Artificial Intelligence in Europe

Norway

Outlook for 2019 and Beyond

How 277 Major Companies Benefit from AI

REPORT COMMISSIONED BY MICROSOFT AND CONDUCTED BY EY

Disclaimer

This report has been prepared by Ernst & Young LLP in accordance with an engagement agreement for professional services with Microsoft. Ernst & Young LLP's obligations to Microsoft are governed by that engagement agreement. This disclaimer applies to all other parties.

This report has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, or other professional advice. Refer to your advisors for specific advice. Ernst & Young LLP and Microsoft accept no responsibility to update this report in light of subsequent events or for any other reason.

This report does not constitute a recommendation or endorsement by Ernst & Young LLP or Microsoft to invest in, sell, or otherwise use any of the markets or companies referred to in it. To the fullest extent permitted by law, Microsoft and Ernst & Young LLP and its members, employees and agents, do not accept or assume any responsibility or liability in respect of this report, or decisions based on it, to any reader of the report. Should such readers choose to rely on this report, then they do so at their own risk.

Contents

AI is clearly an important business priority for many Norwegian companies. Combined with an already-strong economy and digital maturity, Norway is in a fantastic position to create exciting new opportunities with AI.

— Harry Shum, Executive Vice President of Microsoft AI and Research Group

Preface

Foreword

Human Ingenuity

The printing press, the automobile & the Internet are just a few technological achievements that have advanced our world. All were driven by human ingenuity: our innate creativity that inspires us to learn, imagine & explore. This spirit is what pushes us to challenge the boundaries of the possible to go ever forward.

Today, AI is helping to amplify our human ingenuity, opening up exciting new possibilities for how intelligent technology can shape our world. At Microsoft, our goal is to democratize access to AI for everyone through innovative & powerful platforms, & above all, we're focused on ensuring that our AI tools & technologies are deployed responsibly & earn people's trust.

And yet, we realize that AI is one of the lesser understood modern technological break-throughs. Many questions remain. How are companies applying this technology to empower employees, engage with customers, transform their business and optimize their operations? Where are they seeing benefits, and what are their blockers?

To provide answers, Microsoft commissioned this study to understand the AI strategy of major companies across 7 sectors & 15 countries in Europe. It examines these companies' readiness to adopt AI, how they rate the impact and benefits from AI implementations, and what they perceive as risks & keys to success.

We hope you find these insights inspirational for your own journey toward adopting AI & realizing its benefits for amplifying human ingenuity.

Vahé Torossian
President, Microsoft Western Europe

Get inspired by your peers

We are currently witnessing a comprehensive digitalization of our society. New technological advances are changing how we live and work. Artificial Intelligence has the potential to expand human capacity and give us the super powers we need to solve the greatest challenges of our times. But such powers must be mastered responsibly. Innovation and ethics go hand in hand.

At Microsoft, we want to develop technology that empower humans, rather than replace them. We challenge business leaders to look beyond automating to cut costs and seek out opportunities to drive growth and innovation. Still, AI will significantly change the labor market, and continuous learning is a key premise to ensure the necessary skills for the future. Collaboration between the public and private sector, academia and policy makers is more important than ever before.

Twenty-one Norwegian companies have participated in this extensive survey about AI. Their experiences create a framework to better understand the technology and its potential to empower people and organizations in new and more impactful ways. We hope the report will both help and inspire you to see how AI can develop and prepare your business for the future.

Kimberly Lein-Mathisen
General Manager, Microsoft Norway

At a Glance

While the hype of artificial intelligence (AI) and its potential role as a driver of transformational change to businesses and industries is pervasive, there are limited insights into what companies are actually doing to reap its benefits. This report aims at getting a deeper understanding of how companies currently manage their AI activities, and how they address the current challenges and opportunities ahead.

To get to the heart of this agenda, we received input from AI leaders in 277 companies, across 7 sectors and 15 countries in Europe, via surveys and/or interviews. Below is the brief summary of what they had to say.

AI is a "hot topic" - but more so on C-level than in daily operations

71% of the companies respond that AI is considered an important topic on the executive management level. This is significantly higher than on the non-managerial / employee level where AI is only considered an important topic in 28% of the companies. Interestingly, Board of Directors also came out lower with 'only' 38% of respondees reporting that AI is important to their board.

Most impact expected from 'optimizing operations', with 'engaging customers' as a close second

89% of the respondents expect AI to generate business benefits by optimizing their companies' operations in the future. This is followed by 74% that expect AI to be key to engaging customers by enhancing the user experience, tailoring content, increasing response speed, adding sentiment, creating experiences, anticipating needs, etc.

C-suite respondents scored 'engaging customers' highest of the AI benefit areas. Noticeably, 100% of the most advanced* companies expect AI will help them engage customers, compared to only 63% of the less mature companies. Using AI to 'transform products and services' comes out slightly lower with 65%, and 'empowering employees' the lowest with 60% of the companies expecting AI-generated benefits in that area.

AI is expected to impact entirely new business areas in the future

57% of the companies expect AI to have a high impact or a very high impact on business areas that are "entirely unknown to the company today". This is almost as much as AI is expected to impact the core of these companies' current business with 65% expecting AI to have a high or a very high impact on the core business. With AI presumably pushing companies into totally new domains in the future, it is perhaps not surprising that AI is receiving attention as a key topic for executive management.

Very few of the 277 companies consider themselves "advanced" with AI

Despite the apparent sizable impact that companies expect from AI, only a very small proportion of companies, constituting 4% of the total sample, self-report that AI is actively contributing to 'many processes in the company and enabling quite advanced tasks today' (referred to as 'most advanced' in this report).

Another 28% are in the 'released' stage where they have put AI selectively to active use in one or a few processes in the company. The majority, 51% of companies, are still only planning for AI or are in early stage pilots. 7% of companies are self-rated as least mature, indicating that they are not yet thinking about AI at this stage.

Only 4%

of the companies are actively using AI in 'many processes *and* to enable advanced tasks'

Percentage of companies that are still only in the planning or piloting stages:

61%

71%
of the companies

respond that AI is considered 'an important topic' on the executive management level

Noticeable potential for AI in many corporate functions

The most widely reported adoption of AI (47%) was in the IT/Technology function, followed by R&D with 36%, and customer service with 24%. Interestingly, several functions are hardly using AI at all; most notably, the procurement function, where only 4% of the companies currently use AI, followed by HR with 7% and product management with 9%. This is perhaps surprising, given the many use cases and applicable solutions in these functional areas.

8 key capabilities that are most important 'to get AI right'

When asking the respondents to rank the importance of 8 capabilities to enable AI in their businesses, 'advanced analytics' and 'data management' emerged as the most important. 'AI leadership' and having an 'open culture' followed.

When self-assessing the capabilities where the companies are least competent, they point to emotional intelligence and AI leadership - defined as the (lack of) ability to lead an AI transformation by articulating a vision, setting goals and securing broad buy-in across the organization.

To summarize, the challenge ahead appears to be *as much* about culture and leadership as it is about data, analytics, and technology.

Norwegian companies beginning to explore possibilities with AI

When looking across the 21 companies that have participated in the study in Norway, it is clear that they are actively exploring and pursuing possibilities with AI, with their current maturity level roughly on level with their European peers. More than half of the companies report that AI is currently considered an important topic at the C-suite level and 81% report that AI is as important as other digital priorities, if not more important. Expected impact is high as well: the vast majority of companies from Norway report expecting AI to create some degree of impact across all business areas – core, adjacent and new.

What sets the most 'AI mature' companies apart?

They expect AI will be beneficial in 'empowering employees' (76% of 'more mature' companies* vs. 42% of 'less mature' companies)*.

They report using a combination of structured and unstructured data for AI (65% of 'more mature' companies vs. 15% of 'less mature' companies), and data from both internal and external sources (68% of 'more mature' companies vs. 16% of 'less mature' companies).

They expect AI will help them 'engage customers' (85% of 'more mature' companies vs. 59% of 'less mature' companies).

They see AI predominately being driven from a combination of technology push and business pull (61% of 'more mature' companies vs. 32% of 'less mature' companies).

* 'More mature' defined as companies that self-ranked as 4 or 5 on the maturity 5-scale, and 'less mature' defined as companies that self-ranked as 1 or 2.

57%
of the companies

expect AI to have a high impact on 'business areas that are entirely unknown today'

Share of companies that use acquisitions as a way to obtain AI capabilities:

10% only

80%
of the most mature

companies expect that AI will be beneficial by 'empowering employees'

About this Report

What's new?

Artificial Intelligence (AI) is not new. It has existed for decades: processing voice to text or language translation; real-time traffic navigation; dynamically serving targeted advertisements based on personal data and browsing history; predicting trends and guiding investment decisions in financial institutions. The current developments have been fueled by an exponential rise in computing power, increasing accessibility and sophistication of powerful algorithms, and an explosion in the volume and detail of data available to feed AI's capabilities.

Reality vs. hype

Only recently started to see more widespread, scaled adoption of AI across sectors, value chains and ecosystems. Yet AI technology is quickly approaching a point where it is becoming a critical element in enabling companies across sectors to drive revenue, increase profits and remain competitive.

We hear many people in numerous companies talk about AI. While the hype is pervasive, not a lot of people fully understand its technological potential, where it can create value or how to get started. This report aims at providing a practical understanding of why European companies are investing in AI, what they are investing in, and how they are managing the complicated process of adopting this new technology and deriving value across business opportunities.

Perspectives, experiences, self-assessment, and benchmarks

From new surveys, interviews and case studies gathered from approximately 277 companies, we provide a snapshot of the current state of AI in 15 European markets. This includes analyzing AI's relative importance on the strategic agenda, its expected impact and benefit areas, how mature companies are in terms of adoption, and examining self-reported competence levels regarding the capabilities required to succeed when implementing AI.

From the aggregate dataset we have been able to determine some benchmarks across the covered markets, which we compare the individual country with throughout the report. The report also covers a full spectrum of industry groups which tend to reveal interesting insights.

> **In the long term AI has the potential to be transformative to the sector, we have only just started.**
>
> **— DNB**
> Financial services group

Straight from the executives

Where this report and extensive dataset adds new insights is primarily into how leading companies are approaching AI on a very practical level. We hear straight from executives how their companies are addressing current challenges, and how they apply AI to unlock new value pockets.

Based on the many interviews conducted, this report reveals some clear excitement and immense potential for using AI to bring new, improved products and services to market, create exceptional experiences for customers and employees, and create ways to operate that enhance performance across the board.

We learned that regardless of which use cases the companies pursue and the role that AI currently has, taking a strategic outlook to assess the implications for the business and responding accordingly are increasingly seen as crucial for any executive agenda.

Contributions from open-minded and collaborative companies

We are extremely thankful for the time and effort the many executives have put into participating in interviews and providing data for this study. We're particularly appreciative of their willingness to openly share experiences and provide their perspectives on where the future is heading within AI.

While this indicate a general interest in the AI topic, it also speaks to the increasingly collaborative approach many leading companies are taking when entering new technology domains and embarking on journeys into unknown territories.

> **AI is one of the most powerful technologies, driving digital transformation and new value creation in the energy and maritime industries.**
>
> **— Kongsberg Gruppen**
> Technology group

By shifting focus towards the more complex and spending less time on simple, mundane tasks, we can be real advisors, shifting focus away from high volume routine tasks that create little value.

— **DNB** Financial services group

Machine learning should be considered a craft, not a science. Acquiring experienced staff is required to be able to be on top of things, and thus succeed with an AI strategy.

— **Sbanken** Bank

Rich Data

Which sources of information is the study based on?

This report combines multiple sources of data to answer the questions of why, where and how AI is currently being used in business. It provides an inside view across markets and sectors. It combines local and pan-European views, and adds value through a quantitative perspective on how advanced companies are with AI, and a qualitative perspective on how to develop the skills required to succeed with AI. We have received input from over 300 people from 277 participating companies. This has resulted in a range of interviews and case studies as well as 269 company responses to our survey.

Extensive online survey data from business leaders in 269 companies

We have surveyed people with a leading role in managing the AI agenda in all the companies that have contributed to the study. This gives us an aggregate dataset that enables a perspective for each market and each sector, as well as comparative insights for the respective company types, sectors, and countries in Europe.

Qualitative in-depth interviews with senior business executives

In addition, we conducted deep-dive interviews to gain deeper, qualitative insights into how AI is affecting the executive agenda. Through conversations with business leaders, we report on where they expect AI will have an impact, how important AI is to their current and future business strategies, what benefits they hope to realize from implementing AI, and which capabilities they believe are key to advance AI maturity in their companies.

We also present case studies of specific companies, both local and international, to provide an understanding of what they are doing with AI and why, drawing on lessons learned and obstacles to overcome when putting AI to use for specific use cases and to derive value on a strategic level.

Proprietary AI investment data

We have supplemented the primary source input from the companies with acquisition data from numerous sources, to take the pulse of the AI investment market in Europe. These insights help provide a picture of the wider European AI ecosystem and its development.

AI expert perspectives

With this wider understanding of AI start-up acquisitions, partnerships, and investment funding, we outline how investments in AI are skyrocketing, where AI investment is taking place geographically, and which sectors are making bets. As we are on the cusp of widespread change driven by AI, we also reached out to AI experts from academia for an outlook of AI technologies going mainstream, and to gain an understanding of the macro scale of business effects that they expect will materialize when looking into a distant future.

Recognizing and mitigating potential survey and interview bias

In terms of methodology, this report follows robust research design and protocol. Doing so minimizes potential bias, but does not eliminate it, as it is inevitable in market research. One potential type is social desirability and conformity bias, as the topic of AI receives lots of media and political attention. Response bias, including extreme responding, cultural bias, and acquiescence bias ("yea-saying"), are potential factors as we ask respondents to self-report on their respective companies' experience. Therefore, while this report follows best practices, some bias is possible.

Nonetheless, with the combination of extensive survey data, interview data, investment data, and expert perspectives, we believe the report provides a solid foundation for an indispensable view of executive experience with – and future plans for – AI in business.

Executive Perspective

Who are the respondents that have contributed to the study?

The data approach used allows us to identify trends across industries and countries based on input from various functional business areas. Consequently, we have captured a range of insights, learnings, and perspectives from both strategic and technical points of view.

Respondents predominantly in senior level positions

To ensure that these insights and perspectives are relevant at the executive level, we surveyed and interviewed high-ranking officers with a responsibility for driving the AI agenda in their respective companies. With 60% of respondents being either part of top management or the executive management team, their input is likely well attuned to the general perspective and overall strategic direction of the companies they represent.

Functional diversity

The respondents cover very different functions, of which the most common are designated AI/digital department, followed by IT, and strategy/general management functions. This functional diversity increases the breadth of the report, with insights and perspectives covering widely different aspects of AI.

Surveyed companies span multiple sectors

The participating companies are spread fairly evenly across seven sectors, with the majority of companies belonging to Industrial Products & Manufacturing, followed by Financial Services, and Transportation, Energy & Construction. Services and Life Science are represented to a lesser extent.

A combined annual revenue of $1.9 trillion

Participants come from both major listed companies, privately held companies, and in some case relatively small companies. In totality, they represent a combined revenue of approximately $1.9 trillion. Despite covering a significant part of total European business, our selection criteria have also favored more niche oriented companies with extensive AI experience and capabilities.

Primarily listed companies represented in Norwegian data

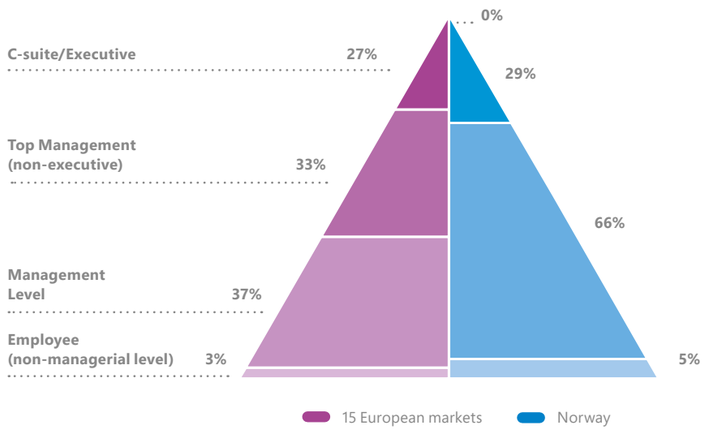
The vast majority of respondents in Norway are major listed companies or companies privately held by foundations. All the participating companies in Norway had a combined total annual revenue of over $60 billion in 2017.

More than 300 participants

Number of participants interviewed and/or online surveyed in the study

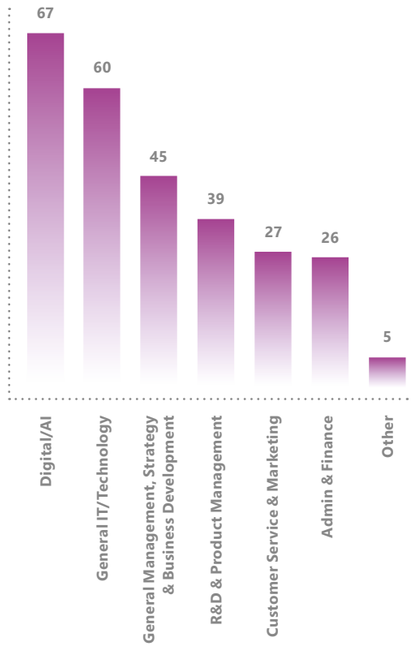
Majority hold a top management or executive position

Organisational level of person participating in the study



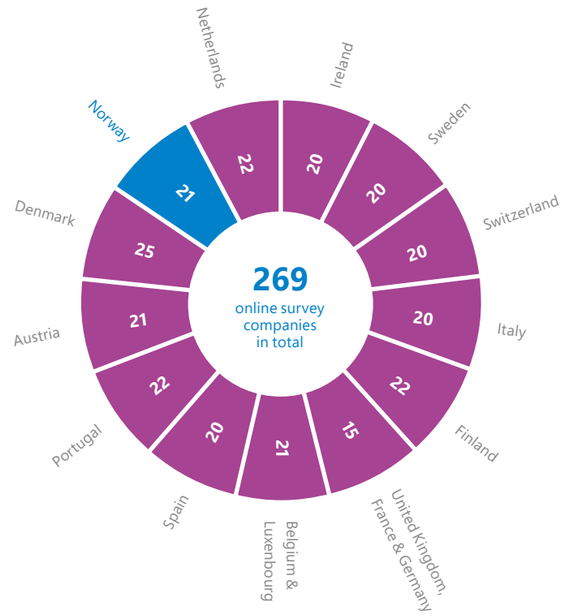
Large group of respondents with a specific AI/digital role

Organizational function of respondents in the online survey



Surveyed companies are well represented across each of the 15 European markets

Number of online surveyed companies per country



Seven major sectors covered in the study

Representation of participating companies per sector category

9% — **Life Science**
Pharmaceutical, Healthcare, Biotech

21% — **Industrial Products**
Manufacturing, Materials, Equipment

17% — **Finance**
Banking, Insurance, Investments

7% — **Services**
Professional Services, Hospitality, Public Services, Membership Organization

13% — **CPR**
Consumer Products & Retail

16% — **TMT**
Technology, Media/Entertainment & Telecom

17% — **Infrastructure**
Transportation, Energy, Construction, Real Estate

277 Companies

A.P. Moller - Maersk, Acciona, Adamant-Namiki of Europe, Aegon, Aena, Ageas, Agfa-Gevaert, Agrifirm Group, Ahlstrom-Munksjö, AIB, AkzoNobel, Almirall, Alpro, ALSA, Amadeus, AMAG, Ambea, APM Terminals, Aprila Bank, Arcelor Mittal, Ardagh Group, Arval BNP Paribas Group, Asiakastieto Group, Assa Abloy, Assicurazioni Generali, Atea, Audi, Austrian Airlines, Austrian Federal Computing Centre, Autogrill, BAM Group, Barco, BASF, BAWAG P.S.K, Baxter, BBVA, Besix, Bolloré, BTG, BUWOG, C&C Group, Campbells International, Capio, Carmeuse, Carnival UK, CEiiA, Cermaq, Chr. Hansen, Cirsa, City of Amsterdam, Colruyt Group, Com Hem, Combient, Comifar Distribuzione, Constitutional Court of Austria, Coolblue, COOP Nederland, Cosentino Group, Costa Crociere, Credit Suisse, Crédito Agrícola, DAF Trucks, Danfoss, Danske Bank, Dawn Meats, DFDS, DNA, DNB, DSM, DSV, Dümmen Orange, Dynamic ID, DAA, Edison, EDP - Energias de Portugal, Egmont, EQT, Ericsson, Erste Group Bank, ESB, ESIM Chemicals, Esprinet, Europac, Fazer, FDJ, Federal Office of Meteorology and Climatology MeteoSwiss, Ferrovial, Fexco, Finnair, Fortum, Galp, Geberit, Genalice, Generali Versicherung, GetVisibility, Gjensidige Forsikring, Glen Dimplex Group, Globalia, GN Store Nord, GrandVision, Grupo Antolin, Grupo Ascendum, Grupo Codere Cablecom, Grupo Juliá, Grupo Nabeiro – Delta Cafés, Grupo Pestana, Grupo Visabeira, GSK, GAA, H. Lundbeck, Hafslund, Handelsbanken, Hera, Hostelworld, Husqvarna, IKEA Group, Ilmarinen Mutual Pension Insurance Company, Implenia, Impresa, Indie Campers, Intesa Sanpaolo, ISDIN, ISS, Jansen AG, Julius Baer, Katoen Natie, KBC Group, Kemira, Kingspan Group, KLP Banken, Komplett, Kongsberg Gruppen, LafargeHolcim, LanguageWire, LEGO, LEO Pharma, Lerøy Seafood, Liga Portugal, L'Occitane, Lonza, L'Oreal, Lusíadas Saúde, Luz Saúde, Länsförsäkringar, MAPFRE, Merkur Versicherung, Metall Zug , Metro, Metso, M-Files, Millicom, Mota-Engil, Mutua Madrileña Automovilista, Møller Mobility Group, Neste, NH Hotel Group, Nilfisk, Nokia Corporation, NorgesGruppen, Norstat, Novabase, Novartis, Novo Nordisk, Novozymes, Now TV, OBI, Oesterreichische Nationalbank, OP Financial Group, Opportunity Network, Orion, Paddy Power Betfair, Peltarion, Pernod Ricard,PFA, Philips, Planeta DeAgostini, Poste Italiane, Posti, PostNord, Proximus, Pöyry, Rabobank, Raiffeisen Software, Raiffeisen Switzerland, Ramada Investimentos SA, Randstad, Rexel, ROCKWOOL Group, Room Mate Hotels, Royal College of Surgeons in Ireland, S Group, Saipem, Saint Gobain, Sakthi Portugal, Salsa, Saxo Bank, Sbanken, SBB Swiss Federal Railways, Schindler, SEB, SGS, Siemens Mobility, SimCorp, Skandia, Solvay, Sonae, Sonae Arauco, SpareBank 1 SMN, SpareBank 1 Østlandet, Sportmaster, Statkraft, Stedin, Steyr Mannlicher, Stora Enso, Styria Marketing Services, Suomen Terveystalo, Swedbank, Swisscom, Taylor Wimpey, TDC, Teamwork, Telefónica, Telekom Austria, Telenor Global Shared Services, Telia, Tesco, Tetra Pak, The Navigator Company, TIM, Tine, Tokmanni , TomTom, Tryg, TTS Group, TVH, Ubimet, UDG Healthcare, UniCredit, Unilin, UPM, Vaisala, Valmet, Valora Group, Van Lanschot, Vattenfall, Version 1, Visana, Vodafone Automotive, VodafoneZiggo, Voestalpine High Performance Metals, WABCO, WALTER GROUP, Western Bulk, William Demant, Wind Tre, WIT Software, Wolters Kluwer, Zurich Airport, Zurich Insurance, Öhman, Ørsted, Österreichische Post.

