Research into the use of AI in business in the Netherlands and how to drive adoption
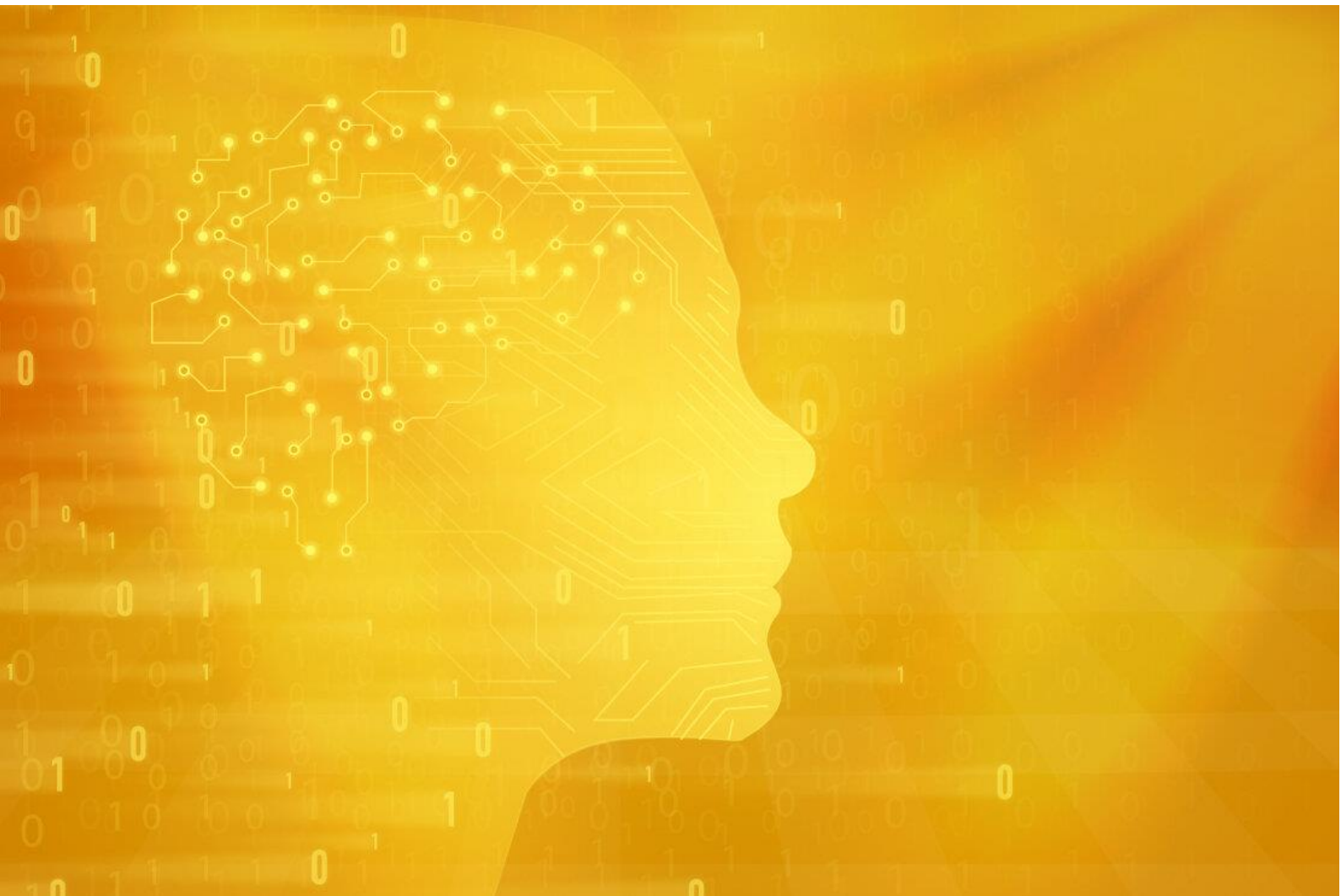
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A joint white paper between

DIGITAL SUNDAI

Erasmus Centre for **Data Analytics**

HOGESCHOOL ROTTERDAM — Kenniscentrum Business Innovation

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Introduction

The increasing interest and discussion on the topic of AI as well as the Netherlands' high degree of digitalization incited research on the topic. The goal of this study is to evaluate the current applications and use of AI as well as identifying predictive factors in its lower-than-expected adoption.

