ARTIFICIAL INTELLIGENCE IN THE CONSTRUCTION INDUSTRY: ADOPTION,BENEFITS AND RISKS

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BACKGROUND

- Construction sector is key to acquire data
- Construction started to adopt AI

- AI artefacts are not neutral as they are created by humans
- Privacy and Ethics scaling up inequalities

- Literature review on construction mainly focused on AI applications, benefits and trends
- Lack of studies on risks

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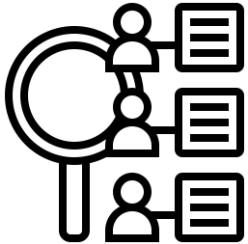
RESEARCH AIM AND RESEARCH QUESTIONS

Better understand the needs of the construction community in terms of AI by **increasing awareness** among academics and professionals on the implementation of AI in the construction sector and the related implications.

To prevent incidents and work towards the solution of potential challenges.

- Which is the current level of adoption of AI in the most advanced construction practices?
- Which are the main perceived benefits in using AI in advanced construction practices?
- Which are the main perceived risks in using AI in advanced construction practices?

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METHODOLOGY

Literature Review
on AI application in Construction

Online Survey (105 professionals in digitally advanced companies)
to investigate adoption, benefits and risks

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RESULTS: LITERATURE REVIEW

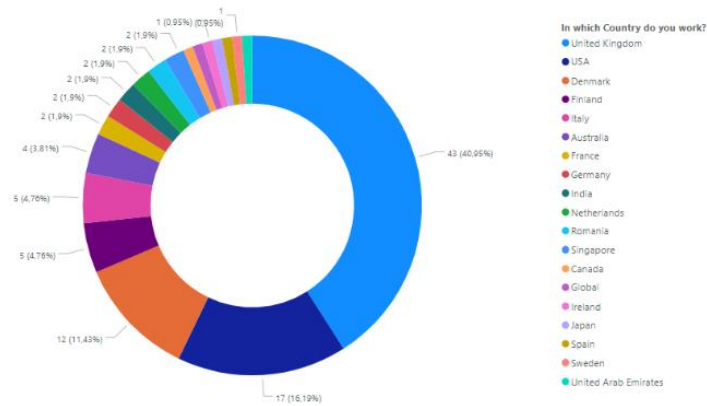AI to strengthen the industry's performances

Main Applications:

- reality capture (Scan-To-BIM) process
- recognition of the reinforced concrete's failures
- generative design
- process track
- autonomous vehicles and robots
- process optimization
- process management knowledge capture

