Artificial intelligence in project management
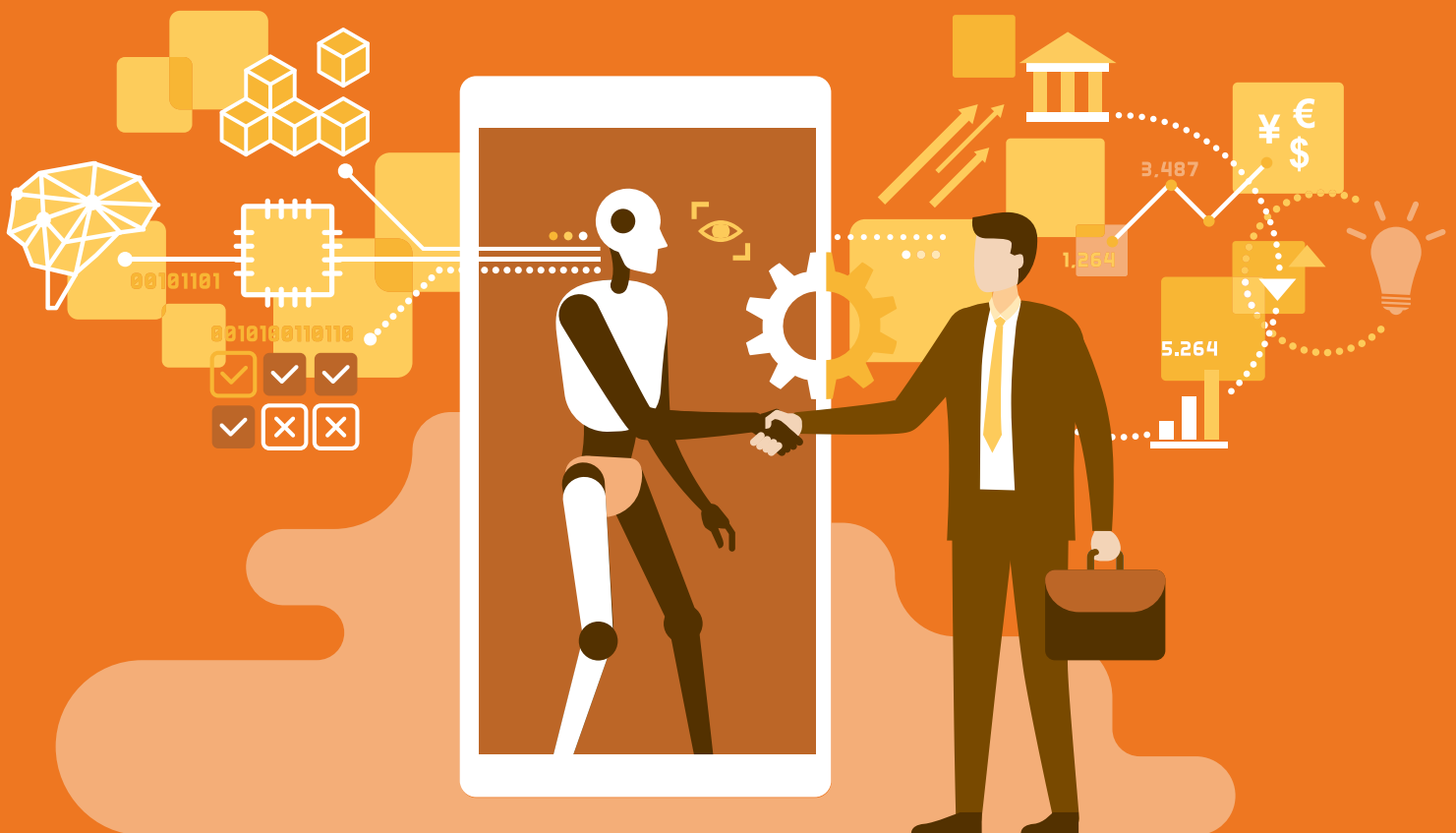
A review of AI's usefulness and future considerations for the project profession

Association for Project Management

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Acknowledgements

Authors

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Fredrik Kockum is a PhD candidate researcher at Southampton Business School, University of Southampton. Fredrik's research includes project management and operational research where he studies the behavioural impact of artificial intelligence on project managers through system dynamics simulation. His interests include business and management research as well as industry collaborations through management consultancy. Although Fredrik is an early-career researcher and management consultant he has a track record of publications and industry collaborations. He is recognised for his teaching and has received awards for engaging his students at Southampton Business School.

APM research sponsor

Contributions

Contents

Executive summary

This report provides new insights into the state of artificial intelligence (AI) in project management. Through interviews with project professionals with experience of AI technology, the findings illustrate areas where AI has the potential to enhance the project profession and the justification for using this technology. Additionally, this report's survey data from more than 280 project professionals provides insights into the perception of AI technology and projects.

Based on the findings from the interviews and survey, the report identifies the benefits of using AI to include enhancing project decision-making, supporting problem-solving functions and being preferable used for planning activities. Respondents believe AI has a high perceived usefulness in complex projects, and a low ease of use. The report findings indicate that there is a positive correlation between the perceived usefulness of AI and a high level of project complexity. It is significant that professionals and organisations ensure the ease of use of AI is high to maximise the high perceived usefulness.

The report acknowledges specific challenges and opportunities for the project profession when using AI. These include the need for training in how to use AI in projects and that the current understanding of AI among professionals varies significantly. To use the findings from this report effectively, a number of practical suggestions for professionals and organisations are given. Project professionals should be offered AI training and organisations should develop a 'why' for using AI by defining a clear problem formulation and should also develop effective data management processes.

Background

Ever since Alan Turing asked whether machines could think in the 1950s, there has been a discussion of using computers for different areas of decision-making. The 2021 *AI Roadmap* by the UK AI Council suggests that all sectors of society need to increase their confidence in using AI. Therefore, it is critical to improve the understanding of AI among project professionals (Kockum and Dacre, 2021).

Dedicated to providing its members with contemporary research, the Association for Project Management (APM) has produced several initiatives building up to this specific report of AI in project management. Previous research series include "The Future of Project Management", "Projecting the Future" and "Project Data Analytics: The State of the Art and Science", all of which helped create a momentum around project data analytics and how AI may change how projects are delivered. Additionally, APM's *The Golden Thread* demonstrated the significant role of the project profession in the UK. *The Golden Thread* report revealed the profession has typically been positioned as separate from core business activity. However, now that it contributes £156.5bn to the annual UK Gross Value Added (GVA) (8.9% of the whole UK economy), the project profession is set to be at the heart of business activities (APM, 2019).