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To this aim, 40 departmental managers participated in a survey containing 25 questions, each pertaining to departmental applications and factors potentially driving or inhibiting AI adoption. Following the two-month collection period, two experts in the field of AI were interviewed to provide further insights into the current use and impact of the technologies on businesses.

A collaboration between the Dutch AI Startup Digital Sundai and two academical research centers, namely the Erasmus Centre Data Analytics (ECDA) and the Kenniscentrum Business Innovation (KcBI), each providing expertise through their network and experience in the field, enables this paper.

Overall, the results confirm previous findings with significant differences not only between but also within firms. This white paper is designed to contribute to the AI ecosystem in the Netherlands by providing a realistic description of its current application and insight into how to drive its adoption.

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AI is at the heart of digitalization and industry 4.0, breaking through every industry with increasing investments into the technologies across countries and firms.

Defining AI

When discussing Artificial Intelligence (AI), the narrow definition of AI is referred to. All types of AI that focus on one specific task are included. As opposed to general AI, this paper focusses on its specific applications in business.

Expert opinions

„The technologies are evolving so quickly that we can do much more, and it becomes easier to find a balance in the line of work."

"In general, business is enthusiastic about the application of AI and are becoming more aware of the technologies."

Examples of AI technologies

- Machine Learning (ML)
- Chatbots
- Natural Language Processing (NLP)
- Robotic Process Automation (RPA)
- Predictive Analytics
- Deep Learning (DL)
- Recommendation systems

Discrepancies found between AI value and use

Recent developments in computational speed, algorithms and data storage in combination with increased availability and accessibility of data have increased the value of prediction, which AI facilitates considerably.

Interestingly, despite the substantial value creation AI entails for businesses, researchers have observed discrepancies in its actual use within organisations. The current rise in coverage of the topic and increasingly positive attitudes towards the technologies contributes to adoption within departments, however, there are AI-specific factors that ought to be considered in its application.

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Current use of AI

In this research we have set out to determine the actual use of AI in departments and its adoption drivers. The first findings pertain to how AI is currently benefitting business.

Majority of companies are in piloting stage (43%), up from 40% in planning stage in 2017

There are 5 stages a company sequentially goes through in their journey to become data driven. It all begins at stage 0 where no AI application is even being considered. Stage 1 is the planning stage, where its potential uses are evaluated, followed by stage 2 which consists of piloting AI projects. Stage 3 consists of implementing AI in products and/or processes. Once AI supports multiple parts of the firm, stage 4 is reached, with AI being released throughout the organization.
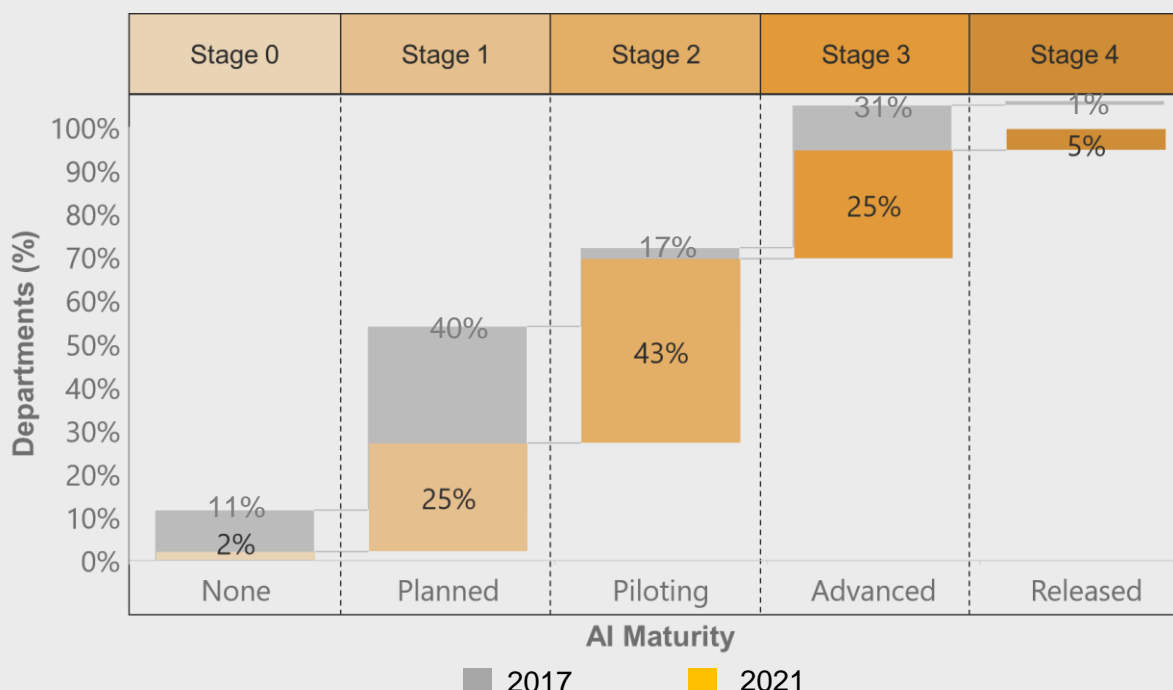
Additionally, more advanced maturity stages require a different focus, thus modifying the priorities and steps to be taken.

