From Motivation to Implementation: Exploring Practitioners' Perceptions of Artificial Intelligence in Danish Environmental Assessment Practice

Simone Rosenmaier Filipsen
Environmental Management and Sustainability Science
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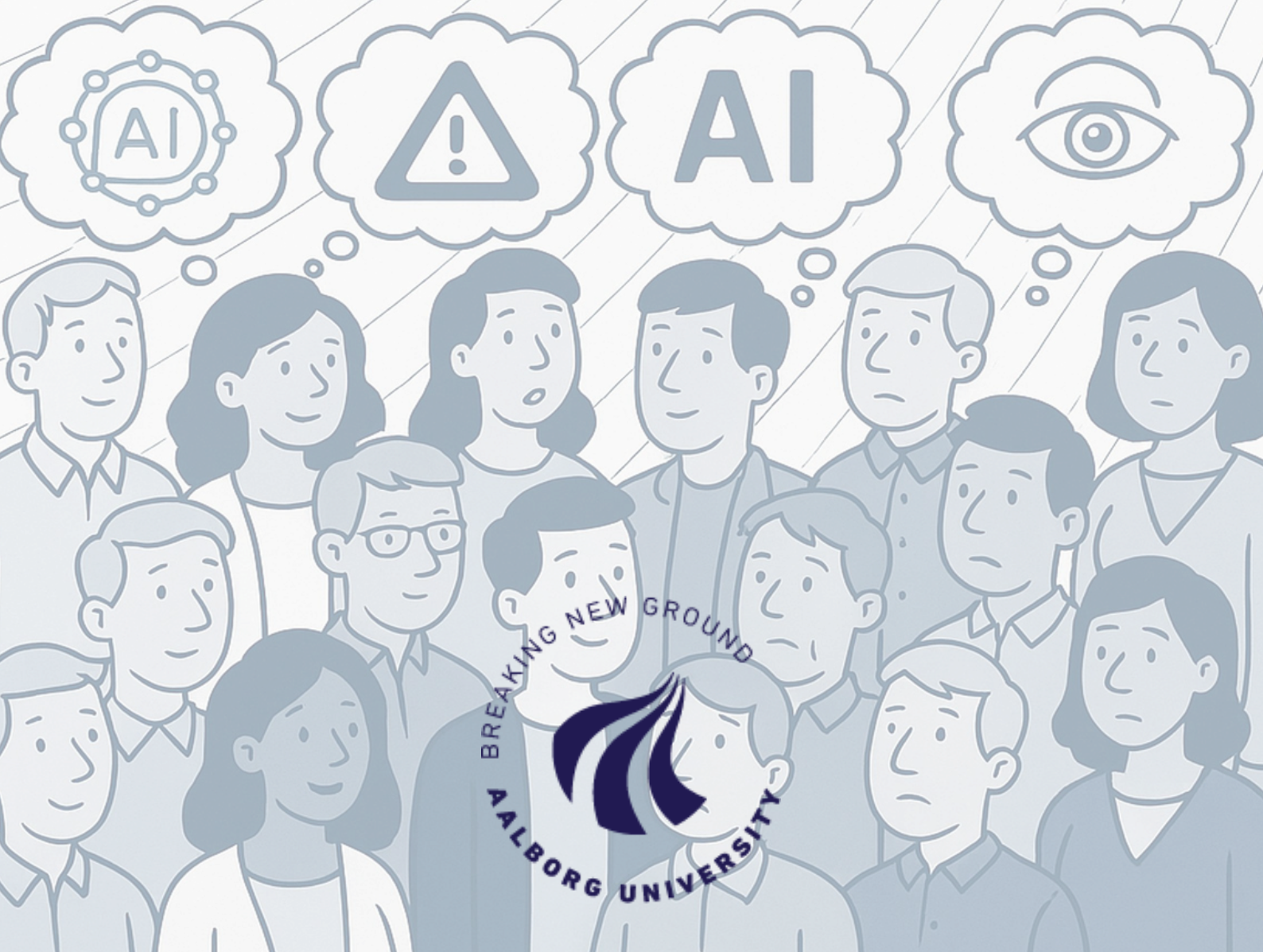
Master's Thesis



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Abstract:

