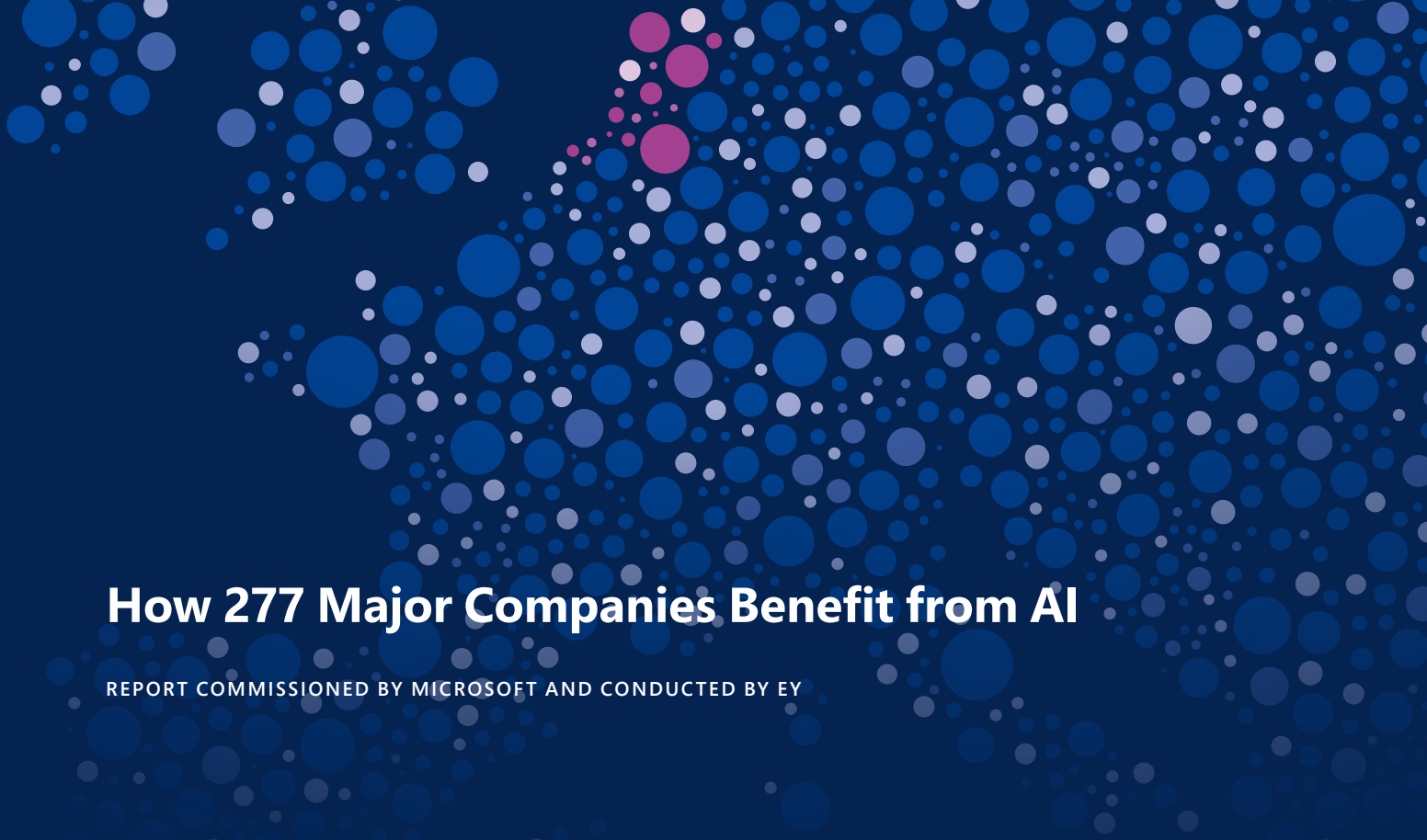
Artificial Intelligence in Europe

The Netherlands

Outlook for 2019 and Beyond



How 277 Major Companies Benefit from AI

REPORT COMMISSIONED BY MICROSOFT AND CONDUCTED BY EY

Contents

The report shows that Dutch companies are early adopters of AI, which is a clear competitive advantage. The countries that will succeed in the long run are those who are embrace change quickly and effectively. While we're excited about the important benefits that AI technologies can bring to society, we know there will be challenges. If the Netherlands can also lead in the development of clear ethical and legal principles around the development of use of AI, it has the potential to be global leader in this space.

— Brad Smith, President and Chief Legal Officer for Microsoft

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

Icon of Digital Success

The Netherlands is the largest and one of the fastest-growing digital economies in Western Europe. From an economic perspective, it is important we hold on to this position and strengthen it. This requires effort from every person and every organization.

It is positive to see that the Dutch organizations that participated in this research attach great importance to AI. They also acknowledge that everyone is needed to realize the transformation towards digitization. This research clearly shows that no one can be left behind as innovation reshapes our industries, and innovation is crucial to stay ahead of the competition.

Ensuring that Dutch citizens can develop the right digital and creative skills is critical, as only then can we sustain and accelerate our competitive advantage as a country over the short, mid and long term. That is the agenda Microsoft is committed to helping drive for the country.

We must take these steps together, across government, industry and society, by having companies invest in technology and education, helping them to create a vision for the future, making them part of ecosystems, and having them join their AI forces with a variety of external parties. That way, AI will be able to work to the advantage of us all, and we can fulfil our ambition: to strengthen our leading position as a country. By doing so, we can enable the Netherlands to be the icon of digital success for the world.

Ernst-Jan Stigter
General Manager, Microsoft Netherlands

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.

Dutch companies slightly ahead on AI compared to European peers

When looking across the 22 companies that have participated in the study in the Netherlands, it is clear that there are areas where they appear slightly ahead on AI compared to their European peers. More Dutch companies report that AI is an important topic to their C-suite and Boards of Directors than the European aggregate. Furthermore, companies from the Netherlands self-report as being more mature, with 11% more companies in the piloting, released, or advanced stages, and expecting more impact from AI than the average – both in the core, in adjacent areas, or in entirely new business domains.

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.

> **AI is a journey of discovery to a new world. You can do things that you could not do at first.**
>
> **— Dümmen Orange**
> Floricultural company

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.

> **During the past few years, we have learnt what is easy, what is hard, what is realistic and what is only hype.**
>
> **— DNA**
> Telecommunications company

AI is the basis for maintaining the competitiveness of our business.

— **Now TV** Telecommunications company

The challenge is that AI will be available in many different places so you will need to manage all AI and machine learning in all your products and services. It is not in one place or one function, it is all over the place.

— **Ericsson** Telecommunications company

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 $2.3 trillion

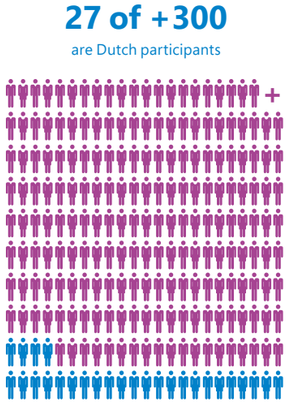
Participants come from both major listed companies, privately held companies, and in some case relatively small companies. In totality, they represent a combined revenue of approximately $2.3 trillion. Despite covering a significant part of total European business, our selection criteria have also favored more niche oriented companies with extensive AI experience and capabilities.

Primarily listed companies represented in Dutch data

The vast majority of respondents in the Netherlands are major listed companies, with some companies privately held by foundations. All the participating companies in the Netherlands had a combined total annual revenue of over $205 billion in 2017.

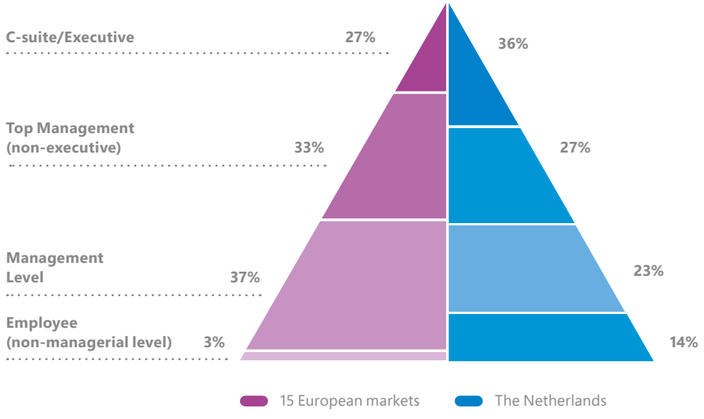
More than 300 participants

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



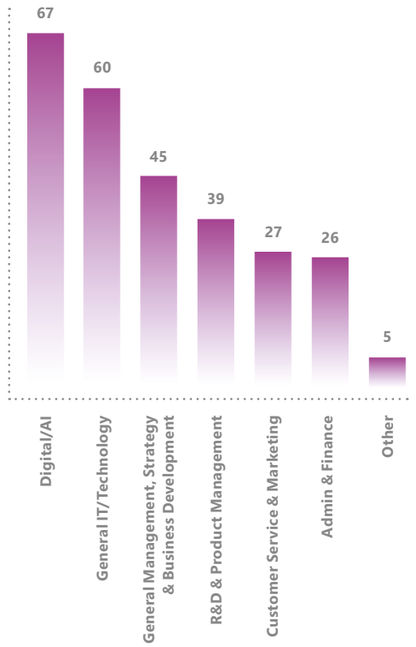
Majority hold a top management or executive position

Organisational level of person participating in the study



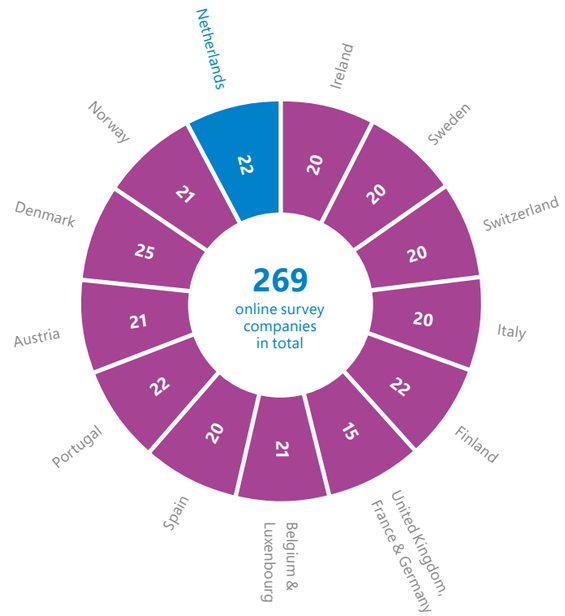
Large group of respondents with a specific AI/digital role

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, Bollore, 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.