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The largest proportion, 43% of departments are currently in stage 2 which consists of one or multiple AI pilot projects implemented. At this stage, investments into the technology are increasing and collaboration in initiatives are often sought out. This result shows an increase in maturity when comparing with previous research which found most companies, 40%, in the planning phase in 2017.

Nevertheless, AI is not yet widely applied. Despite its presence around the globe, most of AI's opportunities have not yet been tapped. It is expected to further transform core processes as well as entire business models in the coming decade.

AI's impact on profit remains marginal but will strongly increase in the coming 3 years

Respondents varied substantially between responses about the current situation and the expected future, demonstrating the growth AI is currently experiencing.

Notably, while more than half, 55%, of the respondents currently estimate AI's impact on their department's profit to be inferior to 1 percent, more than close to three quarters, 70%, predict a future impact superior to 5 percent in only three years' time.

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Expectations on AI's impact on profit remain high, perhaps unrealistically high. Considering the substantial barriers in the AI journey it is unlikely that in only 3 years AI's impact will increase so significantly.

AI impact on profit

Legend: ■ Currently ■ In 3 years
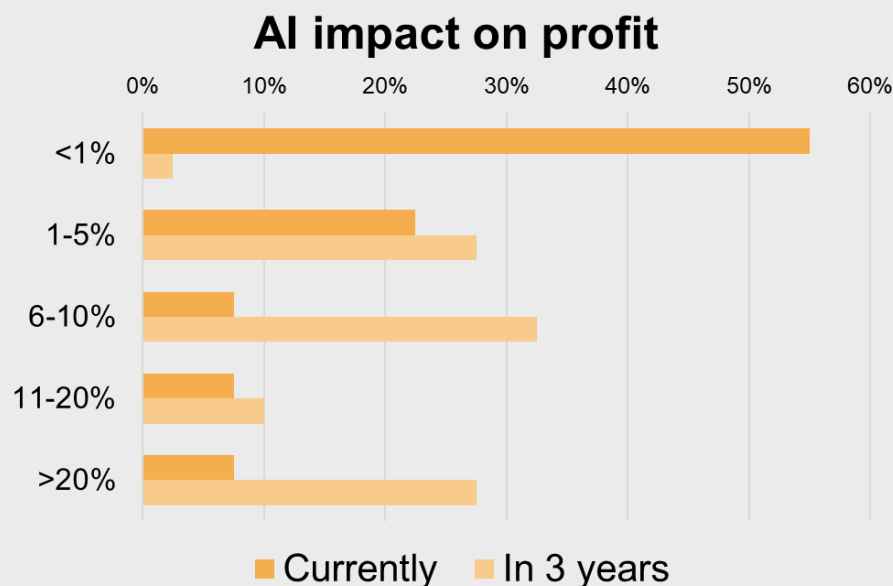
The main AI applications focus on the customer

Most departments indicate applying AI in automation, followed by prediction and generating insights. Personalisation and prescription are less common and other applications include segmentation and match making.