Environmental Assessment (EA) practice is increasingly shaped by global pressures, including sustainability transitions and digital innovation. Among emerging technologies, artificial intelligence (AI) has gained attention due to its potential to enhance efficiency and analytical capabilities in EA processes. Although current research outlines promising opportunities for AI in EA practice, its application in practice remains limited. Therefore, this study explores Danish practitioners' perceptions of opportunities and barriers shaping their motivation to implement AI into EA practice. Drawing on the theoretical framework, 'spaces for practice', this research is based on 19 semi-structured interviews with Danish practitioners, including consultants, authorities and developers. The results reveal a strong motivation to explore AI, driven by the potential to streamline repetitive tasks, improve report consistency, and facilitate knowledge sharing. However, this motivation is restricted by significant barriers, including limited knowledge, lack of guidelines and methodologies, concerns about data reliability, and organisational limitations. Furthermore, practitioners often defer responsibility for initiating change, indicating a need for collective action and clearer frameworks. While the motivation for AI in EA practice is strong, the findings underscore that conditions such as institutional support, shared standards, and transparent collaboration are crucial to transforming this motivation into practice. The research concludes that AI's future role in EA practice relies not only on its technical capabilities but also on the social and structural context that shapes practitioners' ability to implement AI.

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Fra motivation til implementering: En undersøgelse af praktikeres opfattelser af kunstig intelligens i dansk miljøvurderingspraksis

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Resumé

Miljøvurderinger er et centralt værktøj i planlægning og sikrer at miljøhensyn inddrages i beslutningsprocesser. I takt med at globale forandringer som klimaudfordringer, bæredygtighedsagendaer, og med den teknologiske udvikling, er der opstået et behov for at gentænke og udvikle miljøvurderingspraksis. En teknologi, der har vakt særlig interesse i denne sammenhæng, er kunstig intelligens (AI), som rummer potentiale for at effektivisere miljøvurderingsprocesser, håndtere store datamængder og bidrage til mere kvalificerede vurderinger. På trods af dette store potentiale, er anvendelsen af AI i miljøvurderingspraksis dog stadig begrænset. Derfor undersøger dette speciale, hvordan danske miljøvurderingspraktikere forholder sig til AI, og hvilke muligheder og barrierer de ser for at kunne integrere AI i deres arbejde.

Specialet tager afsæt i følgende forskningsspørgsmål: "Hvilke perspektiver har danske miljøvurderingspraktikere på integrationen af AI i miljøvurderingspraksis, og hvordan afspejles disse i deres rolle i at muliggøre denne integration?". For at belyse dette er to underspørgsmål opstillet: 1) "Hvilke muligheder og begrænsninger forbinder danske miljøvurderingspraktikere med brugen af AI i miljøvurderingspraksis? og 2) "Hvilke muligheder og begrænsninger ser danske miljøvurderingspraktikere i forhold til at implementere AI i miljøvurderingspraksis?".

Undersøgelsen bygger på 19 semi-strukturerede interviews med danske praktikere fra tre centrale aktørgrupper: konsulenter, myndigheder og bygherrer. Med udgangspunkt i den teoretiske ramme, 'spaces for practice', analyseres praktikernes motivation og opfattelser af muligheder og begrænsninger i forhold til AI. Denne ramme fokuserer på, hvordan praksis ikke blot formes af formelle regler og strukturer, men også af individuelle opfattelser, organisatoriske forhold og interaktioner med andre aktører. Dermed behjælper den teoretiske ramme analysen med at kunne sige noget omkring hvordan motivation, opfattede muligheder og begrænsninger former den enkelte praktikers handlemuligheder i praksis. Her skelnes mellem indre motivation (den enkeltes egne opfattelser, erfaringer og vurderinger) og ydre motivation (hvordan andres forventninger og normer påvirker én).

Resultaterne viser, at mange praktikere er grundlæggende motiveret for brugen af AI. De peger især på muligheder for at optimere tidsforbrug og ressourcer, at automatisere rutineopgaver, sikre mere ensartede rapporter og genanvende viden fra tidligere vurderinger. Flere nævner også, at AI kan skabe rum til mere værdiskabende opgaver som flere dialoger med interessenter og faglig refleksion. Samtidig fremhæves nødvendigheden af menneskelig kvalitetssikring, idet de mener, at AI ikke kan erstatte faglig dømmekraft og kontekstforståelse.