As the central hub in projects, project professionals can be provided with an overwhelming amount of information, which can cause process paralysis during decision-making (Barber *et al*., 2021). In such circumstances AI technology may be used as a cognitive load enhancer (Dacre *et al*., 2020). Using AI to assist project managers is not a new idea, and software tools based on algorithms for project planning and scheduling is best practice (Hazır, 2015). However, AI has been oversold occasionally during the past decade and can be placed in a hype cycle (Gartner, 2020). The hype cycle explains how a technology moves from being hyped by high expectations, to becoming more mature and understood. As understanding of the technology increases, expectations of it become more accurate. The following quote from Bill Gates and his colleagues inspired this research to clarify the expectations and perception of AI among project professionals:

"We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten." Gates *et al*., 1995

> "Respondents believe AI has a high perceived usefulness in complex projects, and a low ease of use. The report findings indicate that there is a positive correlation between the perceived usefulness of AI and a high level of project complexity"

Rationale and aim

"This research aims to study the general perception of AI and the ease of use of AI technology within projects"

How to use AI technology in project management has had a lot of attention recently and the impact of AI has become a popular topic to debate when predicting the future of the project profession. AI has potential to become a significant tool for project professionals when delivering projects. Therefore, this report aims to show how professionals view the current state of AI in project management. This research aims to study the general perception of AI and the ease of use of AI technology within projects.

The scope of the report is to find common themes of AI in projects rather than to provide specific cases of AI in projects. The research developed three objectives to reach this aim. The objectives were both research- and practice-oriented. This allowed the report to include previous research to determine the current state of AI research in project management, and to suggest recommendations based on the current perception of AI among project professionals.

Research objectives:
1 To study the literature of AI and project management
2 To examine perceptions of AI among project professionals through interviews and a survey
3 To propose benefits, challenges and opportunities of AI in project management

Methodology

A mixed methodology was adopted for this research, consisting of in-depth, semi-structured interviews with project professionals experienced in AI technology. This was followed by a survey reaching a larger number of project managers (Saunders *et al*., 2015). The interviews with project professionals guided the design of the survey.

The interviews consisted of 16 in-depth conversations. The participants were contacted through the network of APM and the established network of University of Southampton. The semi-structured interviews allowed the research team to ask open-ended questions and follow-up questions as new themes and insights emerged. The demographics of the interview participants are outlined in Appendix B. Themes identified in the interviews made up the foundation for the survey, which was completed by more than 280 project professionals. The survey was distributed to targeted groups in APM's network through electronic newsletters and social media. The survey was also sent out electronically to contacts of the research team.

The method and the development of the report followed the three objectives listed above. Firstly, a literature review of AI and project management was done while conducting iterative semi-structured interviews with project professionals experienced in AI. The interviews were transcribed and analysed through open coding. Secondly, the qualitative data collection formed the survey which was completed by a larger number of project professionals. Lastly, the report was developed with the research findings and practical recommendations. The research process is illustrated in Figure 1.

Step 1 **Literature review:** Literature search for "project management", "artificial intelligence" and "project data" **Qualitative data collection:** 16 iterative semi-structured interviews Transcription and open coding	**Step 2** **Quantitative data collection:** Online survey 280 participants	**Step 3** **Reporting:** Results Recommendations Future research
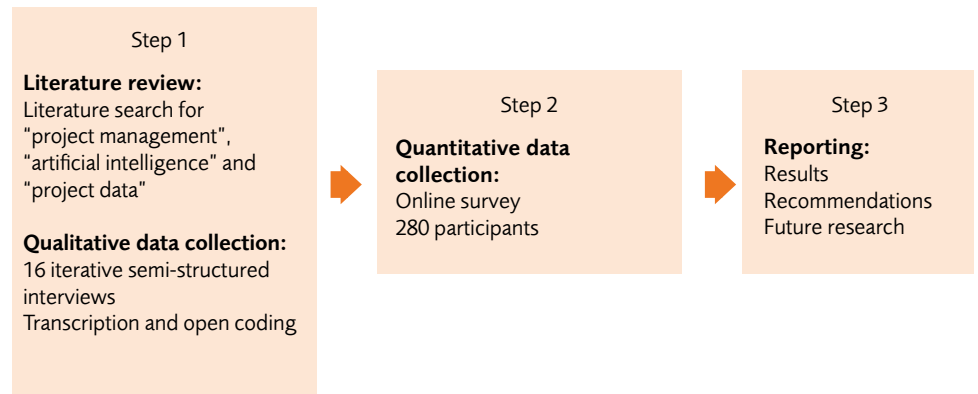
Figure 1: Research process

Why are complex projects important?

Modern society is changing fast and it is suggested that projects will become more complex (Bakhshi *et al.*, 2016). As a result, it is necessary to study new methods of managing projects in complex environments (Daniel and Daniel, 2018). This research study is in response to this need and looks at ways to help project professionals navigate project complexity.

Complex projects can take many forms. Some projects are large and referred to as "megaprojects" (Flyvbjerg, 2014), while other projects are small in scale but very complex. The size of the project does not necessarily affect the level of complexity. A small-scale project can be just as complex as a megaproject and can carry the same risk of failure (Merrow and Nandurdikar, 2018). Research has identified the capacity to share knowledge in project teams as a key factor in absorbing and reducing a project's complexity (Bjorvatn and Wald, 2018). It is significant to acknowledge that the level of complexity is not static and can vary through the project life cycle (Thamhain, 2013).

There is no single definition of complex projects because complexity is subjective and therefore cannot be universal (Maylor *et al.*, 2013). For this report, APM's definition of complexity is used:

"Complexity: relates to the degree of interaction of all the elements that make up a project, programme or portfolio and is dependent on such factors as the level of uncertainty, interaction between stakeholders and degree of innovation." (APM, 2019, p.210)

Summary of literature review

AI in project management is not a new topic for discussion. In 1987 Levitt and Kunz developed a research study called "Using artificial intelligence techniques to support project management", which focused on AI as cognitive support. They suggested that AI techniques could extend the functions of computer-based project management.

More recent research into applying AI techniques to specific project management activities shows positive results. Wauters and Vanhoucke (2016) found AI techniques to be accurate in estimating project duration. Pospieszny *et al*. (2018) showed that AI techniques are highly accurate in estimating effort required in software projects. These examples show how AI can be used to optimise project management tools and techniques. However, very little research has focused on how project professionals perceive AI.

The interest in applying AI to drive business is motivated by innovation. However, some barriers for AI implementation are identified as high short-term investment costs, high risk of long-term return on investment (ROI), lack of trust in the technology, lack of AI experience, and fear of the potential of AI to replace jobs (Cubric, 2020).

The number of publications on the topic of project management and AI has fluctuated since the 1990s, as shown in Figure 2. The number of publications was occasionally high between 2004 and 2011, and was close to those levels in 2020. The rise and fall in publications can be a result of many factors. One factor may be hype, which causes a surge in interest (an 'AI spring') and then when reality doesn't meet expectations there's a decline in interest (or 'AI winter') (Haenlein and Kaplan, 2019; Maclure, 2020). This trend can be seen in the number of publications. In the future, it is suggested that the rise and fall in the interest in AI is likely to be less extreme as the technology matures.