The main use cases are found in optimizing operations and engaging customers. Use cases are expected to grow across all categories, with the current proportions remaining similar in the future.

The largest proportion of departments is currently applying AI in automation mainly to optimise operations and engage customers.

AI brings benefits in three major domains

Benefits are one of the strongest drivers of AI and three specific advantages were identified as most relevant to its current application in business.
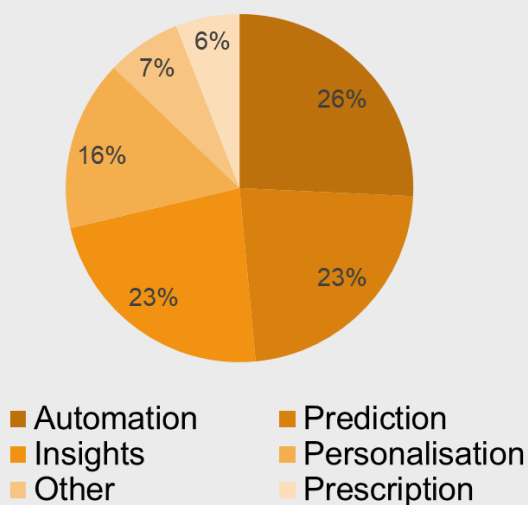
1. Creating opportunities

The most commonly stated benefit pertains to the additional opportunities created by AI. Firms that can identify opportunities rapidly are predicted to take advantage of the new landscape, making experimentation crucial.
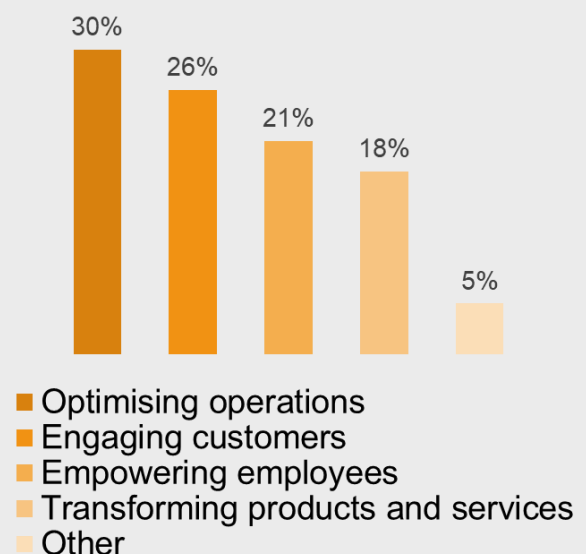
2. Providing a competitive advantage

The second key benefit AI entails is the provision of a competitive advantage. Including AI technologies within the department allows firms to remain competitive, and it is predicted that managers using AI will replace those who do not.

Main applications of AI

- Automation
- Prediction
- Insights
- Personalisation
- Other
- Prescription

Main use cases

- Optimising operations
- Engaging customers
- Empowering employees
- Transforming products and services
- Other

3. Increasing efficiency

By taking over repetitive as well as time-consuming tasks, AI enables possibilities for more valuable human interactions and provides suggestions facilitating decision making. Efficiency is thereby considerably increased.

AI is thus starting to bring the value it promises to business, however the gap between its apparent benefits and its actual use indicates certain challenges and limitations to its adoption.

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Interestingly, the fear of AI replacing their jobs is not a main concern hindering adoption. This finding confirms expert opinion underlining the importance of distinguishing AI from automation and realising that AI facilitates prediction but has its own limitations. Many executives are still facing the challenge of managing employees' negative attitudes towards AI in business.