- Most of the examples of AI in construction still deal with R&D projects

- Literature lacks case studies on the application of AI in industry where benefits have been measured and risks have been discussed
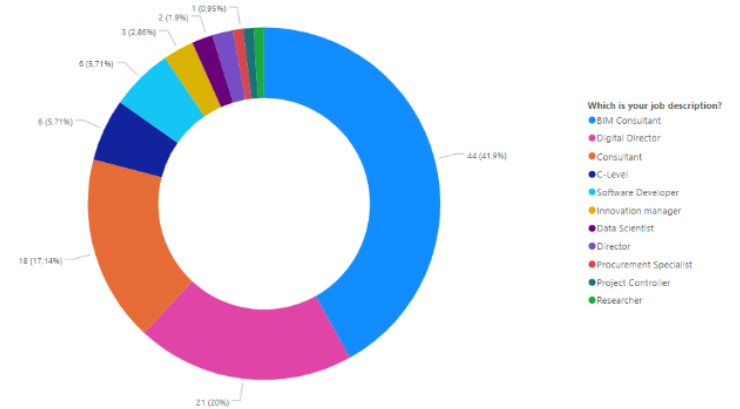
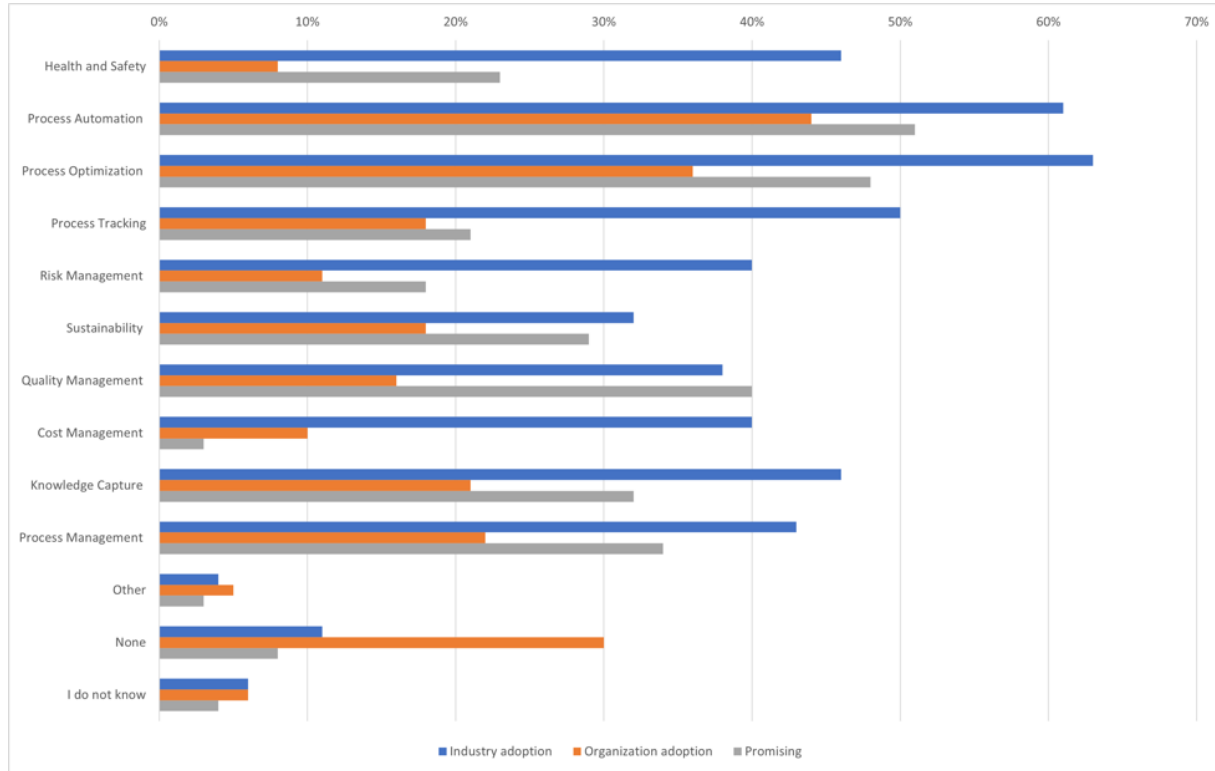Bolpagni, Bartoletti and Cirbini (2021), Artificial Intelligence in the Construction Industry: Adoption, Benefits and Risks

Data set

Country

In which Country do you work?
- United Kingdom
- USA
- Denmark
- Finland
- Italy
- Australia
- France
- Germany
- India
- Netherlands
- Romania
- Singapore
- Canada
- Global
- Ireland
- Japan
- Spain
- Sweden
- United Arab Emirates

Job Description

Which is your job description?
- BIM Consultant
- Digital Director
- Consultant
- C-Level
- Software Developer
- Innovation manager
- Data Scientist
- Director
- Procurement Specialist
- Project Controller
- Researcher

RESULTS: INDUSTRY ADOPTION, COMPANIES ADOPTION AND PROMISING AREAS

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Perception of AI adoption in construction
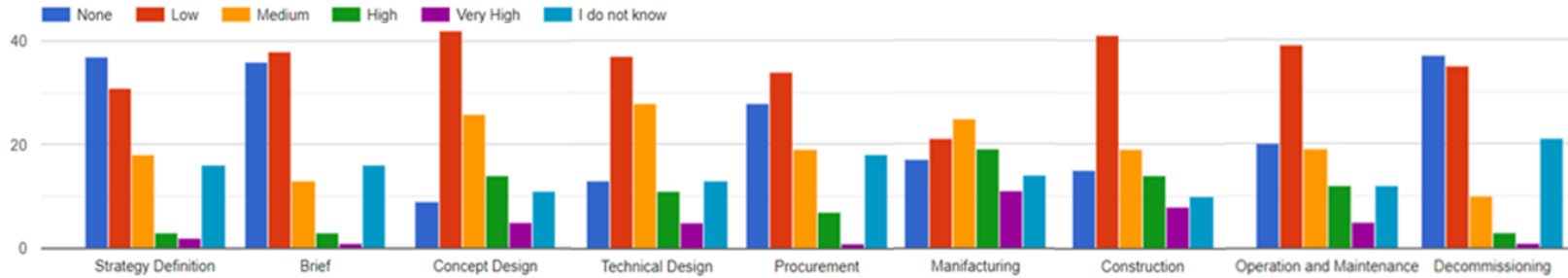
Actual adoption AI adoption in construction