"The rise and fall in the interest in AI is likely to be less extreme as the technology matures"
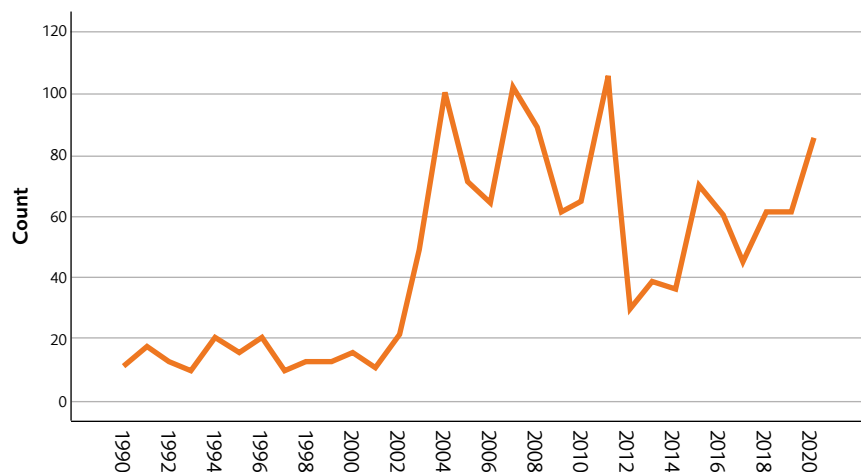

Figure 2: Project management and artificial intelligence publications – Scopus database

Although the number of publications about project management and AI has fluctuated, the publications on "project data" have risen steadily since 1990. This is seen in Figure 3, and the number of publications on this topic highlights the need to understand these concepts further.
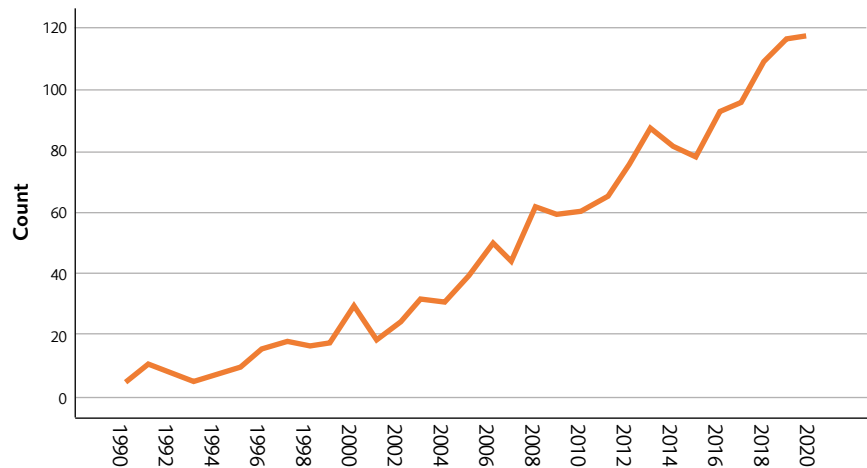
Figure 3: Project data publications – Scopus database

Different types of AI technology

During the interviews with professionals, it became clear that different AI techniques have been developed for different purposes. For example, an AI chatbot can be applicable during the execution phase for communication with project stakeholders. Whereas advanced AI technology, based on machine learning, is suitable for prediction tasks. Deep learning is another set of AI technologies applied to analyse complex data sets. Other problems that do not require machine learning may use less complex AI techniques based on expert systems. This report presents a short introduction to these different AI techniques.

Expert systems
Expert systems is a term used for systems to support decision-making. These systems are stated to store "knowledge from experts". Expert systems typically follow a rule-based approach and generally lack the ability to adapt and learn from previous data (Castillo *et al.*, 2012).

Machine learning
Progress in machine learning is one reason for the recent rise in interest in AI. Machine learning tools are used to identify patterns and relationships in large data sets and are able to 'learn' from this data. A common machine learning tool is 'neural networks', which predict project success (Hsu *et al.*, 2021). Off-the-shelf solutions such as TensorFlow by Google and services by IBM Watson Studio have significantly increased the accessibility of these tools. However, research shows that the practical implementation of AI is often delayed due to managers being uncertain how it can be used in their organisation and the difficulty of reusing AI models for different purposes (Bughin *et al.*, 2017; Cubric, 2020).

Deep learning
As a sub-set of machine learning, deep learning offers a more complex way of analysing data. The 'black box' phenomenon is often used to describe the difficulty in interpreting the reasons behind the output of deep learning models (Goodfellow *et al.*, 2016).

AI definition

With different types of AI technologies, there is a possibility of professionals having different interpretations of AI. This report does not imply computers can think, feel or act as humans do. Instead, it takes a perspective that computers can optimise certain tasks, which can be perceived to be performed in an intelligent way. The following definition of AI in project management is used:

"Artificial intelligence – this refers to the study of 'intelligent agents', autonomous non-human entities that can take in information from their environment and act upon their environment in a way that enables them to succeed in their goals. Intelligent agents need to have mastered machine learning and aspects of predictive data analytics in order to be able to do this. In a project context, some people have speculated that an intelligent agent could enhance or change the roles and status of many project professionals." (Brookes *et al*., 2020)

Report findings

The research team interviewed 16 individuals with experience of AI. A survey was developed based on the interviews and was completed by more than 280 project professionals. The semi-structured interviews were analysed using open coding and key quotes from the interviews are presented in the findings section. The results include interview quotes, and the most significant survey findings are presented in tables.

Survey demographics

The survey participants came from a range of industry backgrounds, and the gender distribution was 66% male and 34% female. The biggest groups of participants were in the 'business, finance and consultancy' (22%) and 'IT, technology and telecoms' (26%) sectors. A majority (70%) of the professionals who completed the survey were currently based in the UK and Europe and most were aged between 18 and 49. The years of project experience was 27% for both 'less than 2 years' and 'more than 5 years' categories. Most of the survey participants had less than 5 years' project experience. This could mean the participants do not have in-depth experience of some project areas. However, the research team considered this during the data analysis, and this should also be considered by the reader when interpreting the research data.

> "Most of the participants had less than 5 years' project experience. This could mean they do not have in-depth experience of some project areas"
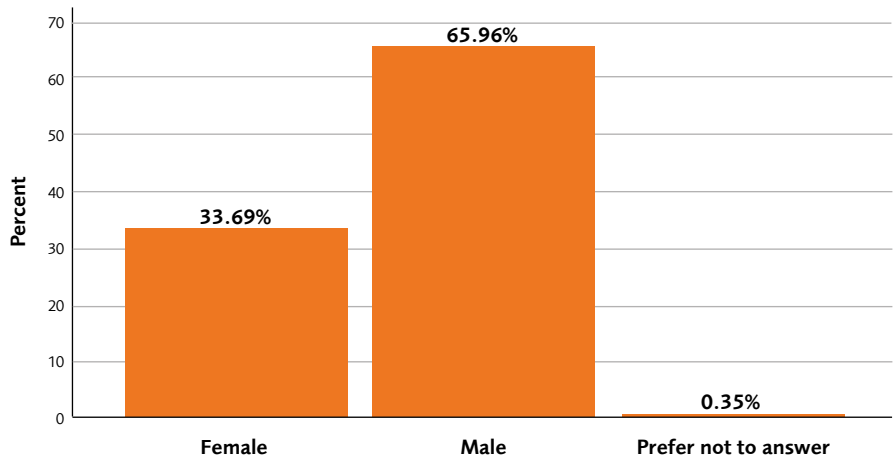
Table 1: Gender distribution