Departments on the 'front end' are more advanced

The adoption of AI is unequal across business functions. The ones closer to the customer are often more advanced in their application of AI, capturing most benefits within as well as outside the firm, lower in the value chain.

The most commonly applied technologies are chatbots, especially in B2C markets such as telecommunications, utilities and banks, since they produce a large number of interactions that can be analysed with the help of AI. The most advanced departments within the sample are Analytics, Marketing, Sales, Customer Service and Digital.

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Department	Main AI technologies	Frequent Applications
Customer Service	NLP, Chatbots, Machine Vision	Social Listening, Sentiment Analysis
Marketing and Sales	NLP, Chatbots, Machine Vision	Personalised Marketing, Sales forecasting
Analytics	ML, NLP, Image Recognition	Analytics platform, conversational & real time analytics
Operations	RPA, ML, Process Mining	Optimisation, predictive intervention and maintenance
Strategy and Corporate Finance	RPA, ML, Process Mining	Capital allocation, regulatory compliance

■ Most advanced AI adoption   ■ Less advanced AI adoption

Factors in AI adoption

This study investigates how eleven known barriers and drivers are impacting AI adoption in business today. Participants were asked to score technological, organisational and environmental factors within their departments.

In addition to benefits and costs and risks, the factors evaluated were complexity, availability and quality of data, management support, infrastructure and resources, AI-business alignment, technology innovation culture, accountability and governance, pressure and support ecosystem.
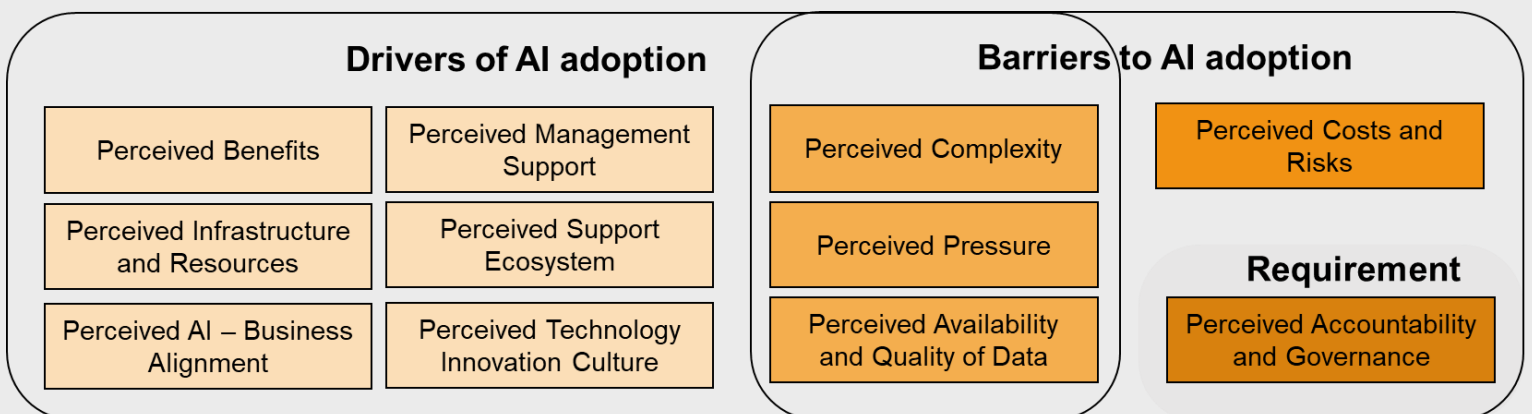
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Organisational factors are key in driving adoption

When comparing the three main categories of factors namely technological, organisational and environmental, it becomes apparent that the more effort companies invest in drivers, the higher the adoption is. Nevertheless, the data shows a particularly strong correlation between organizational characteristics and AI adoption.

The comparison between more mature departments with less advanced ones reveals the strongest predictors. While technological and environmental factors are significant in the decision to adopt the technology, it is the organisational factors that ultimately determine its success.

The proportion of departments in more advanced phases of AI adoption investing high effort in organizational factors is superior to the proportion in the lower half by 36%.