Dutch companies

All companies, excluding Dutch companies

Note: Of all contributing companies, 14 chose to be anonymous, 4 of them being from The Netherlands

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

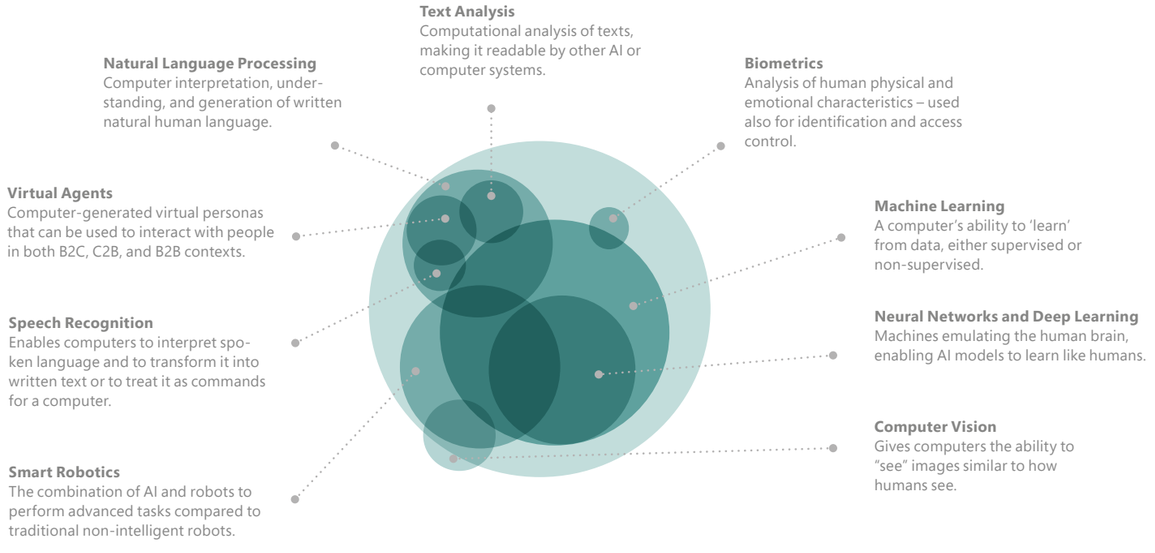
The most commonly used AI technology among the surveyed companies is Machine Learning. This is inarguably due to its wide-ranging applicability, making it relevant for a variety of use-cases across the value chain. Of the different types of Machine Learning, the most common is supervised Machine Learning, 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

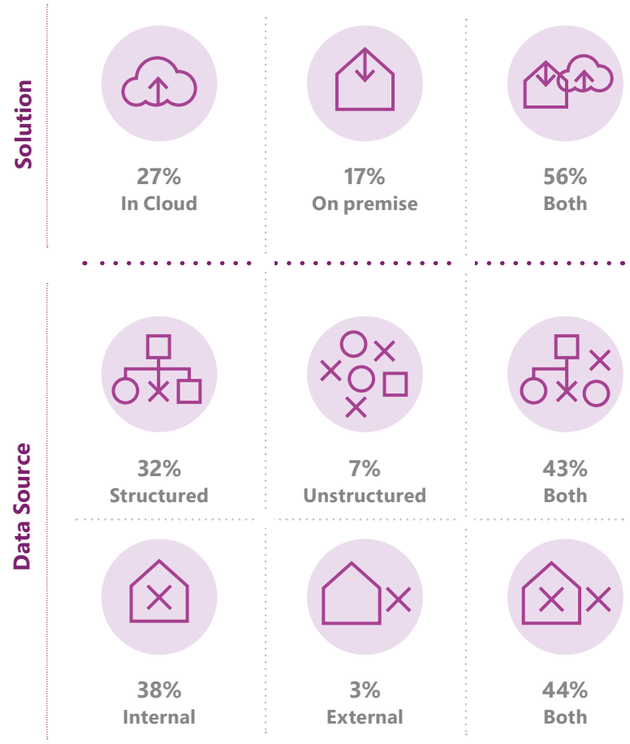
Companies are increasingly using cloud-based AI solutions for both storage and on-demand computing power - 83% of companies reporting using Cloud technology to some extent to enable their AI capabilities. Key benefits of cloud solutions mentioned by many respondents are the flexibility to swiftly scale 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, neural networks and text analysis most used by Dutch companies

On average, the underlying technologies that are most used by Dutch companies are concentrated in three areas: machine learning (73%), neural networks (59%) and text analysis (45%). Neural Networks ranks considerably higher than the European aggregate (39%).

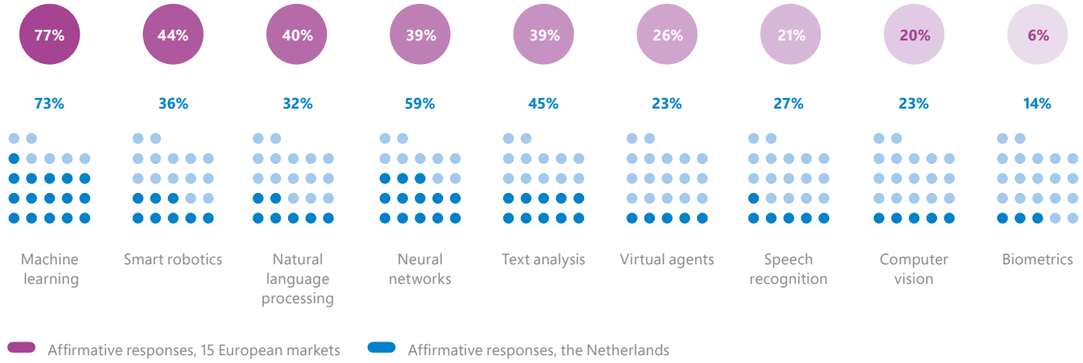
Companies are using a mix of Data Sources and Storage

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?



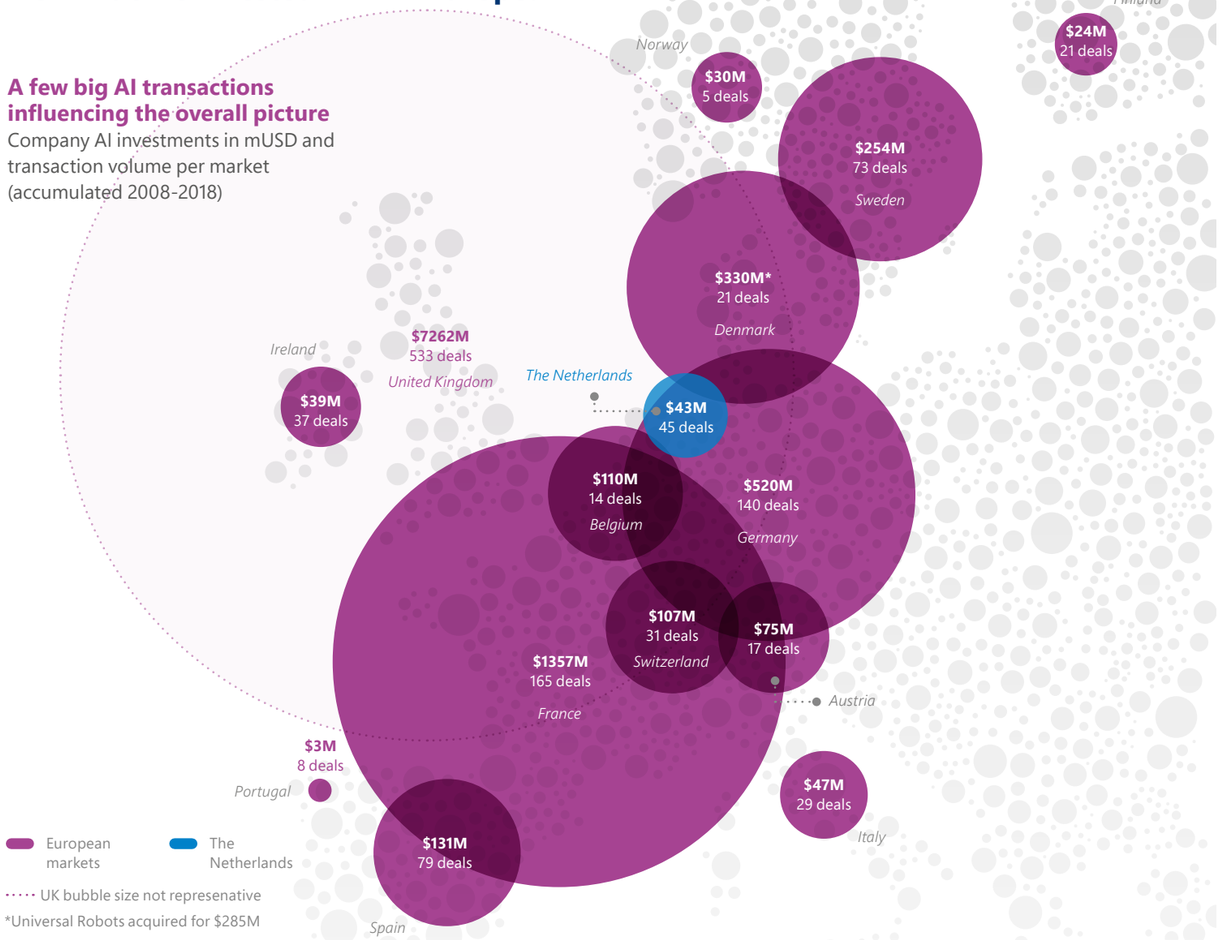
Note: Remaining percent 'Don't know' responses

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

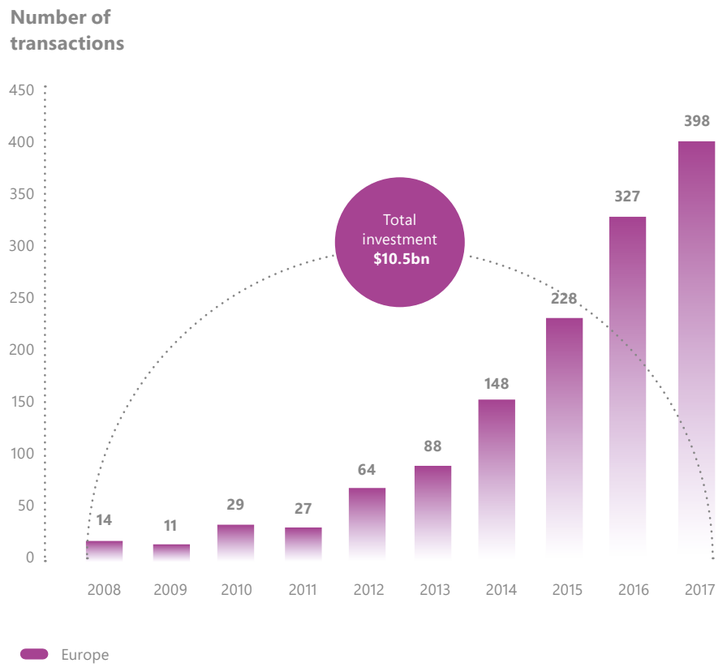
It comes as no surprise that a lot of investment activity is in the UK, France, and Germany, having attracted 87% of investment in AI companies over the past decade. The UK leads significantly in this regard, with 533 of the total 1,362 AI transactions in Europe. From an investment perspective, it is 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 $43 million invested in AI start-ups in the Netherlands in the past decade

In the Netherlands, there were 45 transactions over the past decade involving companies working with AI. Of these, 31 reported deal value totaling $43 million. A large portion of this amount was a $21 million investment in Harver. Of the AI companies in the Netherlands that received investments or were acquired, 47% focus primarily on machine learning technology, likely due to its wide applicability across a range of business problems and sectors.

Steady increase in European AI investment

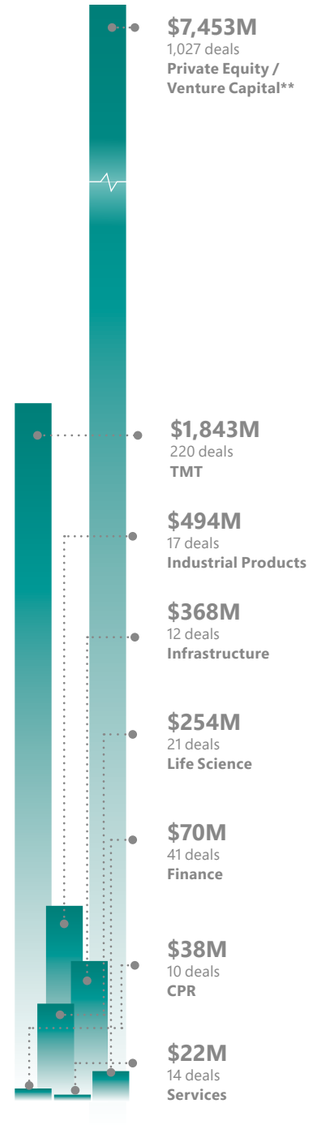
AI companies invested into, transaction volume, Europe (from 2008-2018)**



*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)

Van Oord

Van Oord, one of the world's largest dredging fleets, is taking advantage of AI solutions enabled by the cloud to enhance its processes, free up resources and focus on future innovation and growth. With its fleet of ships spread throughout the world handling various pieces of documentation and certifications in both print and digital forms, on legacy hardware and in multiple languages, Van Oord's transition to the cloud has helped enable new technologies such as AI.