På trods af motivationen står en række barrierer i vejen for implementeringen. Praktikere nævner manglende viden om AI, manglende klare retningslinjer og metodiske værktøjer, bekymringer om datakvalitet og begrænsede ressourcer. Mange oplever desuden organisatorisk tøven og manglende ledelsesmæssig støtte, og nogle udtrykker usikkerhed om, hvordan andre aktører vil reagere på brugen af AI. En tydelig tendens er, at praktikere venter på, at andre tager det første skridt, hvilket skaber en kollektiv tilbageholdenhed, hvor ingen føler sig ansvarlige for at drive udviklingen frem.

Specialet konkluderer, at AIs fremtid i dansk miljøvurderingspraksis ikke alene afhænger af teknologien i sig selv, men i høj grad af de sociale og strukturelle rammer, som praktikere arbejder inden for. Motivationen er til stede, men for at den kan omsættes til handling, kræves der fælles standarder, bedre viden, organisatorisk opbakning og ikke mindst rum for samarbejde og dialog på tværs af aktører. Der er behov for fælles databaser, retningslinjer, og fora, hvor erfaringer og bekymringer kan deles. Først da vil AI kunne integreres som et reelt og værdiskabende værktøj i fremtidens miljøvurderingspraksis.

Preface

This thesis marks the culmination of my Master's degree in Environmental Management and Sustainability Science at Aalborg University. The motivation for this study came from a growing awareness of how artificial intelligence(AI) is increasingly influencing decision-making processes across section. Within the field of Environmental Assessment, where professional judgment, regulatory frameworks, and environmental responsibility meet, AI presents both promise and uncertainty. Through this thesis, I have aimed to explore how practitioners themselves perceive and navigate this development.

The research would not have been possible without the great contributions of the 19 Danish practitioners who shared their time, insights, and experiences through interviews. I am deeply grateful for their openness and engagement.

I would also like to extend my sincere thanks to my supervisor, Emilia Ravn Bøss, for insightful guidance, constructive feedback, and continuous support throughout the process. Your academic clarity and encouragement have been invaluable. Additionally, I appreciate the input and collaboration from Associate Professor Ivar Lyhne in helping to identify relevant interviewees, which gave a essential foundation to the empirical work.

I hope that this thesis contributes meaningfully to the ongoing conversation about AI in environmental assessment practice and serves as a stepping stone for further research collaboration, and innovation in the field.

Aalborg, May 2025

Simone Rosenmaier Filipsen

ARTICLE

From Motivation to Implementation: Exploring Practitioners' Perceptions of Artificial Intelligence in Danish Environmental Assessment Practice

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Abstract

Environmental Assessment (EA) practice is increasingly shaped by global pressures, including sustainability transitions and digital innovation. Among emerging technologies, artificial intelligence (AI) has gained attention due to its potential to enhance efficiency and analytical capabilities in EA processes. Although current research outlines promising opportunities for AI in EA practice, its application in practice remains limited. Therefore, this study explores Danish practitioners' perceptions of opportunities and barriers shaping their motivation to implement AI into EA practice. Drawing on the theoretical framework, Spaces for practice, this research is based on semi-structured interviews with 19 Danish practitioners, including consultants, authorities and developers. The results reveal a strong motivation to explore AI, driven by the potential to streamline repetitive tasks, improve report consistency, and facilitate knowledge sharing. However, this motivation is restricted by significant barriers, including limited knowledge, lack of guidelines and methodologies, concerns about data reliability, and organisational limitations. Furthermore, practitioners often defer responsibility for initiating change, indicating a need for collective action and clearer frameworks. While the motivation for AI in EA practice is strong, the findings underscore that conditions such as institutional support, shared standards, and transparent collaboration are crucial to transforming this motivation into practice. The research concludes that AI's future role in EA practice relies not only on its technical capabilities but also on the social and structural context that shapes practitioners' ability to implement AI.

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1 Introduction

Impact Assessments (IA) are one of the most successful project and strategic assessment tools today, as they generate information about the potential effects of a development to allow decision-makers to "think before (they) act" (Banhalmi-Zakar et al., 2018, Morrison-Saunders, 2011). Nearly all United Nations (UN) members have embedded IA in national legislation or have signed an international legal instrument that requires using IA (Morgan, 2012). The concept of IA is therefore not only universally recognised but is also accepted and applied worldwide, and fundamentally rooted in political and societal processes (Banhalmi-Zakar et al., 2018). IA is a field that constantly evolves due to changing global dynamics and operates today within complex environments (Bond et al., 2024b). These complex environments are specified by Bond et al. (2024b, p. 89) as *"changing demographics and urbanisation, intensive project delivery, rapidly developing technologies, increasingly interconnected geographies, and political uncertainties"*.