Drivers of AI adoption		**Barriers to AI adoption**	
Perceived Benefits	Perceived Management Support	Perceived Complexity	Perceived Costs and Risks
Perceived Infrastructure and Resources	Perceived Support Ecosystem	Perceived Pressure	**Requirement**
Perceived AI – Business Alignment	Perceived Technology Innovation Culture	Perceived Availability and Quality of Data	Perceived Accountability and Governance

The proportion of departments in more advanced phases of AI adoption investing high effort in organizational factors is superior to the proportion in the lower half by 36%.

More hesitation among managers closer to AI use

The most impactful enabler for AI adoption identified in the research is the perceived management support. AI increases the importance of the manager role. Nevertheless, it requires education and understanding of AI to provide a positive image, while remaining realistic to avoid disappointment. Communication and transparency towards employees are crucial to generate trust in AI adoption.

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Another finding that became apparent from the data collected is the discrepancy between the General Management Department in terms of perceived benefits of as well as perceived pressure to adopt AI.

Considering the General Management department included exclusively CEOs, a certain overestimation of AI's capabilities and impact can be observed at higher levels. Executives are promoting and pushing AI adoption without necessarily being familiar with its actual implementation and use.

Executives are promoting and pushing AI adoption without being familiar with its actual implementation and the associated challenges.

Proportion of departments indicating strong effort

1st quarter (Top AI adopters) ■ 2nd quarter ■ 3rd quarter ■ 4th quarter (Bottom)
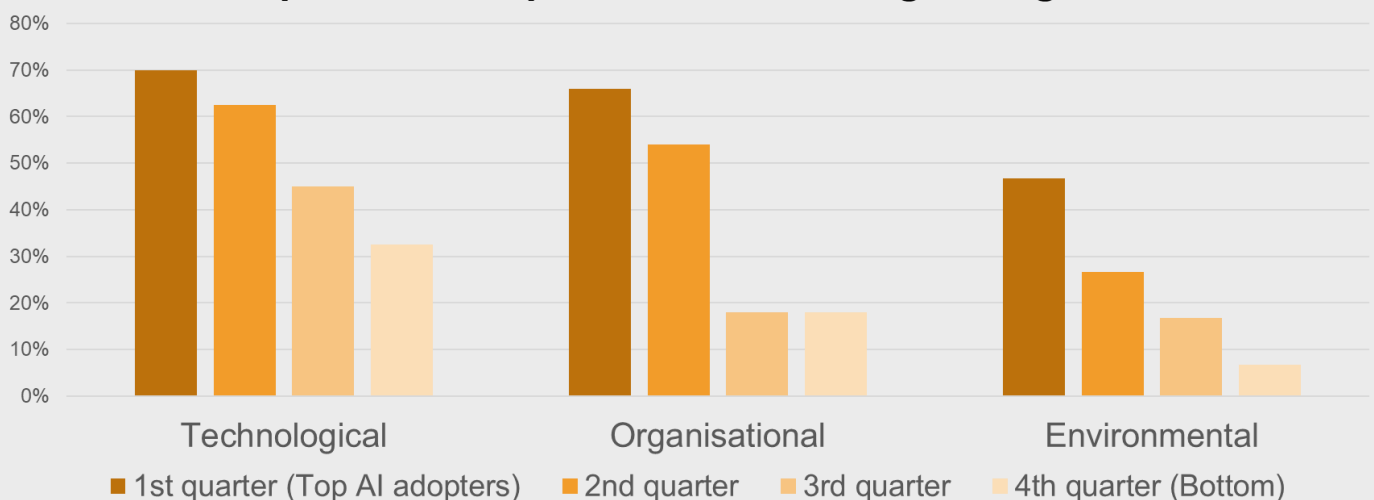
Infrastructure and resources are the second strongest differentiator between firms

The infrastructure and resources available within departments are decisive in AI's success. For instance, in addition to data availability and quality, a balanced data science team is required.

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Furthermore, the importance of designing a coherent and active AI strategy is emphasized, as well as the adoption of new key performance indicators to drive adoption. By providing an integrative strategy promoting AI, its value can considerably be increased.

