly reduces the cost-per-order as more calls turn into a sale. These value levers make improving

About Elisa

Elisa is a telecommunications, ICT and online service company and a market leader in Finland. Elisa recognizes that digitalization is influencing the work that people do, ways of working, management, tools and the working environment, and hence their business is continuously changing. During their 135-year history, they have always been enthusiastic about utilizing new technologies and ways of working. That is why the vision of Elisa is to become a recognized international provider of digital services and a brand of excellence.

Source: Organisation's web page

targeting a naturally attractive and relatively simple to calculate AI use case. Elisa has already seen promising uplift in the relevant KPIs and is continuously investing to improve the targeting models further.

In more long-term perspective, enhanced targeting also should translate to better customer experiences, improved customer satisfaction and therefore eventually to reduced customer churn rates. Successful targeting algorithms can transform the outbound sales experience from an inconvenient distraction to a service experience for the customers. Elisa is monitoring its customer experience KPIs to find out the exact business impact on this front.
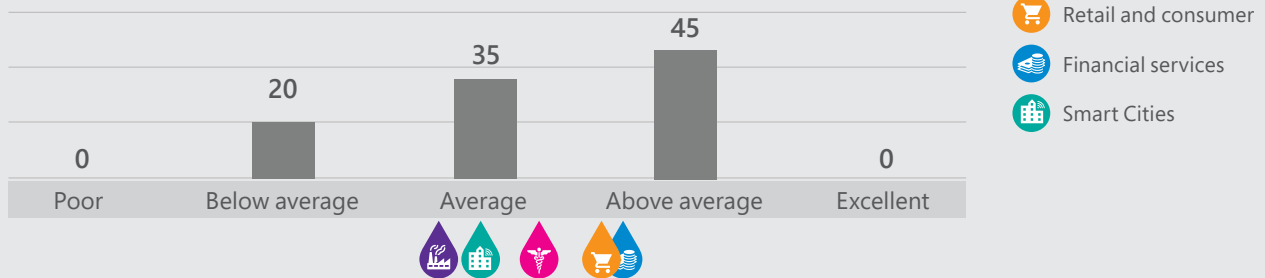
"
There are also benefits to an organizational culture that does not force a too centralized and harmonized approach to AI, especially too early on in the journey, because there are a lot of learnings and insights to be gained from trying different things in different ways throughout the organization.

JUKKA-PEKKA SALMENKAITA

ELISA

Action on insights

%

	Poor	Below average	Average	Above average	Excellent
	0	20	35	45	0

Legend:
- Manufacturing
- Healthcare
- Retail and consumer
- Financial services
- Smart Cities

Q: How do you see your organization's current capability in turning the insights from data analytics into business benefits through sharing and communicating the insights, making data-driven decisions and taking action?

Across all sectors, the most evenly spread capability is the ability to turn insight into business value. The manufacturing respondents scored the lowest in this category, in line with previous studies and our industry-specific AI boost effects (see Section 1.5 How will AI impact Finnish industries?) estimating that the manufacturing sector is expected to have a slightly longer delay in enjoying the full effects of AI.[1]

Interestingly, these findings are supported by the findings of our previous study[2], where only 12% of respondents were confident they were utilizing their customer data to a very high degree. The results also reflect the weight of positive expectations AI carries, with no respondents yet confident about optimally realizing all attainable benefits.

Turning insights into action is not only about the technical capability of creating recommended actions based on data. There is a major cultural challenge related to people's willingness to act upon the recommendations created through data analytics and therefore change management efforts are required across all companies.

> *You need to be willing to accept what the data tells you – even the painful truth.*
>
> **TERO BLOMQVIST**
> TAMPERE

> *AI as itself is not a silver bullet, only the deployment to organization makes the difference.*
>
> **ANNI RONKAINEN**
> KESKKO

[1] PwC, 2017. Sizing the Prize.
[2] PwC and Microsoft, 2017. How Finland is embracing digital transformation – Digital challenges and successes showcased.

OP

Automated insurance claims handling

OP handles hundreds of thousands of insurance claims each year. OP has been piloting the use of automation in order to find efficiencies in the streamlining and speeding up the insurance claims process. Utilizing machine learning and AI are next steps to improve balance between risk, customer experience and operational efficiency of this process.

Not all claims lend to automated processing, but many do. OP has identified that it can automate a bulk of the basic claim application processing and thus free resources for handling the more complex cases that require human judgement. The potential savings are significant and rather easily quantifiable.

Data in the insurance claims process is both in structured and unstructured format. While utilizing AI to structured data is mature, unstructured data (e.g. pictures) provides a great challenge for machine learning. OP plans to integrate unstructured data sources like images to the process. Visual image recognition can be used in many cases to support and validate the claims. Also new external data sources support this.

AI for fraud detection is efficient, spotting irregularities from much larger datasets than a human processor

could ever do. This helps the claims process to be even more effective and saves a lot of manual work.