By centralizing and fully digitizing the collection and processing of documentation, Van Oord uses computer vision AI technology to scan and intelligently process documents. This has eliminated labor intensive processes and been met with great enthusiasm from employees who wanted to devote more time to less menial tasks.

After the success of initial use cases, Van Oord moved fast in two-week sprints to demonstrate the business value and incrementally roll out the solution at scale for an integrated, automated solution. Working in an agile environment also helped a traditional business harness new technologies in a way that brought employees on the journey and managed the costs of implementation in the process.

With the solution in place and continuing to develop, automation has freed up resources, reduced human error and made auditing easier. The reduction in manual processing has been significant, with search optimization and an intelligent uploading process saving up to 15 minutes per certificate. Given the 50,000 certificates handled on average, this represents a substantial time-saving benefit.

With the AI solution in place and continuing to develop, automation has freed up resources, reduced human error and made auditing easier.

Van Oord

Van Oord is a Dutch family-owned company with over 150 years of experience as an international marine contractor. The company specializes in dredging, land reclamation and offshore energy solutions for both wind and oil & gas. They have helped expand major global ports, build offshore wind farms and dredged the Suez Canal. A series of acquisitions and mergers means Van Oord now operates one of the world's largest dredging fleets and employs almost 5,000 employees across 46 locations globally. Its revenue in 2017 was €1.5 billion.

What next?

Van Oord is further evolving its new platform, building AI solutions to offer a simplified version of the search functionality to customers and enabling third-parties to check vessel compliance for themselves. Further, automated translations of the certificates in foreign languages are on the drawing board as well as training machine learning algorithms with metadata to provide deeper and more intelligent search functionality as well as intelligently discern and flag certification expiry.

It was a good showcase for us as an IT department to show the business what we can do for them. We get more requests from the business, now that they have seen what the (latest) technology can do.

People always worry that their work might become automated. As a family business, it was important to us to explain to employees that technology wouldn't replace their job, but give them time to spend on the more meaningful and innovative aspects of their roles.

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.

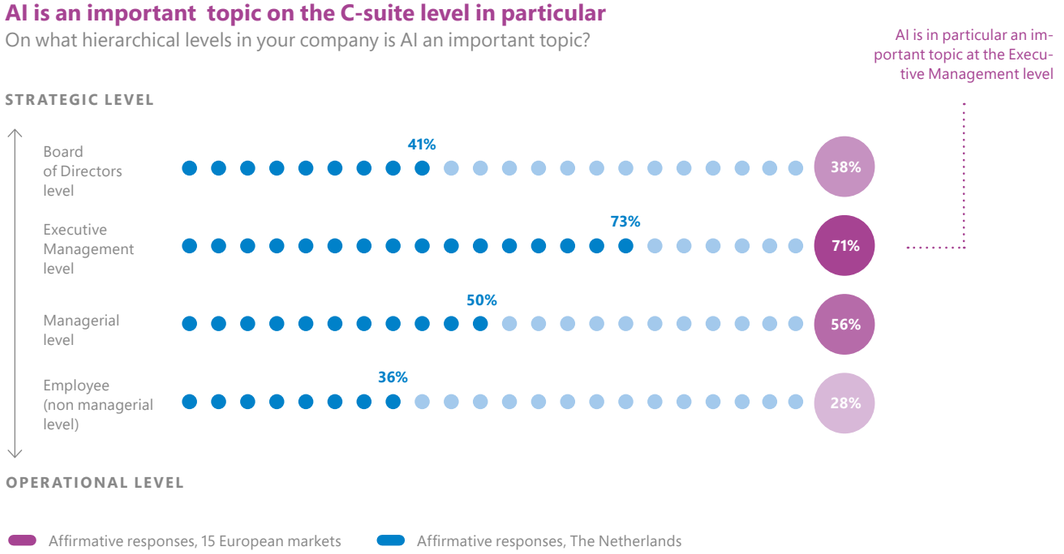
Relatively speaking, the AI topic seems to not yet having reached the same level of importance at the non-managerial level (employees) than at the top. Speculating about the reason, it could both pertain to job insecurity and to the fact that AI is still a highly abstract topic for many when it comes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

AI an important topic among executives in the Netherlands

AI is an important topic across all levels of the organization. This is particularly the case within executive management, where 73% of the Dutch companies surveyed report that AI is an important item on their agenda. Companies in the Netherlands are among the highest in Europe in terms of considering AI to be an important topic for non-managerial employees. This could reflect the recent influx to the country's workforce of graduates with AI related backgrounds.

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.

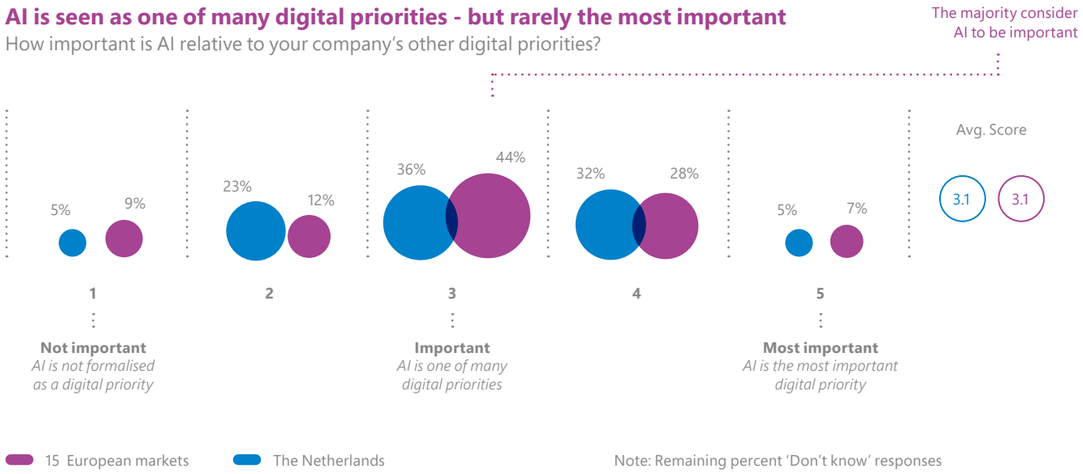
Furthermore, many of the companies are focused on building the appropriate data infrastructures or modernizing legacy systems as a top digital priority, both being prerequisites for introducing AI into the company. Considering that AI is heavily reliant on data as its fuel, this development suggests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

AI seen as relatively important versus other digital priorities in the Netherlands

Most companies in the Netherlands 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 Dutch respondents on average consider AI to be an important topic among many digital priorities, a ranking in line with the European aggregate. Respondents are also focusing on collecting and storing the right data, and building their general digital strategy and competency as a company. These results suggest that, although AI is still not the highest digital priority, they 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.

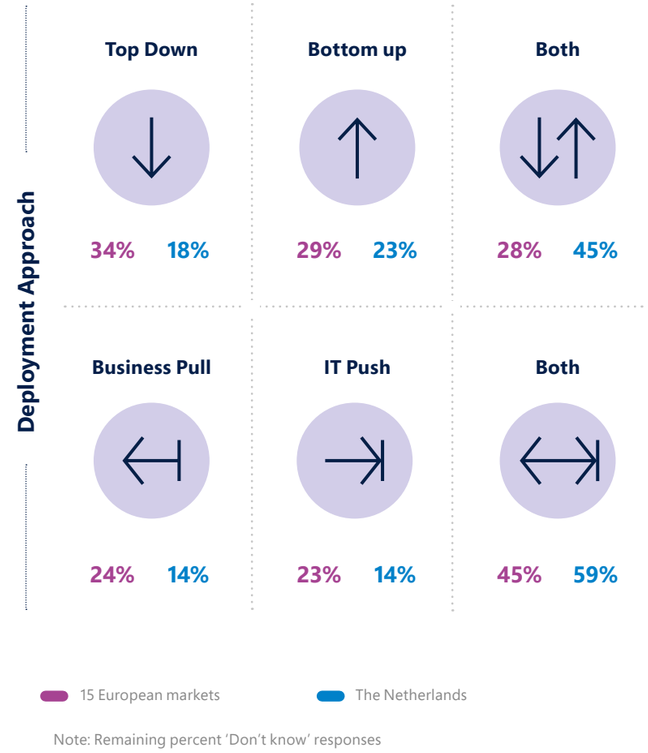
This resonates well with one of the most consistent inputs from the executives on the most sought after AI profiles which centered in on the hybrid profile that understand the business needs *and* the ability to match them to the technological possibilities.

Both Business and IT drive AI advancements in Dutch companies

Among Dutch companies surveyed, AI deployment is driven by both pull from the needs of the business as well as push from IT's capabilities and innovations. In addition, 45% of companies in the Netherlands manage AI via a combination of both a top-down and a bottom-up approach, well above the European share (28%). This outcome is consistent with the results showing that AI is important across different organizational levels for Dutch companies (see page 27.).

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?

The vision is much more important. In addition, making datasets available is a challenge. We are dealing with companies that use a lot of technology but which we do not own. Some companies are afraid of everything to do with data interpretation and reluctant to share it.

— Royal Agrifirm Group
Agricultural cooperative

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

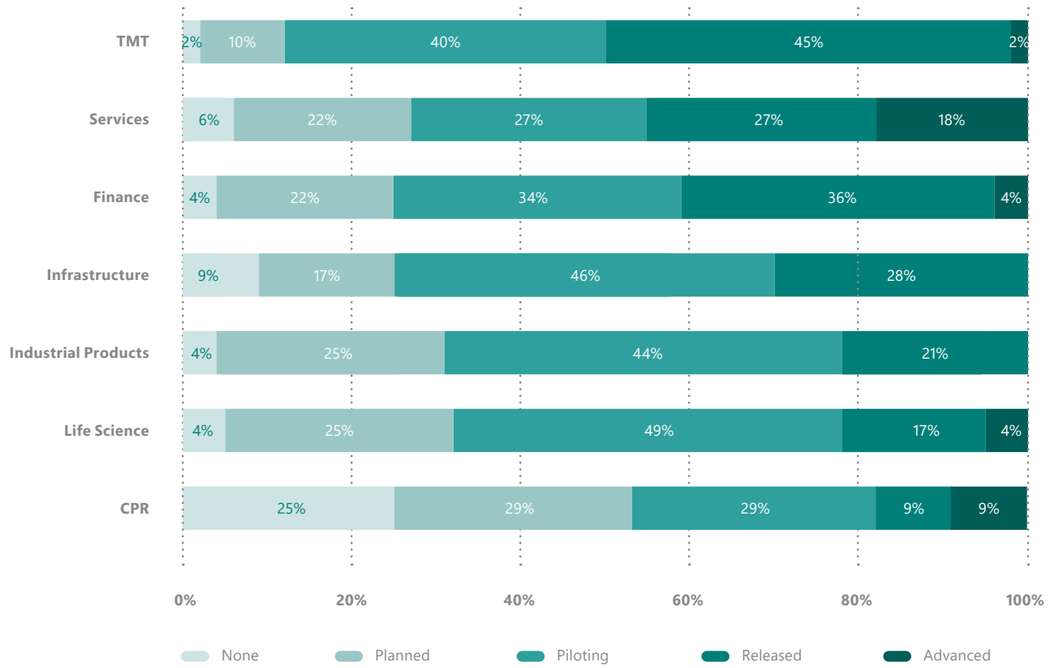
Companies currently leading the way in terms of AI maturity are in TMT, Services & Hospitality, and Financial Services. Companies in those sectors gravitate towards grading their AI maturity as 'Released' (AI in active use, though selectively or not with very advanced tasks), or 'Advanced' (AI actively 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