Legend:
- Aerospace, defence and security
- Business, finance and consultancy
- Construction, manufacturing and transport
- Education and training
- Government and non-profit
- Healthcare
- Hospitality, leisure, food and drink
- IT, technology and telecoms
- Public and private services
- Other

Pie chart values: 4%, 22%, 12%, 7%, 3%, 6%, 6%, 26%, 5%, 8%
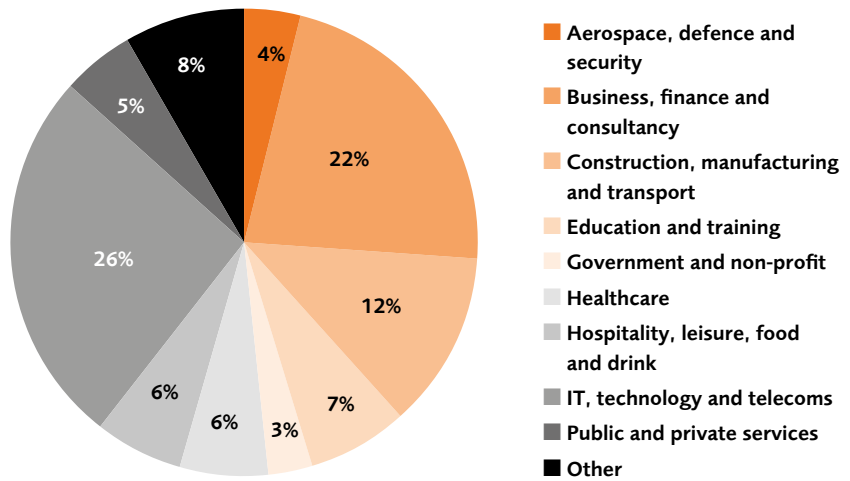
Table 2: Industry background

Bar chart (Percent):
- UK and Europe: 70%
- North America: 18%
- South America: 3%
- Africa: 2%
- Asia: 6%
- Australia and Oceania: 1%
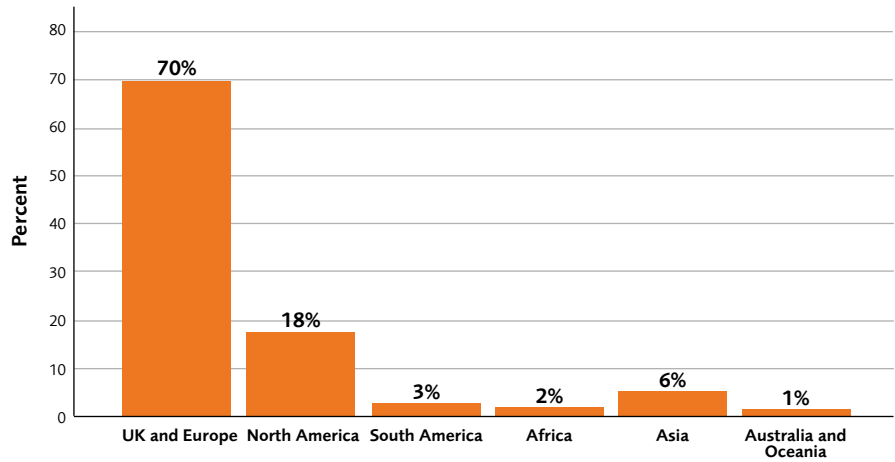
Table 3: Current location

Bar chart (Percent):
- 18-34: 47%
- 35-49: 40%
- 50-69: 13%
- 70+: <1%

Table 4: Age group

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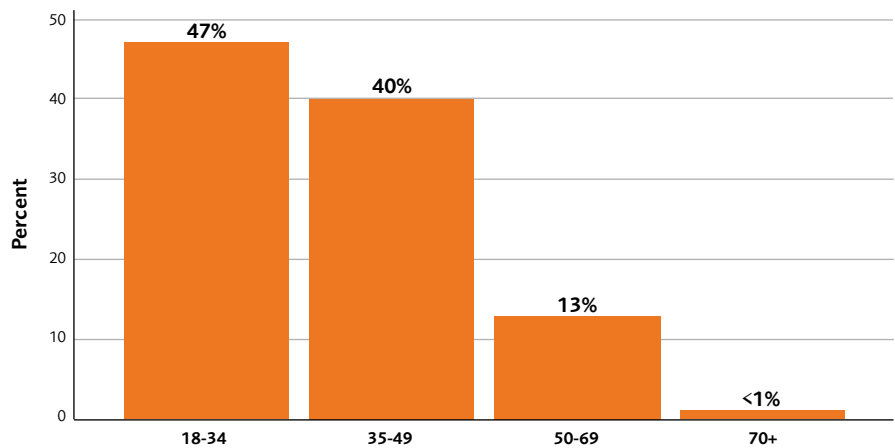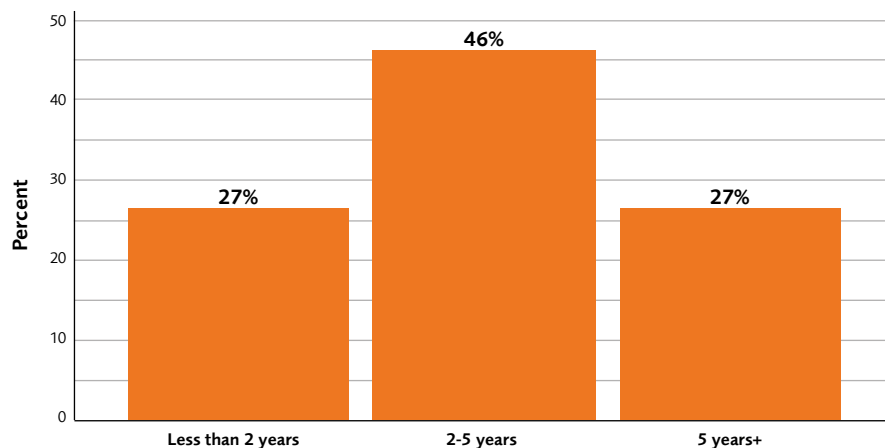
Table 5: Years of project-related experience

AI and complex projects

When interviewing professionals, a common theme was that AI does not seem to be applied equally in all types of projects. Some interviewees said that simple projects may not get as much out of AI as complex projects with large data sets. Since organisations have limited resources, complex projects are more likely than simple projects to get AI resources to assist in project delivery. One interviewee said:

"Unfortunately we cannot use AI for all our projects; we have to select the projects which will get the most out of AI. It seems that our large and complex projects are more likely to benefit from AI than our less complex and simple projects."

The significance of AI in complex projects was confirmed in the survey and project professionals who took part believe complex projects are more likely to benefit from AI compared with a simple project. A total of 96% of project professionals stated complex projects are likely to benefit from AI compared with a simple project (see Table 6). Additionally, a clear majority of the survey participants stated a complex project is more likely to fail than a simple project (see Table 7).