A coherent and active AI strategy ought to be formulated.

Moreover, a significant factor in implementing AI are accountability and governance measures, which are neither driving nor inhibiting AI adoption, but are identified as a requirement by the experts interviewed.

The ecosystem AI creates around itself is also decisive in the adoption. More advanced businesses regularly organise knowledge shares within as well as outside the organisation.

In fact, the main source of expertise to develop use cases is expected to shift in the future. Currently, close to a third of departments, 29%, mostly rely on internal capabilities, followed by AI experts, and consultants. Start-ups and group initiatives are not often referred to. Start-ups are predicted to more than double in demand, with almost a quarter of firms, 24%, striving for collaboration in 3 years, at the expense of consultants and AI experts.

Main source of AI expertise
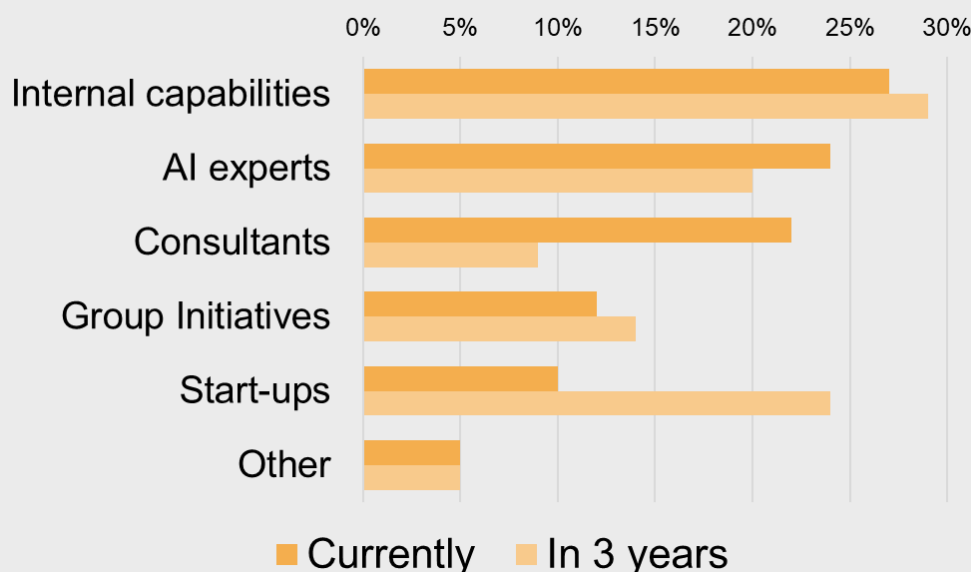
Currently, 29% of departments mostly rely on internal capabilities to develop use cases. In 3 years, 24%, are striving for collaboration with start-ups, at the expense of consultants and AI experts.

Finally, three factors are considered to both enable AI, as well as being as barrier to its adoption, namely complexity, pressure and availability and quality of training data. All three emphasise the current hype around AI, which has become a so-called 'buzzword' and thereby increase the gap between its potential value and actual use by contributing to an unrealistic perception of its capabilities.

One of the most salient reasons AI adoption is lacking despite its predicted economic advantages is that businesses lack a clear understanding of how to implement AI in their specific business or department. Many experts in the field recommend creating a better understanding of AI's possibilities.

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AI poses challenges and risks, in particular related to transparency

Companies and departments are likely to face certain challenges in its implementation. Regardless of the firm's age, size and industry, two barriers were found to have significant negative impact on the adoption of AI.

1. **Transparency, explainability and ethical risks**

Due to the technology's inherent complexity, it is often difficult to explain results computed by AI. The reliance on data and algorithms creates the possibility of incorrect application and the introduction of unintended bias, but also privacy invasion and intentional misuse.

2. **Increased competition**

The other main concern in its current surge is the increased competition in business. It is also a driver of AI adoption and raises concerns about potentially decreasing its value by becoming a general solution.

Limitations of AI

Applying AI in business brings various advantages yet entails AI-specific requirements. It is important to recognize that there is no one-size-fits all solution and that its success and priorities depend on the context.