Customer experience is lifted by offering much faster handling of the claims. Some people might however be put off if they find out that their claims are handled by machines rather than humans. GDPR offers possibility to ask 'traditional' processing by humans. OP treads this carefully as customer experience and satisfied customers are in the heart of the group's strategy.

About OP

OP Financial Group is Finland's largest financial services group. OP's strategy is based on long-term business development and renewal in the best interests of their customers. They aim to gradually change from a plain financial services provider to a diversified services company of the digital era with a strong financial services expertise. OP Financial Group annually invests more than 400 million euros in the development of new products and services and in technology modernization.

Source: Company's web page

"

One key aspect in all AI-related development is ownership and governance. Who has the end-to-end accountability? What is the best way to get organized around AI and to understand all the interdependencies of cross-functional teams and this new type of operating model.

HARRI NUMMELA

OP

What are the anticipated benefits?

In most organizations, AI and related development initiatives and investments do not yet hold their own budget but rather are a part of the general R&D portfolio and budget. The investment plans of the interviewed organizations for the next year or two range from hundreds of thousands up to €7 million, with the median estimate being €2-3 million. Also, organizations are making significant employee investments. They are encouraging up to tens of employees, focused especially on data science and development, to fully work on AI related development projects and thus advance the organization's agenda and capability through their own expertise.

Demonstrating a strong belief in AI and determination to leverage its emerging benefits, many of the respondents haven't set any prerequisites for return-on-investment (ROI). Accepting that the world may be standing at the threshold of a revolution, the respondents are keen to promote organization-wide learning and skill development and are eagerly monitoring how their proof-of-concept projects and experiments affect their business. Organizations with the most successful production implementations are already witnessing ROIs of two to five times the initial investment, and are constantly ramping up their experimentation.

Top AI initiatives focused on efficiency have already delivered efficiency boosts of up to 5% in target business functions, and the organizations are enthusiastically observing the trickledown effects they generate in adjacent lines. Still, even organizations witnessing measurable benefits often underline that the main advantage they are after in their AI endeavors is spreading knowledge and know-how throughout the organization while stimulating their employees to participate in the learning path they are now on.

"

AI is not an island on its own. It's part of a wider digitalization agenda.

SAMULI SAVO
STORA ENSO

€2-3million is the median AI investment of the interviewed companies.

HUS

Augmented intelligence for medical diagnosis

According the global econometric projections discussed in the first section of this study report, the healthcare industry is expected to be the most impacted sector by the emerging AI capabilities in the long term. Hence it is of specific interest to dig in deeper what HUS – the Hospital District of Helsinki and Uusimaa, providing specialist medical care treatment to over 500 000 individual patients annually - is experimenting and what are their experiences around the topic. It is not only technologically and functionally astonishing to take a glimpse on practical AI applications and plans in healthcare, but also striking to realize the overarching humanitarian and societal impactfulness of the efforts HUS already has in their operational use and development backlogs.

HUS sees Artifical Intelligence as a key enabler to improve the overall effectiveness of the critical paths in the different treatment processes, putting the value creation to the individual patients always on the first priority. HUS has already a long history of deploying different algorithms and analytics applications, but the latest technology development has opened up new windows of opportunity to take the capability to the next level. The first machine learning -driven breakthroughs have taken place in predicting the risk of sepsis for small premature infants – enabling more timely and comprehensive information for human decision-making, resulting to lives saved.

In addition to using AI to amplify its core medical capabilities, HUS has also deployed leading edge machine learning techniques to improve the efficiency of its administrative processes. One of the best examples in this space is a solution classifying medical referrals into correct bins. The solution leverages text

About HUS

HUS – The Hospital District of Helsinki and Uusimaa – is a Joint Authority formed by 24 municipalities. The aim is to offer patients in all member municipalities a timely and equal access to specialized medical care. Functioning as part of HUS, Helsinki University Hospital HUH is nationally responsible for treating severe, rare, and expensive illnesses and ones calling for the most demanding treatment, special expertise, and technology.

Source: Company's web page

mining and natural language processing algorithms and is capable to achieve accuracy rates of over 90% in sorting documents in Finnish language.