These findings indicate the perceived usefulness of AI is high in complex projects. They also indicate that the usefulness of AI rises as the level of complexity increases. This can help professionals justify the decision to focus on using AI for the most high-profile complex projects rather than on all projects in a portfolio.
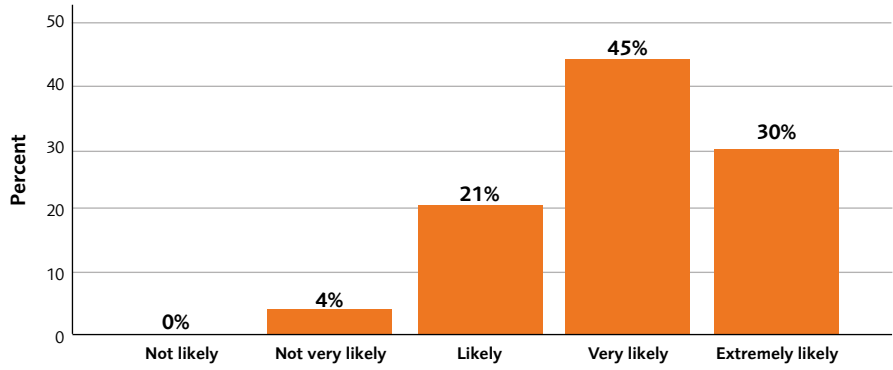
Table 6: How likely is a complex project to benefit from AI compared with a simple project?
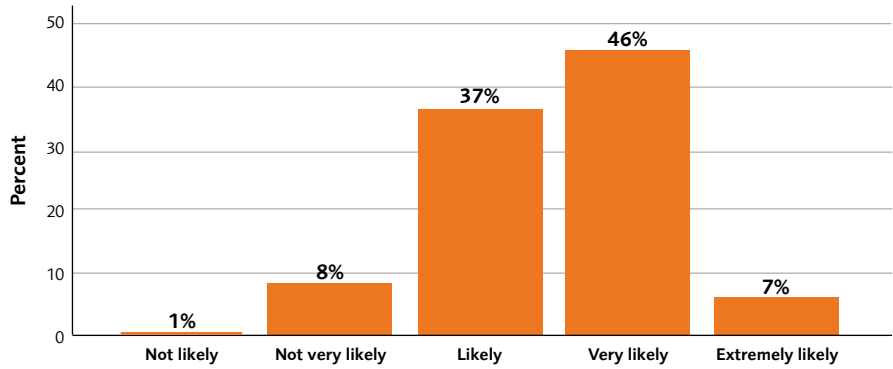

Table 7: How likely is a complex project to fail compared with a simple project?

AI for analysing project data

It emerged from the interviews that project professionals think AI can be useful when analysing large data sets and that AI can decrease the level of complex decision-making. The following citation explains this:

"If we have data and the tools to analyse the data then in theory some of our complex decision-making with large data sets can be reduced and simplified."

The use of data in projects also includes the challenge of efficient data management processes. Since AI is highly dependent on the available data, the difficulty in using data in projects indicates there is a low ease of use for AI. This is partly a result of the difficulty of reusing the same data sets and AI models for different problems. The interviewees repeated the fact that AI is only useful if the project data is fit for purpose. The significance of project data was expressed through the following citations:

"The expression of 'garbage in, garbage out' is very relevant. We [the organisation] are struggling to manage our data the right way and when we don't have data that is fit for purpose the AI output will reflect that."

"We use AI to analyse large sets of project data, which we otherwise would not have the time and resources to analyse. We find AI to be very beneficial for our projects."

When asked how likely they would be to use AI to analyse large volumes of data in complex projects to improve decision-making, 27% of survey respondents stated that they are extremely likely to do so (see Table 8).

> "The interviewees repeated the fact that AI is only useful if the project data is fit for purpose"
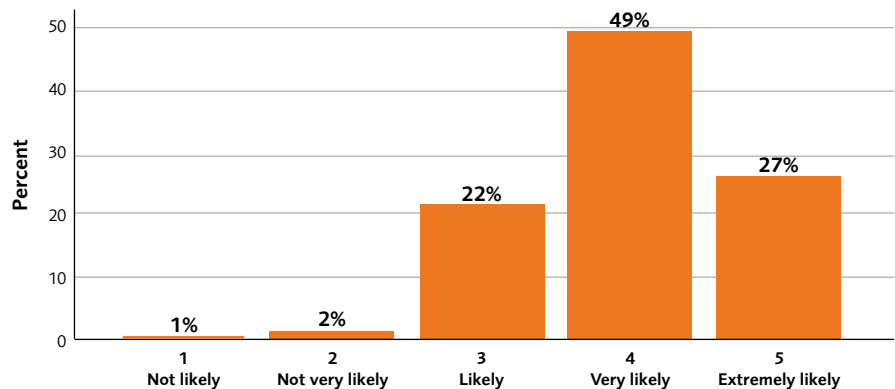
Table 8: How likely would you [be to] use artificial intelligence to help analyse large volumes of data in complex projects to improve decision-making?

Need for AI training

The lack of training in how to use AI in complex projects was a common theme from the interviews. One interviewee explained their knowledge of AI was primarily self-taught. This was expressed in the following way:

"Most of my knowledge in this area is self-taught. I have a personal interest in this field and some background in programming, but without training from my organisation it has been challenging to understand how we can use these methods to benefit the company."

The findings clearly show that project professionals feel that AI training is important, with 96% of survey respondents ranking it between important and extremely important (see Table 9). Most

project professionals surveyed said they have received insufficient AI-related training. Only a relatively small percentage of project professionals, 12%, said they had received adequate training in using AI technology in complex projects (see Table 10). More specifically, in the 35-49 age group, 33% had received no training. This can be compared with 42% of the older age group of 50-69 years. It is important for the project profession to aim for similar training opportunities for all age groups. The report findings also identified a difference in AI training dependent on industry; 38% of the participants from the IT sector had received no training in AI compared with 24% of the participants from construction, manufacturing and transport. A gap in AI training between the age groups and project industries could lead to a growing gap in AI knowledge, which would not be beneficial for the project profession.

In the previous section, the findings indicated that the ease of use for AI in projects is low due to the difficulty in managing data. Here, the low ease of use of AI is confirmed through the perceived need and importance of AI training. To leverage the potential benefits offered by AI it is important to overcome the difficulties of applying AI in projects. Through training in AI-related areas, professionals may increase their understanding of AI and increase the ease of use for AI in projects.
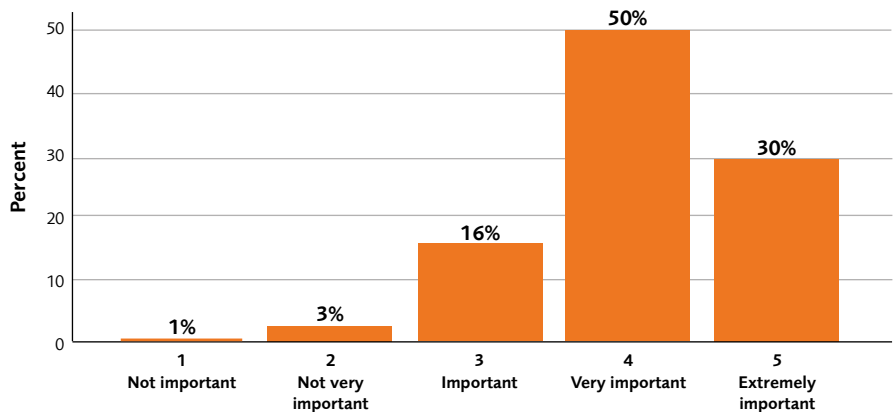