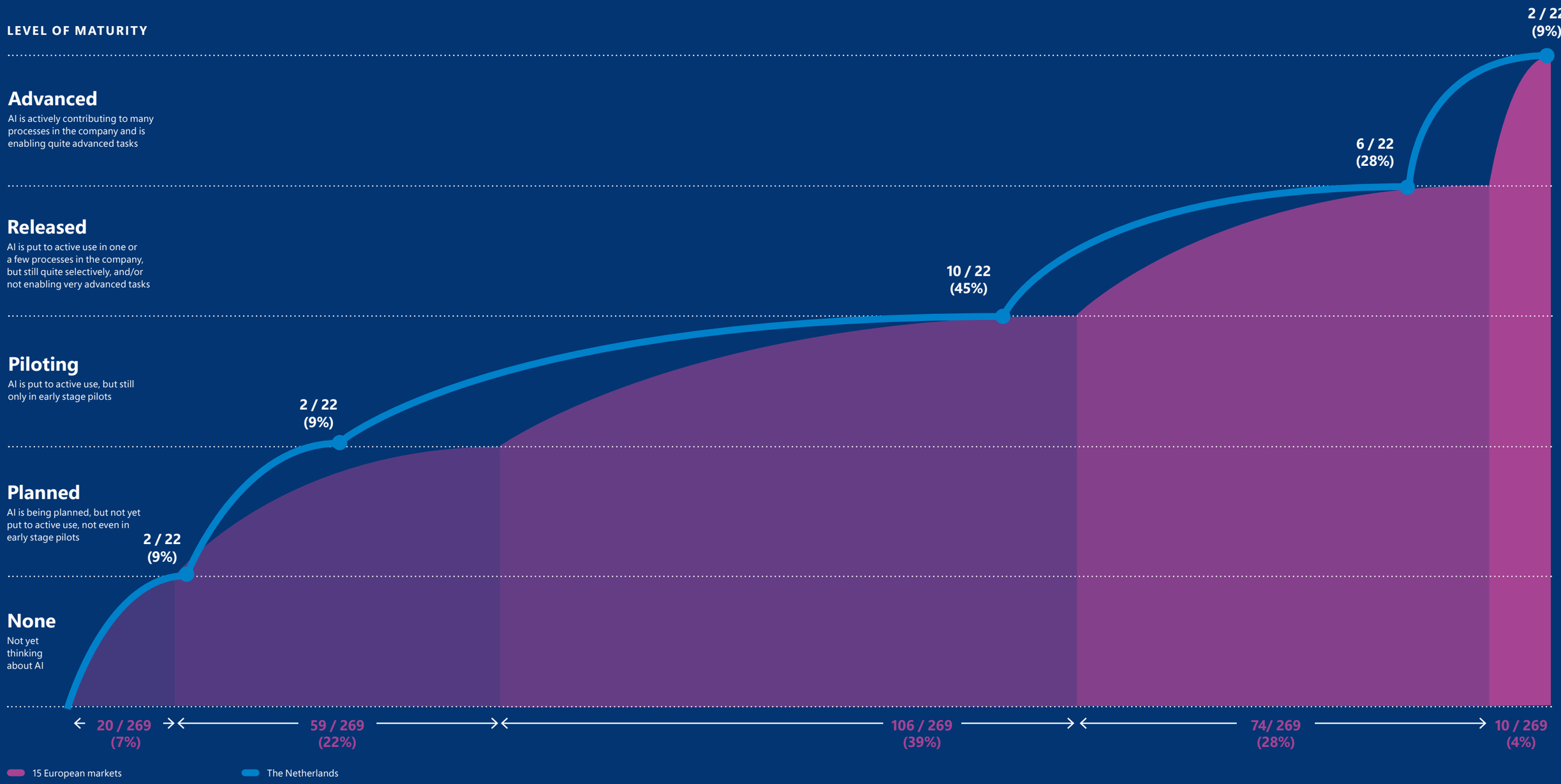
AI Maturity Curve

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.

Dutch companies among the most mature with AI

In terms of AI maturity, 37% of companies in the Netherlands report having AI initiatives that are in the "released" or "advanced" phases. For the latter, AI is actively contributing to several processes across the organization. Some of these use-cases include the employment of machine learning to improve products and services, photo recognition models to use in claim analysis processes or predictive maintenance for products. Out of the remaining Dutch companies, 45% have initiated early stage pilot projects and 9% are in the planning phase.



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

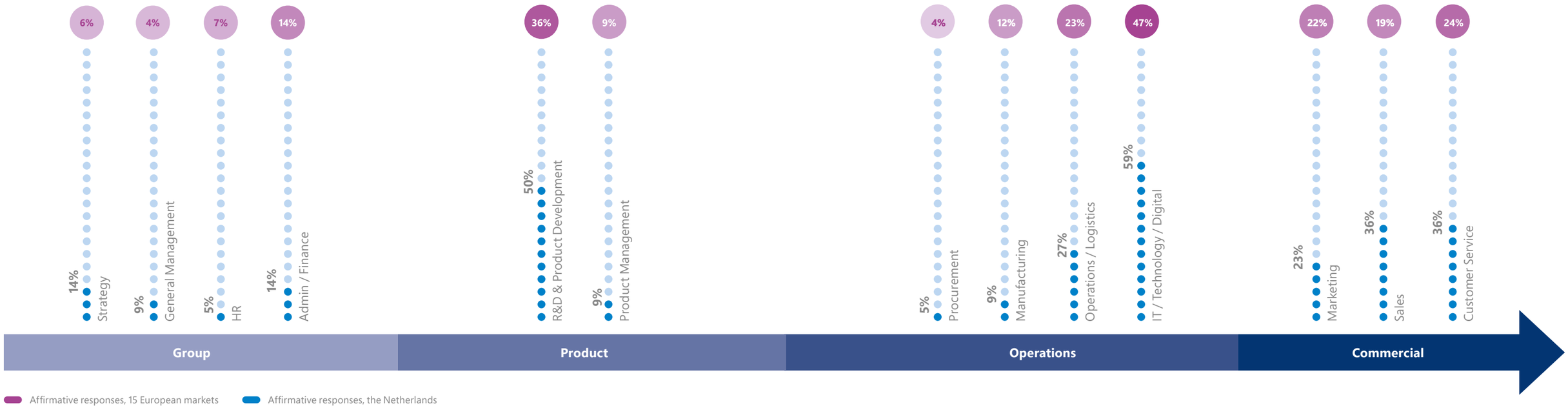
There are several functions where AI is hardly in use among the participating companies. This includes people-'intensive' functions such as HR and Procurement. This is not due to lack of potentially valuable AI use-cases, which in the case of HR include talent acquisition (avoiding human bias), onboarding (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 R&D & Product Develpopment in the Netherlands

Among companies surveyed in the Netherlands, usage spans all 13 business functions and follows a similar trend to the European distribution. The distribution of AI usage across business functions within companies surveyed in the Netherlands is concentrated in two areas, with highest usage in IT, Technology & Digital (59%), and R&D & Product Development (50%). Overall, there is a higher share of companies in the Netherlands utilizing AI in each of the business functions compared to the European aggregate, especially Strategy, Sales, Customer S ervices stands out.

AI most commonly applied in IT & R&D functions

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



AI has the ability to positively influence customer experience through timely and hyper-personalized recommendations and interactions. In this sense, AI can certainly be a point of differentiation and competitive advantage.

— **Randstad**
HR services firm

EPCOR

EPCOR is a leading company within maintenance, repairs and overhaul services for aircraft pneumatic components and Auxiliary Power Units (APU) – two component types which can be the lifeline of an aircraft under engine failures. By coupling cloud-based APU data with machine learning, EPCOR helps airlines meet cost, safety and reliability goals.
Having grown from around 30 staff ten years ago to almost 200 today with a growing focus on the APU market, EPCOR made the decision to modernize its IT infrastructure to, among other things, improve data quality and enable easier, faster data extraction. The business is now able to extract value from previous dormant information and embark on harnessing more advanced data science and analytics.
EPCOR can now recognize and track the types of damage made to a component which combined with historical data can anticipate damages and provide a proactive approach to maintenance. Through this proactive approach, AI and big data assist in scheduling maintenance stops and reducing overall repair costs for its clients. EPCOR´s investment in its IT infrastructure to enable the roll-out of AI and machine learning has been a contributing factor in its recent growth, and will help them increase productivity and efficiency without a corresponding ramp up in headcount. The results make aircraft maintenance more reliable and the journeys safer, with less flight delays for passengers and airlines.

The results of implementing AI has made aircraft maintenance more reliable and the journeys safer, with less flight delays for passengers and airlines.

EPCOR

EPCOR is a wholly-owned subsidiary of Air France Industries KLM Engineering & Maintenance, one of Air France KLM Group's key businesses, with a combined revenue of €4.2 billion in 2017 and a staff of 14,000. EPCOR focusses on Maintenance, Repair and Overhaul (MRO) services for pneumatic components and APUs for over 100 airlines around the world. Based in the Netherlands, EPCOR has grown from 30 employees ten years ago to about 100 today and work with more than 100 airlines around the world.

What next?

As the dataset from existing APUs continues to grow in both size and value, EPCOR´s maintenance predictions will become more valuable as its reliability in predicting repair needs is enhanced. With plans to build further on their cloud-enabled AI capabilities, EPCOR is looking to new applications and features in order to further increase efficiency and productivity. The technology deployed will deliver more opportunities for innovation and, as a result, differentiation, but also the ability to provide new assurances to customers and performance of an APU.

“ We have APU engineers and all the technical knowledge about the engines. The one thing we didn't have was the IT technology. That's why we hired experts, and now it's all coming together.

“ We can predict the performance of an APU. We can therefore optimize stock and turnaround time. Looking forward, with the knowledge we have right now, we will be able to prevent significant damage to APUs as well as the costs involved.

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.

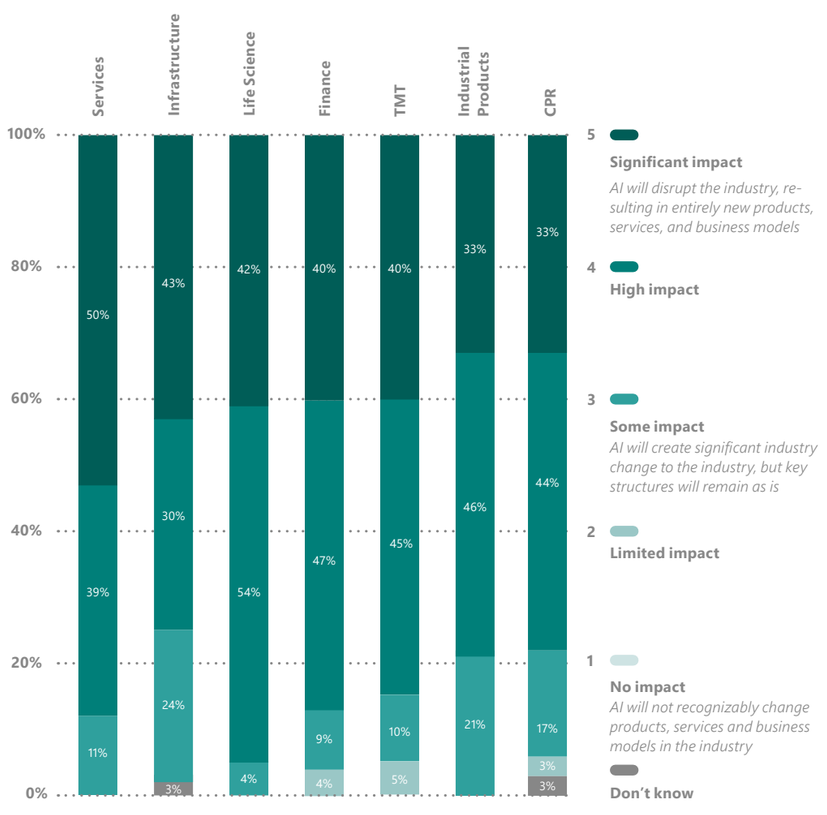
Countries expect different impact from AI

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?