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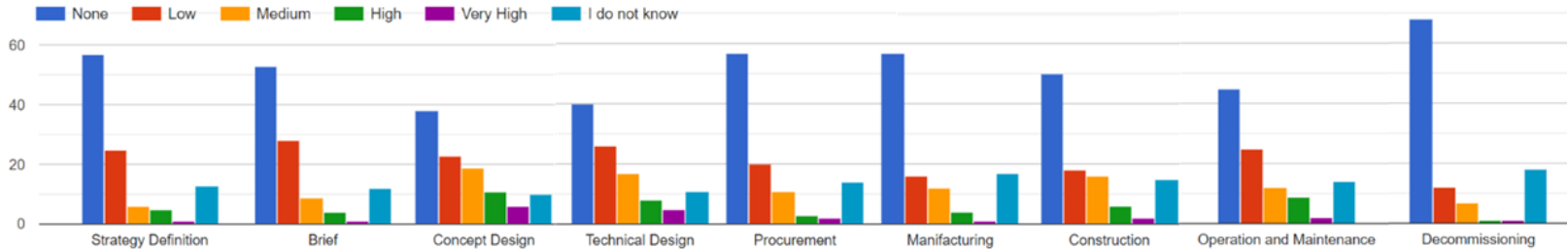
RESULTS: BENEFITS IN USING AI IN CONSTRUCTION

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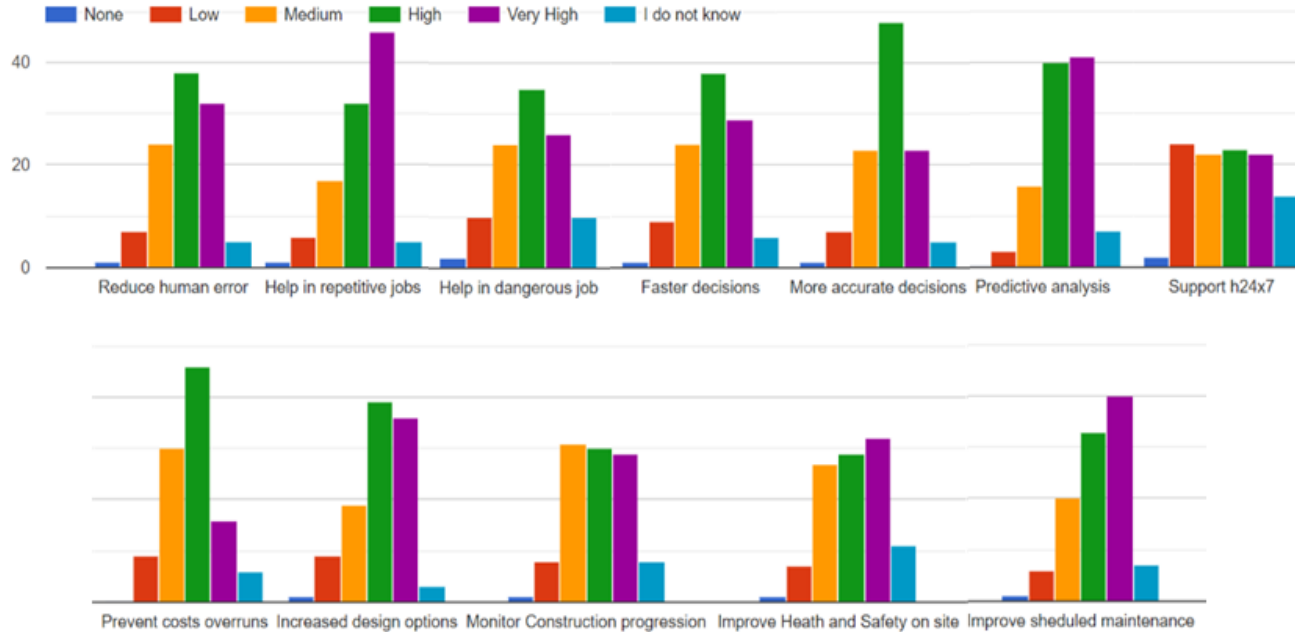
RESULTS: RISKS IN USING AI IN CONSTRUCTION