Expert opinions

"The goals of implementing AI depend on the department and drivers are different for different kinds of companies."

"AI is fantastic at recognising patterns and comparing it to other patterns but when it comes to connecting findings to the rest of the world in a broader sense and putting it into context, AI has great difficulty."

The pressure to adopt AI stems from a certain fear of missing out and contributes to its unrealistic perception in business. With its increasing adoption across firms, the effort and time required to achieve success is underestimated by a majority of organisations.

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Roadmap to AI journey: setting priorities right

The most important first step in the adoption of AI lies in the manager role. The latter ought to create a realistic image of AI within the organization. In particular, a common understanding must be created, which may require further elaborating its potential at lower levels while demonstrating the practical obstacles to the C-suite. Once this is achieved, an AI specific strategy can be formulated across departments.

Once piloting begins, the focus shifts onto the infrastructure and resources within the organization. In some cases, the data should first be created or made available and experts who trust and know how to operate the technology must be acquired. As implementation begins, exchange outside the firm is beneficial. Experimentation and collaboration are key to leverage AI's full potential.

Overall, AI has a lot of potential, which has not yet been realized. Whether the time frame within which the potential benefits will materialize is realistic or not, the vast majority of respondents foresee much more value in AI than we currently observe. Many believe there will be substantial value to be captured from AI in the coming years. This is simply the starting point of the journey.

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Adoption insights

The first priority is to familiarise with AI and the technologies' capabilities. AI has the potential to benefit every department in all industries, however, must be made a priority and applied at scale to capture its full value.

Expert opinions

"AI requires alignment and prioritization across the organization before the benefits can materialize".

"Another condition is easy access to data which is often in silos and different IT systems."

"It is important to collaborate outside of the own company since firms often face the same issues and can help each other through experience."

AI's Potential

AI adoption was found relatively high with a large majority of businesses having developed at least one AI use case, confirming its application in all kinds of context. The value of AI is beginning to become apparent, and adoption is increasing. In the end, AI is a tool and is crucial to know how to use it.

Expert opinions

"Since its application is still quite recent, we are working on realizing its full potential."

"We have applied AI, but the technology still has much more potential to be deployed at scale in the entire organisation. This will be an interesting and challenging journey."

About the research

This paper stems from a collaboration between Digital Sundai, Erasmus Centre for Data Analytics and Kenniscentrum for Business Innovation, each contributing to the project by providing their expertise and joining resources.

After careful evaluation of the measurement model derived from previous research, the survey was distributed across various channels in the time frame between the 28th of March until the 23rd of May 2021. The second data collection stage consisted of qualitative data through interviews, which were conducted on the 30th of May and the 7th of June 2021. While respondents in the survey were managers, as diverse as possible to compare different departments' approaches, the interviewees for the qualitative part were advanced AI users. Their positions are closely related to AI and the companies they work for score very high in digital literacy.

About the collaborators

Digital Sundai

Digital Sundai strives to improve the performance of organizations through Digital and AI. Founded in 2019 in Amsterdam Digital Sundai is a company providing Digital & AI solutions and consultancy. The founder Robin Zondag is a digital and AI service industry veteran of more than 20 years supporting corporate customers to improve their performance.

Erasmus Centre for Data Analytics (ECDA)

The Erasmus Centre for Data Analytics' purpose is to explore data analytics, enhance data knowledge, and find business and societal uses for data analytics and AI to benefit from the digital transformation. The Erasmus Centre for Data Analytics was founded in 2018 and is a flagship centre of excellence of Erasmus University Rotterdam on AI, data and digitalization, bringing together academic experts, organisational leaders and students.

Kenniscentrum Business Innovation (KcBI)

Kenniscentrum Business Innovation wants to inspire education and the business community with knowledge about innovation in SMEs. It is the knowledge center within Rotterdam University of Applied Sciences in the field of innovation and entrepreneurship. By conducting and supporting practice-oriented research for the Economic Domain and the business community, the knowledge center supports companies and students of Hogeschool Rotterdam.