Dutch companies in the top five for expected impact from AI

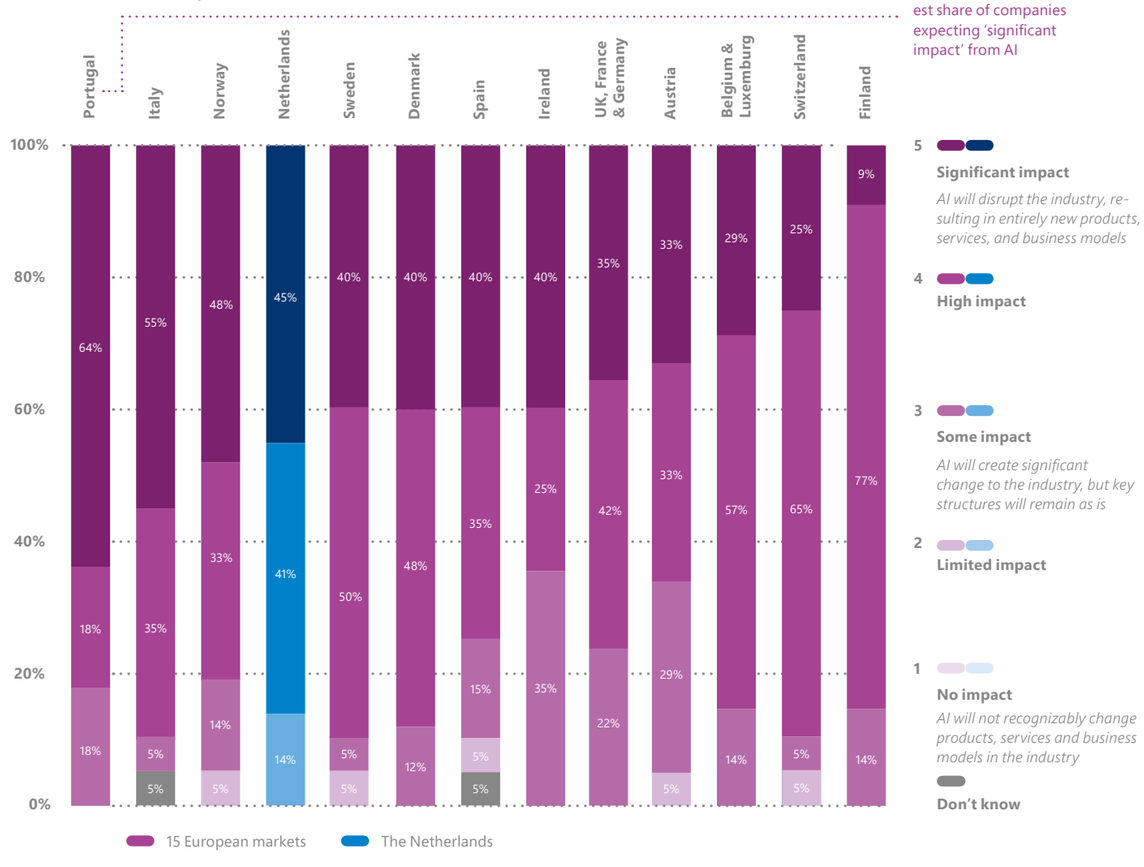
At 45%, companies in the Netherlands are among the top five across Europe when it comes to expecting AI to have a significant impact on their industry in the future. Some of the companies interviewed highlight the potential impact that smaller, digital-first and agile companies will have in tapping into the new demands of customers. Some interviewees from large, traditional corporations said they feel threatened by their inability to move fast enough to keep up with the changes in their industry; others see AI's impact as an opportunity to become a more proactive company, decrease process lead-time and offer more tailored products and services to their customers.

"We are not too worried about FinTechs. They are developing nice products but are serving a niche market. By partnering with FinTechs we can both make better propositions. We are more concerned with the tech giants. They have a lot of data and a lot of money, so if they decide to enter the insurance market that can be a problem.

— Aegon
Financial services group

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?

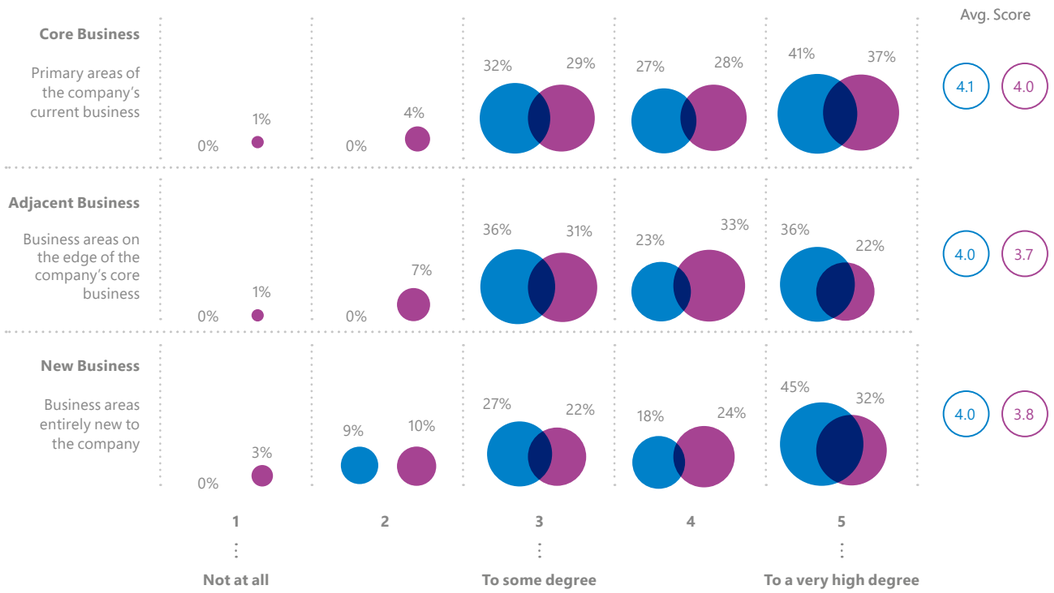


AI Here, There, Everywhere

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?



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.

Dutch companies expect high AI impact from core to new

Around 60% of companies in the Netherlands expect AI to have a high or very high impact across core, adjacent and new business areas. Specifically, 45% of companies in the Netherlands expect AI to have a very high degree of impact on the business in areas that are entirely new to the company, well above the 32% European aggregate. In interviews, Dutch executive s across all sectors have confidently expressed the irrevocable impact they expect AI to have in the near future.

TomTom

For TomTom, the constant need to revise its comprehensive digital maps that are delivered to its customers on a weekly basis means that the question is how quickly, not whether, it can integrate AI into its operations. TomTom now makes up to 1.5 billion updates to its digital maps a month in its efforts to support its customers in a world that increasingly relies on digital maps as accurate representations of reality. The challenge of updating its digital maps is concerned with volume, quality and lead time – in other words needing to make lots of accurate changes as quickly as possible. With 570 updates made every second, this would not be possible without TomTom's human teams working in partnership with very efficient, increasingly intelligent software.

The changes made to TomTom's digital maps include a complex mixture of geometry and road features, from points of interest and altered road junctions to new addresses and traffic signs. With laser radars on its fleet of mobile mapping vehicles, community input from hundreds of millions of users globally and GPS probe data from 550 million connected devices, TomTom's employees work with AI to leverage this wealth of data in its mapping products. What used to require thousands of hours of manual interpretation is now increasingly automated, meaning TomTom employees can be dramatically more productive in updating the platform. TomTom realizes this is the key to staying competitive as it moves towards a future of mobility that will involve real-time updates of digital maps and autonomous vehicles which are enabled by a high quality understanding of their surroundings.

What used to require thousands of hours of manual interpretation is now increasingly automated, meaning TomTom employees can be dramatically more productive in updating the platform.

TOMTOM

TomTom is one of the global leading navigation solutions companies, offering navigation products, software and services. The company is headquartered in the Netherlands, where it is listed on the Amsterdam stock exchange. TomTom has more than 4500 employees around the globe. In 2017, TomTom had €903 million in revenue, of which 46% stemmed from consumer products, 36% from automotive & enterprise, and 18% from telematics. The majority of TomTom's business is in Europe, in which it is the market leader.

What next?

AI is set to play a crucial role in the near future as an enabler of accurate and scalable data processing, with an ultimate aim of real-time updates to TomTom maps. This will help TomTom offer its users a safer and more comfortable driving experience. Further, with a growing number of sensors and devices on vehicles everywhere, this exponentially growing volume of traffic data, paired with increasingly powerful processing solutions, can bring TomTom's technology a step closer to enabling safe autonomous driving vehicles.

"

We process and interpret trillions of data points - when all cars on the A1 highway suddenly move 30 meters to the right, then the road has probably been changed.

"

We don't see any limitations due to regulation at the moment. However in our branch where we are collecting data, regulations are a very important topic.

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

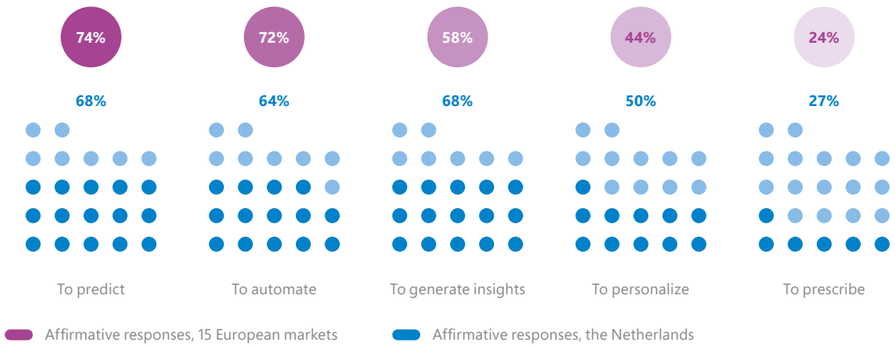
Prescription is the laggard among the five AI uses, with current use-cases typically being early stage, such as suggestion engines and decision recommendations for salespeople and advisors. AI for advanced prescription such as complex decision making lies in the future, as it requires collecting large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

Prediction, Insights and Automation most relevant in the Netherlands

At least 50% of respondents in the Netherlands consider four of the five main uses of AI relevant for their company. The most common uses of AI are to predict and to generate insights, followed closely by automating intelligently. Current use-cases highlighted by executives include combining functional performance and business performance to identify best practices, and automation of routine back-office tasks related to finance and regulation.

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

Within the company, choices on AI topics are mainly managed centrally and for this reason, it is often possible to speed up processes by setting up tools and processes that can be automated across the business.

— Now TV Telecommunications company

Insights

Identify and understand patterns and trends

We use AI to find trends across R&D datasets that would normally be very time consuming or even impossible to find. The potential for AI within R&D is huge, as it will speed up the pace of drug discovery.

— H. Lundbeck Pharmaceutical company

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?