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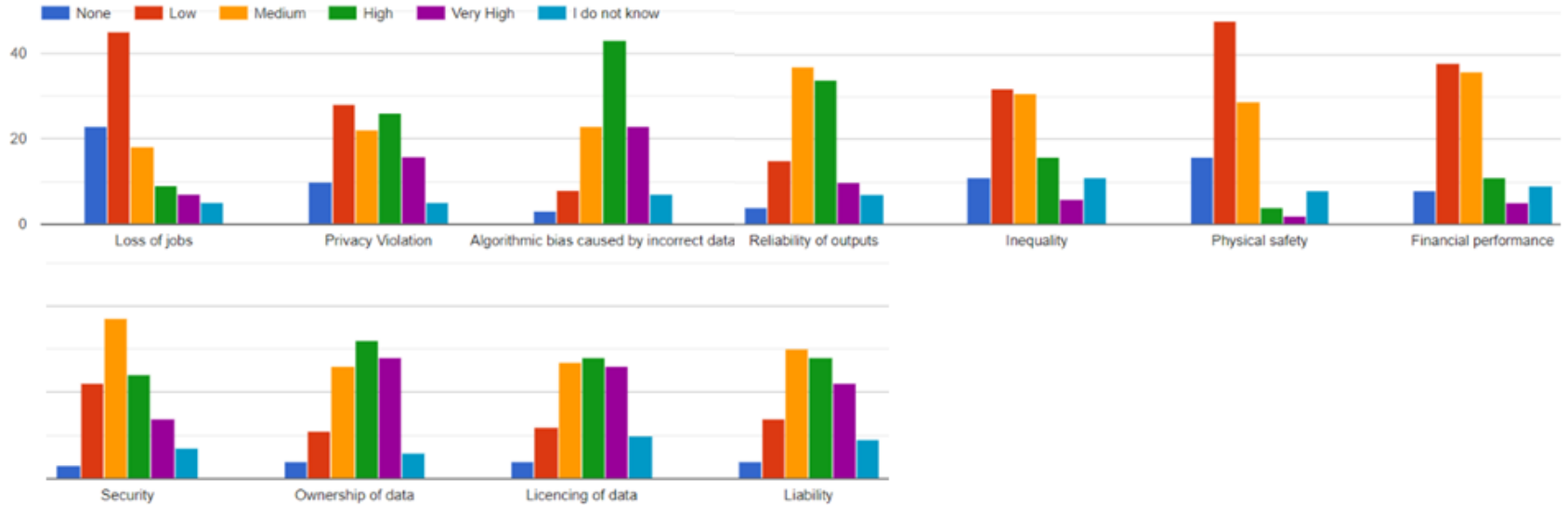
DISCUSSION

- Application is still limited.

- Professionals believe that the industry is more advanced that their actual companies.

- The areas of application are aligned with the ones identified in the literature review.

- Most applications of AI are mostly during **design** and they deal with **process automation** and **process optimization**.

- Implementation of **own products** by having a dedicated team and the main application of AI is currently **Machine Learning**.

- Benefits aligned with Literature review, addition of few aspects including the implementation in bidding.

- Risks aligned with the ones identified in other sectors such as **privacy violation, equality vs monopoly, cybersecurity and ethical aspects** such as algorithmic bias. Those risks were not previously highlighted in the literature related to the construction sector.

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CONCLUSION AND NEXT STEPS

- Despite the adoption in the industry is still limited, even in the most advanced construction practiced, **professionals would like to invest in such technology** to mainly improve their **productivity** and manage **sustainability** aspects.
- Other hand, practitioners have identified **several areas of risks** that should be addresses by policy makers.
- Constructions is where the **barriers between digital and physical are becoming increasingly blurred**, and it where the boundary between public and public spaces is fading.
- The construction sector cannot absolve itself from considerations about risks in AI.
- Nevertheless, the sector must **understand and embrace the concept of ethics and impact of AI** as it plays a crucial role in shaping the norms around the way we live and interact with each other.
- Need to establish a **framework to measure risks**.

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