Norweigan companies All companies, excluding Norweigan companies

Note: Of all contributing companies, 14 chose to be anonymous, 0 of them being from Norway

Bits and Bytes

What technologies and data solutions are within the scope of the study?

AI can be defined as the ability of a machine to perform cognitive functions which are normally associated with humans. This includes reasoning, learning, problem solving, and in some cases even exercising human behavior such as creativity.

Advanced AI applications are not yet widespread

AI holds the potential to transform business in a radical way given its wide variety of use. Quite simply, business leaders need to understand AI in order to grasp the opportunities and threats the technologies pose.

While companies acknowledge the significant potential of broader, more advanced AI technologies such as computer vision, speech recognition, and virtual agents, they are currently not in common use by companies in Europe. Companies surveyed are currently focused on narrower and more specific use-cases that support existing business. These efforts will undoubtedly help companies build capabilities that are necessary to deploy more advanced AI solutions in the future.

Machine Learning

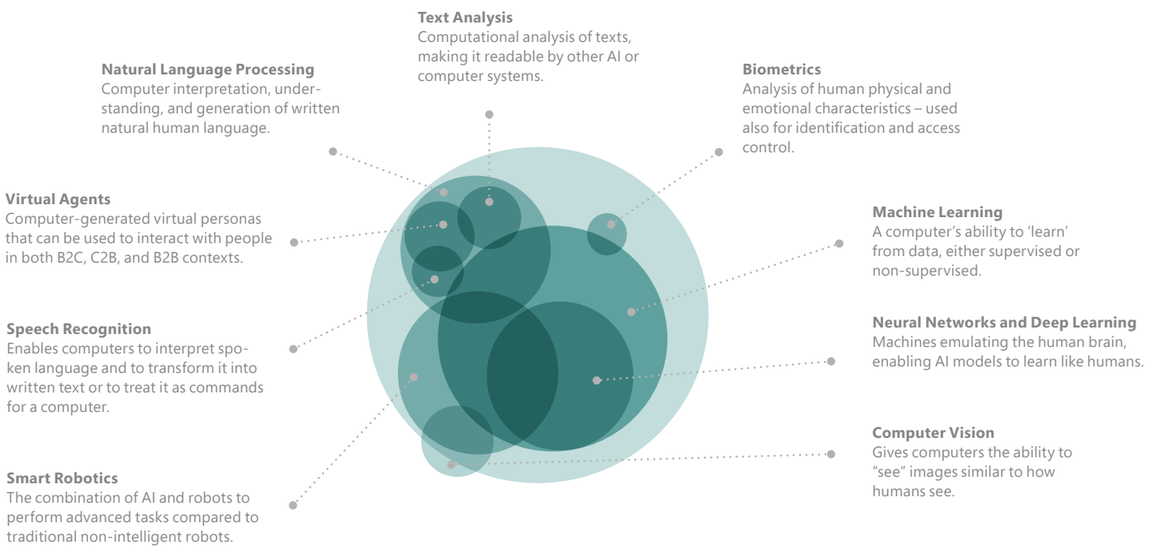
The most commonly used AI technology among the surveyed companies is Machine Learning. This is inarguably due to its wide-ranging applicability, making it relevant for a variety of use-cases across the value chain. Of the different types of Machine Learning, the most common is supervised Machine Learning, where software is fed structured data and finds patterns that can be used to understand and interpret new observations.

While companies historically have primarily have used internal data for supervised Machine Learning, many have begun exploring the possibility of combining internal and external datasets in order to produce even deeper insights.

Machine Learning and Smart Robotics were found to be the most useful. It is not clear from the study if this is because they are simply the most common starting points before deploying more advanced technologies, or if they also longer term hold the most wide and significant application potential.

A broad definition of technologies are included in this AI definition

Technologies included in the definition of AI used in this study



Companies are using a combination of on-premise and cloud solutions

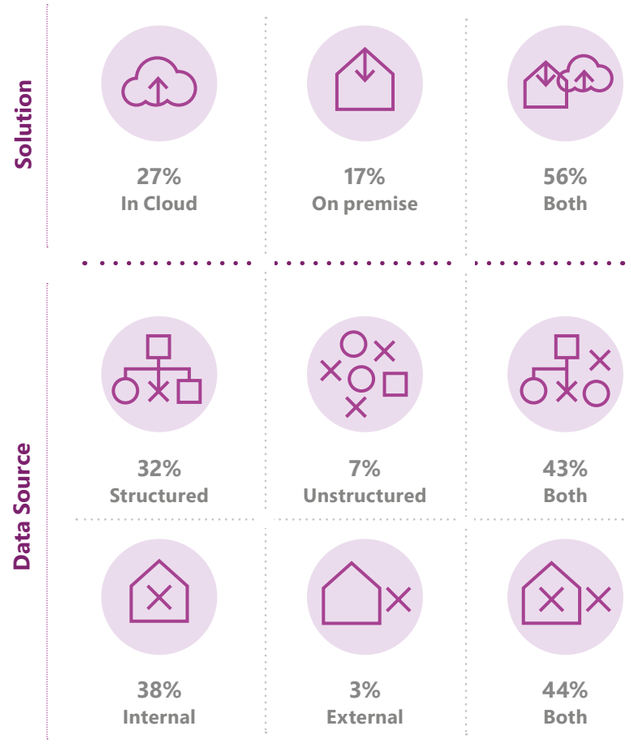
Companies are increasingly using cloud-based AI solutions for both storage and on-demand computing power - 83% of companies reporting using Cloud technology to some extent to enable their AI capabilities. Key benefits of cloud solutions mentioned by many respondents are the flexibility to swiftly scale systems up and down to accommodate changing demand, a variable cost structure, and access to larger data sets. However, many companies are still relying on on-premise solutions, not least due to existing data infrastructure.

Machine learning most used for Norwegian companies

The vast majority of Norwegian companies report that machine learning is the AI technology that they use most, well above the European aggregate. With a considerably lower adoption rate, machine learning is followed by neural networks and deep learning (38%), smart robotics (33%), and text analysis (33%).

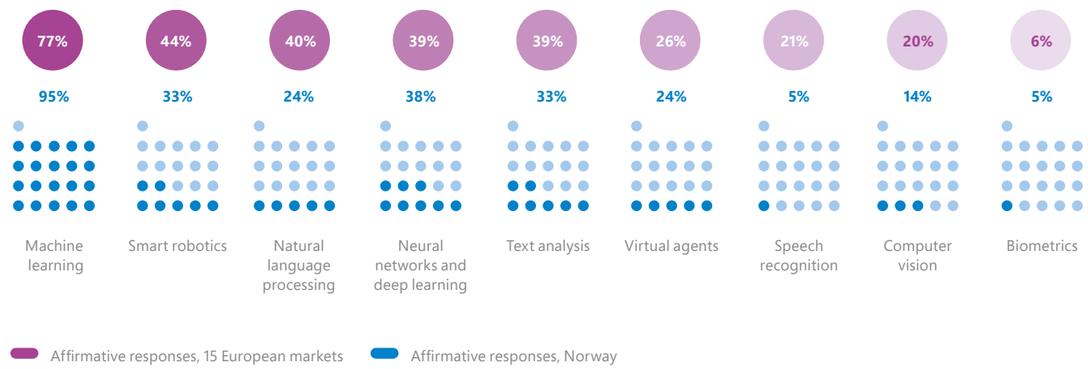
Companies are using a mix of Data Sources and Storage

Solution: How are you primarily dealing with the computing demands needed for AI?
Data Source: 1.Are you currently using unstructured or structured data types in your AI process? 2.Are you currently using internal or external data sources in your AI process?



Machine Learning and Smart Robotics found to be the most useful

Which of the following technologies have you found to be most useful in your company's deployment of AI?



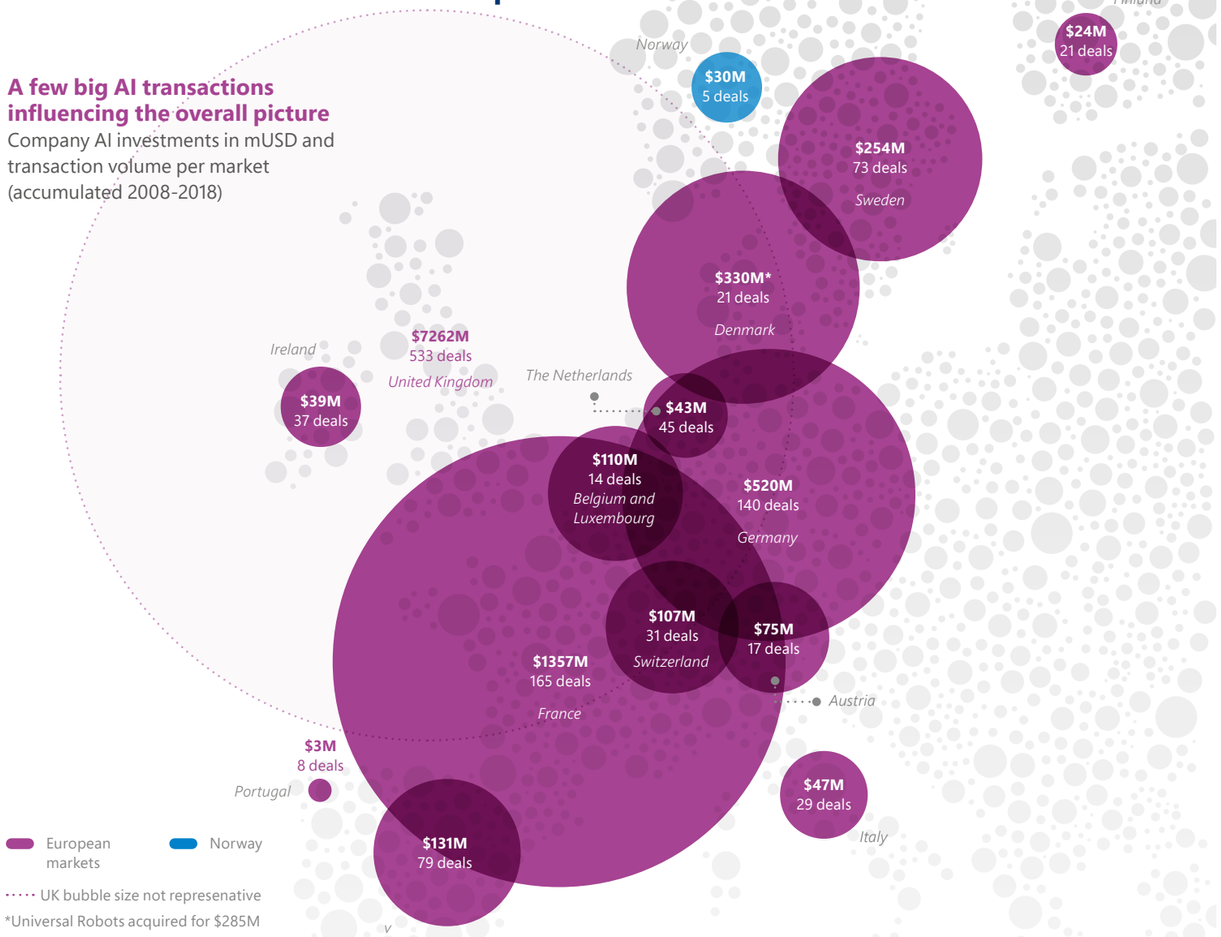
Note: Remaining percent 'Don't know' responses

Follow the Money

How much is invested in AI in Europe?

A few big AI transactions influencing the overall picture

Company AI investments in mUSD and transaction volume per market (accumulated 2008-2018)



The acquisition data from numerous sources enabled us to explore the European AI ecosystem and gain insights into investment activity.

An exponential increase in AI investment over the past decade

Looking at AI transaction activity across Europe, there has been a steep consistent growth trend over the past 10 years, totaling 1,334 transactions involving AI by 2017 – with a six-fold increase in activity in the last 5 years alone. This trend is on track to continue, with an exponential increase in interest in AI driving more large companies to invest in AI or acquire AI capabilities from innovative start-ups. Of the 15 markets surveyed, some include one or two transactions that are significantly large deals.

Majority of investments in AI from private equity and venture capital

Private equity (PE) and venture capital (VC) firms are significantly more active investors and acquirers of AI than corporates, accounting for 75% of deal volume in the last 10 years. This is an indication that AI companies are in the early stages of high risk/high growth dynamics. It also indicates that, for large corporates, acquiring or investing in external AI businesses in order to obtain AI capabilities is relatively limited. This is confirmed by our survey results where only 10% of companies are seeking to obtain needed AI capabilities through external investment or acquisitions, and is also much in line with what we're seeing when comparing with the US and Asia.

Note: Several transactions in the dataset did not have publically disclosed deal values, suggesting that actual total values are higher than what's shown above

Investment activity concentrated in major European markets

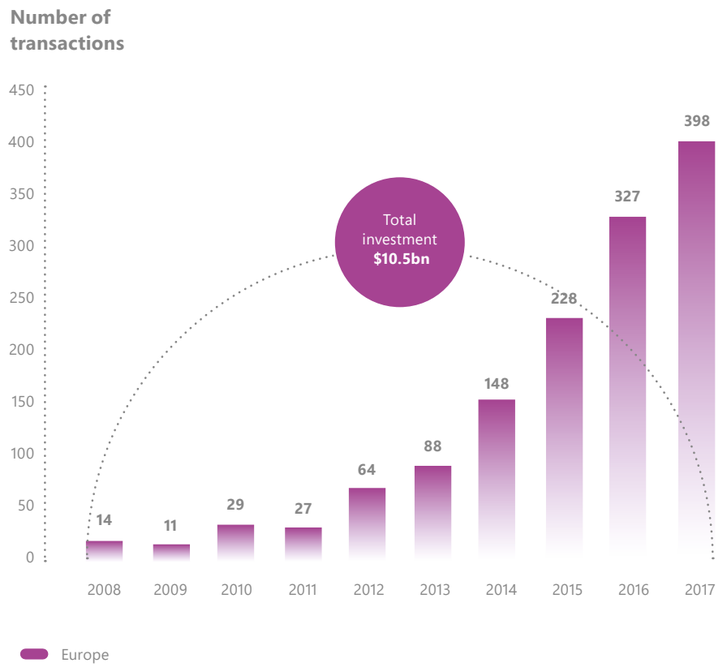
It comes as no surprise that a lot of investment activity is in the UK, France, and Germany, having attracted 87% of investment in AI companies over the past decade. The UK leads significantly in this regard, with 533 of the total 1,362 AI transactions in Europe. From an investment perspective, it is also worth noting that in April 2018, the EU committed to a 70% increase in investment in European AI by 2020, suggesting further growth and potential in the region.

Over $30 million invested in AI start-ups in Norway in the past decade

In Norway, there were only five transactions over the past decade involving companies working with AI. Of these, 3 reported deal value totaling $30 million, implying the actual amount is higher. A large portion of this amount was the $25 million investment in Arundo Analytics. Interestingly, the small amount of deals in start-ups in Norway is somewhat compensated for by Norwegian investors, mainly venture capital firms, involved with 11 transactions in AI start-ups outside of Norway.

Steady increase in European AI investment

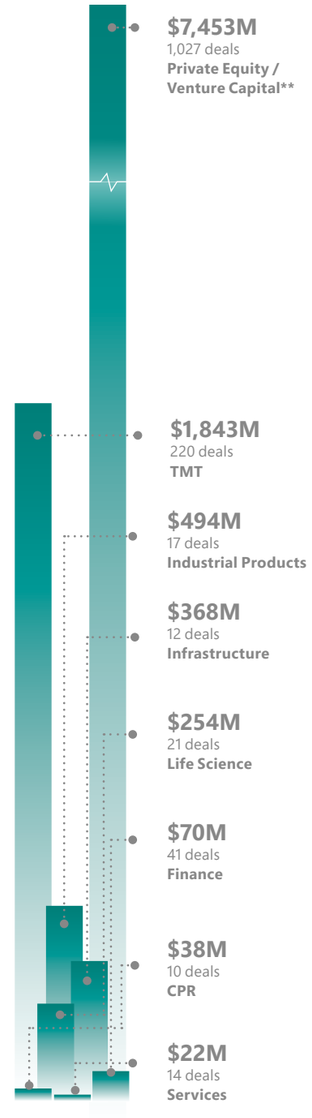
AI companies invested into, transaction volume, Europe (from 2008-2018)**



*For all of Europe, 34 countries (not just the 15 markets focused on in this report)

TMT most active, behind private equity and venture capital

Investments into AI companies per sector, mUSD (accumulated 2008-2018)*



**Including governmental investment

(Case Study)

Norstat

Four years ago, Norstat initiated a data collection process on survey respondents and is now starting to reap the benefits. The data is fed through intelligent algorithms, allowing Norstat to optimize operations by automating quality control. This creates higher value for Norstat's customers by increasing market insight accuracy and quality.

AI is used to identify patterns in survey responses and to calculate the probability of receiving a high quality response. By comparing respondent metrics to a large dataset of historic responses, Norstat is able to automatically remove low-quality respondents from the database. Via such automated processes operations become less labour intensive and easier to scale, while the market insight provided becomes more robust, for example by removing noise from respondents who complete surveys too quickly.

Investing in automation requires significant patience, as it takes time to collect enough data to get good predictions.

However, compared to other players in the market Norstat started the journey of data collection quite early. As a result, many of the processes that used to be manual are now automated, leading to a significant reduction in operational costs. Norstat recognizes the advantage that lies in the amount - and quality - of data that has been captured over the past few years as few other players have acquired similar datasets in terms of volume and quality. The company does not therefore see Big Data and AI as a major sector disruptor, but rather a tool to improve quality.

Investing in automation requires significant patience, as it takes time to collect enough data to get good predictions.

NORSTAT

Norstat is a privately held high-quality data solutions provider in the research industry. The company uses well-grounded research methods to collect reliable data about any desired topic or target group, to help customers make the right decisions based on reliable market insight. Norstat conducts data collection in 19 countries and has operations in 12 countries across Europe, with a revenue in 2017 of over 400 million NOK.

What next?

Norstat will continue to increase the application of automated analysis in the future, foreseeing a gap that will form between those players who work based on predictions and those who use mass-targeting and human processing methods. The company is in the process of launching a user platform that is structured so that AI can help more precisely target respondents and obtain higher hit-rates based on previous behavior, for example by identifying the most appropriate type of incentives for responding.

"We maintain a live dataset – however our largest investment was to initiate the collection of the data in the first place. It is important to have a vision driving this.

"AI is somewhat a buzz word, however building Artificial Intelligence basically means building algorithms that allows us to act on all the data we have collected. It requires patience to get this right.

Expert Perspective

What does the future look like according to AI analysts?

We also spoke to a range of leading AI experts from business and academia to gain insights into the kind of change which we are on the cusp, and the role AI is expected to play as part of a broader transformational wave.

AI is entering the mainstream and here to stay

One thing was clear from the experts we spoke to: as far as the peaks and troughs of hype and technological leaps surrounding AI go, there is no doubt that we are living through a particularly prominent peak, with no indication that the buzz nor the potential will fade away any time soon. In a world increasingly dominated, disrupted and driven by innovative tech powerhouses, large and small, it is no understatement to suggest that AI will be a chief protagonist in the change transcending all elements of business in what has been labelled the Fourth Industrial Revolution.