The most promising new areas for benefiting from AI can be found in the core. Currently the specific focus is put in the head area medical imaging. Here the aim is to develop and deploy image recognition algorithms for identification of a possible bleeding below the arachnoid membrane, which remains often invisible in the examination by human eye. For the learning task, HUS uses thousands of anonymized, labeled head area images in training the algorithms deployed on top of their cloud-based data lake solution. Once deployed to production, many individuals, friends and families each year will avoid unexpected departures due to unidentified reasons 1-year after the occurrence of the initial symptoms.
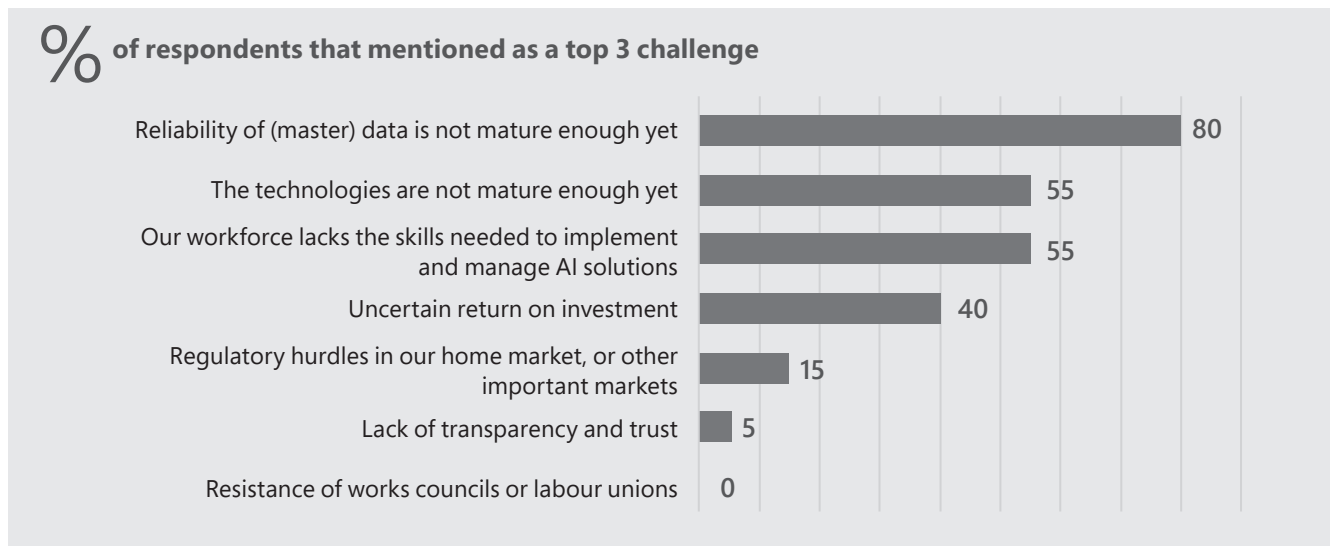
"

ROI calculations are often futile, when it comes to investing in AI within the health care industry. How does one measure the value of a human life?

JARI KÄHKÖLÄ
HUS

What are the biggest obstacles?

% **of respondents that mentioned as a top 3 challenge**

Challenge	%
Reliability of (master) data is not mature enough yet	80
The technologies are not mature enough yet	55
Our workforce lacks the skills needed to implement and manage AI solutions	55
Uncertain return on investment	40
Regulatory hurdles in our home market, or other important markets	15
Lack of transparency and trust	5
Resistance of works councils or labour unions	0

Q: In your opinion, what are the top 3 challenges associated with AI?

The importance of data as the powerhouse for AI is clearly emphasized in the challenges the respondents have encountered and foresee in their AI projects. 80% of respondents listed data reliability as one of the top 3 challenges, with 30% giving it the top spot.

The second place for the most common challenge is shared between the maturity of technologies involved in AI projects, and the skills of the employees using them, with over half of the respondents mentioning both of these challenges. Equally to master data reliability, the maturity of technologies was mentioned as the top challenge by 30% of the respondents, while skill level was seen as the most problematic by 10%. Interestingly, the 30% of the respondents, who had most issues with technology, commonly chose skills as the second biggest challenge.

Do challenges seen in tech maturity and skill level have a causal correlation?

80% of respondents listed data reliability as one of the top 3 challenges.

"
*People often say data is the new oil.
I believe data is actually the new water.
It's everywhere, but the trouble is that
it's often contaminated.*

VESA EROLAINEN
METSO

> **"**
> *The maturity of technologies is not there yet. AI solutions require extensive training, before they start to create value and this teaching process is both costly and time-consuming.*
>
> **MARKKU HEIKURA**
>
> VERO

What are the spearheads for AI?

Functional AI heatmap

Q: To what extent have you implemented Artificial Intelligence in the following company functions?

	Implemented	Piloted	Planned
Product development/engineering			
Procurement			
Manufacturing/assembly/quality			
Project delivery			
Service delivery			
Maintenance and repair			
Logistics (inbound, warehousing, inter-facility, outbound)			
End-to-end supply chain planning			
Customer service, e.g. self-service portals			
Sales			
Marketing and communications			
Order management			
Finance & controlling			
Human resources			

High focus area ▬▬▬▬ Not a focus area

" *Our AI initiatives are highly business-driven. We focus on the areas where true business value can be realized.*

TURKKA KESKINEN
UPM

Current AI applications focus most commonly on the customer operations – customer service, sales and marketing. Many organizations also have implementations in logistics, with retail and consumer organizations leading the wave. Predictive maintenance is a big thing in manufacturing, and successful applications will bring benefits also to the other sectors in the long run.