This development has also resulted in the introduction of several types of IAs. Already in 1969, the Environmental Impact Assessment(EIA) was introduced due to increased concerns in developed economies and the impact of human activities on human health and the biophysical environment. This led to the concept of EIA, which primarily focuses

on assessing a project's environmental implications. Furthermore, the need to apply IA to strategic levels of decision-making, for example, policies, legislation, plans and programs, led to the development of Strategic Environmental Assessment (SEA) (International Association for Impact Assessment, 2009).

In Denmark, the key legal instrument for EIA and SEA is the Danish Environmental Assessment Act(DEAA) (Miljøministeriet, 2023). This act implements two EU directives, namely the EIA Directive and the SEA Directive. Under these directives, both EIA and SEA are under the broader umbrella term Environmental Assessments(EA) (European Commission, Directorate-General for Environment, 2025a,b,c). The DEAA aims to ensure a high level of environmental protection and to promote the integration of environmental considerations during preparing and implementing plans, programmes, and projects to support sustainable development (Miljøministeriet, 2023).

The Danish approach to EA is implemented through the EA process illustrated in Figure 1.

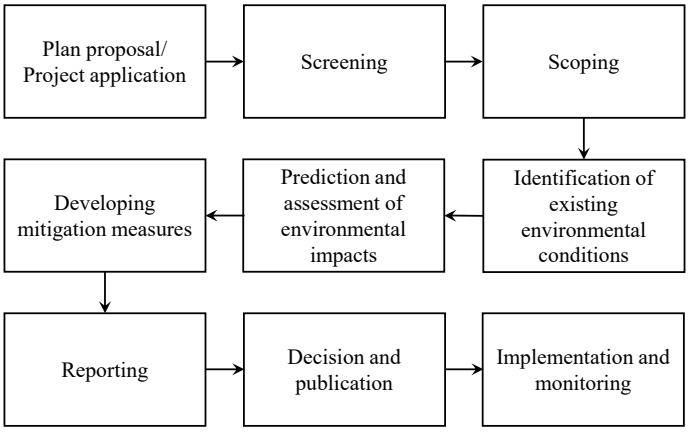

Figure 1. The EA process (Inspired by (Bhateria et al., 2024, Boess and Kørnøv, 2023)

Initially, the EA process begins with either a plan proposal or a project application. The next step differs depending on the type of plan or project. According to the DEAA, a distinction is made between types of plans: some are subject to a SEA (Section 8, subsection 1), while others are subject to screening (Section 8, subsection 2). The same applies to projects, where projects listed under Annex 1 automatically require an EIA, whereas Annex 2 projects are subject to screening to decide whether an EIA is necessary. The screening process is therefore relevant for Section 8, subsection 2 plans and Annex 2 projects, as it helps determine whether an EA is required. As part of this process, a hearing with relevant authorities is conducted (Miljøministeriet, 2023).

If an EA is required, the next step is scoping, which involves identifying the key environmental issues that must be addressed in the EA report. For both SEA and EIA, this is done in consultation with relevant authorities, and for EIA, the public is also included. This ensures that the EA addresses the relevant environmental topics and potential impacts Miljøministeriet (2023).

The process then proceeds to identify existing environmental conditions in the plan or project area. Next, the prediction and assessment of environmental impacts of the plan or project are assessed based on the EA factors identified in the scoping. Once the impacts are identified, the focus shifts to developing and evaluating mitigation measures to avoid, minimise or compensate for negative impacts (Boess and Kørnøv, 2023).

Following this, the reporting phase begins, where the different components from the EA process are documented in an EA report. Once the report is completed, it is publicised and a public consultation is carried out, allowing the public and affected authorities to comment. This step enables the broader community and stakeholders to express their opinions, raise concerns and give feedback on the EA report (Miljøministeriet, 2023).

The process concludes with a formal decision, where the project is either granted or denied approval. In the case of plans, a final approval and adoption are issued. Finally, once the plan or projects are implemented, any significant environmental impacts are monitored, if criteria have been specified in the EA report (Boess and Kørnøv, 2023).