Business-minded people will drive the transformation

The AI experts confirmed some of the key ingredients necessary for AI in organizations: a combination of domain and technical expertise, the appropriate technology, the right talent, and lots and lots of data. While letting tech-savvy individuals drive innovation is great for building understanding, true transformation will not come until business people start suggesting problems for AI to solve - not the other way round.

Agile culture enables AI

Culture was a recurring theme as well. It can either stifle forward momentum in organizations, or be the silver bullet that enables the potential of AI to be realized from top to bottom.

Some of the experts even argue that it's not only technical skills that hold up AI projects, it's also the need for a culture of experimentation.

Companies that are more natively digital or have gone down that road understand the value of experimenting and iterating. They don't think in traditional terms of committing to year-long projects that need to produce specific outputs, but rather to explore and test ideas before scaling.

When it comes to AI, knowledge is power

Expert opinion also seemed unanimous in that most people not directly involved with AI must still have quite a basic understanding of what AI is and what it can actually do. Therefore, the task is to educate and improve understanding, from C-suite leadership teams to employees at the coal face. This also ties in with the importance of partnering to get started and access the expertise needed to use AI. While partnering and collaborating solves the perennial AI challenge concerning the scarcity of talent, the significant cost and substantial benefit that can be gained from AI means that organizations also need to be cognizant of building capabilities in-house for the long-term.

Finally, as AI develops, we are also going to see innovation and expertise spreading outside of the dominant clusters of the likes of Silicon Valley, as governments, businesses and universities increasingly invest in building knowledge, resources and capabilities.

"Farmers and growers are still reasonably conventional, with an average age of 55 years. The chances are that this will change significantly in the future. It could just be that technology companies will become the disruptors of our market.

— Royal Agrifirm Group
Agricultural cooperative

From the Horse's Mouth*

*From the highest authority

The full extent of the AI story remains in its early stages. What we do know is that big data, computing power and connectivity are changing the industrial landscape. The opportunity rests in accelerating the digitization of businesses, making them more data driven by building applications that deliver machine-assisted insights.

— Mona Vernon, CTO, Thomson Reuters Labs

In some cases, there is too much hype, but paradoxically, the potential opportunities and benefits of AI are still, if anything, under-hyped. Often, the impact of new technologies is overestimated in the short term and underestimated in the long term, and while there is a lot of noise regarding AI, there's been a lack of in-depth discussion and analysis of how it's actually going to transform businesses.

— Nigel Duffy, Global AI Innovation Leader, EY

We believe that every organization is going to have to write their own AI manifesto: what they believe about AI, how they're going to use or not use data, how they're going to publish data, and make the consumers of their products and services aware of that. The creation of those manifestos is going to become a gateway to the success of AI.

— Norm Judah, Chief Technology Officer of Worldwide Services at Microsoft

If you have a ton of data, and your problem is one of classifying patterns (like speech recognition or object identification), AI may well be able to help. But let's be realistic, too: AI is still nowhere near as flexible and versatile as human beings; if you need a machine to read, or react dynamically, on the fly, to some kind of ever changing problem, the technology you seek may not yet exist. Intelligence is a really hard problem.

— Gary Marcus, Founder & CEO, Geometric Intelligence [acquired by Uber] professor, NYU, contributor to The New Yorker and The New York Times

AI is a general purpose technology, so will eventually affect all industries. However, this impact can be slowed by the lack of data in particular industries. There's also more innovative cultures inside different organizations, that can either drive adoption or prevent it.

— Marc Warner, CEO, ASI Data Science

Role of AI in European Business

There is a lot of hype surrounding AI at the moment, and few doubt its potential. We examine how important is AI compared to other digital priorities and where AI fits on the strategic agenda.

We look at the impact of AI on the company's core business, as well as adjacent and new areas of business.

We also examine the current AI maturity levels across sectors and markets, the potential drivers for deploying AI, and where AI is applied within organizations, across customer-facing functions, operations, product development, and internal business support.

A Strategic Agenda

Where is the AI conversation currently taking place?

A good starting point to understand how large European companies are handling AI is to look at who in the organization is driving the AI agenda, whether it be the Board, the C-suite, managers, or employees.

AI is particularly relevant at higher organizational levels

From driving strategic considerations at the Board level to being a topic of interest or concern at the employee level, the results are clear: AI is important and resides across all levels at many of the organizations we interviewed.

Only a few companies stated that AI is not currently an important topic at any level of the organization - while the vast majority of companies view AI as generally important regardless of how advanced they are, or how much AI is being considered for deployment in the near future.

Active C-suite and Board of Directors involvement

In 71% of the companies surveyed, AI is already an important topic on the C-suite agenda and across various roles - from cost-focused CFOs looking for efficiency through automation, to CDOs with customer-oriented ambitions as part of wider digitalization efforts, to the CTOs who is often still responsible for a type of AI Center of Excellence.

Companies more advanced in AI tend to have stronger involvement of the C-suite and the Boards of Directors than the rest. They focus less on the technology itself and more on the business problems that AI can addresses.

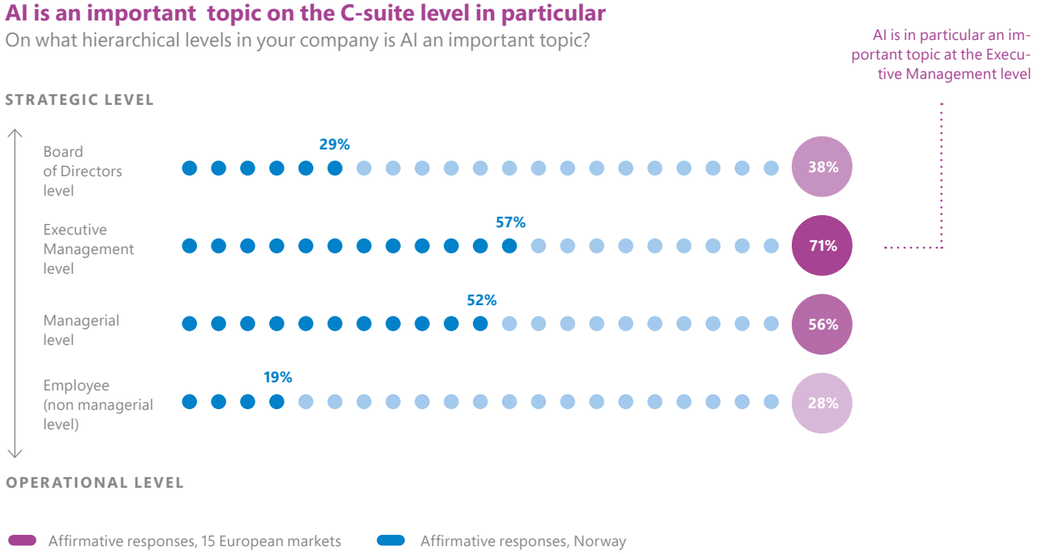
Relatively speaking, the AI topic seems to not yet having reached the same level of importance at the non-managerial level (employees) than at the top. Speculating about the reason, it could both pertain to job insecurity and to the fact that AI is still a highly abstract topic for many when it comes to proving day-to-day business value.

AI an important topic among Executives in Norwegian companies

In Norway, 57% of respondents report that AI is an important topic on the Executive level's agenda. Yet, compared to the European aggregate, Norwegian companies report a lower result for each hierarchical level. One possibility for this is that the question asks respondents to select all that applied, suggesting AI could be concentrated at particular levels rather than dispersed throughout the organization.

AI is an important topic on the C-suite level in particular

On what hierarchical levels in your company is AI an important topic?



Among Friends

What is the importance of AI against other digital priorities?

In a business era driven by innovation and tech-led disruption, AI is obviously not the sole priority.

AI as a digital priority

When asked on a scale of 1 to 5 how important AI is to the business relative to other digital priorities, the majority of respondents told us that it is about equal. Very few organizations said it was their most important digital priority, or not formalized as a digital priority at all, with the spread of responses leaning slightly towards the upper end of the importance spectrum.

This slant is likely to increase as many companies expect AI to become more important, as the technology develops and use-cases become more clear to companies.

The participating companies are generally in the process of understanding the potential of existing data, including to what extent it can be used, what it can be used for, and how to capture and leverage it.

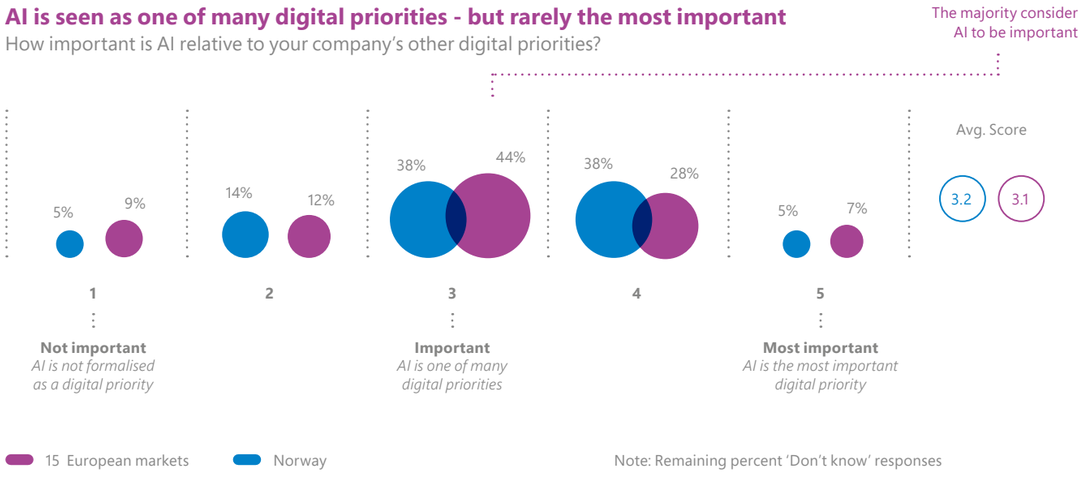
Furthermore, many of the companies are focused on building the appropriate data infrastructures or modernizing legacy systems as a top digital priority, both being prerequisites for introducing AI into the company. Considering that AI is heavily reliant on data as its fuel, this development suggests that the foundations are being laid for further AI integration in the years to come.

AI seen as slightly more important vs. other digital priorities Norway

Many companies in Norway are engaging in successful pilot projects and Proofs of Concept, or have AI initiatives that are released into production. When it comes to their prioritization, respondents in Norway on average consider AI slightly more important than other digital priorities, a ranking marginally above the European aggregate. However, only 5% of the companies report AI to be the most important digital priority. Respondents are also focusing on collecting and storing the right data and building their general digital strategy. These results suggest that, although AI is not the highest digital priority, it is gaining importance and companies are taking the steps necessary to move their AI initiatives forward.

AI is seen as one of many digital priorities - but rarely the most important

How important is AI relative to your company's other digital priorities?



Note: Remaining percent 'Don't know' responses

Push or Pull

How is AI predominately deployed into the organizations?

To understand the drivers behind the adoption and deployment of AI in the companies, we took a closer look at how AI is approached in a top down-bottom up management context, and from a functional tech- vs. business driven dynamic.

AI driven from a combination of technology push and business pull

The contributing companies are quite evenly split across deploying AI as a top down process, as a bottom up, or as a combination of the two. However, when looking at the self-reported most advanced companies, they are more top down than bottom up in their approach. It was clear from speaking with them, that this is partly a result of AI being increasingly important enabler in the company, and playing an increasingly significant role in the overall strategy.

AI driven from a combination of technology push and business pull

According to a large part of the companies. and despite still being a technically complex thing that requires many specially skilled employees, AI is most often deployed as a combination of business pull and technology push.

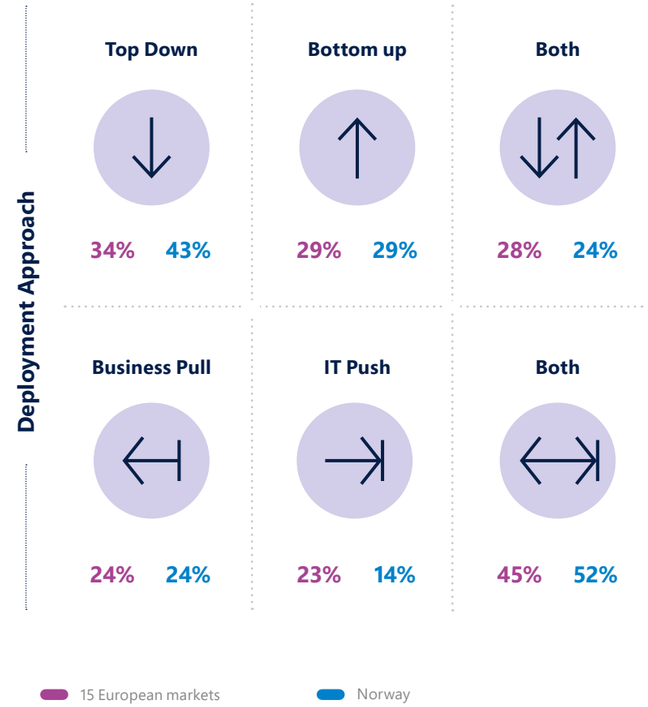
This resonates well with one of the most consistent inputs from the executives on the most sought after AI profiles which centered in on the hybrid profile that understand the business needs *and* the ability to match them to the technological possibilities.

Both business and IT drive AI advancement in Norway

Among Norwegian companies surveyed, AI deployment is customarily driven by both pull from the business needs as well as push from IT's capabilities and innovations. In addition, 43% of companies in Norway manage AI using a top-down approach as opposed to 29% using bottom-up and 24% using both approaches simultaneously. The interviews confirmed that Norwegian companies lean towards a more centralized approach to AI, for instance through a center of excellence in charge of training business units on AI and digital matters.

AI deployed and managed in a balanced way

How would you characterize the way AI is being managed in your company? How would you characterize the way AI is being deployed in your company?



Note: Remaining percent 'Don't know' responses

Ready, Set...

What is the maturity of AI in different sectors?

“

Our main focus for some time was just to collect data and make sure that we are collecting the relevant data. Now we are improving its relevance and quality. The next step in our maturity process, that we are now entering, is using machine learning and AI technology to create new services and add value to our existing products.

— Husqvarna
Consumer equipment company

While working with AI should be considered a continuous journey, the AI maturity of surveyed companies provides a tangible indication of the level of advancement of current initiatives.

Multiple use cases, limited scalability and advanced use

The majority of companies have begun exploring use-cases, while some companies have made early investments with the intention of taking a leading position in AI. The levels of advancement also vary in that some companies are focusing on narrow use-cases to support their existing business, while others are taking an explorative approach. Among the small group of companies with no or only little AI activity to date, several respond that they are planning to drastically ramp up efforts soon.

Technology immaturity and internal data quality are key obstacles

Many companies that have already implemented AI initiatives in their businesses are seeing tangible benefits. Consequently, many of them are exploring more use-cases and structuring their learnings from previous AI projects into a modus operandi that can speed up new initiatives.

Meanwhile, a substantial number of companies have intentionally chosen to take a ‘follower’ position, reporting the perceived immaturity of AI technologies as a key reason. Another reported obstacle to rolling out broader AI initiatives are rooted in data and data infrastructure, where companies have separate projects aimed at improving the structure of existing data, collection of new data, and data access in general. However, the trend is clear: AI maturity is on the rise as adoption of key technologies accelerates and internal capabilities grow.

The vast majority of European businesses are currently either conducting pilot projects to test selected use-cases, or have commenced implementing AI in the business. When talking with executives, it is evident that many companies are struggling with how to integrate pilot projects into daily operations.

Clear sector patterns, with TMT, Services, and Finance on top

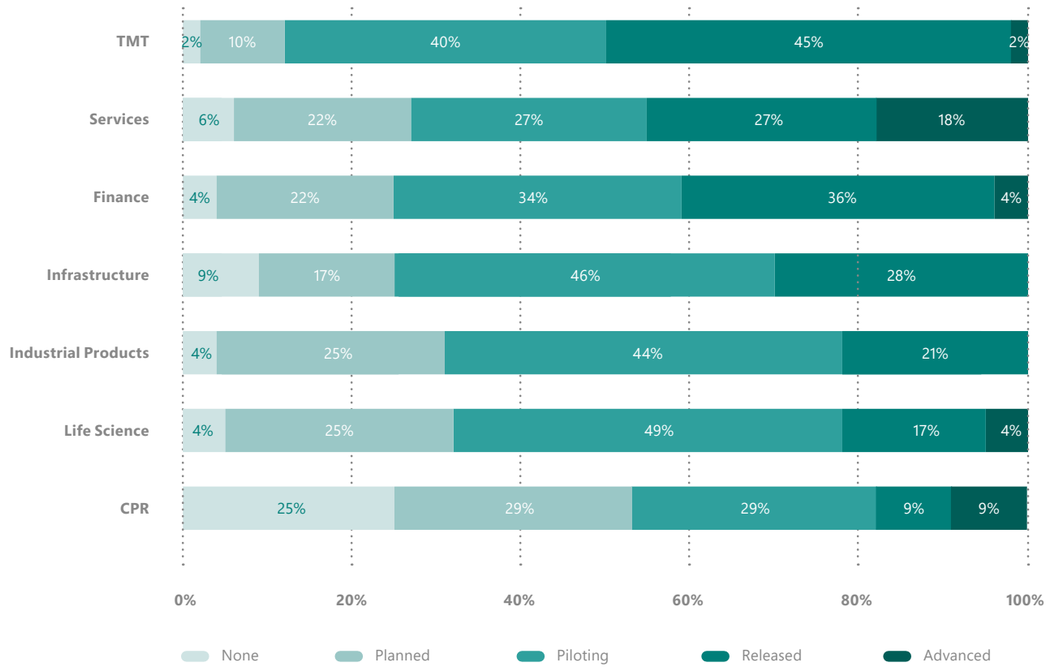
Companies currently leading the way in terms of AI maturity are in TMT, Services & Hospitality, and Financial Services. Companies in those sectors gravitate towards grading their AI maturity as ‘Released’ (AI in active use, though selectively or not with very advanced tasks), or ‘Advanced’ (AI actively contributing to many processes and enabling advanced tasks). A logical explanation for the maturity in TMT and Finance is their tendency to be digitally advanced and more savvy with analytics, favoring these companies to progress beyond piloting by having data science capabilities in place to evolve towards more advanced AI stages.

Infrastructure and IP with relatively many projects in ‘piloting’ phase

The Infrastructure and Industrial Products sectors both stand out as having no companies responding that they are ‘Advanced’ in AI at this stage.

TMT sector with largest percentage of companies that are either released or advanced

How would you describe your company’s general AI maturity? Sectors arranged by maturity based on Advanced and Released



This indicates slower technology adoption lead times in these slightly more conservative sectors. Yet, with 74% of companies being in the ‘Piloting’ or ‘Released’ phases, the Infrastructure sector also seems to be evolving onto more advanced AI maturity.

Life science and CPR have fewest released projects

Consumer Products & Retail companies have a broad spread in terms of AI maturity, where 25% state they have no plans at present for how and when to use AI – much higher than other sectors – while others in the same sector are already at the ‘Released’ or ‘Advanced’ stage of AI maturity. Several companies in both Consumer Products & Retail and Services & Hospitality cite the challenges of knowing what relevant AI technologies are available, utilizing unstructured data, as well as affording the payback period where there may be large upfront costs and undetermined returns on investment.