Naturally, as the core of daily business, product development and service delivery functions enjoy a constant focus of AI initiatives: with many implementations already in place and more in piloting phase, the respondents are already planning future AI projects to enhance their products and services through AI. These initiatives improve quality and customization, serving as the foundation for the anticipated consumption boost inspired by AI.

In human resources, finance and controlling functions, AI applications are still sparse, and focused on automating simple, mostly mechanic reporting activities. Yet, the planned AI efforts are focused in these specific functions.

Amer Sports

Demand prediction for supply chain

Amer Sports uses machine learning to improve the management and predictability of their supply chain. The implemented data platform combines customer data with sales data and makes it easy to analyse, visualise and share the insight across the supply chain.

Initial hypothesis Amer Sports tested was that it is possible to automate the prediction of demand by combining customer data with sales data from the ERP system. Once customers register the products they bought online, Amer Sports is able to trace back the products route through the supply chain. The data also estimates for example how many items of each product is left in each store and when the stock will be sold. Demand forecasts derived from the system enables Amer Sports to be more data driven from procurement to production to shipping and sales.

For example, if the sports watches supplied by Amer Sports are selling particularly well in a sports shop in a particular area, sellers and suppliers will be informed of this through the data platform. A seller can contact the store at the right time and offer more products. This creates additional sales and ensures the availability of products, which considerably increases net sales.

In its first year of operation, the data platform increased the sales of pilot product category, sports watches, by a few per cent in the fourth quarter, which was the goal.

About Amer Sports

Amer Sports is a sporting goods company with internationally recognized brands. The company's technically advanced sports equipment, footwear, apparel and accessories improve performance and increase the enjoyment of sports and outdoor activities. The Amer Sports strategy emphasizes excellence in consumer-centric product creation. Through continuous research and development, Amer Sports seeks to develop new and better sporting goods that appeal to consumers and its trade customers.

Source: Organisation's web page

This was achieved by improving the effectiveness of B2B sales by means of sales data, which was possible even at such short notice.
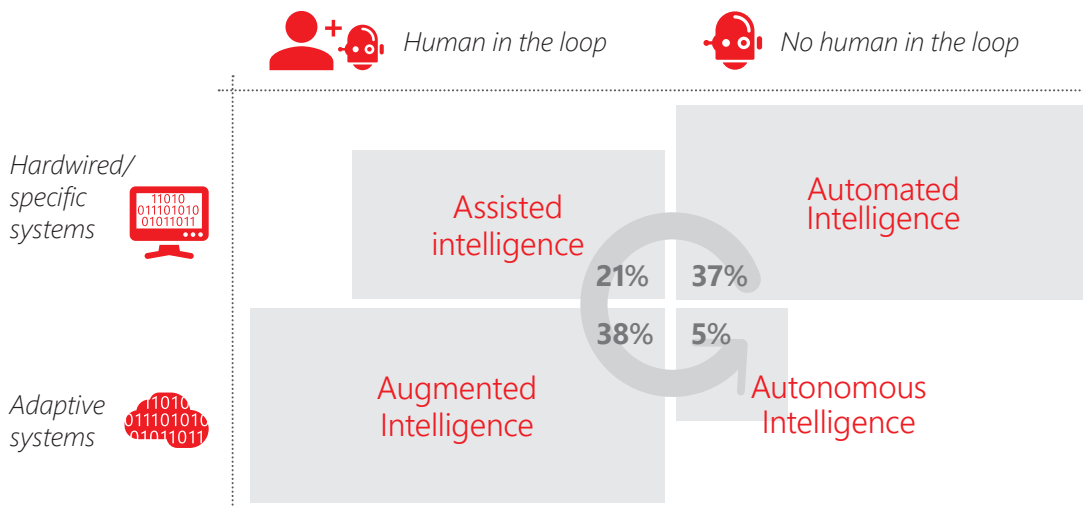
The platform offers unlimited opportunities for further development, for making use of artificial intelligence and personalized services, among other options. Amer Sports aims to develop the platform iteratively for other products and geographical areas.

There is no going back once you get started with AI. Just make sure you get started now!

MIKA TIILIKAINEN
AMER SPORTS

Where does the AI value come from in 2023?

Human in the loop   No human in the loop

Hardwired/ specific systems

Assisted intelligence   Automated Intelligence

21%   37%

38%   5%

Augmented Intelligence   Autonomous Intelligence

Adaptive systems

Q: List the following AI categories according to the extent you anticipate them to deliver business impact in the next 5 years?

The popular future scenario of AI is reflected by the anticipated share of impact the different AI categories will have in the next five years – automation boosting productivity and releasing the workforce from menial tasks, giving them time to focus on more demanding activities, where augmented and assisted intelligence will help leverage the human capabilities to their greatest extent. The pragmatic reality is that fully autonomous applications are unlikely to be in common use by 2023. Today's autonomous pinpoint solutions will proliferate and breach new application domains and areas, but ubiquity is probably still several years away.

" How can we expect to create brain-like capabilities with AI in a situation, where science has only been able to understand a tiny fraction of the human brain?