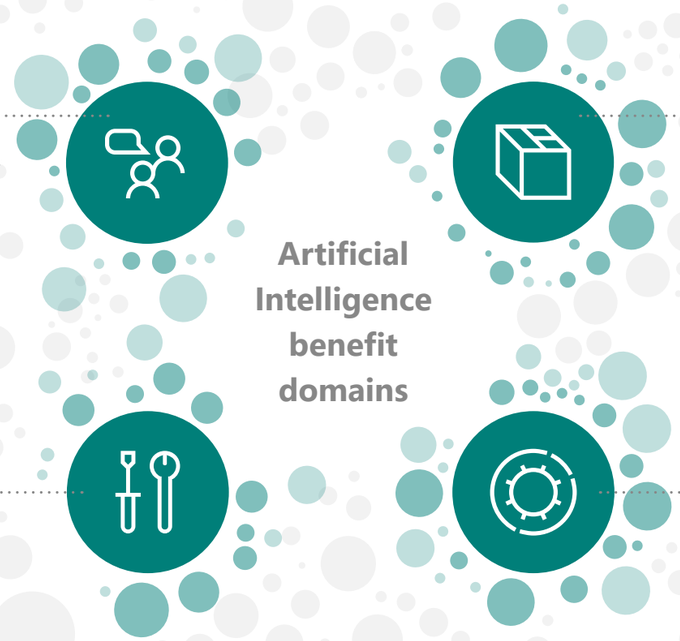
The contributing companies generally expect to benefit in all four key domains as outlined in **Microsoft's Digital Transformation framework**: *optimizing operations*; *engaging customers*; t*ransforming products and services;* and *enabling employee*s. Each domain draws on underlying AI functionalities – '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.

> **"It is important to ensure proof of concept and a clear indication of value creation before moving forward. AI has to drive measurable impact and not just hype.**
>
> **— Ørsted**
> Energy company

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.

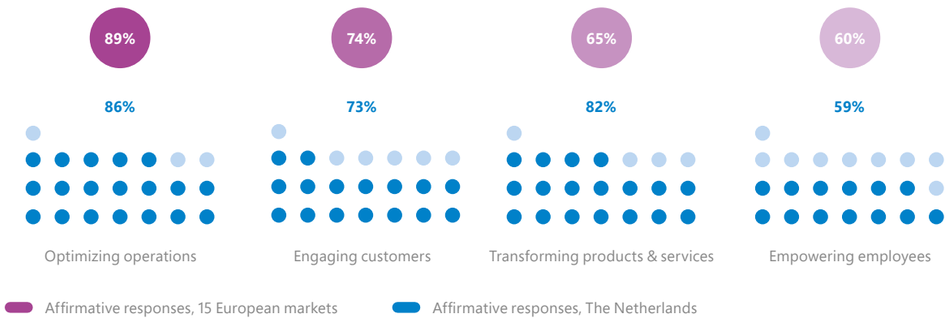
What we did hear overwhelmingly, however, was the importance of bringing all employees along on the company's AI journey. This involves getting internal buy-in that AI will be a force for good, generating excitement about working with intelligent technologies, and making existing jobs easier and more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

Higher expectations for product and service transformation than other countries

Among Dutch companies surveyed, 86% expect AI to optimize their operations for example by enabling predictive maintenance to decrease down time, or by optimizing personnel planning; 82% of companies in the Netherlands expect AI to transform their products and services, for instance by developing operational services driven by big pools of data from large or data-rich companies that can be sold to smaller or data-poor companies; 73% of Dutch respondents believe AI will benefit customer engagement in ways such as automating customer interactions or applying AI-driven chatbots. Lastly, 59% of companies in the Netherlands expect AI to empower employees by freeing up their time and thus allowing them to focus on more interesting and value-adding tasks, or by providing personalized and tailored training.

Most companies expect to generate benefit from optimizing operations

What business benefit do you expect AI to generate?



Proximus

AI is an extremely important topic for Proximus. Although it describes the phase it's in as "very small scale, we are just playing around a bit," it already has quite a number of cases that will soon reach the industrialized stage. Proximus will be using AI for multiple aspects of its business, from efficiency and facilitating costs cutting, to customer service, sales, and HR.
Three key AI focus areas are: the efficiency process, such as providing better information to its internal and external clients, and enabling faster and better decision making, including optimization and maintenance of its networks, for instance by predicting downtime; offering a more personal experience to its customers, for instance through virtual assistants; and creating new revenue streams with AI. Key to this is that all enterprise systems are fully integrated with AI.
Input for new AI projects comes from specialized teams that focus on a wide variety of digital projects, where AI is a key focus area, including data quality. Since Proximus collects enormous amounts of data, it is focusing on avoiding worthless data coming in and going out, making sure that the data it collects is suitable and organized in a structured manner.
In order to gather the knowledge necessary for the AI transition, Proximus trains people about the business, and it also has special "data translators" in place. These people are the links between the data scientists and IT experts, and experts on the business projects.

Input for new AI projects comes from specialized teams that focus on a wide variety of digital projects, where AI is a key focus area, including data quality.

proximus

Proximus is the largest telecom provider in Belgium. It started as Belgacom Mobile, and changed to Proximus in 2014. The company offers telecom, internet, television, and network-based ICT solutions through multiple brands such as Scarlet and Proximus. Proximus serves millions of clients with its TV services, telecom service, and combined services through its 3- or 4-play formula. The company has over 13,000 employees, and had a 2017 revenue of €5.8 billion.

What next?

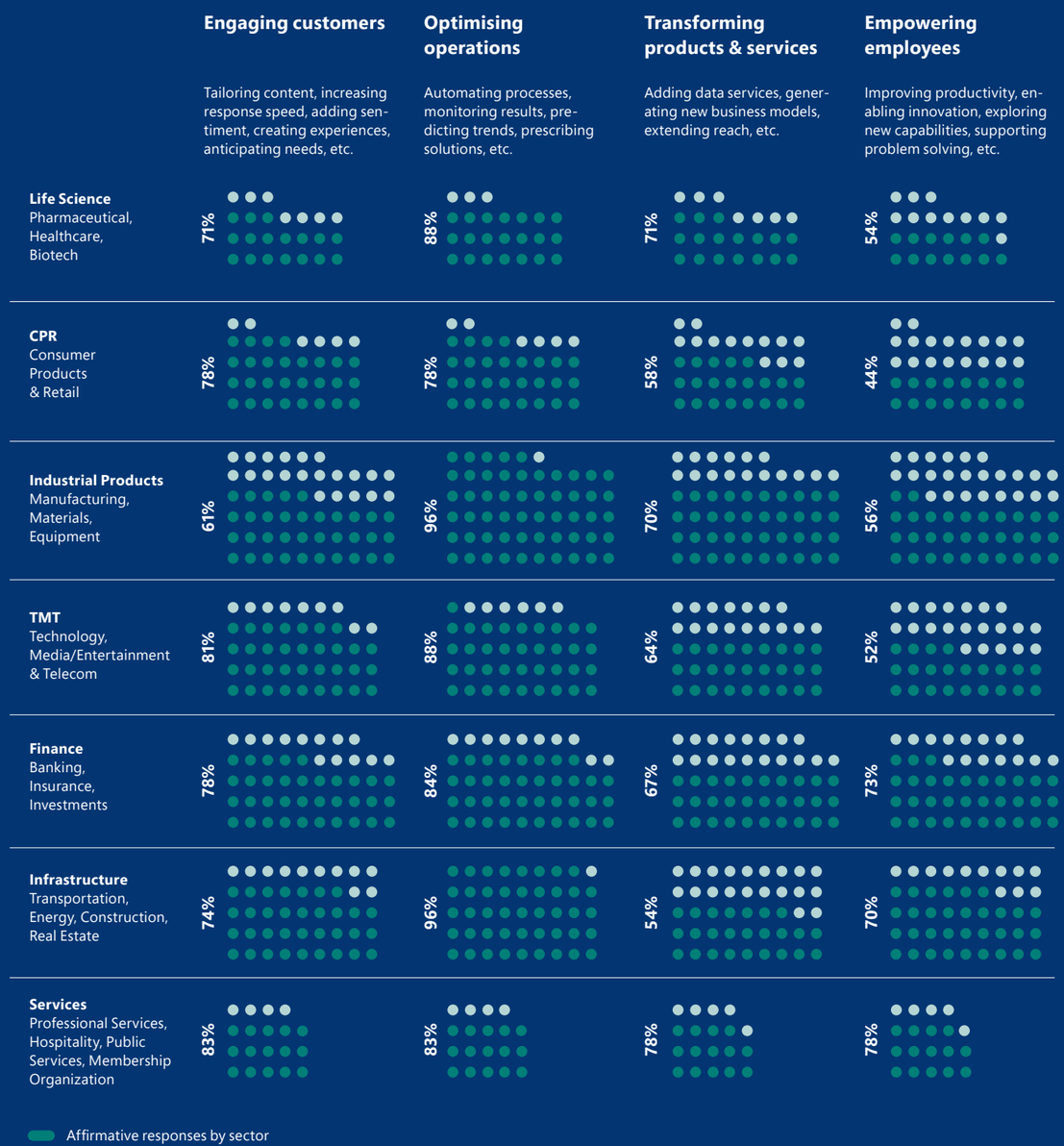
Proximus is transforming into "the digital services provider." It is achieving this by digitizing its current business, transforming core networks to the Cloud, and developing new digital services for its customers. AI will play an important part, but new AI solutions need to be adopted not only by its customers, but also its employees. Therefore, the success of implementing AI will depend on how convinced employees are about the capabilities of AI, and how it will improve the quality of their work.

"Working with AI is also a social challenge. How do you make sure it is not seen as an evil force that is stealing your job? That is why we speak about automation and not about robotics.

"It is a challenge for us to gain scale advantages. We think we are big in Belgium, but we are absolutely nothing compared to China.

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

It is critical that you begin with the right approach to leveraging AI, such as ensuring your data isn't inherently biased and building explainability/auditability into your algorithms. There is also some risk with making assumptions as to how AI will impact the business without collecting the data. It is easy to get excited with the opportunities afforded by AI, but it is important to take a data-driven approach.

— **Randstad** HR services firm

I don't expect new market entries because of AI, I think AI will increase the entry barrier. Or it will lead to scaling.

— **Dümmen Orange** Floricultural company

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 The Netherlands

1 Regulatory Requirements

59%

More than half of Dutch 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. The Netherlands shares this concern with other European countries surveyed: for almost all of them, regulatory requirements was named as a top risk.

2 Impact on Personnel

32%

AI is not just about technology. The adoption of AI is equally about change management, including culture and mindset shifts. It requires balancing employees' fear of losing their jobs with the awareness that once AI frees them from menial tasks, they will gain more time to help customers and develop products and services. It is also about recruiting new employees and supporting current employees as they adopt new kinds of technology.