Role of Ai in European Business

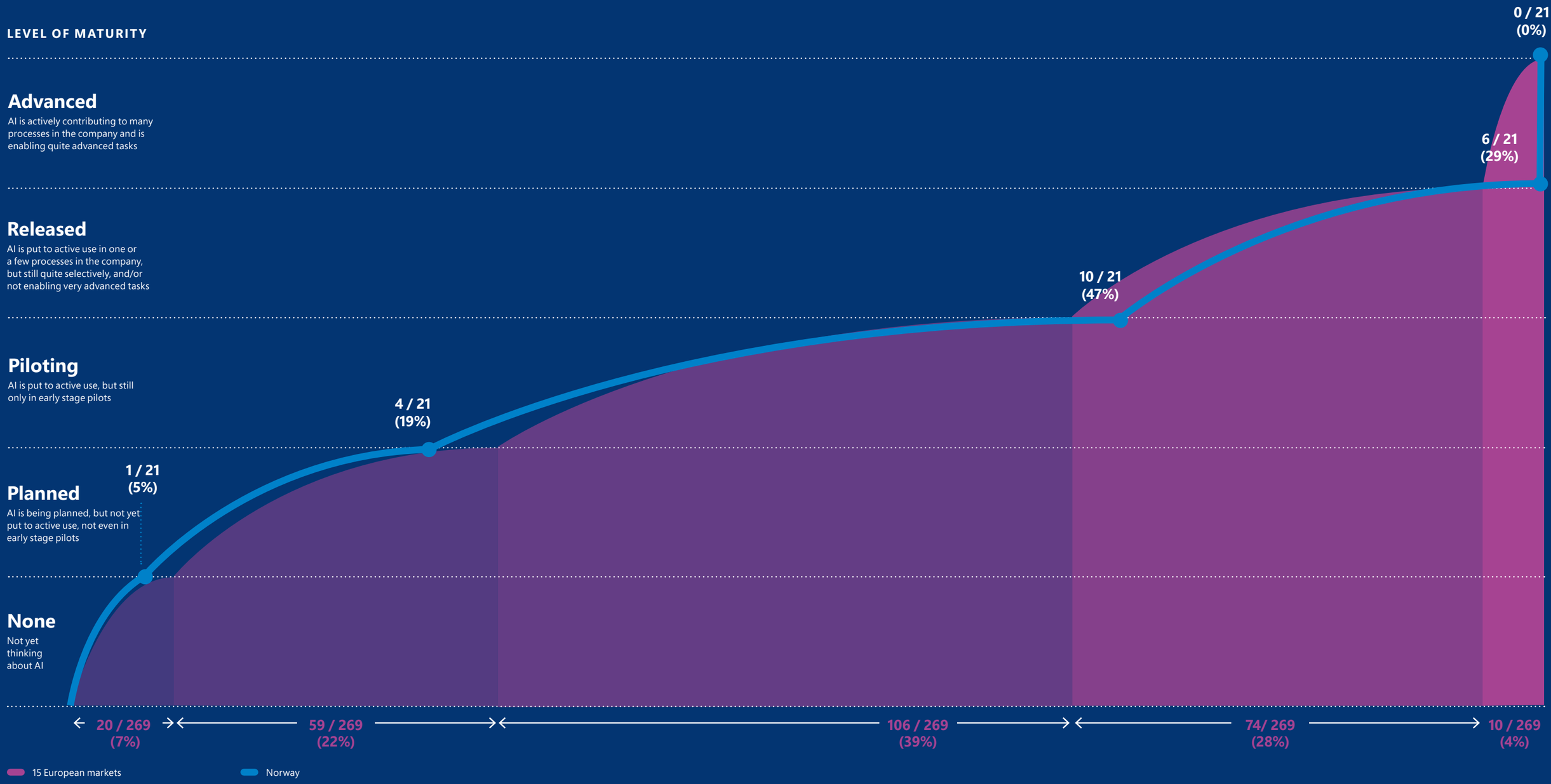
AI Maturity Curve

Majority of companies are in the 'Piloting' or 'Released' stage

We asked companies to self-report their current AI maturity level, grading themselves at None, Planned, Piloting, Released, or Advanced - as defined below.

Companies in Norway have a significant number of early stage AI pilots

In terms of AI maturity, companies in Norway are on par with the European aggregate. A significant share of Norwegian companies surveyed are planning (19%), conducting pilot projects (47%), or have begun releasing AI applications for use in their daily operations (29%). On the contrary, none of the companies we spoke to felt they have reached an advanced stage with AI and 5% report they have not started thinking of AI yet. These results suggest that even though AI seems to be ramping up, there is still some work to be done before reaching full maturity.



Role of AI in European Business

State your Business

Where is AI currently deployed across the companies' value chains?

Looking at the business functions that most commonly use AI provides a good indication of where companies are placing their bets. These functions are driving the company AI agenda, influencing the future direction of the company's AI efforts.

Many AI in R&D and IT/Digital functions

On top of an expected high prevalence of AI within IT departments, AI is also commonly used within R&D functions. This primarily comes down to three factors: employees in R&D are often engineers who tend to have a good understanding and appreciation of AI; the R&D function is often already wired towards taking an experimental, agile approach which is key to AI; and the R&D function often sits on significant amounts of useful data leading to high potential use-cases.

Online customer interactions generating front-end data

Customer-facing, commercial functions such as Marketing, Sales and Customer Service are also heavier users of AI, partly driven by their digitization levels. Although AI is generally adopted more slowly in customer facing interactions than in back-end functions, the abundance of data from increased use of online channels is expected to make these functions obvious candidates for AI technologies in the future. Operations and back-end functions use AI to increase efficiency by automating processes and informing decision-making. The key enabler is data infrastructure, and many companies – currently limited by legacy systems and processes that impede capture and retrieval of data – need to upgrade their infrastructure.

Limited use in HR and Procurement

There are several functions where AI is hardly in use among the participating companies. This includes people-'intensive' functions such as HR and Procurement. This is not due to lack of potentially valuable AI use-cases, which in the case of HR include talent acquisition (avoiding human bias), onboarding (Q&A), performance evaluation (analyzing data), etc. but rather seems to be a result of prioritizing other functions and priorities first.

AI mostly applied in IT, Tech & Digital and Administration & Finance in Norway

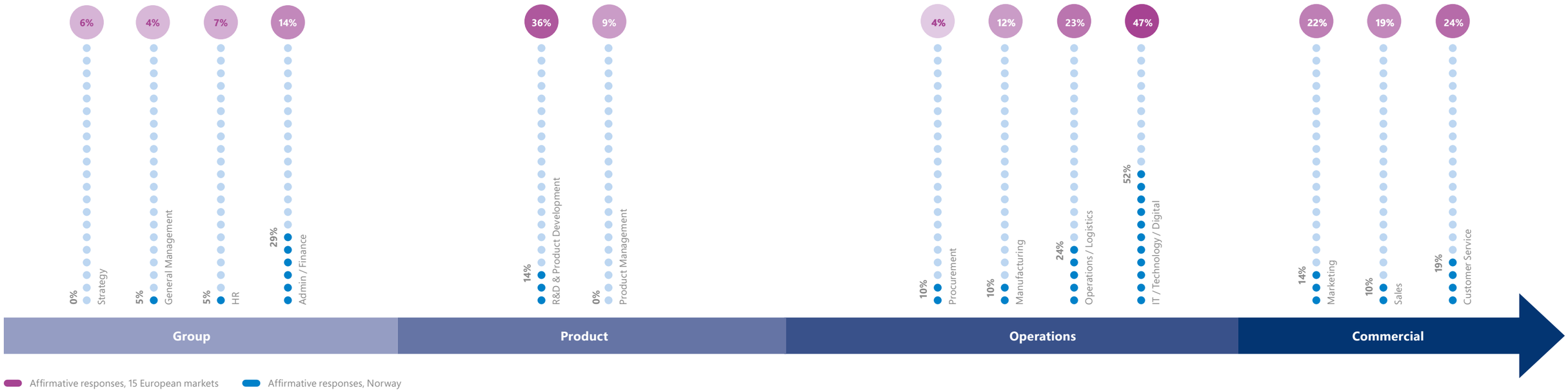
Among companies surveyed in Norway, usage spans 11 out of the 13 business functions presented. The distribution of AI usage across business functions within companies surveyed in Norway is concentrated in two areas, with highest usage in IT, Technology & Digital (52%), followed by Administration & Finance (29%). On the contrary, R&D & Product Development (14%) falls significantly below European aggregate. The lower application of AI in R&D & Product development could be explained by the lack of Life Science companies in the Norwegian sample.

"AI is important for us and almost all other banks. While many focus on RPA today, this will move to more cognitive services in the future. The focal point in the medium to long term should be areas where we find client value or large process improvements by using AI.

— Sbanken
Bank

AI most commonly applied in IT & R&D functions

Which of your company's business functions currently use AI?



(Case Study)

Western Bulk

Western Bulk is in the business of chartering and operating dry bulk vessels, providing seaborne transportation services to its customers. This is a highly competitive and complex industry, and in order to position themselves for the future, the company is evaluating opportunities of data-driven technology, where AI is becoming increasingly strategically important. The industry remains quite reliant on human input and knowledge, and has been relatively slow to adopt intelligent system integrations to drive data collection for decision-making purposes. However, there is a lot to explore in areas such as market intelligence, risk management, vessel operations and chartering decisions. The question is not if a move towards data-driven processes will take place, but how long it will take to get there. Today, Western Bulk uses AI to increase the efficiency of internal processes, from using AI on emails to identify and categorize cargos and tonnage, to simple tasks in accounting like reading travel receipts. Although the current application is not complex, using AI to automate manual copy-paste tasks has allowed Western Bulk to be "less typing and more brains," empowering employees to focus their time on higher-yielding tasks.

Using AI to automate manual copy-paste tasks has allowed Western Bulk to be "less typing and more brains," empowering employees to focus their time on higher-yielding tasks.

Western Bulk is currently only exploiting off-the-shelf AI tools, but sees in-house development as important to win in the market going forward. With risk management at the heart of their operations, Western Bulk's Chartering Managers face complex decision-making and are constantly exposed to risk. The goal therefore is to use AI to better understand the risks involved, and allow Managers to make data-driven rather than gut-based decisions.

Western Bulk

Western Bulk is a privately held global operator of dry bulk vessels headquartered in Oslo, with offices in Casablanca, Singapore, Seattle, and Santiago. Western Bulk combines a solid shipping experience with an asset-light, decentralized, trading-oriented business model. Risk management is a key part of Western Bulk's DNA, and fundamentally important for all operations. Western Bulk's employees operate primarily out of Oslo and Singapore, and the company's revenue in 2017 was 827 million NOK.

What next?

Western Bulk is already benefiting from AI in administration and finance, but the vision for the future is that AI can be used to conduct more complex operations. In the relatively complex operation of vessels, Western Bulk believes that AI can help identify problems on voyages and suggest correct measures. However, this requires a shift to a more data-driven modus operandi, which today is characterized by manual handling and industry know-how. Western Bulk envisions a more data driven – and by extension, more transparent – sector in the future.

One of the biggest challenges with AI is finding the right balance of features that are important for the business today, and the features that we think will be important to the business in the future. We need to exploit and explore. Balancing present with future thinking is always difficult.

We need to move away from gut-feeling decisions and to become more data-driven. AI will be an important tool to achieve this.

Business Benefits and Risks

As a number of industries are beginning to reap the benefits of AI, we investigate what AI is actually doing for businesses today and what is expected in the future.

We look at how big an impact executives expect AI will have in terms of driving growth or causing disruption in their industry, and examine AI's basic and more advanced uses - highlighting examples of these functionalities in operational mode.

We also present a strategic approach to understanding AI's four benefit domains from a business perspective, summarizing the value executives expect to generate by using AI, and touching on what business leaders see as the most prevalent business risks.

Another World

What is the expected impact from AI within the next 5 years?

Of the surveyed companies, 81% believe that AI will have a high or significant impact on their industry within the next five years. Digging deeper into the data, many of these companies expect AI to fundamentally change their competitive landscape, driven by increasing risk of competition, including from new types of start-ups and companies from adjacent industries. The majority of companies also believe that AI will play a key role in their efforts to continuously cut costs to stay competitive.

Strongholds and premiums to change as AI gains ground

Many companies expect competition to intensify due to the 'winner takes all' dynamic often associated with the massive scale that AI and digital can create. They also expect significant impact on their products, increasingly in the form of new services, and they believe the speed of developing new products and taking them to market will drastically decrease - making current competitive strongholds less viable in the long-term.

This is particularly clear in R&D intensive sectors such as Pharma, where big datasets and intelligent algorithms to speed up the drug discovery process (10x mentioned as realistic) can impact the dynamics towards *existing* peers, while new AI based entrants (e.g., intelligent devices) can influence how premiums are distributed in future value chains.

Across sectors, executives expects significant impact

Services comes out on top in the 'High Impact' category, but all sectors expect a significant degree of impact from AI. An overwhelming share also anticipate that AI will result in entirely new products, services, and business models.

Companies from Industrial Products and CPR expect relatively least 'high' impact from AI, but even in these sectors, more than 30% expect the industry to be disrupted.

Limited sync of maturity and expected impact

The biggest disparity is within Finance, specifically Pension and Insurance, where ambitious companies are making significant investments in building data infrastructure and AI capabilities, while others are taking a waiting stance, and will jump on the AI train when the technology is more mature.

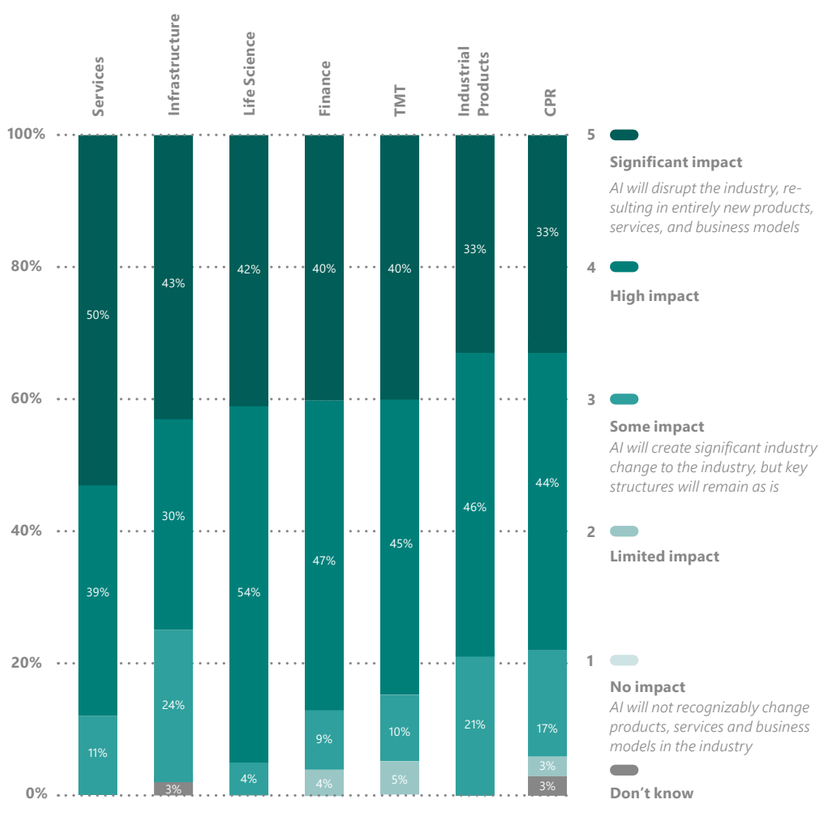
Countries expect different impact from AI

When approaching impact from a country perspective, the tendency remains; very high expectations across the board. Portugal stands out with most 'high' impact responses.

In the opposite end of the expected impact scale, Ireland, Austria, and Spain, in that order, are the countries where most companies expect only 'some' impact from AI or less.

Services the sector with the highest expected impact from AI

How much impact do you expect AI will have on your industry within the next 5 years?



Norwegian companies in the top third for expected impact from AI

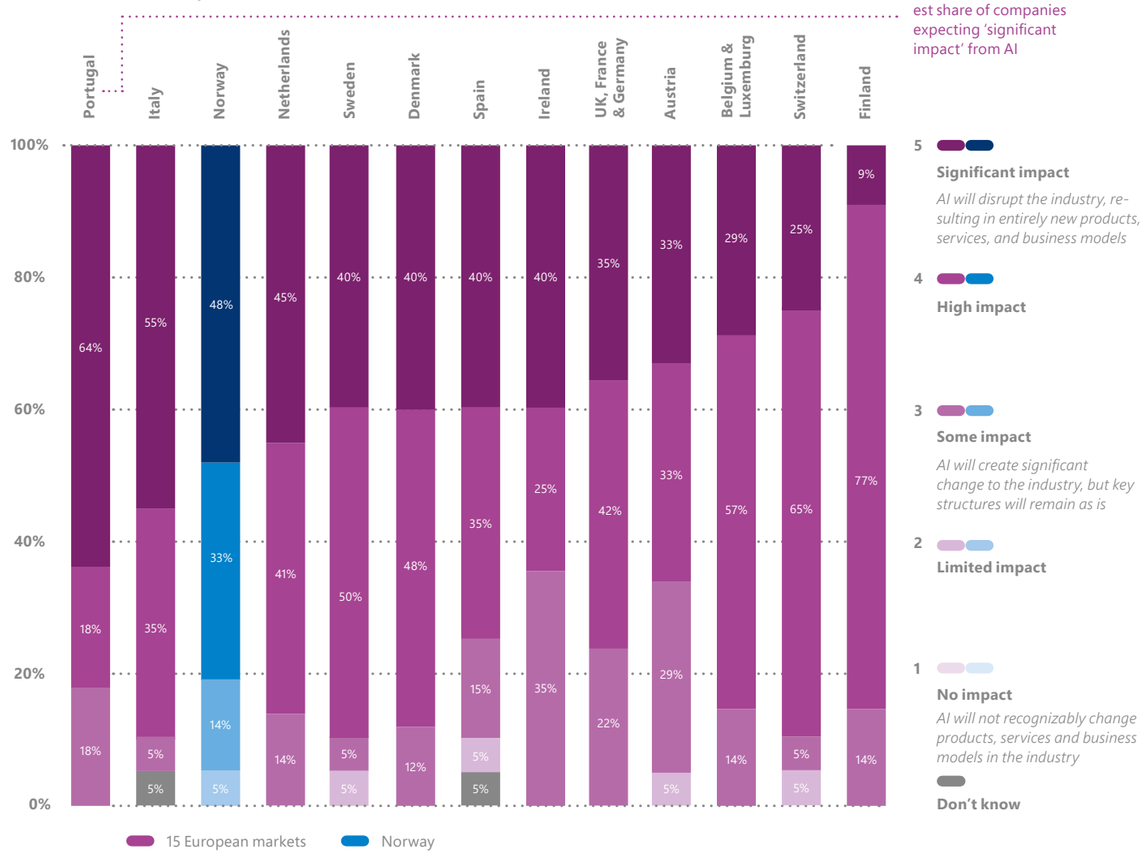
At 48%, companies in Norway are among the top third across Europe when it comes to expecting AI to have a significant impact on their industry in the future. Yet, Norway has a significant proportion (19%) expecting only limited or some impact. One possible explanation is that many companies in the Finance sector have high impact expectations, while companies in Industrial Products & Manufacturing have rather low expectations. According to the respondents, some of the ways in which AI will disrupt industries relate to personalization of customer content, intelligent decision making or radical automation.

> **One of the most important success factors we've had is that we've been able to balance what the technology is in terms of possibilities and limitations with what is relevant for us and our customers, allowing us to develop and implement solutions of value.**
>
> **— Sparebank 1 Østlandet** Bank

High expected impact from AI consistently across countries

How much impact do you expect AI will have on your industry within the next 5 years?

Portugal has the highest share of companies expecting 'significant impact' from AI

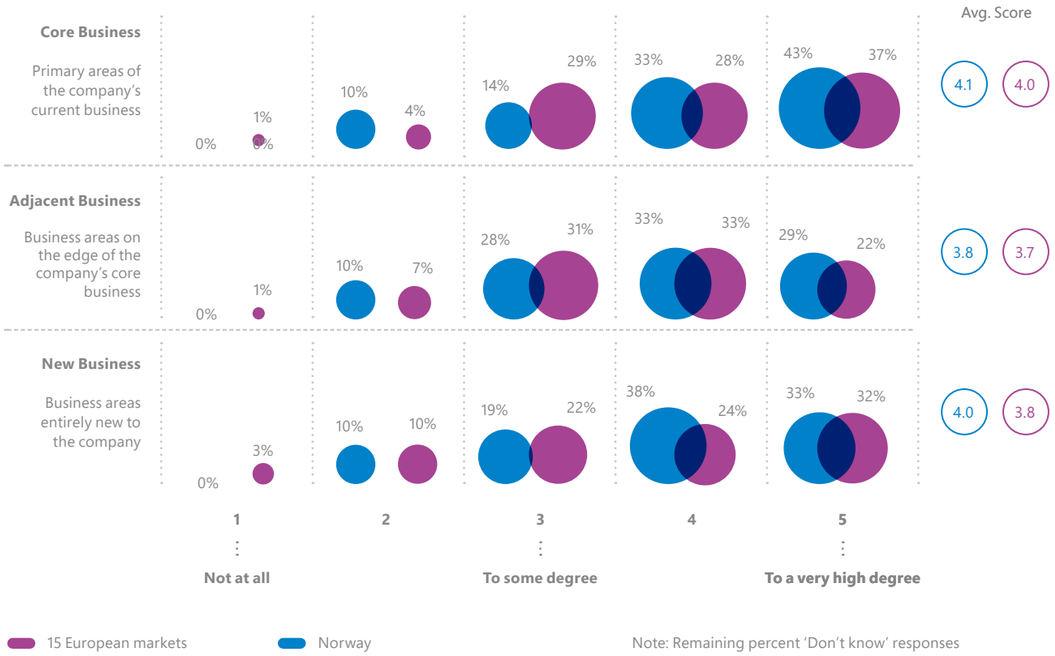


AI Here, There, Everywhere

What is the proximity of AI's future impact to core business?

Companies expect impact across all horizons

To what degree do you expect AI will create impact for your company within each of the following areas?



Note: Remaining percent 'Don't know' responses

Many of the participating companies are expansive, with diversified business units offering a range of products and services. We questioned *where* they expect AI to have an impact - in their core, adjacent and/or new business.

AI will impact across the board, but less consensus on timelines

Companies expect AI to have a relatively equal impact on core, adjacent and new areas of their business. In interviews, they say impact depends on the timeline, for instance AI impacting the core business now, but adjacent and new business later on. The range of answers for "Adjacent" and "New" across Europe are more split and contain more "Don't Know" responses than for "Core" – perhaps because there is an inherent challenge in making predictions about AI's impact on new business areas where business results are not yet realized, and where the role of current and upcoming AI technology is not clear.

Yet, interestingly 32% feel confident AI will impact areas that are "entirely new to the company." This is not far behind the 37% of respondents who expect a very high degree of impact on the core areas of the current business.

Norwegian companies expect high impact from core to new

At least 60% of companies surveyed in Norway expect AI to have a high or very high impact across core, adjacent and new business areas. Specifically, 43% of companies in Norway expect AI to have a very high degree of impact on primary areas of the company's current business, above the 37% European aggregate. Some respondents anticipate AI to have a bigger impact on the core business in the short to medium term and on new business models and products in the longer term.