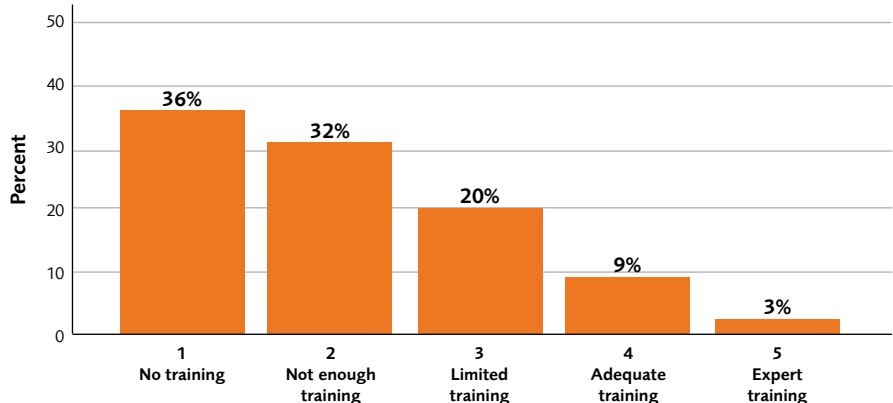*Table 9: How important is AI training when using AI in complex projects?*

Table 10: How much training have you received to use AI in complex projects?

AI across the project life cycle

This report shows that some professionals use AI for project scheduling and planning, which previous research has demonstrated to be a well-established practice (Montoya-Torres *et al*., 2010; Pellerin and Perrier, 2019). However, the use of AI in other phases and project activities is not as well documented. The use of AI through different project phases was explained by one of the interviewees through the following citation:

"We are able to use AI predictions for different phases of a project, for example project scheduling, and our system indicates if a project is not performing according to plan. So actually we can say we use AI for planning and monitoring our projects, but I also think we could expand this and use AI during the last phases of a project. There is potential for AI to provide insights for lessons learned."

Looking at the survey findings, project professionals stated they are most likely to use AI to monitor and control activities during the deployment and execution phase (65%). Whereas 17% stated they were more likely to use it in the 'definition and planning' stage and 15% for 'transition/closure' (see Table 11, which shows answers from all age groups in the survey).

"Project professionals stated they are most likely to use AI to monitor and control activities during the deployment and execution phase"
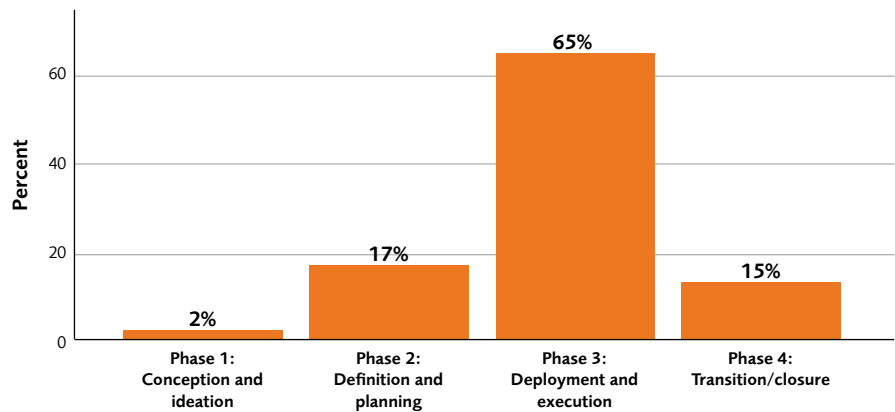
Table 11: In which project phase would you most likely use AI?

The survey found some significant differences depending on the age demographic. In the 50-69 age group, 28% of the professionals stated that they would be most likely to use AI during the definition and planning phase. This is a significant difference to the 17% representing all participants in Table 11. Additionally, 8% of the 50-69 age group said they would use AI in the transition/closure project phase compared with 20% among 25 to 49 year olds. The reasons for these differences were not studied, but this shows that different backgrounds can influence the understanding and the need for AI during different phases of the project life cycle.

Elements of AI in projects

During the interviews, the research team identified central elements of AI that were significant for the interviewees. These include that AI is useful for decision-making, speech and language recognition, learning new project insights, planning and problem solving. One of the interviewees expressed this in the following way:

"Depending on what the objective is for using the AI model, there can be different elements of AI which are more preferred than others, but overall, my experience tells me AI can enhance decision-making, assist with speech and language processing, help us learn new insights. Essentially, AI can make a project plan more reliable, and essentially helps us solve problems."

AI can be used to enhance communication through speech and language recognition. One interviewee described how an AI chat bot was used to give project updates and provide information to project team members without interaction with the project manager. The following citation explains this:

"We have started to use speech and language recognition through a chat bot which works as a communication hub where all project team members can receive updates and information straight from the chat bot instead of from the project manager."

When asked their preferred element when using AI, 38% of survey participants chose planning (see Table 12). These findings demonstrate that AI can have multiple functions and can be applied differently depending on the specific project.
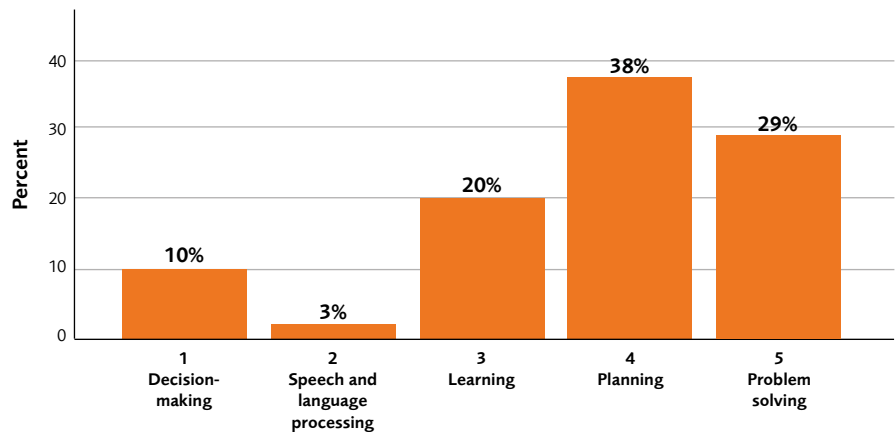

Table 12: What is your preferred element of AI?

AI's impact on project professionals

A common topic when discussing AI is the potential future scenario of AI replacing professionals in their work through automating specific tasks. However, the interviewees stated the argument for AI replacing project professionals is taken out of context and blown out of proportion. The following interview citation is used to describe this:

"Some professionals that only perform repetitive tasks may become redundant, but these affected individuals have potential to upskill and the automated tasks will free up time and enable us to focus on delivering projects more successfully."