3 Information Overload

27%

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, the Netherlands. 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

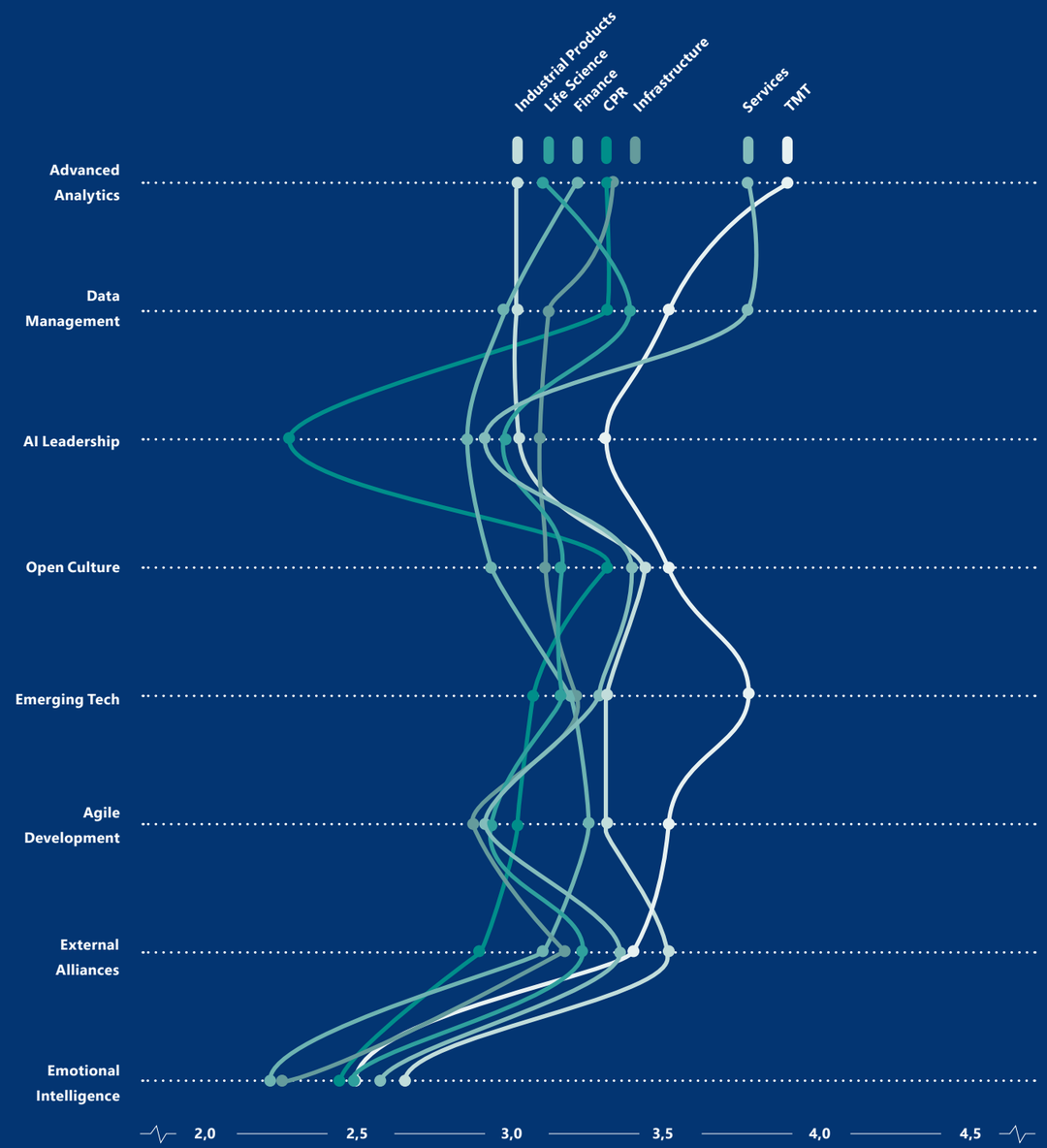
Advanced Analytics and Data management considered most important AI capability

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 the Netherlands 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

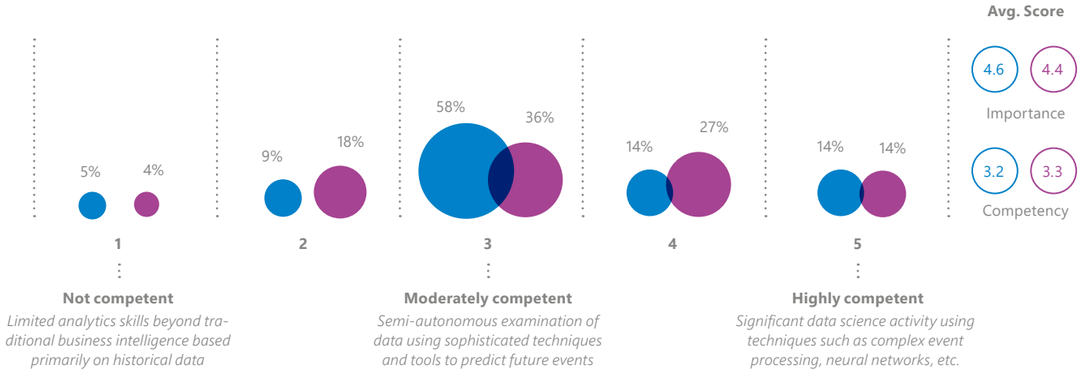
One of the most consistent inputs from the executives was the need for people with deep domain knowledge combined with strong technology proficiency. This hybrid profile is essential to identify relevant use-cases in the business with possible AI solutions.

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.

> **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

Companies consider themselves moderately competent within Advanced Analytics

How competent is your company within Advanced Analytics?



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

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 a key priority for companies in the Netherlands

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 Netherlands' average score is slightly above the European average (4.6 vs. 4.4). Despite its high importance, 58% of the companies in the Netherlands only feel moderately competent with Advanced Analytics (average score of 3.2). 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.**

> **The real challenge of today is to recruit people with the right skillsets. We either have to train more people ourselves or recruit people from abroad.**
>
> **— VodafoneZiggo**
> Telecommunications company

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.

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.

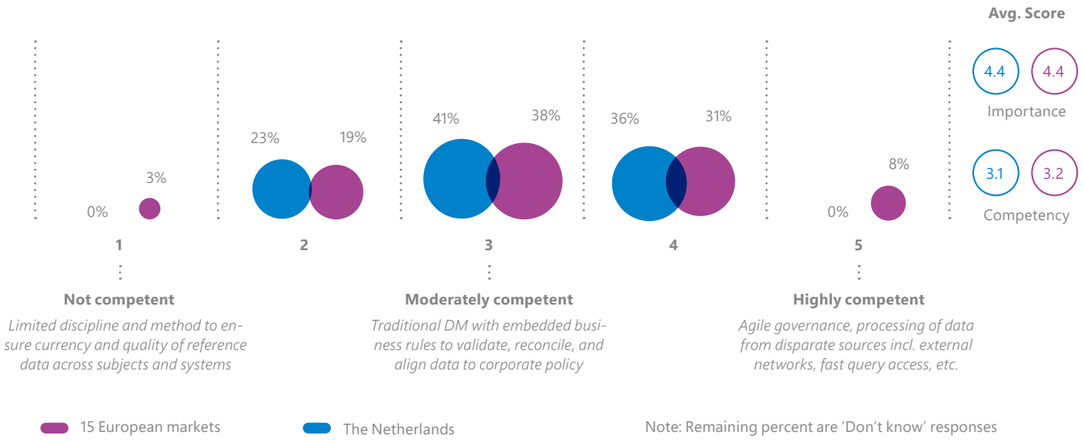
Similarly, 60% of these self-rated most advanced companies report use of hybrid architectures of on-premise and cloud based storage, while the less advanced predominately rely on on-premise platforms.

Is the data you have neutral enough to train your models, or is there already a bias hidden inside? Most data that exists now is collected by people, and probably has bias hidden in it.

— Aegon
Financial services group

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 one of the most important capabilities for companies in the Netherlands

Dutch companies rate Data Management as the third most important of the eight capabilities necessary to succeed with AI (4.4 average score on a scale of 1 to 5) – the same as in Europe. However, the average level of competence (3.1) in Data Management among Dutch respondents is considerably lower than the average level of importance. Among Dutch respondents, 77% report to be above moderately competent in Data Management, although none consider themselves highly competent in this capability. This suggests that some companies have developed a Data Management foundation but are still working towards achieving the capability level that will fully support their AI systems. 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.

Ethical use of data is a challenge or risk. Data must be stored properly. The person who generates the data is also the owner of the data, and that person has to decide what to do with it.

— Royal Philips
Health technology 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%.

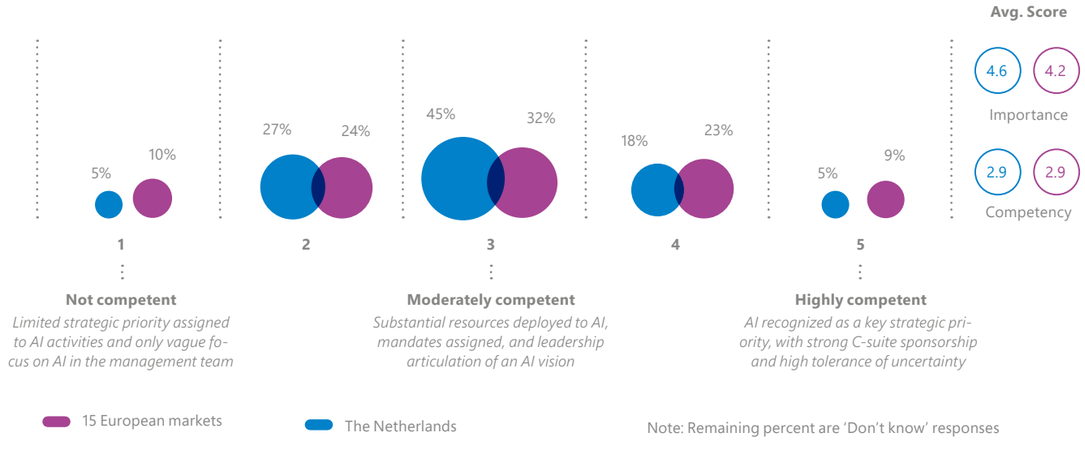
We observed in the interviews that companies very rarely have AI capable leaders across the Board of Directors, Executive Management, and Functional Management layers. Senior AI leaders can sometimes be found on one of the levels, but rarely with any speaking leadership colleagues to challenge ideas.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

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
Investments

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 the Netherlands

Companies in the Netherlands consider AI Leadership to be one of the most important capabilities needed to succeed with AI, tied with Advanced Analytics (4.6 average on a scale of 1 to 5). However, Dutch companies rate their competence with AI Leadership among the lowest of the eight capabilities (2.9 average.). The European average (2.9) is similarly well below the importance average rating. This likely reflects that many of the companies surveyed have undergone an initial digital transformation and are now starting to build momentum and buy-in among their leadership for AI initiatives.

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.**

We have already collected our data in a data lake for almost 3 years. We have worked with data collection and adding analytics into our processes for some time and that is why we are now ready for further developments.

— Telia
Telecommunications company

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.

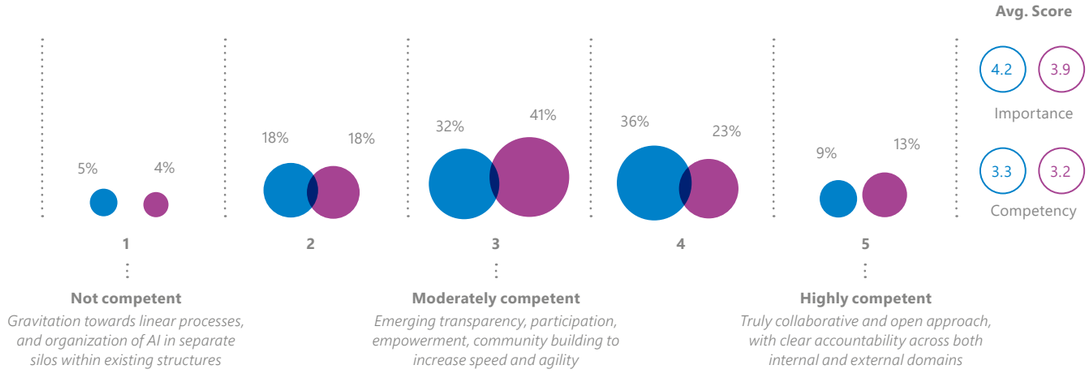
Cooperation across the organization

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

Dutch companies rate Open Culture competency among their highest

Open Culture is ranked as the fourth most important capability for companies in the Netherlands to be successful with AI. The Netherlands average importance score in Open Culture is above the European average (4.2 versus 3.9), while the competency level in the Netherlands and Europe is moderate (3.3 vs 3.2). Some of the Dutch 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

"Essentially the use of AI involves enabling employees and the creation of energy in the organization to fully exploit the solutions. The will of employees to share their knowledge and to be able to recycle it in the rest of the organization is also an essential capability in order to use AI.