Tetra Pak

Tetra Pak is experienced in implementing AI in various business functions. Tetra Pak generates insights from its huge volume of machine data and imagery collected across manufacturing lines spread throughout the world. The algorithms developed on the machine data predicts the next possible failure and is used as an input for maintenance activities. The images of finished products are fed into a deep learning-based AI system that, in real-time, triggers an alarm if any quality issues are detected.

To ensure maintenance does not lead to excessive downtime for its customers, Tetra Pak uses augmented reality for remote support. Because technicians can support customers globally, they increase their coverage and respond quickly to customers' needs using mixed reality technology. Predictive maintenance combined with implementation using augmented reality benefits customers to optimize their operations though automation and planned maintenance. Tetra Pak is also exploring language-based cognitive services in areas of language translation and conversational solutions (such as chatbots) for diverse business areas.

Predictive maintenance combined with implementation using augmented reality benefits customers to optimize their operations through automation and planned maintenance.

Tetra Pak has a Data Science Center of Excellence that works on emerging AI areas and reports to the Chief Digital Officer. These experts work to utilize Tetra Pak's vast amounts of data for efficiency, robustness, quality and employee empowerment. To collaborate with its in-house team, Tetra Pak engages in partnerships with universities and other organizations. Through these activities, Tetra Pak is using AI to transform food processing and packaging for the digital age.

Tetra Pak

Tetra Pak leads the world in food processing and packaging. Founded in 1951 in Sweden by Dr. Ruben Rausing, Tetra Pak forms one third of the Tetra Laval Group that is headquartered in Switzerland. Dr. Rausing's guiding premise was that "a package should save more than it costs" and AI is now keeping that tenet central within Tetra Pak. Today it has an enormous offering of products and services that range from containers for foods to UHT processing and automation services. Tetra Pak employs 25,000 people globally and brought in €11.5 billion in revenue in 2017.

What next?

Tetra Pak is looking to scale up its data science capabilities to benefit from connected solutions and a connected workforce. Connected solutions enhance quality inspections, and ensure that insights from one part of the world benefit other parts. A connected workforce streamlines customer engagement in sales and technical support. Tetra Pak continues to develop and test AI solutions and to demonstrate their business value.

"AI enables us to leverage the unstructured data like images and generate value.

"AI is empowering our colleagues with an interactive experience in areas of augmented reality, language translation services and conversational solutions.

Use It or Lose It

How is AI put to use in companies today?

AI enables a wide range of uses, broadly split into personalizing, automating, predicting, prescribing and generating insights. We asked companies how relevant each was to their business and found a significant degree of variance in terms of what executives expect to use AI technologies for.

Prediction is the top use

With 74% of companies seeing prediction as a relevant use of AI, this functionality, which includes churn analysis, predictive analysis, and predictive maintenance, comes out as the top use. Companies with a large customer base use churn analysis to identify and proactively engage customers with exit potential. Sales teams use predictive analysis to identify leads with the highest likelihood of conversion. Companies that sell or use advanced costly machinery use predictive maintenance to save money through decreased downtime.

Intelligent automation for effectively dealing with routine tasks

Smart automation is seen as widely applicable by 74% of companies surveyed. With estimates that 20-30% of current tasks can be done without human intervention, a substantial number of companies are currently in the process of training chatbots to transform the way information is acquired.

Generating insights to make informed decisions

Focusing on generating insights based on internal and external data, 58% of companies view AI as a way to make better decisions. This requires a sophisticated data infrastructure. Companies reliant on R&D are using AI to speed up the process of analyzing data for new product development and to inform future research.

Personalization is becoming a common feature

Among the surveyed companies, 44% are using AI to personalize the user experience, for instance by tailoring content to individual interactions as an effective way of driving mass-personalization. Next steps in personalization include chatbots and virtual assistants, where some companies already have fully automated customer front-end solutions in place.

Prescriptions' potential is big

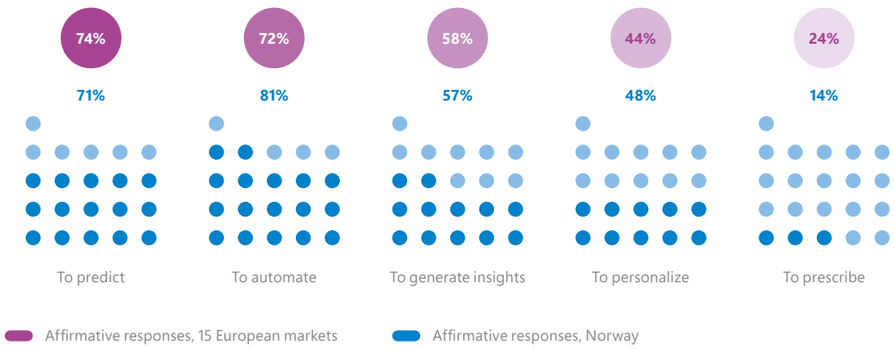
Prescription is the laggard among the five AI uses, with current use-cases typically being early stage, such as suggestion engines and decision recommendations for salespeople and advisors. AI for advanced prescription such as complex decision making lies in the future, as it requires collecting large amounts of data and understanding which variables are significant, including some that are difficult to digitize.

Companies in Norway expect AI to optimize operations

At least 50% of respondents in Norway consider three of the five main uses of AI relevant for their company. The most common uses of AI are to automate and predict, followed by generating insights. Current use-cases highlighted by respondents include automation of customer service, as well as prediction of customer behavior and asset maintenance.

Prediction and automation relevant to most companies

What are the relevant uses of AI in your company?



Predict

Anticipate events and outcomes

AI will help make our products more reliable and allow real predictive actions based on various data sources.

— Siemens (Mobility Division) Mobility solutions company

Automate

Handle tasks without human intervention

AI will currently be used to handle simple processes and solutions, which allows the bank to focus efforts on key tasks, those that have a real impact on customers' lives. But in the future, it could also automate more complex processes.

— Sparebank 1 Østlandet Bank

Insights

Identify and understand patterns and trends

In all areas where a lot of data is reviewed and processed and has to be understood and assessed by people – we believe that in those areas AI can help us a lot to improve our efficiency.

— Handelsbanken Bank

Personalize

Tailor content and user-experience

We can provide a more personalized service to our guests, both before check-in, during the stay and after check-out. Content personalization and recommendations will further improve customer engagement.

— Grupo Pestana Hotel chain

Prescribe

Suggest solutions to defined problems

We use Natural Language Processing to group customer inquiries and suggest which of our 300+ templates we should use in response. Our employees only need to confirm the choice or tweak it slightly. This dramatically lowers the time it takes to respond.

— PFA Pensions and insurance company

Making AI Simple

What is a good framework to map the potential benefits from AI?

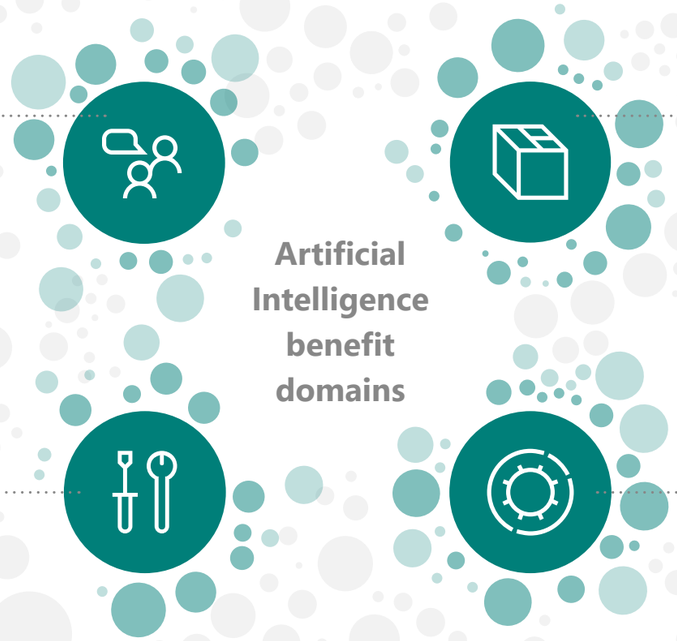
The contributing companies generally expect to benefit in all four key domains as outlined in **Microsoft's Digital Transformation framework**: *optimizing operations*; *engaging customers*; t*ransforming products and services;* and *enabling employee*s. Each domain draws on underlying AI functionalities – 'reasoning' through learning and forming conclusions with imperfect data; 'understanding' through interpreting the meaning of data including text, voice, and images; and 'interacting' with employees, customers and other stakeholders in natural ways.

Applying AI to these domains can be transformational to a business, ultimately changing the landscape of the business itself and the industries and eco-systems in which it operates.

Let's look in more detail at what that entails.

Artificial Intelligence impacts business in four benefit domains

Companies must consider how they approach the benefit domains in their AI strategy formulation



Engage your customers
E.g., provide customers advice, shorten conversion cycles, and reduce time to resolution

Transform your products & services
E.g., speed up product innovation cycles, enable new value add services, and provide real time support

Enable employees
E.g., increase employee efficiency through predictions, enabled support, and automation of repetitive tasks

Optimize your operations
E.g., improve planning and reduce costs through intelligent prediction, operational efficiency, and deep insights, predictive maintenance

Improved production and efficiency through optimized operations

While digital transformation in general is based on customer engagement, optimizing operations is what companies first look to when putting AI to use. It draws on multiple levers such as: intelligent prediction, e.g., identifying chronic diseases, anticipating non-performing products, or adaptive modelling to flag corrective actions; operational efficiency, e.g., optimizing forecasting and order-to-fulfilment flows across the value chain, or processing huge sets of documents in a fraction of the time; and deep insights, e.g., detecting anomalies to surface irregularities such as fraud, or identifying new pockets of opportunity before competitors do.

Engaging customers more effectively through AI

After optimized operations, companies look to customer engagement as the domain in which to seek most business benefits. Early examples of AI applications in the customer engagement space involve levers such as conversational agents, e.g., bots providing personal recommendations and transactional advice; personal assistants, e.g., guiding decision-making, shortening conversion cycles; and self-service, e.g., options to help customers reduce time to resolution.

Staying ahead of the competition by transforming products and services

Transforming products and services, and enabling employees, came out on the same level, slightly below the two other domains when it comes to where companies expect to generate future business benefits.

Transforming products and services, ultimately giving rise to entirely new business models, is mostly favored in R&D-heavy sectors where companies consider AI and advanced analytics as levers to speed up the product innovation and discovery process. In B2C-oriented sectors, AI enables provision of new services via multilingual cognitive tools, geo-location suites, sentiment analysis, cognitive robotic advisory capabilities, personalized service agents and more to transcend the sectors to a new level of value-add -with significantly increased scale and reach in real time.

Enabling employees to be more efficient and capable

Across sectors, numerous AI use-cases focus on increasing employee productivity or serve to enhance the human ingenuity and the ability to fulfil a given function. AI helps employees in B2C companies expand organizational knowledge by analyzing vast customer behavior datasets in order to adapt online and offline store layouts, driving conversion and sales. Customer personalization is used at scale, powered by AI solutions that reveal real-time customer insights, identifying the best next actions for up-sell and cross-sell opportunities, as well as predictive models that obtain a 360-degree view of the customer by integrating customer data and sentiment to generate targeted offers.

"AI and digital transformation requires us to rethink our ways of working and producing products. AI will both improve existing processes as well as enable completely new products, services and business models.

— Kongsberg Gruppen
Technology group

Where Value Hides

What benefits do business leaders particularly expect from AI?

Respondents were asked to assess the potential of AI within each of the four benefit domains.

Optimizing operations and engaging customers to deliver most value

Among all companies surveyed, 89% expect AI to prove beneficial in optimizing operations, with use-cases most highlighted by executives being monitoring results, predicting trends, and prescribing future solutions. A lot of focus is given to intelligent automation, such as making compliance cheaper and more robust, improving risk analysis, optimizing supply chains, providing predictive maintenance capabilities, and more.

Not surprisingly, the ability to structure repeatable processes and reduce human error and bottlenecks is something most executives can get behind from a cost-saving perspective.
74% of companies surveyed expect AI to help them engage customers and enhance the user experience, including tailoring content, increasing response speed, adding sentiment, creating experiences, and anticipating needs.

Fewer expect products and services and employee engagement

Although executives speak of the potential in making sense of existing and new sources of data to introduce higher margin services to product portfolios, expedite new product development, and introduce innovative new offerings, only 65% expect AI to help transform products and services.

Even fewer (60%) expect AI to provide benefit from empowering employees to improve productivity, enable innovation, support problem solving, etc.

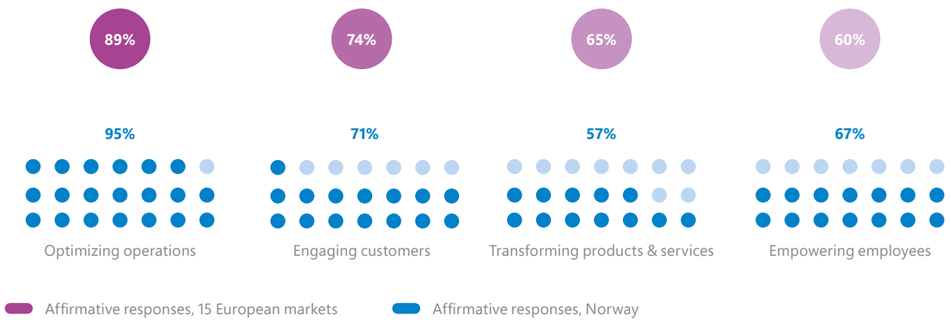
What we did hear overwhelmingly, however, was the importance of bringing all employees along on the company's AI journey. This involves getting internal buy-in that AI will be a force for good, generating excitement about working with intelligent technologies, and making existing jobs easier and more engaging.

Companies in Norway expect AI to optimize operations

Among Norwegian companies surveyed, 95% expect AI to optimize their operations in ways such as automating tasks, or forecasting capacity, well above the 74% in Europe. At 89%, companies in Norway believe AI will benefit customer engagement, for instance by automatically identifying customer needs and tailoring offerings; and 67% expect AI to enable employees by freeing up their time and thus allowing them to focus in more interesting and value adding tasks, or by providing personalized and tailored training. Lastly, 57% of Norwegian companies expect AI to contribute in transforming products and services for instance by providing real-time insights.

Most companies expect to generate benefit from optimizing operations

What business benefit do you expect AI to generate?



A.P. Moller – Maersk

There is no doubt that AI has the potential to transform Transportation & Logistics, giving rise to a new class of intelligent logistics assets and operational models. Data science is not new to A.P. Moller – Maersk, yet only recently has AI become a part of Maersk's core strategy as a functional technology with tangible applications. As a designated new discipline positioned close to the core of group strategy, Maersk is developing AI capabilities as part of a broader transformation of the business.
Maersk takes a broad view of AI, applying intelligent technology to three main areas: product offerings, (using AI to develop new products and services and improve existing products and services); enhanced customer experience (service delivery, issue resolution, empowering customer-facing employees); and operational efficiencies (for example via network optimization).

As a designated new discipline positioned close to the core of group strategy, Maersk is developing AI capabilities as part of a broader transformation of the business.

Treating AI as a distinct part of wider digital initiatives, Maersk established an in-house software development and innovation unit, consisting of 100 employees and growing. The aim is to deliver AI products and solutions rooted in the group business strategy, building on well-defined use-cases with deep sponsorship from the business, thereby avoiding the trap of living separately from the business and not adding value.
Maersk's early investment in agile transformation and people capabilities has resulted in the organizational structure and concentration of talent necessary to drive AI forwards in a large global organization.

MAERSK

A.P. Moller – Maersk is a Danish conglomerate with activities in two sectors: Transport & Logistics and Energy. Maersk is the largest company in Denmark, and the world's largest operator of container ships and supply vessels. The company has approximately 88,000 employees, a fleet of more than 1,100 vessels, and subsidiaries and offices in 130 countries. Its 2017 revenue was $31 billion.

What next?

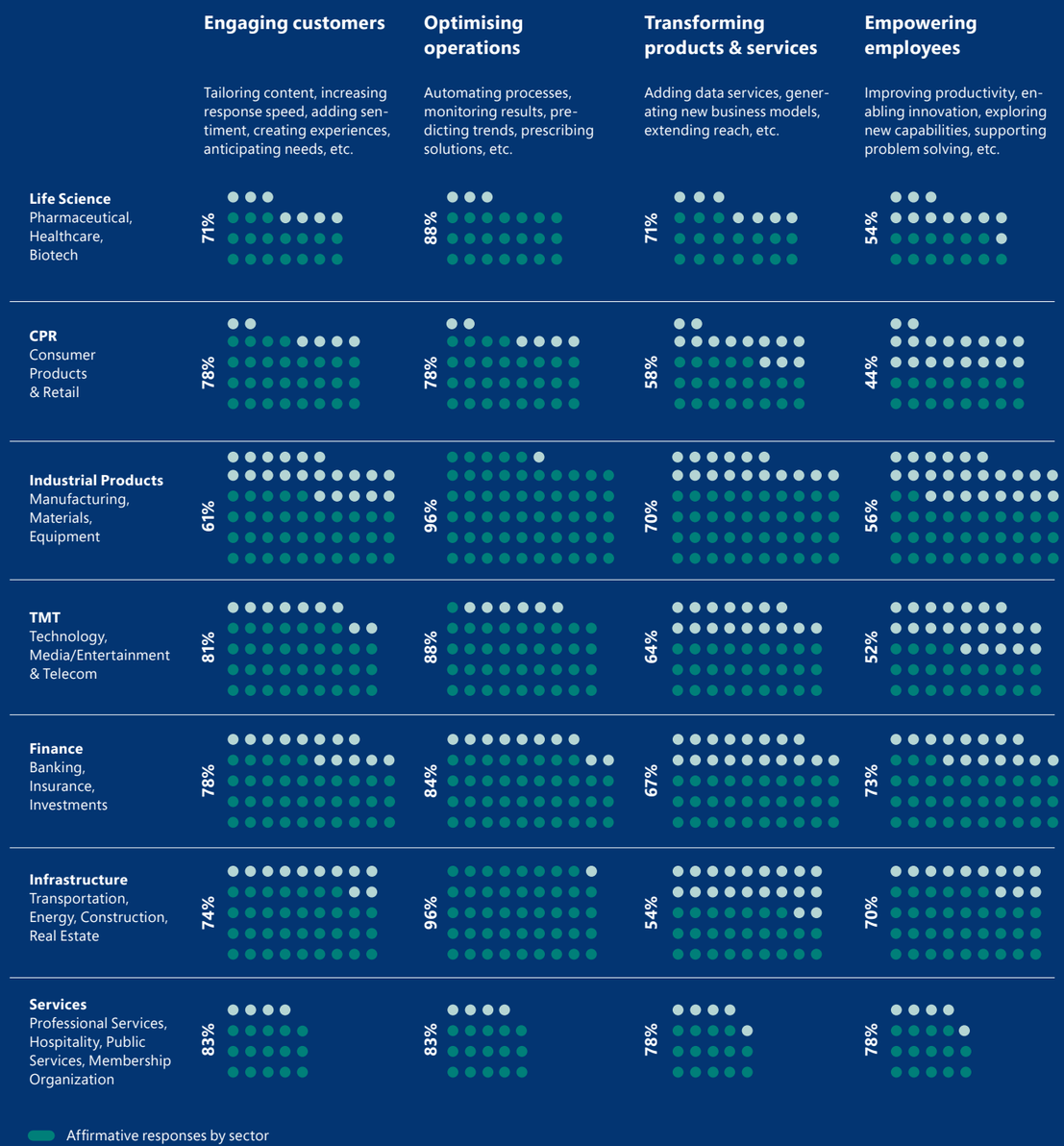
Maersk is developing a platform to leverage company data to develop products, partly by optimizing the company's data architecture to ensure faster development. To meet these demands, Maersk is changing its approach to attracting talent. AI also requires an entire new skillset among company leaders, transforming them into AI leaders who are deeply engaged in implementing AI in the business.

"At Maersk, we build things that have deep business sponsorship and add value.

"There's good awareness about what AI can bring to the shipping industry. In the future, Maersk won't just be a shipping company, but an integrated forwarder of logistics.

Sector Benefits Landscape

We asked companies across sectors what business benefit they expect AI to generate across Engaging customers, optimising operations, Empowering employees, and Transforming products & services



Front to Back

What are the expected benefits by sector?

Executives surveyed and interviewed in the various sectors recognize the distinct benefits of AI, speaking about the myriad of ways they see AI transforming their businesses and industries. Although there are clear patterns to discern, executives from different sectors often speak to different benefit areas from which they particularly hope to capitalize from.

Services companies expect the most benefits from AI

Services companies reported the highest expected benefits across all four domains, expecting significant value from AI through engaging customers and empowering employees, for example via improving resource and skills allocation across their large human capital pools. (Note: the Services sample is the smallest of all sectors.)

Expedited drug discovery and disease prediction in Life Science

Executives in Life Science are among those most excited about benefits pertaining to transforming products and services. Many see AI leveraging existing internal and external datasets to speed up the drug discovery process and enable the transition towards precision medicine.

Deep learning with huge datasets is also expected to assist with disease prediction. Customers can be engaged using new health-oriented IoT-related wearables, paving the way to valuable data collection and even entirely new business models.

Engaging customers in new ways in Consumer Products and Retail

The Consumer Products and Retail companies we spoke to rank lowest in terms of expecting benefits from AI, pulled down by only 44% expecting benefits from AI to empower employees. However, with multilingual cognitive tools and being able to bring targeted, tailored offerings to customers, many spoke of the potential to engage customers, and of using AI for crucial activities such as understanding brand performance and sentiment analysis.