"With the right AI skillset, professionals may perceive the proposed change in the role of project managers as an opportunity"

The survey asked how likely AI is to change the role of project managers. Table 13 demonstrates that most professionals believe AI is likely to change the role of project managers and 24% stated this is extremely likely to happen. Further to earlier findings of the need for AI training, it is important to enable project professionals to build necessary AI skills. With the right AI skillset, professionals may perceive the proposed change in the role of project managers as an opportunity. Additionally according to the survey, professionals believe AI is likely to become an important tool for project managers (see Table 14). Therefore it becomes critical for project professionals to understand how to use AI most effectively.

The survey asked what type of projects and project industry are likely to benefit from AI the most (see Table 15). The professionals stated that IT projects are likely to benefit from AI the most. This is an indication that IT project professionals are most likely to utilise the benefits of AI during project delivery.

The report findings suggest that AI will change the role of project professionals. Studying any specific changes was outside the scope of this report. However, the key opportunity of AI seems to be within its analytical capabilities, whereas the automation of project tasks is an opportunity to free up time and to enhance project delivery.
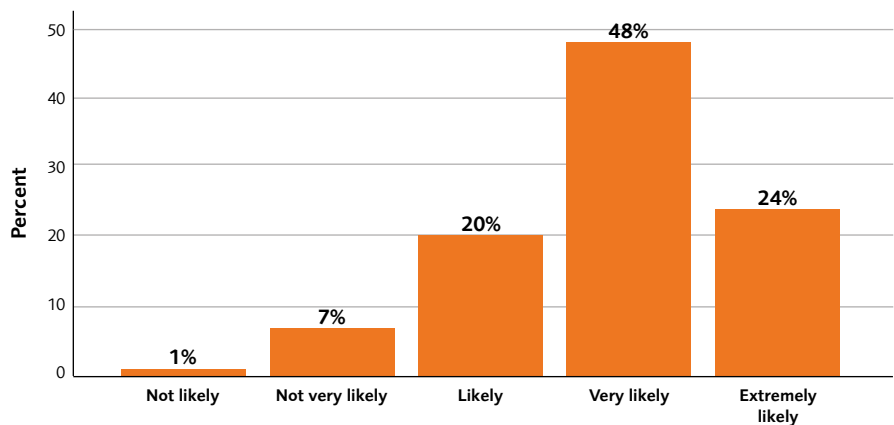

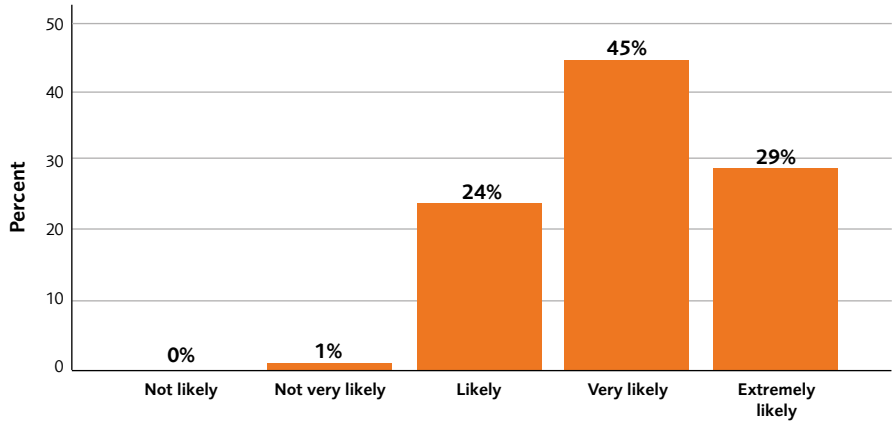*Table 13: How likely is AI to change the role of project managers?*

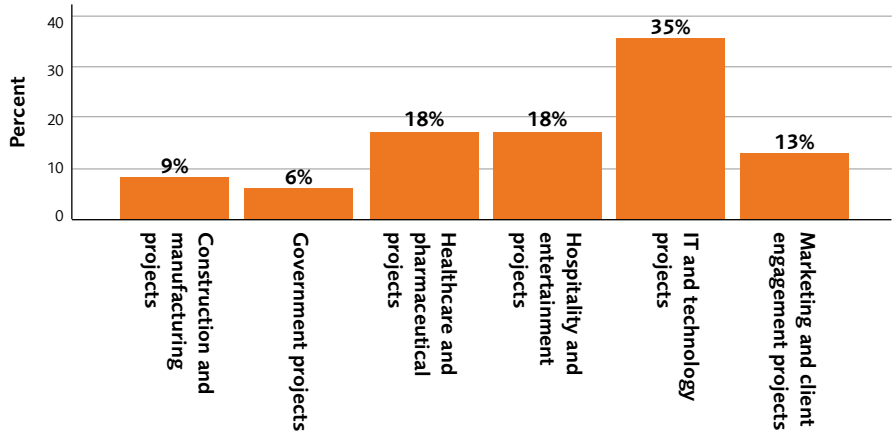*Table 14: How likely is it that AI will become an important tool for project managers?*

Table 15: What type of projects do you think will benefit from AI the most?

Opportunities and challenges

The report findings indicate both opportunities and challenges for the project profession when using AI. Five key opportunities and challenges are presented:

AI training

Our research found that the number of project professionals that have received training in AI is significantly low, yet the demand for AI skilled individuals is high. This is an important finding since a large majority of the survey participants stated training in AI is important in order to use it for projects. The report found project organisations are not providing training in AI at a sufficient level. However, organisations that provide good AI training will reap the rewards of having AI-skilled individuals on their projects.

Various degrees of AI understanding

As a novel area in project management, the report found that the understanding of AI varied among participants. At the moment many project professionals have a limited understanding of how AI can be used in projects, so developing expertise in AI will give professionals and their organisations significant advantages and opportunities.

High degree of AI novelty

Our interviews with project professionals showed that AI is still unproven in many project sectors and real-life case studies of AI used by project professionals are scarce. This means that sharing successful case studies of AI in project management is difficult. However, this creates opportunities for businesses that are successful in this field to take a leading role and outperform competitors.

Ambiguity of the impact of AI on the project profession

The report found that project professionals believe AI will impact the role of project managers. Although project managers believe AI will impact the project profession, there is some ambiguity in what the consequences of this impact will be. To study the specific consequences of this change was outside the scope of this report and it is suggested that this be explored in future research. However, the challenge to reduce this ambiguity includes to build the necessary skills and clearly communicate changes in project processes that will affect how professionals work. If employers successfully communicate the change and impact AI will have on professionals' project roles, organisations have an opportunity to build a trustworthy workplace and support professionals when exploring this novel technology.

AI ease of use could be improved

At the moment professionals state that using AI is a challenge because it's not easy to use. This becomes a barrier for implementation and can slow down the overall adoption of AI in the project profession. Some of the challenges of AI are inherently difficult to change, such as reusing data and AI models for different problems. However, this becomes an opportunity for early adopters to explore how to improve AI's ease of use.