— Aegon
Financial services group

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

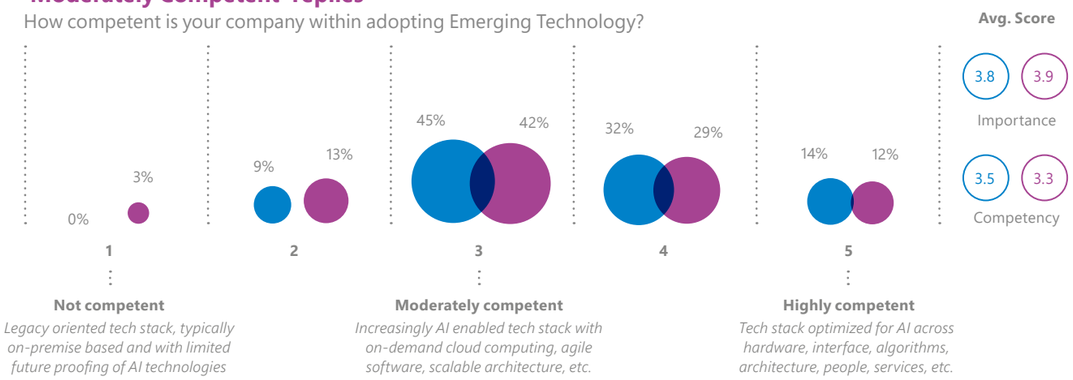
Despite the need to explore and navigate a tech sea characterized by uncertainty, a recurring theme when interviewing executives is the importance of balancing excitement with new technology and commitment to an innovative mindset, with one foot planted firmly on the ground.

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.

> **A big challenge is to follow all the rapid evolutions in the market and match that to the right business initiative.**
>
> **— DAF Trucks**
> Manufacturing company

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 rates as highest competency in the Netherlands

Both in the Netherlands and in Europe, companies rate Emerging Technology as their highest competency (3.5 versus a 3.3 average.). However, Dutch companies rate the importance of Emerging Technology comparatively lower than the other eight capabilities compared with other European countries. The executives interviewed in the Netherlands report to be on the lookout for new and potentially disruptive technologies while assessing the impact these may have on 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.**

> **The challenge is to understand how to benefit from something that is so new and some AI technologies are not mature so it is not that you can do a 'plug and play' approach. There is a lot of work and adoption to do as there are no solutions that you can just buy and start using.**
>
> **— Combient**
> Technology membership organization

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

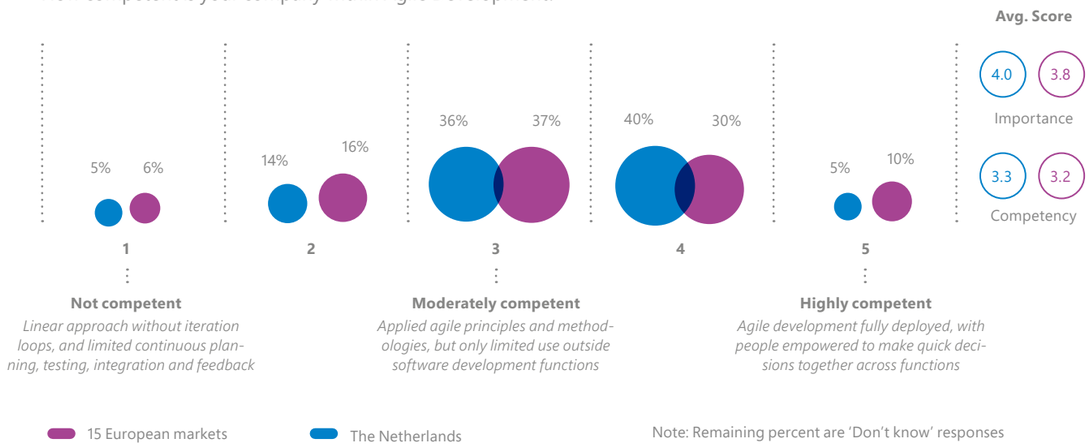
Taking an iterative approach can also help mitigate risks. Frequent feedback loops allow the project team to better identify, understand, and correct undesired outcomes before the AI application is put into production, potentially doing harm. This flexibility does not only apply to risks, as agile projects 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.

> **My philosophy is that experiencing and experimenting is the only way forward. We can spend an infinite amount of time and resources on thought leadership but when we first get stuff done, when we start managing the craft and how to pivot, it will not be about the technology but about what we are asking and looking for.**
>
> **— EQT**
> Private equity group

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 among the highest competencies for Dutch companies

Companies in the Netherlands consider themselves to be on average above moderately competent in Agile Development (3.3). This capability is among the highest ranking in terms of competency in the Netherlands. In terms of importance, Dutch companies rate Agile Development between moderately and highly important (4.0 average) – above the European ratings (3.8). Many of the companies in the Netherlands talked about AI pilot projects being introduced in at least some areas of their organization, which can explain the higher competency level in the Netherlands. According to the respondents, in most cases AI pilots originate in IT, Data Science or R&D departments.

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 try to industrialize what we have started, instead of running 10 new pilots. We try to be selective as we know what time it takes from pilot to industrialize.**
>
> **— Proximus**
> 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 now use a combination of partnerships, attracting new people and finding people who are already in-house. Data scientists are hard to find. We also cooperate with universities for the advanced driving systems.

— DAF Trucks
Manufacturing 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.

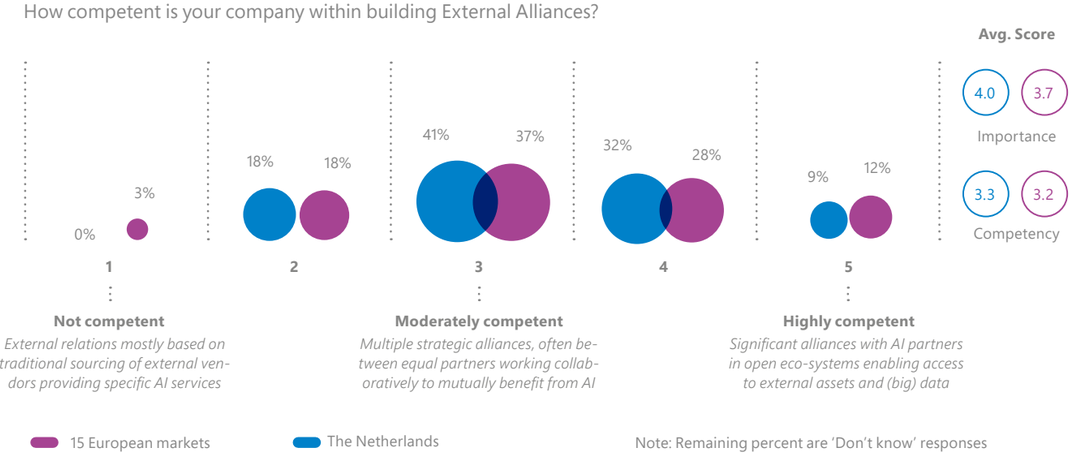
Companies also see this as a way of establishing a pipeline of AI talent already familiar with their business and the problems they face. Some of the more ambitious companies have a strategy of positioning themselves within AI, comprised of active conference participation and multiple university partnerships 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 the second highest competency for Dutch companies

Dutch companies rate External Alliances as an important capability to succeed with AI (4.0 average score.), slightly above the European average (3.7). Yet, this is among the lower half of the Dutch importance ratings. As with the other capabilities, Dutch companies rate their competence with External Alliances below their rating of its importance (3.3 average.). The results suggest that Dutch companies see the value of collaborating with outside experts and have already gained some experience from previous collaborations. Yet, many 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.

“ We do something with partnerships, but we want to have the core of the capability in-house. We have invested as such in the platform that we have. They focus on the use cases and the exciting things. The things around it like applications, we do with other parties.

— VodafoneZiggo
Telecommunications company

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.

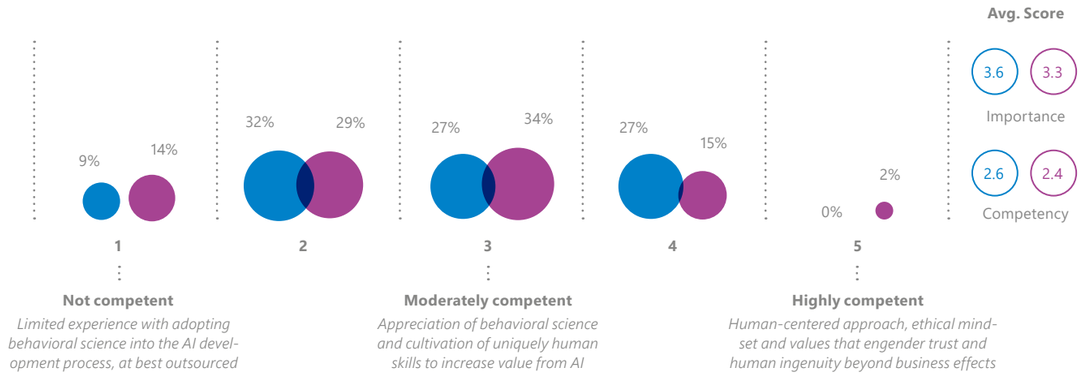
Many advanced companies perceive this to be either 'very' or 'highly' important. Notably, these companies come from five different markets and a wide variety of industries, including Life Sciences, Financial Services, TMT, CPR, and Services & Hospitality.

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?



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

Dutch companies rate Emotional Intelligence above moderately important for their success with AI (3.6 average.), above the European average (3.3). Even so, in the respective Dutch and European samples, these ratings are the lowest of the eight capabilities. Similarly, the competency with Emotional Intelligence is also the lowest of the Netherlands and European averages (2.6 versus 2.5), which is below moderately competent for both. 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 one of two capabilities (the other being Data Management) in which no Dutch companies rate themselves as highly competent.

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.**

The challenge is to get the right expectations from the organization, what you can achieve. It sometimes seems so easy when presented in the media. But in reality, you really need to understand your business and flows and how to apply this technology.

— **Com Hem** Telecommunications 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

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.

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 the Netherlands that can empower your company to achieve more with AI

Surya Ramkumar

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As Director of Services at Microsoft Netherlands, Surya brings the breadth and depth of Microsoft products and services – from Artificial Intelligence to Productivity – to innovate and inspire businesses to drive bottom-line impact. Well-experienced in AI in action, she works with organizations to make the latest technologies tangible and practical. Surya is passionate about driving human-centric AI innovation. She holds a Masters in Computer Science from National University of Singapore and a Bachelors in Engineering from Nanyang Technological University.

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Having a background in International Business and Technology, Cara is passionate about business transformation and operational excellence. Being curious and exploring the unknown drives process improvements and sets a context for collaborative innovation. And while systems of intelligence are essential, the need to evolve the mindset of individuals is even more important.

Deeply interested in the individual behaviors that influence collaborative relationships, Cara support partners, customers, our Microsoft teams and employees to achieve what they can achieve - and to do that with purpose.

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Industry dynamics have shifted majorly due to new technologies, entrants, markets, services and regulations. As such, every company is in the midst of redefining and valorizing the strength of the past while building differentiating capabilities and the right value propositions for the future.

Transforming and growing into an open, innovative and constantly developing organization whilst competing in a worldwide market can only be done with the right partners and a continuous learning methodology. That's how you can successfully address industry specific (industry) challenges.

Contributors

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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.

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Ellen holds a PhD in technology, policy and management from MIT. She has masters degrees in engineering management and system design from MIT and 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.

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