Virtually all Industrial Products and Infrastructure companies look to optimize operations

Companies from the Infrastructure and Industrial Products & Manufacturing sectors top the list at 96% respectively in terms of expecting efficiency gains through AI optimized operations. The heavy focus on equipment, complex supply chains and materials means there is ample scope for intelligent optimization. Yet, there is a relatively small focus on engaging customers and empowering employees. This is likely due to the frequent B2B nature of these businesses, and the potential for automated machinery to play an ever-growing role in the industrial sector.

TMT expects AI to increase engagement, insights, and connectivity

The focus in many Telecom, Media and Technology companies seem to be on using AI to reduce costs of retaining and growing customer bases. AI is projected to help build seamless experiences across devices, predicting churn, and automating customer service capabilities to solve some of the sector's longstanding challenges while bringing down costs.

AI to revolutionize Financial Services firms

Finance companies reported some of the highest expectations for AI benefits across the four domains, which can explain the sector's current frontrunner when it comes to current AI maturity. From using machine learning to detect fraud and automation to streamlining KYC efforts in the back office, and to reducing compliance and regulatory costs via technologies that digest vast quantities of legal documents, banks and other financial institutions are looking to provide higher quality service at faster speeds and lower costs. Similarly, mortgage applications can be approved in a matter of minutes, and investment decisions can be guided by robo-traders to transform products and engage customers in the front office.

> **As a railway company, we have significant physical assets that need to be maintained. With AI we see significant opportunities, like automatically detecting faults in railway tracks and predicting maintenance needs. This improves not only efficiency but also security.**
>
> **— SBB Swiss Federal Railways**
> Railway company

Today AI is often somewhat a 'black box', however we need to know why AI came up with a certain conclusion, such as telling a customer why their loan application was declined or similar. Trust in AI is lacking, so there is a risk that customers remain on the fence with regards to the application of AI.

— **KLP Banken** Bank

We are not looking to develop a separate AI strategy; AI is part of our toolbox, applied to solve various problems and challenges. We do not consider the use of AI as an end in itself.

— **DNB** Financial services group

Risky Business?

What do business leaders need to pay attention to when implementing AI?

There are inevitable concerns about the business risks associated with AI, as many of the applications of the relatively new technology are still in their early development while receiving significant media and political attention. However, from what business leaders tell us, they are balancing their excitement about AI's potential with some healthy reflections on key business risks, not at least the risk of investing in a technology that may not prove its commercial value if not done correctly.

Broad concern with regulatory landscape

Over half of all companies surveyed expressed concern regarding regulatory requirements. This concern can broadly be split into compliance with existing requirements and navigating the nascent, often ill-defined regulatory landscape for AI. For the former, companies need to take advantage of solutions in accordance with everything from GDPR to cybersecurity concerns. For the latter, the lack of clarity around AI regulation can slow down scaled implementation as business leaders worry about investing in solutions when the rulebook is still being written. Many first movers within our AI report feel they need to write the rules themselves and hope for the best.

Concern with the human in the new machine age

A prevailing risk many companies were also concerned with was impact on personnel. The need for employees across the organization to buy in and adapt to working with AI touches on all industries and markets. The instinctual fear of job losses among personnel is one that needs to be managed as AI will often transform the daily tasks of employees, rather than replace them altogether, allowing for more people-oriented or creative work. There is also a larger task in training employees to work together with AI, usually a challenge and risk in itself.

Seeing the wood for trees

A further dominant risk articulated by several surveyed business leaders is about feeling information overload. AI can help make sense of huge quantities of data, but setting up AI and learning to use it effectively requires feeding the technology the right data and working out what is useful versus what is noise. A further element in the risk of overload is understanding the different AI technologies and solutions available and making sense of technological as well as market developments to know where to make strategic use of AI.

Top 3 business risks in Norway

1 Regulatory Requirements

62%

More than half of Norwegian companies expressed concern about regulatory requirements, and in particular, the need for clear guidelines and regulations regarding AI. Without such clarity, investment in AI can be perceived as risky for companies because they may invest in something allowed at the time that may not be later on. Norway shares this concern with other European countries surveyed: for almost all of them, regulatory requirements was one of the top three risks.

2 Upkeep of the System

33%

The pace of change in AI technology is very rapid. Companies fear that a technology they invest in now will be outdated before it has achieved its expected ROI. Additionally, as with any system, it requires planned and unplanned maintenance, including updating its servers and the data it uses. Companies tell us it is difficult to demonstrate business cases with small pilot tests, and therefore, hard to know where to invest initially and over time.

3 Information Overload

24%

Information overload may occur when trying to figure out what is useful in vast amounts of data, identifying insights or establishing predictive trends. Working with such large amounts of data requires consideration for the users looking for understandable, actionable results. As companies implement AI, they are considering both the technical aspects of working with very large datasets and the human aspects of interpreting the results in a real-world, business context.

Note: Affirmative responses, Norway. The respondents were asked to select all that applied of the following response options included: Diffusion of resources, Loss of control, Upkeep of the system, Information overload, Regulatory requirements, Impact on personnel.

Learn from the Leaders

The promise of AI lies in creating business value.

We have identified the eight most recognized capabilities needed to successfully create value from AI, and assessed how competent companies are within each.

Perhaps more importantly, the executives we spoke with highlighted the importance of these 8 competencies as those needed to successfully create value from AI.

Capabilities. How?

What competencies are required to get AI right?

This section explores the necessary eight capabilities to develop AI maturity, realize tangible business benefits, and minimize risk. As exhibited in the chart on the following page, we asked the companies to rank the importance of these capabilities in terms of incorporating AI into their business, as well as to self-assess how competent their companies are with regards to each AI enabling capability.

The human element and technology

Some of the eight capabilities center around human elements: AI Leadership; Open Culture; Agile Development; Emotional Intelligence. Others are more technology oriented: Advanced Analytics; Data Management; Emerging Tech; External Alliances.

Ranking of key capabilities for realizing AI potential

Advanced Analytics comes out on top as the most important AI enabling capability among the companies surveyed. *Data Management* is second. *AI Leadership* is perceived as the third most important capability. *Open Culture* refers to collaboration and the ability to embrace change and uncertainty.

Understanding how to deploy the right *Emerging Technologies* in a future proven way is ranked fifth, followed by *Agile Development*, where self-organized teams are characterized by shorter project cycles, the ability to work with constantly evolving technology, and transparency regarding success and failure that leads to wider buy-in and scaling.

Entering into *External Partnerships* ranks second to last in terms of importance, perhaps because it's the area that resonates most with existing capabilities and where business leaders perceive themselves most in control.

As the majority of companies we spoke to are looking to supplement their in-house skills with external partners when building their AI solutions, particularly for pilot projects, it is not due to a general lack of relevance.

Bringing behavioral science into play via *Emotional Intelligence* to build solutions that understand and mimic human behavior, and make it easier for humans to interact with the technology, is seen as the relatively least important AI enabling capability. An explanation for this could be that the technical skills are still so relatively complex for companies to grasp and establish, that more advanced human cognitive skills become less of a priority at this stage.

Noticeable sector deviation

As exhibited in the following chart where business leaders are asked how competent their company is in relation to the most important AI enabling capabilities, the sector aggregate scores land at or just above the median, with a fairly close spread. Sectors that are more mature in using AI are those that report higher competency in Advanced Analytics - particularly TMT (Telecom, Media/Entertainment & Technology), as well as Finance (including Banking, Investment & Insurance), and Life Sciences (including Healthcare & Pharma) all report lower competency in AI Leadership. A possibility is that in the pharmaceutical industry, AI chiefly resides in R&D, and has yet to affect the broader organization on the wider strategic level.

Companies intend to use various levers to obtain these AI capabilities. Companies are relatively evenly split between using recruitment (60%), training (56%), partnering (57%). Only 10% of the companies use acquisition of teams or businesses as a way to fast track building much needed AI capabilities.

8 capabilities

1. Advanced Analytics
Obtaining and deploying specialized data science skills to work with AI by attracting talent and working with external parties

2. Data Management
Capturing, storing, structuring, labeling, accessing and understanding data to build the foundation and infrastructure to work with AI technologies

3. AI Leadership
The ability to lead a transformation that leverages AI technology to set defined goals, capture business value and achieve broadly based internal and external buy-in by the organization

4. Open Culture
Creating an open culture in which people embrace change, work to break down silos, and collaborate across the organization and with external parties

5. Emerging Tech
The organizational-wide capability to continuously discover, explore and materialize value from new solutions, applications, and data platforms

6. Agile Development
An experimental approach in which collaborative, cross-functional teams work in short project cycles and iterative processes to effectively advance AI solutions

7. External Alliances
Entering into partnerships and alliances with third party solution providers, technical specialists, and business advisors to access technical capabilities, best practices - and talent

8. Emotional Intelligence
Applying behavioral science capabilities to understand and mimic human behavior, address human needs, and enable ways to interact with technology and develop more human-like applications

AI Competency Model

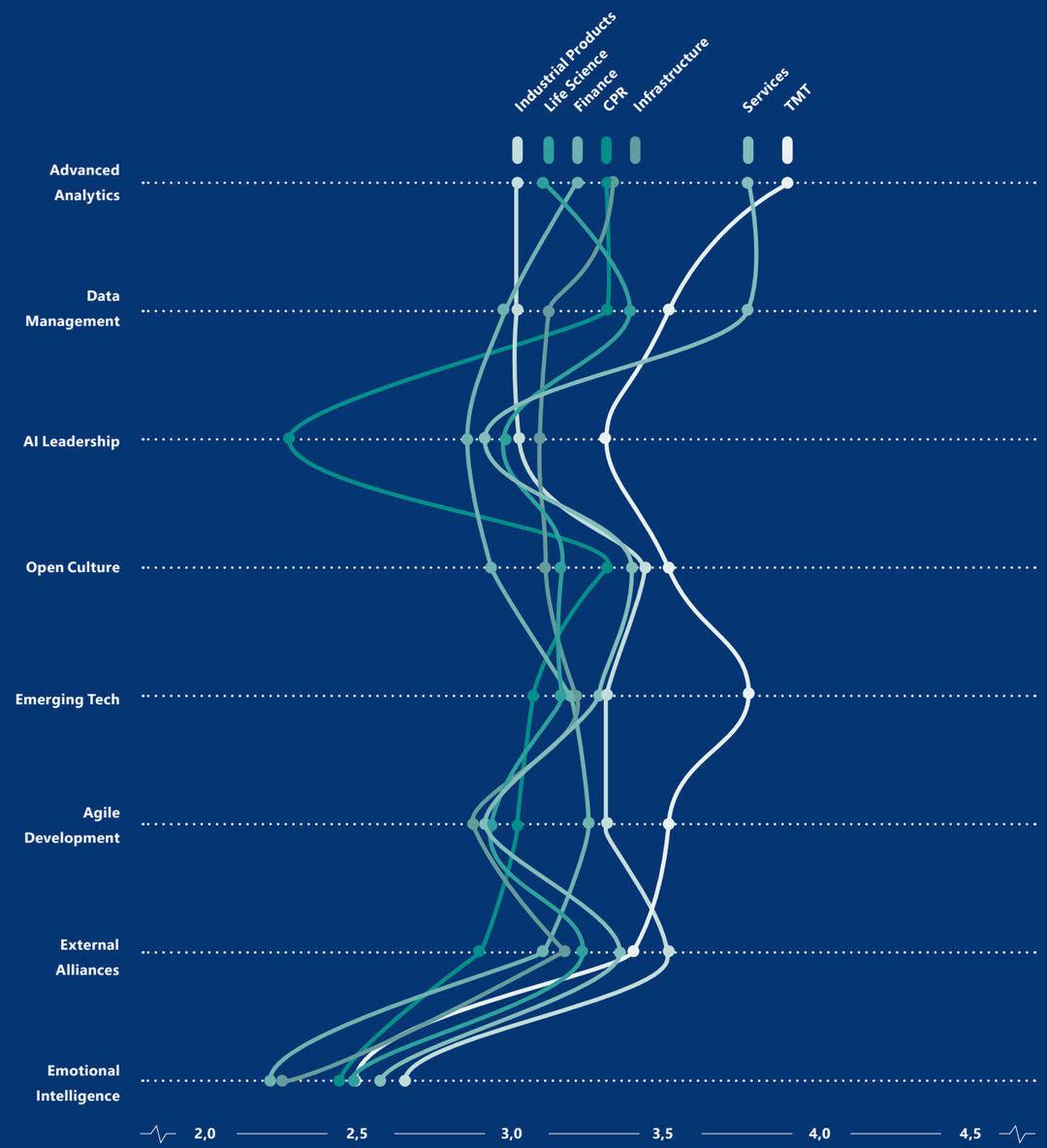
Advanced Analytics and Data management considered most important AI capability

How competent is your company within these organizational capabilities?
How important is each of the organizational capabilities for your success with AI?

Note: 'Don't know' answers not included in average score.
Average competency and importance for Norway and 15 European markets (1: lowest – 5: highest).
Capabilities ranked according to highest importance in 15 European markets.

TMT leads the other sectors in AI competency

How competent is your company within these organizational capabilities?



Note: 'Don't know' answers not included in average score.
Average competency by sector (1: lowest – 5: highest).

1. Advanced Analytics

Obtaining and deploying specialized data science, data engineering, data architecture and data visualization skills by training employees, attracting talent and co-creating with external partners

The backbone of AI is made up of skilled, intelligent minds who are capable of understanding business problems at the granular level, and deploying AI to effectively solve or support others in solving these problems. This requires technical data science and mathematical engineering skills, to hybrid profiles with sufficient business acumen to decode problems and ability to tackle them using quantitative methods.

A self-fulfilling talent prophecy

It is evident from the study that there is a major lack of technical data skills to meet the drastically rising demand for AI. As a result, the hunt for AI experts has become extremely competitive, and it is far from uncommon that functional AI experts are paid higher salaries than their superiors are - in some cases leading to new HR policies to reflect evolving requirements.

Several business leaders state that the lack of AI talent is the greatest barrier to implementation within business operations. Interestingly, companies that have chosen an early adopter strategy for AI have been successful in attracting senior professionals who again have been able to build out sizeable AI teams in their companies – based on the premise that talents seek talent – making AI recruitment a self-fulfilling prophecy for these pioneering companies.

In other words, the longer you wait, the harder it can be to get the right people. Consequently, a 'wait-and-see' strategy can be risky for companies that are AI followers due to the scarcity of talent, which may prove impossible to attract once the company is ready to make a more ambitious move into AI.

While many companies struggle with acquiring AI talent, we also experienced companies - even in traditional industries such as Transportation and Industrial Products - with AI teams of +25 experienced data scientists holding Ph.D's in mathematics, astrophysics, etc., from high profile universities. Most often, these companies have been first movers on AI and attracted senior practitioners tasked with building out sizeable AI communities to work on the most strategic business agendas.

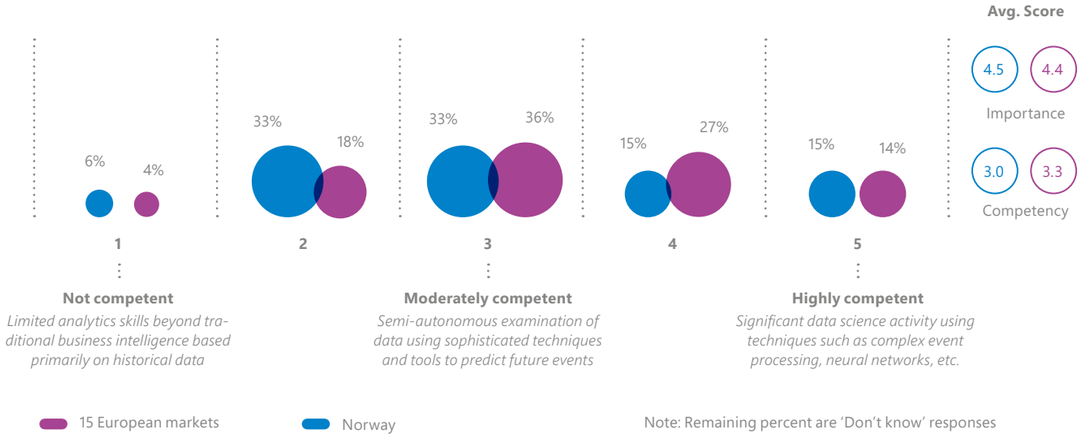
Hybrid profiles becoming the hardest currency

One of the most consistent inputs from the executives was the need for people with deep domain knowledge combined with strong technology proficiency. This hybrid profile is essential to identify relevant use-cases in the business with possible AI solutions.

Contrary to data scientists, software engineers, and even data architects that can be recruited externally, the hybrid profile is often nurtured by training existing employees from the line of business and adding AI skills. To succeed however, a fundamental appreciation for technology is required.

Companies consider themselves moderately competent within Advanced Analytics

How competent is your company within Advanced Analytics?



Co-creating to compensate for blind spots - while avoiding the black box

The scarcity of available talent has led companies to increasingly co-create solutions with external partners who bring with them specialized know-how. However, executives very clearly point to the need for internal AI capabilities in the receiving end to understand the real problems and evaluate the performance of external partners.

Companies find that AI solutions implemented by external parties become black boxes unless the organization is capable of contributing and taking over the solutions after delivery. Avoiding black boxes is a general concern among executives. Consequently, internal data scientists must be able to decode and dissect AI applications to explain of the underlying rationales.

Such rationales are important in making AI driven solutions creditable, and greatly reduce the risk that an AI application draws wrong conclusions based on false assumptions.

Advanced Analytics is the most important capability in Norway

Across all markets surveyed, Advanced Analytics is considered one of the most important of the eight capabilities necessary for success with AI – on a scale of 1 to 5, the average score in Norway is slightly above the European average (4.5 vs. 4.4). Despite the rating in terms of importance, 71% of the companies in Norway report to be moderately competent or below with Advanced Analytics (3.0 average). This demonstrates the room for growth in getting companies ready for something they consider to be important. The companies interviewed talk about their efforts to increase their competency in this area, and in particular, mention challenges around finding the needed skills and personnel, and appropriate applications of advanced analytics.

What to learn from AI leaders:

1. **Providing interesting problems, good data, and a freedom to thrive in a non-corporate environment is key to attracting talent.**
2. **A wait-and-see follower strategy can prove risky and put companies in a talent scarcity trap.**
3. **Training existing staff with deep business intrinsics is key to make AI work - and effective when access to talent is challenged.**

"Telecom is advanced and challenging technologically so we need to combine the best minds in deep domain competence with the best minds with deep knowledge in machine learning and AI. So we are working with talent on multiple layers.

— Ericsson
Telecommunications company

"We recruit from abroad, from eastern Europe to the US, as it can be difficult to find the correct, fitting resources locally.

— Aprila Bank
Bank

2. Data Management

Capturing, storing, structuring, labeling, accessing and governing data to build the foundation and infrastructure to work with AI technologies

Companies tend to focus their AI efforts in areas where they already have relevant data. We found that the amount of available data varies significantly by sector but regardlessly, a significant proportion of the time companies dedicate to AI is spent on data management related tasks.

Data governance is no trivial task

One of the major hurdles companies face regarding data is governance, particularly who 'owns' it, how data is stored, how to access it, and who may access it are all essential questions when working with AI. Questions that used to be about efficiency suddenly become highly strategical and complex to respond to without rethinking governance structure and policy. Governance aside, the most common obstacles to using data are organizational silos or legacy systems built for specific purposes, resulting in decentralized storage that limits access.

An algorithm is as good as the data that supports it. You can make bad analytics by having a bad algorithm but also by using bad data. It is important to get those things in order and have processes and people to make sure that the quality of data is driven and maintained.

— Vattenfall
Energy company

Companies reported that they typically spend 2-3 years building the appropriate data infrastructure for AI, and many respondents with the most ambitious AI visions are still spending the majority of their time fine-tuning their infrastructure.

Data privacy regulations

Data infrastructure is not only a prerequisite for effectively working with AI, but is increasingly needed to comply with data privacy regulations, which respondents see as a key risk. The recent implementation of GDPR in the EU has highlighted the need to govern what data is being used for. AI-specific regulation is in many ways still immature, and AI leaders find that a lack of clear guidelines can limit their progress.

Advanced companies (also) appreciate external and unstructered data

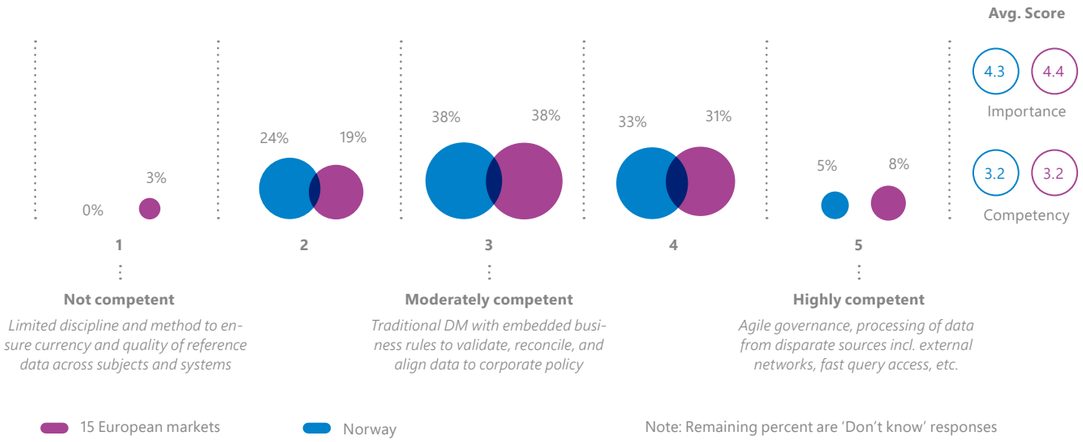
To build precise and useful AI solutions, companies not only need a lot of data, but also accurate data that is appropriately structured and labeled. Data is often reported to be in a state that it is simply unusable, as it could lead to undesirable or unreliable outcomes.