VESA EROLAINEN
METSO

" In healthcare, the professionals, e.g. doctors, are always accountable, but they have a very positive approach to AI initiatives, and see AI as an important augmentation for their future work.

ANTTI J MIETTINEN
MEHILÄINEN

How to get started?

To allow other organizations to benefit from the experiences the respondents have gained throughout their AI journeys so far, we asked them to share their key learnings and top tips for taking the first steps in AI. Encouragingly, all of them were open and eager to share their takeaways. This open and collaborative mindset fulfils key battle #7 from the Ministry of Economic Affairs: "Create an environment that encourages collaboration". It is also a promising sign that Finland is on the right path to become a true competitor on the global AI stage. So, what did our respondents have to say?

AI journey stepping stones according to respondents' top 3 hints and tips

Think big, start small – but start now

By far the most common advice the respondents gave is to start experimenting, immediately. Giving the competition a head start may prove catastrophic in the future, as there will be little room for followers.

Starting quickly doesn't mean you should start hastily – pick a simple, concrete problem or use case with a measurable goal, and target the quick-wins and low-hanging fruit first to ensure you don't fall down at the first hurdle.

Apply an open-minded fail-fast, learn-fast approach: your first trials will probably prove to be non-optimal, but at some point, you will find something that truly works. However, ditch conventional ROI thinking – the learning curve will be valuable in itself, and the best way to learn is by doing.

Involve many different people to encourage buy-in, and let them ideate problems and solutions, and run experiments. In addition to maximizing the probability of identifying the most valuable use cases, this will spur a change in mindset and culture as you will be able to prove the value of analytics and machine learning in many areas.

TO-DO

Transparency and realism must be made the cornerstones of the AI strategy. Communicate successes as well as failures to create an open environment for discussing improvements needed in AI initiatives and applications. The conversation should not assume that AI is a solution for everything, but rather support an exploratory culture that aims to evaluate different approaches for using AI and determine which applications are successful before broader deployment. Look at different approaches which can help you to get started in weeks.

> *"*
> *Start your AI journey with a simple problem to provide fast results in an understandable manner.*
>
> **JOKKE RUOKOLAINEN**
> VEIKKAUS

> *"*
> *Technical execution and skills are not really the issue, it actually comes down to understanding, what can be achieved with AI and what are the concrete use cases that should be pursued.*
>
> **SAMULI SAVO**
> STORA ENSO

Stora Enso

Predicting production disturbances

The heart of Stora Enso's ten-billion annual business resides in its people, their innovations and capital intense production machinery. To maximize the return on capital employed, automatisation has been the industry trend already for more than half a century. Thus, the collection, storing, analysis and taking action upon data has been infused into Stora Enso's company DNA and innovation work already during several workforce generations. As well as its peers, this has brought Stora Enso into an attractive position to create true business value right from the dawn of the data-intensive AI technologies.

To accelerate the value capture, Stora Enso has established corporate level structures to coordinate, manage the portfolio and provide funding for the digital initiatives across its five business areas. During the past two years, more than 30 projects involving machine learning technologies and advanced analytics methods have been conducted through this structure. On top of this number are still the numerous initiatives conducted in divisional and local levels. Likely needless to say, the range of these initiatives spans across nearly all the processes and functions within Stora Enso's business.

Improving the operability and optimizing the utilization of the production assets are in focal point also in Stora Enso's machine learning initiatives. One particular challenge currently under investigation is how to improve the predictability of physical web breaks in the paper and cardboard production lines. Stora Enso has deployed a clever approach to work with the issue: they have harnessed several concurrent task forces, each having slightly different angle, algorithms, technologies and partners to improve the performance. Once the projects are ready, the results are compared and the

About Stora Enso

Stora Enso is a leading provider of renewable solutions in packaging, biomaterials, wooden constructions and paper globally. They believe that everything that is made from fossil-based materials today can be made from a tree tomorrow with a range of innovative solutions based on renewable, reusable and recyclable materials. Stora Enso are constantly looking for ways in which they can improve processes, save energy and resources in their operations, for their customers and throughout the value chain.

Source: Company's web page

best solution or solutions are evaluated and scaled globally.

Interestingly, Stora Enso has noticed that the biggest challenges in driving the AI initiatives are not in the data nor the technology itself, but in communication and cultural aspects. When freshmen from start-ups meet with experienced business professionals, it may sometimes seem that they are not even speaking the same language, though technically its Finnish words spoken on both sides of the table. Patient communication is the key get on the same page start deep diving into the topical issues.

Stora Enso has been exceptionally successful in regenerating itself during the past decade. AI and machine learning will be amongst the key tools to continue on this path, both in transforming the current businesses and building of new ones.

One of the biggest risks in benefiting from AI derives from a kind of a 'chicken or egg' syndrome: are we able to find the most suitable platform to resolve the business problem or are we biased and find a problem that is a fit for the platform.