Key findings

Six key findings from the research:
- ■ **AI enhances decision-making in projects**
- ■ **AI supports problem-solving functions**
- ■ **AI is most likely to be used during project planning**
- ■ **AI improves efficiency when analysing large volumes of data in projects**
- ■ **AI has the potential to increase project success and mitigate project failure**
- ■ **There is a positive correlation between the level of project complexity and the perceived usefulness of AI**

Enhances decision-making in projects

When interviewing project professionals it became evident that AI does not find the correct answer to problems every time. However, when used in an efficient way, professionals suggest AI can enhance the decision-making process in projects and the survey participants cited 'decision-making' as one of the most beneficial elements of AI.

Supports problem-solving functions

The survey found a key benefit of using AI in projects is to support problem-solving functions. This can be done through analysing large sets of data and to identify potential solutions when problems arise. One professional expresses this the following way: "We often get behind schedule, and we then need to manage and reassess our resources. Using the AI predictions can help us manage our resources better."

Most likely to be used during project planning

The report identified that professionals are most likely to use AI for planning. The analytical capabilities of AI can improve planning activities, and with its efficient data management an AI tool can be highly beneficial for project professionals.

Improves efficiency when analysing large volumes of data in projects

We humans are limited in our cognitive abilities and most of us have difficulty processing large sets of information from multiple sources. Professionals stated in the survey that AI is an important tool when analysing large sets of data.

Has the potential to increase project success and mitigate project failure

The findings stated professionals believe AI has the potential to increase project success and reduce project failure. This is also a result from the previously mentioned benefits of improved decision-making, problem solving, project planning and analysis of large data sets.

There is a positive correlation between the level of project complexity and the perceived usefulness of AI

"Complex projects consist of many unknowns ... Using AI technology reduces some of our unknowns"

The survey found that professionals believe complex projects benefit more from AI than simple projects do. This indicates that there is a positive correlation between project complexity and the perceived usefulness of AI. Additionally, during our interviews we found examples of professionals who preferred to use AI for complex projects rather than other projects. The following interview citation is an example of professionals' reasoning: "Complex projects consist of many unknowns, and the unknowns are increasing in our projects. We can see that using AI technology reduces some of our unknowns. For a simple project, we do not see the same need for AI."

Suggestions for project professionals and organisations

This report outlines the benefits, opportunities and challenges of using AI in project management. Below are five key suggestions for project professionals and organisations that aim to use AI for projects:

1. Offer AI training
As a main suggestion, project organisations need to make training in AI more available for professionals. It is key for organisations' senior management to focus on increasing professionals' AI skills.

2. Create a 'why' for using AI
Currently, understanding of AI varies among professionals. To use AI successfully it is crucial for project organisations to justify why this technology is necessary through an organisational 'why'. This will set the correct expectations and create a common purpose for using this technology.

3. Define a clear AI problem formulation
Our research shows that AI can benefit decision-making and support problem-solving functions. To enable this, it is important for professionals to be specific in 'how' to use AI. We suggest professionals and organisations should articulate a clear problem formulation for the objective of using AI. A clear problem formulation will enable better use of resources for data management and identify suitable AI techniques for solving specific problems.

4. Develop effective data management processes
Having suitable data is crucial for effective AI. To adopt and implement AI, project organisations need to establish sufficient data management processes. This may include sharing data between internal project teams, managing historical project data and using external project databases.

5. Create an open learning AI environment
Project professionals do not find AI easy to use and project organisations should aim to make AI more accessible. To achieve this, organisations should create an open and inviting learning environment where learning about AI is encouraged across the whole organisation.

"The report's findings indicate that it is likely that the use of AI will increase over time"

In summary, this research provides insights into the critical conversation about the role of AI technology in project management. For the individual project professional, the current low use of AI in projects opens up opportunities to get ahead of the competition and gain valuable skills before the technology becomes widespread. The report's findings indicate that it is likely that the use of AI will increase over time as AI training is offered to professionals and AI technology becomes more widely available. The professionals that recognise its opportunities and potential early on are likely to be the ones that demonstrate its increasing value and implement its use for positive project outcomes.

Discussion and future research recommendations

This report was initiated through an interest in understanding the perception of AI among project professionals. The research team used interviews to understand common themes and explored these more specifically through a survey. The report contributes to the discussion with specific recommendations for future research.

1. Present specific cases of AI and project management

During the development of this report, it became clear that the project community lacks practical examples of how AI can be implemented and used in projects. Using case studies from specific project industries will spread best practice and inform the project community of avoidable pitfalls when using AI.

2. Explore possible frameworks and best practices for AI implementation

The research team discussed AI in project management in different settings of industry and academia, and found that interest in AI is high. However, the survey found that experience of using this technology is generally low. The project community does not lack enthusiasm for AI, but overall is short of experience in how to implement it. It is recommended to explore possible frameworks and best practices for professionals to adopt which will ease the implementation of AI in projects.

3. Study how project professionals' roles will be impacted by AI

It is necessary to understand the future change in project professionals' roles when using AI. This may include professionals requiring new skills to harness the potential of data, but also new ways of working and new processes when using AI.

4. Discover how project professionals can use AI for more than project planning

The survey found that project professionals prefer using the AI element of project planning. However, during the interviews the research team was able to ask further questions on this topic and found examples of AI chat bots being used to receive project updates and for communicating between project stakeholders. The report suggests further study of project areas beyond planning where AI can be applied.

Considerations

Studying the emerging field of AI in a dynamic setting such as project management brings challenges. Demonstrating these challenges provides transparency to the research. The research team interviewed project professionals with a certain level of interest in the topic of AI. This is appropriate and follows a sampling technique known as targeted sampling, where research participants with a certain background are chosen to be included in the study (Merriam and Tisdell, 2015). This is aligned within emerging research fields where participants with relevant knowledge are specifically chosen for a study (Myers, 2019). It is worth noting that this approach has limitations as participants can be biased and have a certain degree of self-interest. Another limitation with this technique is that the research participants do not represent the whole project profession (Saunders *et al*., 2015). These challenges were mitigated by the research team through being cautious during the data analysis and considering pre-existing assumptions among the participants when interpreting the research data.

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Appendix A: Ethical approval

Our researchers received ethical approval from the University of Southampton Ethics Committee to conduct interviews [Reference Number: ERGO II 53466]. During the submission process, the research team provided measures to handle sensitive data and personal information. The qualitative interviews included a consent form which was signed by both parties. All information from the participants was anonymous and stored according to data protection regulations. The interview participants had the option to be removed from the research at any time without any explanation required. The survey was anonymous and did not collect any personal information.

Appendix B: Interview demographics

The tables represent the interview participants' demographic. In total 16 interviews were held.

Years of project management experience	
2–5 years	3
5–10 years	2
10–15 years	3
15–25 years	3
25+ years	5

Table 16

Gender	
Female	2
Male	14

Table 17

Role in recent project	
Project manager	4
Member of the project delivery team	4
Project sponsor	3
Project stakeholder	1
Other	4

Table 18

Age group	
25–34 years	2
35–44 years	3
45–54 years	4
55–64 years	3
65+ years	4

Table 19

Industry background	
Business/management	6
Construction	6
Education/academia	2
IT	1
Other	1

Table 20

Project management organisation	
Association for Project Management	10
Other (PMI, Prince 2, etc)	6

Table 21

Association for Project Management

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