While most companies are preoccupied with cleaning, structuring and migrating historical data, some have chosen to build new data structures from scratch to collect the correct data going forward. Interestingly, we found that while companies that are less mature in AI tend to use mostly structured data from internal data sources, a significant 80% of the most advanced companies also use both structured and unstructured data, and an equivalant 80% use data from both internal and external sources.

Similarly, 60% of these self-rated most advanced companies report use of hybrid architectures of on-premise and cloud based storage, while the less advanced predominatly rely on on-premise platforms.

A significant share of companies consider themselves moderately to highly competent within Data Management

How competent is your company within Data Management?



Data Management is the second most important capability in Norway

Norwegian companies rate Data Management as the second most important of the eight capabilities necessary to succeed with AI (4.3 average on a scale of 1 to 5) – slightly below the European average (4.4). Further, the average level of competence (3.2) in Data Management for Norwegian respondents is considerably lower than the average level of importance. Among Norwegian respondents, 76% report to be moderately competent or above in Data Management, with only 5% considering themselves highly competent in this capability. This suggests that some companies have developed a Data Management foundation but are still midway before achieving the capability level that will fully back their AI systems. Introducing an adequate data governance structure and finding the right quantity and quality of data is essential according to many of the companies interviewed.

What to learn from AI leaders:

1. Make sure that the value of data is understood and prioritized throughout the organization.
2. Engage the C-suite in defining data governance and strategy - it is key to getting AI right.
3. Build your data structure to embrace unstructured data, also from external sources - advanced companies indicate that you may soon need it.

We need the whole company to think data, be data-driven and understand that data has value we need to put in our products.

— Husqvarna
Consumer equipment company

3. AI Leadership

The ability to lead an AI transformation from top to bottom - by articulating a vision, setting goals and securing broad buy-in across the organization

As with any corporate transformation, the foundation for successful deployment of AI is executive leadership buy-in and sponsorship. The C-suite must be aligned in what they want to achieve, and AI must be placed on the strategic agenda to ensure that AI efforts are an integrated part of the company's overall strategic goals, that capital is allocated, and employee time is dedicated.

AI Leadership among the lowest competency of all capabilities

Given the relative importance of AI Leadership (avg. 4.2 across all sectors), it is interesting to see that business leaders self-assess their level of competency as among the lowest of all eight AI enabling capabilities, with an avg. competency of only 2.9; 66% of respondents state that their companies have moderate, little or no AI Leadership competency. Many executives are realizing that business acumen is not enough in itself for understanding how AI is impacting the business. As AI technologies become increasingly complex, leaders must be able to launch, support and, where necessary, challenge relevant AI initiatives against strategic business imperatives. The disruptive potential that companies believe AI will have also means that leaders should anticipate and prepare for a broader change management exercise aimed at embracing the change from AI on multiple levels.

Significant variation in AI conversations from top to bottom

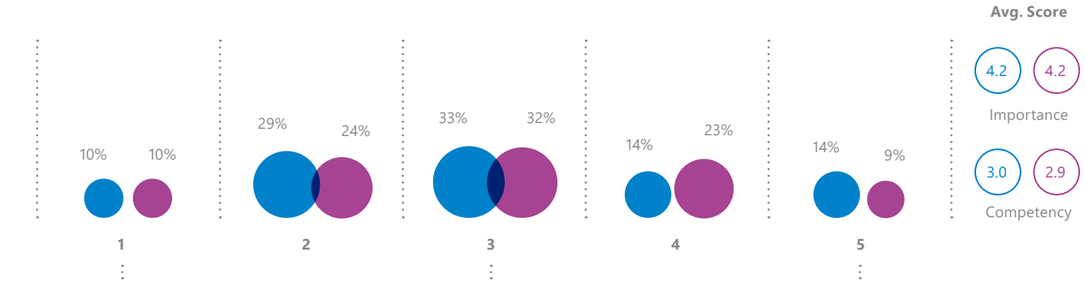
Interestingly, data revealed that AI is considered an "important topic" on the C-suite level among 73% of the companies surveyed. However, less so on the Board of Director level where it is only considered an important topic in 38% of companies, and even less so on the operational employee level with 28%.

We observed in the interviews that companies very rarely have AI capable leaders across the Board of Directors, Executive Management, and Functional Management layers. Senior AI leaders can sometimes be found on one of the levels, but rarely with any speaking leadership colleagues to challenge ideas. This leadership vacuum was often pointed to as an issue from lower level AI experts.

> **Going from talking and building to doing means that you take it to the decision point where leadership has to decide A or B, based on an AI-generated result. From an intellectual perspective, it is easy to say that you will follow AI results. But when the moment comes where you choose between recommendations based on old methods and AI, if you choose AI, that is when change truly happens.**
>
> **— EQT**
> Private equity group

A large proportion of companies consider themselves to have limited or no AI Leadership competency

How competent is your company within AI Leadership?



Note: Remaining percent are 'Don't know' responses

Accepting loss of control

As new technological opportunities foster innovative, dynamic business models, organizations will need to tear down silos to become more agile and collaborative. To achieve this change, it is paramount for leaders to create and convincingly articulate a vision so stakeholders understand the bigger picture.

A general characteristic of this challenge is that leadership needs to accept that it will lose some control. Projects will increasingly be explorative, bottom-up and have less certain outcomes, requiring leaders to be ready to adjust the overall direction of the company more frequently. Increasingly, AI projects will rely on open source code and off-site cloud solutions, building on collaborative capabilities outside the company.

AI Leadership is a high priority for companies in Norway

Norwegian companies consider AI Leadership to be one of the most important capabilities to succeed with AI, (4.2 average on a scale of 1 to 5). However, Norwegian companies rate their competence with AI Leadership the second lowest of the eight capabilities (3.0 average). The European average (2.9) is also similarly well below the importance average rating. This likely reflects that many of the companies surveyed have gone through an initial digital transformation and are now starting to develop their AI leadership competencies. Furthermore, many of the companies interviewed referred to major tech companies when assessing their AI position; with those reference points, many companies considered themselves not to be highly competent in AI Leadership.

What to learn from AI leaders:

1. **The organizational transformation driven by AI will be continuous - this requires seeing AI as a process, not a project.**
2. **Leadership must be accustomed to AI technologies to understand how it will affect the company.**
3. **Articulating a clear AI vision is key to achieving buy-in and motivating exploration of use-cases with uncertain outcomes.**

4. Open Culture

Creating an open culture in which people embrace change from AI, navigate confidently in uncertainty and ambiguity, work to break down silos, and collaborate seamlessly across the organization

New technologies have often disrupted how work is conducted. AI is no different. Establishing an open, collaborative culture to minimize resistance and enable human performance can prove efficient to prepare the organization for transition. However, this may be difficult, as the magnitude of impact driven by AI can imply a fear of uncertainty, ambiguity, and a general resistance to change.

Risk to employees less of a concern among most advanced companies

Companies reported that employees generally have a positive attitude towards AI. Yet, one thing is having a positive attitude in general, another is to retain an open attitude once new technologies start impacting the way work is done.

To achieve buy-in, business leaders must make the changes due to AI tangible to reduce organizational uncertainty. However, companies expect a significant impact from AI which will drive a fundamental transformation and increasingly assist in tasks previously performed by humans.

Interestingly, the companies that self-rated as most advanced see a lower risk to personnel than the less advanced (only 20% of advanced reported this risk as a concern vs. 43% for the companies still in the "planning" phase).

Relatively small competency gap

With a relatively small gap between importance (avg. 3.9) and competency (avg. 3.2), creating an Open Culture is one of the capabilities where business leaders feel most comfortable.

An obstacle mentioned by many respondents is the ability to work collaboratively across the organization despite AI most often being put to use towards quite narrow use-cases. With benefit areas being limited to specific domains or functions, it is often not seen as relevant to involve the organization in a broad and collaborative approach on AI.

Furthermore, many companies have had difficulties in carrying out effective AI programs, which are closely modelled on the lean processes of startups. The primary purpose of such programs is to enable brief, agile projects to gauge the applicability of AI use-cases, requiring a substantial change to company culture. Silos between departments in the company have to be broken down in order to promote a culture where AI-teams work in conjunction with the rest of the company to create value, circumventing needless complexity and time-consuming processes.

Another issue relates to the concept of sharing data openly, when the value of the data largely remains unknown until it has been treated, processed or combined with other datasets.

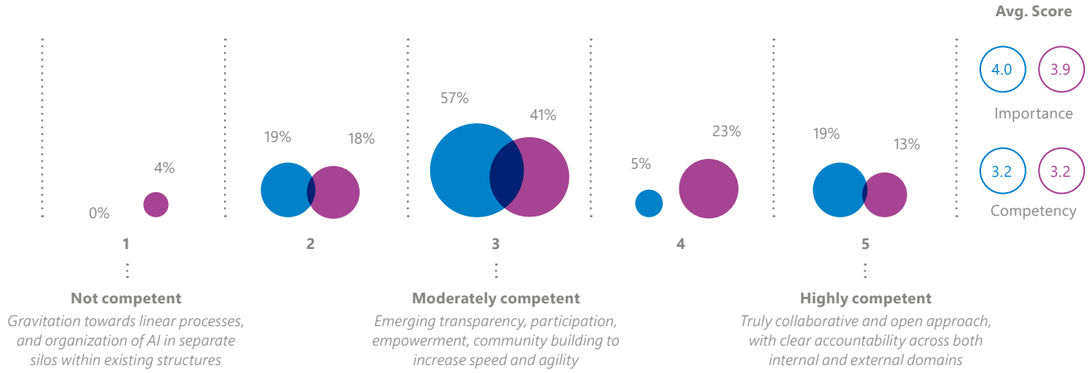
Cooperation across the organization

Many of the most advanced companies that have been able to produce several AI projects have also managed to establish links and cooperation across the organization. These cases indicate that the benefits of an open work culture far exceed the difficulties and associated risks.

An obvious obstacle to an open culture is the fear of job losses with the introduction of AI. According to respondents, the fear of workforce redundancy has some merit, but the concern should not overshadow the significant benefit potential of AI. A pivotal task for company leaders is to proactively articulate a tangible vision for AI initiatives. This will make it easier for employees to understand the AI opportunities on a personal level, and thereby embrace the change ahead.

Most companies rate themselves moderately competent in Open Culture

How competent is your company within creating an Open Culture?



Note: Remaining percent are 'Don't know' responses

Norway rates Open Culture competency among their highest

Open Culture is among the highest ranking capabilities in terms of competency in Norway, where 19% of companies report to be highly competent. Although, on average the competency level is only slightly above moderately competent (3.2.). The rate of importance is comparatively slightly lower compared to the other eight capabilities (4.0 average) – although still slightly above the European average (3.9). Companies interviewed highlight their efforts to establish a type of culture and leadership that embraces AI and is willing to take on the challenges that come with it.

What to learn from AI leaders:

1. **Establish cross-organizational projects to foster collaboration and learning across functions.**
2. **Ensure employee buy-in by being open and clear about on-going projects and desired outcomes.**
3. **Ensure that governance structures support collaboration through projects co-owned by AI experts and business leaders.**

> **You cannot only have data scientists do it. They have a super important role but you also have to complement them with designers. Because you need to find the use cases where you apply those types of technologies. Even though it is the fantastic technology that can bring fantastic results, it has to be embedded in a design approach to meet the customer needs and solve real problems.**
>
> **— IKEA Group**
> Furniture retail company

> **It's imperative to link up traditional analysts and developers with AI competencies. Collaboration between business developers, analysts and developers is key.**
>
> **— Sparebank 1 SMN**
> Bank

5. Emerging Technology

The organization-wide ability to continuously discover, deploy, and create value from intelligent solutions, applications, and data platforms

Evidence of the rapid pace of technological change are plentiful in today's digital world. What we have seen is that there is a definite correlation between companies that are ahead of the pack with AI and with the wider technological adoption. That AI benefits from being able to identify and implement emerging technology may seem intuitive and obvious, yet finding the right formula is no trivial exercise.

How strong is your tech radar?

With an average score of 3.3, the ability to explore and implement emerging technology is an area where business leaders perceive their companies to be most competent across the eight AI enabling capability areas.

One factor in working with emerging and rapidly developing technology to build a stack fit for AI is a well-calibrated 'radar' by which large companies pick up on the trends outside of their own walls. Many companies mention that being unable to quickly integrate innovative trends and cutting edge technology due to the burden of legacy systems, siloed business units, and complex governance processes is proving a real challenge for their AI adoption.

While there is some truth behind such stereotypes, we also heard from several executives who *are* able to build radars that pick up what's happening in technology domains and applications that this *continuous explorative* process is serving them well to get an overview of workable AI solutions that could prove successful in production.

Do you enable or hinder innovation?

Once companies are able to selectively source new solutions from the outside world, the challenge is then how to enable it. This can be a case of actively encouraging enablement, or at the very least not hindering it. Many companies treat AI as a crucial piece of a wider digital puzzle, where dots need to be connected across technologies. This means success with established technologies, from cloud and SaaS platforms to getting the basics right with analytics, is key to building on what is already there.

Working with emerging technology also relates to agile development and the ability to trial, test and experiment in iterative, short cycles. This kind of working culture allows companies to work with less stable, untested technology. Enabling innovation requires an outlook from the very top of the organization that accommodates longer investment horizons and at times uncertain financial returns. This is particularly key when working with AI technology that, according to the executives, is often not as mature as the digital solutions deployed for other purposes.

Not all that glitters is gold

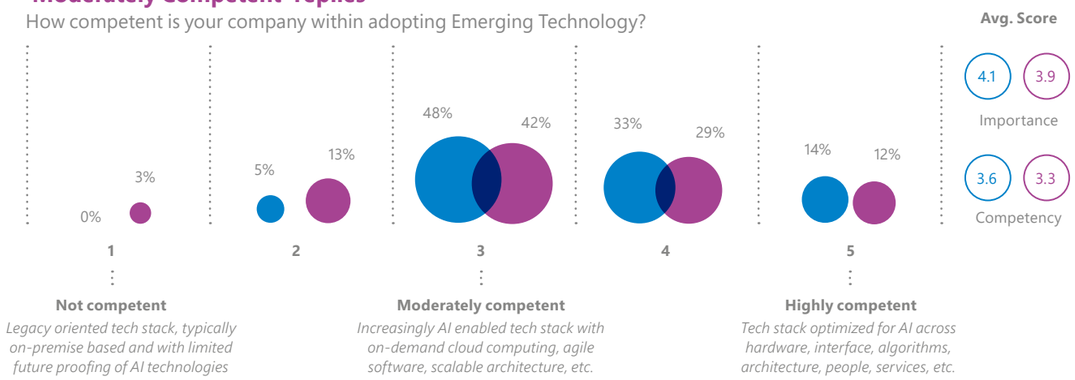
Despite the need to explore and navigate a tech sea characterized by uncertainty, a recurring theme when interviewing executives is the importance of balancing excitement with new technology and commitment to an innovative mindset, with one foot planted firmly on the ground.

Seeing past the hype, remembering the business model, and not wasting finite resources on every shiny object is also important. In other words, remembering as a leader that while experimenting is crucial, not all that glitters is gold.

> **There is a risk associated with betting on the correct technology, for example investing in the wrong technology due to having insufficient data to make correct decisions.**
>
> **— Aprila Bank**
> Bank

Emerging Technology is the AI-enabling capability with most 'Moderately Competent' replies

How competent is your company within adopting Emerging Technology?



Note: Remaining percent are 'Don't know' responses

The importance of execution

Finally, this capability is also effective execution. Many companies we surveyed across Europe had developed prosperous use cases supported by robust concepts and AI applications - on paper. But technical limitations tend to get in the way of implementation.

Employees with limited technical ability often need upskilling to work with new technology. IT and business may need to work closely together and speak each other's languages to reach common goals. In addition, organizations need to learn to move more quickly and nimbly in this space - whether to complete an acquisition of new tech, to ensure compliance with IT standards, or simply to pair new tech with legacy systems. This ability is often also about speed, not far from the development pace that characterizes the emerging tech itself.

Emerging Technology second highest competency in Norway

In Norway, 95% of companies report to be at least above moderately competent in Emerging Technology. This capability is the second highest ranking in terms of competency in Norway. In terms of importance, Norwegian companies rate Emerging Technology between moderately and highly important (4.1 average) – above the European average (3.9). Respondents report to be on the lookout for new and potentially disruptive technologies while assessing the impact these may have for their company and industry.

What to learn from AI leaders:

1. **Build a radar to pick up on merging tech trends and connect them to market opportunities.**
2. **Look past the technology hype and remember the business model - it may likely need to change in the not so distant future.**
3. **Cloud solutions can be helpful to engage with multiple datasets across sources - increasingly a priority to capture value from new pockets.**

> **AI can require significant investments up front, so it comes down to identifying the right cases for the use of AI and spending a lot of time structuring the business cases.**
>
> **— Sparebank 1 SMN**
> Bank

6. Agile Development

An experimental approach in which collaborative, cross-functional teams work in short, iterative project cycles to effectively progress AI solutions

Considering that many AI technologies are still in their infancies, working with them is far from plug and play. To overcome this, many of the companies that are successfully working with AI tend to take an agile, iterative approach to projects. Using this approach, these companies greatly increase their ability to explore AI potential due to a drastically reduced project cycle time and dynamic risk reduction. Short project cycles result in project teams receiving constant feedback on what works and what does not, to continuously steer the direction of the project. This creates a process centered on learning and experimentation, helping to build internal knowledge and capabilities.

Most advanced companies deploy top down or via a hybrid model

With an average competence level of 3.2, Agile Development is an area where companies are self-reported to be reasonably skilled. Quickly establishing proof of concept is key to organizational buy-in, and many companies report that an agile, iterative approach helps them build evidence and proof in a fraction of the time it takes for a more traditional project,

This has great significance, as they find that tangible proof of concept instrumental in achieving buy-in and understanding in the wider organization. Efforts to develop proof via agile development processes are often orchestrated by a central unit that collaborates with business units to identify use-cases. Of the most advanced companies, 80% deploy AI into the organization via top down only or a via hybrid of top down and bottom up.

It varies whether these central units take a leading role in pushing the agenda, or instead focus on gathering knowledge and experience from already existing efforts that are decentralized in the organization.

Agility provides the opportunity for informed changes of direction

Taking an iterative approach can also help mitigate risks. Frequent feedback loops allow the project team to better identify, understand, and correct undesired outcomes before the AI application is put into production, potentially doing harm. This flexibility does not only apply to risks, as agile projects can generally use continuing knowledge and experience to make informed changes of direction and avoid the "black box" syndrome.

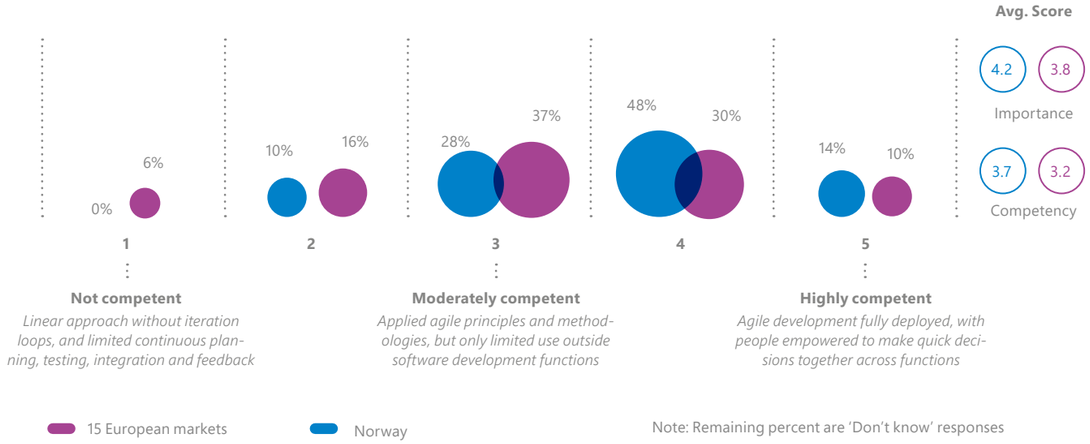
Contrary to agile projects, 'big bang' projects are more destined to fail as they skip the learning process, and lack the important feedback loop pivotal to developing good AI solutions. The world of AI is simply too complex for humans to foresee potential issues, and therefore an agile approach is better.

It is important to work with AI in an agile way and start with small steps, otherwise it will drown in long and costly projects. Our focus is on proving that it creates value via proof of concept.

— Egmont
Media company

Companies seem relatively competent within Agile Development

How competent is your company within Agile Development?



Note: Remaining percent are 'Don't know' responses

Agile development new to many business departments

Most companies fully understand the need for agile development, but less reckon that they have the necessary capabilities for it. Working in an agile manner is very different from what most organizations are used to. While the department running an AI project might be accustomed to following an agile approach, the vast majority of project teams consist of people from other parts of the business.

Several IT and AI departments indicate that this collaboration can be difficult, but still see it as pivotal to drive value from the projects. Getting the business accustomed to working in an agile manner is not easy, as it requires acceptance of new ways of governing and evaluating projects.