MIKKO JOKIO
STORA ENSO

Data first, science second

The second most popular advice from the respondents is that data is key. Bad data is not fixed through good analytics, but if the data is right, even a relatively simple AI application can provide good results. It is also important to understand, that AI applications and algorithms are tools, not end goals.

Building on the foundation of a concrete use case helps identifying the correct data involved in it. Next, ensure the quality of the data, and access to it for the relevant stakeholders. AI is completely reliant on data, so make sure your data foundation is solid.

It is also important to fully understand your data. All data is not equal – some data assets are more relevant than others in specific use cases. It is equally important to understand the relationships between different data assets. The right people to evaluate data relevance and relationships are your data scientists – promote an experimental approach to help them find the killer ideas through data democratization, i.e. give them access to all business data.

TO-DO

Establish a governance body for data. This body should take accountability for data procurement and quality as well as ensure that the data used for the organization's AI capabilities is unbiased. In addition to this, the governance organization also needs to act as a regulatory body to ensure that the AI capabilities and offerings are being used correctly.

Data comes first, science comes second.

HE ZHANG
WÄRTSILÄ
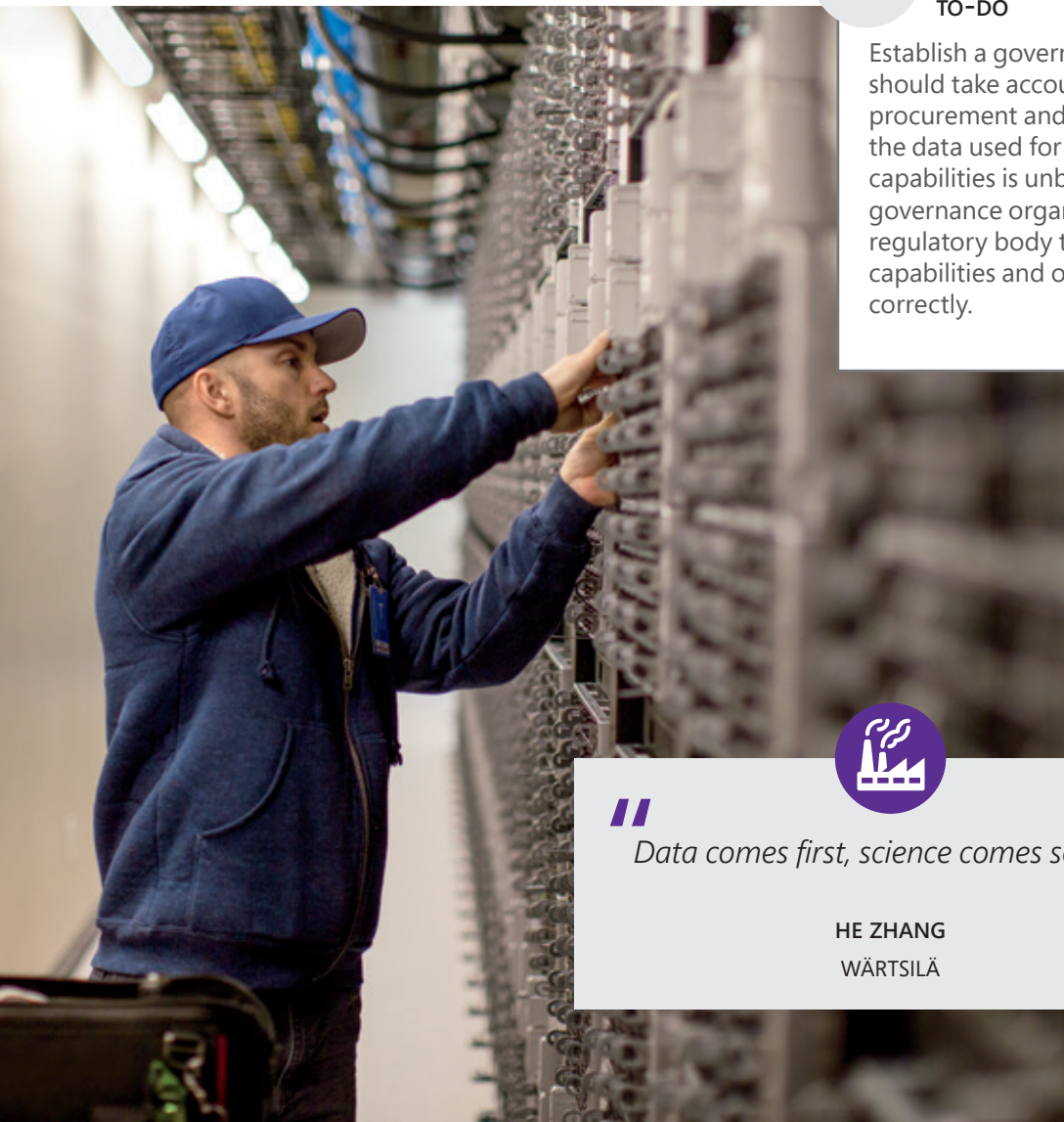
> *The first step each organization should take is to transform from within and break the silos. Transparency and openness are the best safeguard.*

PÄIVI SUTINEN
CITY OF ESPOO

Get your people involved

Along with data, people are your most valuable asset. Allow them to participate and invest in skills development broadly – AI is not an island. Invest in developing capabilities throughout the organization, as this will prove vital in ensuring future scalability.