The outcome of agile projects is typically less predictable than for traditional projects, and for stakeholders to fully embrace an agile approach, they have to accept this randomness and recognize the value of learning.

Agile Development, highest competency in Norway

Norway is the country among those surveyed with the highest reported level of competency in Agile Development (3.7 average). Additionally, Agile Development has the highest level of competency among the eight capabilities for Norwegian companies. In terms of importance, the capability rates between moderately and highly important (4.2 average) – above the European average (3.8). Many of the companies in Norway talked about AI pilot projects being introduced at least in some areas of their organization, which can explain the higher competency level in Norway.

What to learn from AI leaders:

1. **Agile development is effective in engaging people across functions, fostering collaboration, and bridging tech and business.**
2. **Iterative processes promotes quick internal learning due to their frequent feedback loops.**
3. **Fast experimentation with pilot projects and use-case testing can quickly show how to create value through AI.**

We totally believe in an iterative, agile process where you have POCs, then train the bot enough, release it and program the next flows, instead of doing a big bang solution that will probably fail as these things are not simply plug and play. Start small and then grow it.

— Com Hem
Telecommunications company

7. External Alliances

Entering into partnerships and alliances with academia, solution providers, and AI specialists to access technical capabilities, best practices and talent

AI leaders are increasingly opening up to create collaborative alliances with external partners, enabling them to tap into a significantly larger pool of capabilities and talent, and to reduce the time it takes to develop or deploy working solutions.

This trend seems to be the new modus operandi, unfolding across markets and sectors. It is also the capability with the smallest gap between perceived importance and competence level among the participating companies.

Technology, data, and service delivery partnerships

Development of AI and delivery of related projects are most often done with a mix of internal and external stakeholders. The rationale is multifaceted – some companies are simply struggling to obtain the needed talent, whereas others see a partnership approach to be a faster, more flexible solution. These external alliances typically come in two forms: being focused on technology and technical AI know-how, or focused on strategy and business development.

We need to develop partnerships and you need knowledge to become a good partner, both within IT and business development. It will be essential to build up insight and knowledge internally to become a good partner. We need to work widely with partners on multiple levels - both specialists and larger partners who work more broadly.

— Tine
Dairy company

To address one of the biggest prerequisites of working with AI, access to large amounts of data, companies state that they are increasingly looking to entering into data partnerships where they either buy or exchange data with other parties. This is a way for companies to get hold of data that they are unable to capture themselves, or simply a way of quickly increasing the size of their datasets.

Others report that they look to pre-developed, out-the-box algorithms, in order to increase the speed of bringing quality solutions in to product.

Academia playing a more noticeable role in collaborating with companies

It is becoming increasingly common for companies to enter into partnerships with universities in order to position themselves within AI and get access to crucial knowledge.

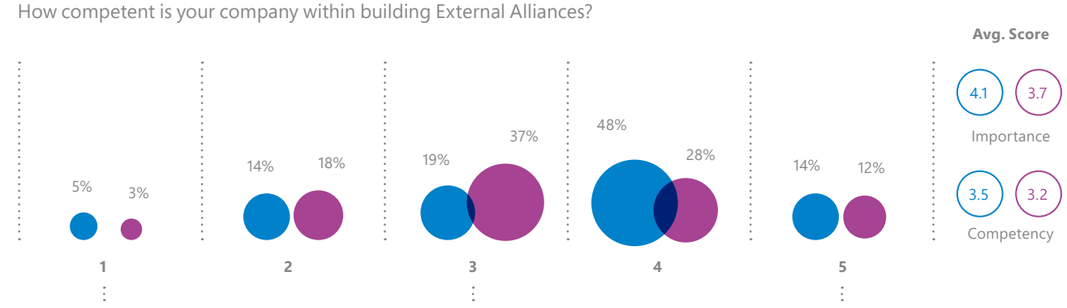
Companies also see this as a way of establishing a pipeline of AI talent already familiar with their business and the problems they face. Some of the more ambitious companies have a strategy of positioning themselves within AI, comprised of active conference participation and multiple university partnerships in which they actively participate in developing courses and programs.

Documentation of code is proving a challenge - also to externals

The lack of code documentation for self-learning algorithms was often mentioned as very practical issue with AI in general. This led some companies to prefer internal teams and individuals in order to ensure that despite poor documentation, the knowledge about the code at least stays inhouse.

Companies generally consider themselves moderately to highly competent forging External Alliances

How competent is your company within building External Alliances?



Note: Remaining percent are 'Don't know' responses

External Alliances among Norwegian companies highest competencies

Companies in Norway consider themselves to be on average above moderately competent in External Alliances (3.5). This capability is among the third highest ranking in terms of competency in Norway. External Alliances is considered an important capability to succeed in AI by Norwegian companies (4.1 average) – above the European ratings. The results suggest that Norwegian companies see the value of collaborating with outside experts and have already gained some experience from previous partnerships. Yet, they are in the early phases of deploying AI and are still trying to figure out what to develop internally and when to collaborate with third parties.

What to learn from AI leaders:

1. Make sure to have internal people in the receiving end before widely engaging with external partners.
2. Academic partnerships are an increasingly sought after way to access innovative eco-systems, gain new insights, and explore emerging AI opportunities.
3. Partnerships can pose a challenge to many business processes; consider involving key functions like legal early, to ensure a productive partnership structure and effective collaboration model.

There is a lack of available talent, so not every bank can have internal teams of data scientists. As such there should be a good market for sector-specific off-the-shelf solutions.

— KLP Banken
Bank

8. Emotional Intelligence

Applying behavioral science to understand and mimic human behavior, address needs, improve human-machine interactions, and ultimately create more human near applications

“ It is given that we will see the rise of AI. All the big tech companies are spending money on AI capabilities. They have explicit visions to master human thinking and behavior. That may or may not happen in the next five years but certainly within a certain time frame. When you combine it with computing power, it will be inevitable.

— Skandia
Pensions and insurance company

AI has for long focused on cognitive capabilities and skills within mathematics, statistics and logical reasoning. Adding human emotion and intelligence, these capabilities move to a new, more complex level: the understanding of human behavior, and the ability to interact accordingly with technology.

Changing the way people interact with technology

One of the limits of traditional AI has been the inability to understand human traits such as emotional state, for instance exhibited in writing, physical condition, or tone of voice. With AI’s cognitive intelligence capacities within reach, machines are increasingly able to sense, recognize, and decode human traits.

This holds the potential to fundamentally change the way people interact with machines, making technology capable of handling more complex tasks and ultimately augmenting humans to an extent previously unachievable.

Emotional Intelligence in its infancy

Except for advanced companies, survey results indicate that companies view the adoption of emotional intelligence in AI processes as the least important capability, and the one where they have the lowest competency. When asked to address *why* this is, companies across sectors and markets note that they are still at a relatively low maturity stage where more immediate requirements such as Advanced Analytics, Data Management and AI Leadership are more relevant and prevalent.

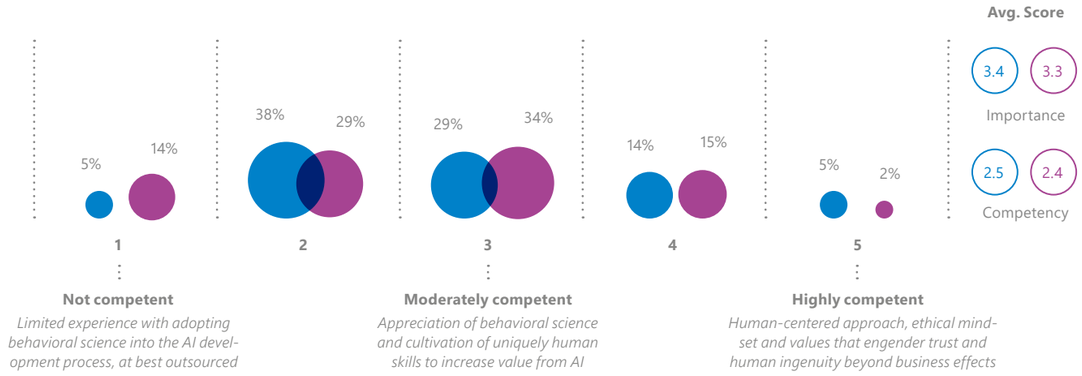
However, when taking a deeper look at the companies that have assessed themselves to be ‘Advanced’ in terms of general AI maturity - meaning that AI is actively contributing to many processes and enabling quite advanced tasks in the company - it is interesting to see that they perceive the Emotional Intelligence capability as more important with a score that is noticeable higher than the average score for all companies.

Many advanced companies perceive this to be either ‘very’ or ‘highly’ important. Notably, these companies come from five different markets and a wide variety of industries, including Life Sciences, Financial Services, TMT, CPR, and Services & Hospitality.

Value in customer-facing applications

The need for behavioral science to understand human needs is expected to increase with the integration of AI in smart devices, and in customer facing applications such as chat bots, roboadvisories, customer inquiries processing, etc. The most advanced companies’ AI technologies are beginning to decode human emotions from text, such as irony, anger, and frustration. This will obviously become more valuable as it is increasingly applied in customer-facing solutions with the ability to learn and improve.

Companies consider themselves least capable within Emotional Intelligence
How competent is your company within applying Emotional Intelligence?



Note: Remaining percent are ‘Don’t know’ responses

Human centrism requires strong leadership

While emotional intelligence holds great potential that could lead to early adopters gaining a competitive advantage, long-term success is dependent on not only technological development, but also leadership.

Leaders must drive the transformation that will make humans comfortable with intelligent technology, as a prerequisite for harvesting its potential benefits. What the most advanced companies have shown is that this transformation must augment human ingenuity to become truly effective.

Emotional Intelligence: even the lowest importance rating is above moderately important

Norwegian companies rate Emotional Intelligence above moderately important for their success with AI (3.4 average), slightly above the European average (3.3). Even so, in the respective Norwegian and European samples, these ratings are lowest of the eight capabilities. Similarly, the competency with Emotional Intelligence is also the lowest of Norwegian and European averages (2.5 vs. 2.4.), which is for both below moderately competent. The ability to adopt behavioral science in the tech development process is in its infant stages for most local companies, which for the most part are still developing their AI strategies. Notably, Emotional Intelligence is the capability with the lowest share of Norwegian companies that report to be moderately competent or above (48%).

What to learn from AI leaders:

1. **The most advanced companies are putting emotional intelligence to use within their AI applications, despite its relatively infant stage.**
2. **Companies must develop their behavioral science capabilities to mimick human behavior and translate it to technology.**
3. **Many have virtual assistants, chat bots, and NLP a powerful way to get started with building emotional intelligence into AI solutions.**

This is going to go insanely fast, so it is just a matter of hanging in there and identifying which trains to follow.

— **Tine** Dairy company

It’s about having the right mindset. It’s not that tomorrow everything will be different. It’s all about building up capabilities and speeding up constantly. The power of technology in general is overestimated in the short term and underestimated for the long-term and I think that’s the case with AI too.

— **VodafoneZiggo** Telecommunications company

EQT

EQT’s AI journey started in 2015, with fundamental questions about how to drive long-term value from digital for its investors. To address this, management brought in talent from leading tech companies to drive change internally and across portfolio companies.
Internal change was push-based and transformative. Focus was put on the Cloud, new tools, and decommissioning old ones. From a fully outsourced model, EQT insourced key functions and now owns the source code itself. Experience, results, and overcoming bottlenecks helped build its position as a trusted advisor. This was used to drive organic pull-based change in portfolio companies, starting with addressing commercial challenges for a few companies, with others naturally following.

EQT believes that AI is a disruptive technology, and it wanted to leverage it. It started building a tool to redefine the core of it business: investing. Motherbrain, a platform that has been live since 2016, allows switching from looking at a small subset of companies that are introduced to EQT or found via research, to screening a global startup ecosystem. It tracks multiple structured and unstructured data points, public and proprietary, for millions of companies, including web traffic, media mentions, and financials.

AI algorithms are deployed to establish whether successful companies have a unique ‘digital signature’ that can be spotted early on, so that EQT can approach them proactively.

AI algorithms are deployed to establish whether successful companies have a unique ‘digital signature’ that can be spotted early on, so that the fund can approach them proactively. The platform is being used in venture capital and private equity research, with predictive analytics under development.

EQT is a Swedish private equity group of 27 funds, with over €50 billion in capital raised. Since its establishment in 1994, EQT has invested in 210 companies, and exited over 100 investments. The group has several investment strategies within private capital, real assets and credit. EQT has 540 employees in 14 countries across Europe, Asia and North America. Portfolio companies have combined total sales of over €19 billion and a combined total of over 110,000 employees.

What next?

EQT is addressing data-driven challenges in investment decision flow. Currently, data gathering and prediction are the most time intensive, however, there is a shift in commoditizing these. Motherbrain’s AI algorithms are used to build predictive analytics with continual learning loops to enable dynamic, better quality predictions, allowing resources to refocus on judgement. It is a lengthy process, as the entire investment flow has to be considered, including identifying companies and comparing them to successful companies that EQT looked at or invested in.

There are so many things you have to fix before even starting to think about AI. The way we see digital and companies that are successful in this space is that they understand their customers and their market in a very granular way.

To be successful with AI, you need data and talent. The missing component is the mental state when you are prepared to try it out, when the moment comes where you choose between recommendations based on old methods and AI. If you choose AI, that’s when change truly happens.

Fast Forward

How to get started and take AI to the next level?

1. Choose a step-by-step approach in getting familiar with AI

Given the wide scope of AI and variations in use cases, it is key to start out by identifying what problems to solve and what opportunities to pursue. High level prioritizing between engaging customers, optimizing operations, empowering employees and/or transforming products and services adds clarity, is helpful to structure the discussion on a strategic level, and ensures a step-change approach to taking the company to the next AI level. Identify the problems you aim for AI to solve, prioritize the value with business owners, and acknowledge the capability gaps to get there. You need to get on the AI train, but do not jump on the AI wagon blindly. AI should serve your business plan, not vice versa.

Read more in the blog on Linkedin about "AI for businesses: Not if, but when and how" by Michel van der Bel, Microsoft President, EMEA

2. Display executive leadership and approach AI from a position of strength

Leadership comes from the top, also in the case of AI. For this to happen, executives must understand AI essentials and strategic perspectives, and they must communicate a clear AI ambition to the organization. AI leaders must actively sponsor and mobilize AI adoption on all levels, from the Board and Executive levels, through Management and the operational employees. Staying ahead in the accelerating AI race requires executives to make nimble, informed decisions about where and how to employ AI in their business. When doing so, look to strongholds before bringing in the AI 'twist'. Amplifying existing company strengths is an excellent way to catalyze motivation and internal support.

Read more customer stories to see how others are using AI to transform their business, and learn from Microsoft Research on how AI is solving the most pressing challenges

3. Hire new skills ahead of the curve – or focus relentlessly on training existing talent

A key challenge for putting AI to productive use and accelerate intended outcomes is the war for skills and talent. This not only relates to data scientists and software engineers, but also to skill sets and experience within human and behavioral science. Opting for a follower strategy and being late to the game can prove risky, as talent seeks to go where talent is already. If aggressive poaching for insourcing talent is difficult to embrace, then work bottom-up by training the engineers you already have on the new AI paradigm and collaboratively ride on the backs of the others. Regardless of strategy, focusing relentlessly on building required skills and talent is key to staying ahead and progressing along the learning curve.

Learn more in the Microsoft AI School about the open-source cognitive toolkit (previously known as CNTK) and how to help train deep learning algorithms

4. Build a data strategy and technology stack purposefully fit-for-AI

Training your AI products essentially requires significant data. Useful data. Valid data. Establishing a solid data strategy and practice in your organization to proficiently acquire data, identify data, clean data, measure data, and manage data will ultimately make your organization flourish with AI. Build your AI resources around data engineers who organize the data, data scientists that investigates the data, software engineers who develop algorithms and implement applications. Make sure that your structure and governance harness the power of data, and that your technology stack across products, solutions, and applications nimbly enables your AI priorities. When doing so, remember that your business model is likely to change.

Learn more about how to build a flexible platform and portfolio of AI tools and next generation smart applications where your data lives - whether in the intelligent cloud or on-premise

5. Beyond all, engender trust and enable human ingenuity

When designed with people at the center, AI can extend companies' capabilities, free up creative and strategic endeavors, and help achieve more. Humans are the real heroes of AI – design experiences that augment and unlock human potential. Opt for a "people first, technology second" approach. This entails designing AI for where and how people work, play and live, bridging emotional and cognitive intelligence, tailoring experiences to how people use technology, respecting differences, and celebrating the diversity of how people engage, Thereby putting people first, reflects human values and promotes trust in AI solutions.

Learn more in the Microsoft Trust Center and the book 'The Future Computed' by Brad Smith and Harry Shum from Microsoft on artificial intelligence and its role in society

Designing for people

At Microsoft we believe that, when designed with people at the center, AI can extend your capabilities, free you up for more creative and strategic endeavors, and help you or your organization achieve more.

The following principles guide the way we design and develop our products:

- Humans are the heroes. People first, technology second. Design experiences that augment and unlock human potential.
- Know the context. Context defines meaning. Design for where and how people work, play, and live.
- Balance EQ and IQ. Design experiences that bridge emotional and cognitive intelligence.
- Evolve over time. Design for adaptation. Tailor experiences for how people use technology.
- Honor societal values. Design to respect differences and celebrate a diversity of experiences.

Innovation is what creates tomorrow.

Learn about our AI platform to innovate and accelerate with powerful tools and services that bring AI to every developer.

Explore Intelligent applications where you can experience the intelligence built into Microsoft products and services you use every day.

Learn about AI for business. Use AI to drive digital transformation with accelerators, solutions, and practices that empower your organization.

Who to Contact

from Microsoft

The team in Norway that can empower your company to achieve more with AI

Asu Deniz
AI Evangelist,
Microsoft Norway

Asdeniz@microsoft.com

Asu helps customers achieve top notch innovation with the use of Data Visualization, Advanced Analytics, Chat Bots, Machine Learning and Cognitive Services to achieve digital transformation. Enables customers in Healthcare, Utilities, Transportation, Media and Retail verticals to unlock their potential using Microsoft Data and Artificial Intelligence stack and Azure. She advises Norwegian customers on their digital transformation, moving over to Azure or on Hybrid Cloud to increase operational efficiency, product transformation and/or empower employees.

Terje Aas
Data & AI Lead,
Microsoft Norway

Teaas@microsoft.com

Terje leads Microsoft's team of Data and AI solution specialists in Norway, driving digital transformation in the largest companies in Norway. By combining industry knowledge with technological capabilities, organizations are supported to create and capture value from their digital business journey. New business models across ecosystems helps Norwegian organizations to innovate, sometimes making outsiders into collaborators. Currently Aas is enrolled in a master's degree at Norwegian University of Science and Technology.

Christopher Frenning
Cloud and AI Lead,
Microsoft Norway

Chfrenni@microsoft.com

Christopher leads Microsoft Norway's intelligent cloud business as the strategic leader and ambassador for the Azure business in the Norwegian market. Before that, two decades of experience scaling a tech startup to an international industry leader, architecting software solutions, leading development teams, enterprise software sales, and international channel management. Likes solving problems. He is a technology afficionado that loves the speed of innovation possible in the cloud.

Contributors

from EY

Team responsible for the Norwegian edition of the study 'Artificial Intelligence Report: Outlook for 2019 and Beyond'

Thomas Holm Møller

Partner EY |
Co-founder EY-Box

Thomas.moeller@dk.ey.com

EY-Box is focused on digital strategy, growth ventures, innovation architecture and tech-led transactions. Thomas works with leading companies to uncover plausible futures, launch new businesses, and rewire their core through data and digital in the search for new profit pools and business models. He serves on the board for several entrepreneurial growth-stage businesses.

Thomas is responsible for the AI study across 15 markets in collaboration with central and local EY strategy teams and AI specialists.

Based in Copenhagen.

Dr. Ellen Czaika

Innovation, Analytics, Digital Deputy Leader, EMEIA

Ellen.czaika@parthenon.ey.com

Ellen holds a PhD in technology, policy and management from MIT. She has masters degrees in applied statistics from the University of Oxford. Ellen advised this study on research design, methodology, and analysis.

Ellen is engaged in the EY EMEIA Center of Excellence on innovation, analytics, and digital. She has worked with global organizations and start-ups, having recently served as the head of R&D for a precision Ag startup that uses AI to assist farmers.

Based in Zürich.

Ronny Seehuus

Partner, EY

Ronny.seehuus@no.ey.com

Ronny Seehuus is EY's Nordic Data & Analytics leader. He has extensive experience from management of analytics, technology, strategy and digitization processes from a variety of sectors. Ronny has worked with consulting in the business and technology interface the last twenty years. Common themes for most of the major projects he has been working on is strategy, analytics, information architecture, organizational restructuring, and introduction of new technology.

Based in Oslo

Christian Mjaanes

Partner, Technology Consulting, EY Norway

Christian.mjaanes@no.ey.com

Christian is Nordic lead for EY's Technology Consulting practice that works with emerging technologies to enable new digital possibilities. He has contributed to setting up interviews to capture data about the companies' use of AI. Christian holds an M.Sc. in artificial intelligence from NTNU and has worked with numerous technologies mimicking intelligent human behaviors. His clients include both large global companies and smaller entrepreneurial start-ups.

From an industry point-of-view, Christian has worked mostly in finance and public sector/healthcare.

Based in Oslo


EY
Building a better
working world


Microsoft