Communicate the efforts and successes openly – the first trailblazers will act as messengers and encourage others to join and develop their skills as well as promote the necessary culture change.

Still, it is equally vital to remember that not all will embrace change at the same pace. Make sure that you also invest in change management, and support your people as part of the organization-wide digitalization and AI journey.

TO-DO

Improve your organization's AI literacy through lecture series, collaboration workshops for use case identification, open AI forums and discussion groups, as well as demos, where people can interact with and become familiar with AI solutions.

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AI can mean different things to different people. It is important to define the term properly to have an accurate discussion about the topic.

JUSSI HERLIN
KONE

Communicate and collaborate

As part of the cultural evolution, it is important to advance a collaborative mindset in the organization. AI endeavors will not reach their full potential as isolated initiatives, but as joint efforts. Create an open-minded environment, where ideas can be shared, break down silos and encourage open communication and collaboration.

To extend AI to its full benefit, open your data and interfaces within the organization, and unleash the potential in the complete AI value chain by bringing the different business functions together to capture synergetic prospects. And be honest – if you don't have the necessary skills, engage the right partners.

TO-DO

Build a wide AI community. It is crucial that the AI resources are not separated from the rest of the employees. The AI community could bring in local AI meet-up groups, AI start-ups or AI specialists to lead talks and bring together individuals with different backgrounds to discuss important AI topics.

People cannot work in their own silos, because AI needs to create pull and that can only be created by working together.

TURKKA KOIVU
ELISA

Veikkaus

Personalized customer experience

Veikkaus is one of the early pioneers and current forerunners in taking benefit from AI technologies on a larger scale within the Finnish business domains. Online gaming and gambling business is highly data intensive by nature, which forms a nutritious soil to enable AI flourish. Veikkaus has been alert to capture capture the opportunity early on. They have started systematically collecting and storing the gaming data already 15+ years ago. At the same time, as the general and industry-specific data protection awareness and regulation is increasing, Veikkaus carefully considers how to use their data assets to ensure compliance at all levels.

Key application areas for AI-enabled technologies for Veikkaus are found in the online gaming channels. Veikkaus has deployed broad range of machine learning algorithms across different online customer journey touchpoints to provide personalized recommendations and content for the gamers. The algorithms are utilizing multiple different learning strategies and techniques depending on the need, e.g. reinforcement learning approach, random forest and neural network algorithms to name a few. These are being constantly developed and improved by Veikkaus' in-house data scientist team, which is one of leading ones in Finland.

However, the maximized business impact requires close cooperation between human and the machine. For example, human creativity is still the key to create the content pool containing the different options for the machine to harvest from. On the other hand, the state-of-art machine learning approaches enable

About Veikkaus
Veikkaus operates all the gambling games that are offered in Finland. Veikkaus games are estimated to generate nearly one billion euros a year. The revenue is used for the benefit of Finnish society in its entirety. Veikkaus' beneficiaries are active in the fields of culture, sports, science, and youth work, social welfare and health, and the equine industry. About one third of playing takes place online. Their gaming service veikkaus.fi is Finland's largest webstore, attracting 400 000 players every week.

Source: Organisation's web page

completely new ways of doing business, e.g. through increased granularity in customer segmentation.

Hence, creating awareness, understanding and trust on the algorithms has been one of the key challenges in scaling of the AI across the business operations. Veikkaus has put lot of effort in demystifying the algorithms and created opportunities for business people to influence on the different criteria and factors, which the algorithms are based on. Still, effective communication is continuously needed to obtain buy in from the business and get people well onboard. Visualization of the machine learning models has been found as one of best ways to make the algorithms explainable and understandable in Veikkaus.

Communication is the key for building trust in AI. Need for clear and continuous communication simply cannot be overstated.

EETU PALOHEIMO
VEIKKAUS

Conclusions

To sum up our findings, we can confidently state that Finnish businesses and organizations are currently living in an early experimentation phase in the new era of AI enabled economy. Basic awareness about business benefits AI can bring to organizations has initiated pilots and moved a number of applications into production. The readiness for making substantial financial investments into AI exploration is still relatively low, considering the overall technology, innovation and R&D spend within the companies in scope. AI initiatives are often spread throughout the organization with chances of success left on the shoulders of lone individuals in the organizations, and they may often lack a communication feedback loop to the highest level of the company.

Given that the organizations invited to this study were selected as anticipated forerunners in AI, we are somewhat concerned about the common AI state of Finnish organizations. This intuition is supported by the fact published in a recent study[1], according to which 80% of the Finnish industrial companies don't even have a plan in place for reaping the benefits of AI. There are still numerous AI monetization opportunities for driving business growth and profitability that companies have not yet even recognized.

There are two no-regret moves for every organization, no matter commercial or non-profit, to make now:

• increase data literacy across all organizational levels, functions and businesses, and
• fix issues around data management.

This should be done both on a strategic and operative level, without forgetting the need for essentially required change management to support the adoption of data driven business leadership. In sections II and III of this study, we have shared some best examples of concrete tools organizations can equip themselves with for their current and future AI endeavors. In short, the four key takeaways are:

1. Think big, start small – but start now
2. Data first, science second
3. Get your people involved
4. Communicate and collaborate

It is a shift in leadership and culture to create insights from platforms and algorithms and act on them.

JUSSI HERLIN
KONE

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[1] Strategy&, 2018. Global industry 4.0 study.

Furthermore, items 2, 4, 5 and 7 on the list of the Finnish key actions highly support these recommendations, and can be applied directly to businesses[1].

1. Enhancement of business competitiveness through the use of AI

2. **Effective utilisation of data in all sectors**

3. Ensure AI can be adopted more quickly and easily

4. **Ensure top-level expertise and attract top experts**

5. **Make bold decisions and investments**

6. Build the world's best public services

7. **Establish new models for collaboration**

8. Make Finland a frontrunner in AI

Source: Ministry of Economic Affairs and Employment of Finland, 2017. Finland's Age of Artificial Intelligence.

Recommendations for Finland are also applicable to businesses in Finland

As a nation we have an urgent need to join forces to ensure our competitiveness in the world of tomorrow. To succeed in the upcoming AI transformation, we should create a common ground for a national ecosystem of AI innovation across public and private sectors and even more rigorously aim our efforts to bridge the gap between academia and businesses. There are already exemplary organizations, such as the city of Espoo, with thoughtful concepts guiding us towards this pathway.

Finally, learning to know the 'unknown unknowns' is the most vital takeaway for every organization's AI survival kit. One should remember that the automobile wasn't a result of continuous improvement of a horse and the electric light was not invented by continuously improving the technology behind a candle. The world of tomorrow will surely be very different to the world today. We believe the future will hold seamless symbiosis between biological and artificial intelligences.

> *Learning to know the 'unknown unknowns' is the key for unleashing the full potential of AI.*
>
> **PEKKA ALA-PIETILÄ**
> FINNISH ARTIFICIAL INTELLIGENCE PROGRAM LEAD

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[1] Ministry of Economic Affairs and Employment of Finland, 2017. Finland's Age of Artificial Intelligence.

Contributors

Microsoft Finland has worked on this in-depth study to investigate how artificial intelligence as part of digital transformation affects Finnish companies and organizations. The study is based on Microsoft's unique approach to the subject and experience as a global leader helping companies drive digitalization worldwide.

By combining deep business and industry insight with digital innovation, PwC's diverse teams of creative, industry and technology professionals help accelerate the successful impact digital can have. We help create integrated, end-to-end digital solutions from strategy and innovation through to execution to solve our clients' most complex business challenges. PwC Finland is part of the global PwC network. www.pwc.fi

The companies and organizations that took part in this study gave us an invaluable insight into the benefits of digital transformation. Microsoft and PwC Digital Services would like to thank everyone involved for their thoughts and their time.

Andreas Korczak

COO
Microsoft Finland

Andreas leads Microsoft's digitalization strategy and implementation within the Finnish market.

Anne Alarotu

Communications Lead
Microsoft Finland

Anne is responsible for communications and PR at Microsoft, telling stories about how technology can help organizations and individuals to achieve more.

Janne Sipilä

Senior Enterprise Channel Manager
Microsoft Finland

Janne is responsible for partner co-sell in enterprise segment. He is helping customers to accelerate digital transformation with the leading partners in Finland.
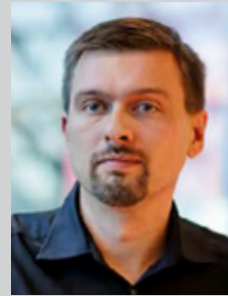
Antti Alila

Cloud & Enterprise Lead
Microsoft Finland

Antti is responsible of driving cloud and data platform business in the Finnish market.

Antti JK Saarinen

Data and Analytics Leader
PwC Digital Services

Antti is a seasoned digital transformation professional with dedication to help customers discover, create and capture business value through data and technology.

Jani Lukander

Data Scientist
PwC Digital Services

Combining a background in human and technology research with a fresh take on business transformation, Jani is helping clients turn their data assets into data-driven insight.

Jenni Erolainen

Data Strategist
PwC Digital Services

Jenni has years of experience working at the crossroads of business and technology, where she helps customers with digital transformation, analytics and data strategy.

Jesse Sandqvist

Marketing Transformation Lead
PwC Digital Services

Jesse has over 15 years background operating in the intersection of business, technology and customer experience.