The EA process involves different practitioners who all deliver policy into practice. Firstly, the EA process consists of government authorities that grant approval of projects or adopt plans (Miljøministeriet, 2023). Authorities are also planners in municipalities or ministries who propose new plans and programs that must undergo an SEA. The planners have EA teams that conduct the SEAs in those cases where they do not need to commission consultants (Ravn Boess, 2023). Next are the developers who propose new projects for development that must undergo an EIA (Miljøministeriet, 2023). The project developers often commission consultants to conduct the EIA for them (Morrison-Saunders and Bailey, 2009). The consultancy team may consist of individual EA practitioners with different educational backgrounds and professional experiences to justify the needs of

the assessment. The consultants advise developers *"on relevant EIA policies, practices and procedures, and undertake the technical work necessary to assess and mitigate the potential impacts of the proposal"* (Morrison-Saunders and Bailey, 2009, p. 1).

EA practitioners play an important role in the EA process. Fundamentally, they exercise their discretionary power in every choice they make. Zhang et al. (2018) highlights how this room for interpretation allows practitioners to adapt new guidelines to the specific context and even influence or reshape existing norms and procedures. This means that practitioners, through their professional judgment and experience, can find new ways of carrying out assessments. In this way, they are able to adapt and change practice within the formal framework (Zhang et al., 2018).

1.1 Emerging fields within EA

While the EA process in Denmark and elsewhere is well-established in legislation and practice, scholars have increasingly turned their focus toward evaluating its effectiveness in helping solve complex global problems and challenges of the 21st century (Banhalmi-Zakar et al., 2018, Bond et al., 2024b). Meanwhile, the UN's Sustainable Development Goals(SDGs) have an agenda in 2030, the International Panel on Climate Change's 2050 carbon-neutral targets are getting closer, and the Paris Agreement targets look unlikely to be met (Bond et al., 2024b, United Nations Environment Programme, 2024). Hence, IA of all types will play a significant role in delivering the evidence in supporting climate change mitigation, advancing environmental justice, and fostering a sustainable future (Bond et al., 2024b).

Morrison-Saunders et al. (2014) argues that IA's future capacity to contribute to sustainable development must be developed by focusing on effective practice. Bond et al. (2024b, p. 89) suggests that *"IA practitioners must do a better job evaluating their work, sharing lessons learned, producing constructively critical comparison studies, and better integrating broad sustainability principles and goals into planning"*.

While there is a growing call for IA to support sustainable transitions better, another significant transformation is underway: the increasing adoption of advanced technologies. The advanced technologies are highlighted by Fothergill et al. (2024) as something that will gradually change assessment methods, enabling more efficient and possibly more effective practices. This technological transformation could potentially change how practitioners conduct IAs, which could be part of the change that Banhalmi-Zakar et al. (2018) and Bond et al. (2024b) have called for.

Among advanced technologies, artificial intelligence(AI) can potentially have an increasingly prominent role in EA practice. This development is not unexpected, since EA and AI share a fundamental connection, in which they both rely on learning from data and making decisions based on it (Fothergill et al., 2024).

1.1.1 Opportunities for AI in EA practice

Khan and Nawaz Chaudhry (2023) highlights that AI can contribute to several aspects of the EA process, including scoping, baseline data collection, impact prediction, report preparation, and compliance monitoring. Similarly, Sandfort et al. (2024) emphasises AI's ability to process large datasets, addressing data availability and enhancing impact significance determinations. Several papers encourage using AI-driven data analysis to enhance scoping by prioritising potential risks based on historical project data (Fothergill and Murphy, 2021, Orenstein, 2017).

AI can also transform how large volumes of text-based information are handled. AI tools can interpret and generate human language. Fothergill and Murphy (2021)and Bond et al. (2024a) argue that AI can streamline IA documentation by extracting key insights and improving report clarity, which makes complex information more accessible to stakeholders. Similarly, Bond et al. (2024b) and Khan et al. (2024) highlight AI's potential to simplify tasks and reduce administrative burdens in EIA practices.

Another significant application of AI is by Laverde-Salazar et al. (2024) and Bond et al. (2024a) highlighted as scenario modelling and impact prediction. Laverde-Salazar et al. (2024) and Bond et al. (2024a) suggest that algorithms and simulation techniques can generate predictive models that predict potential environmental impacts. Bond et al. (2024a) emphasises that AI's predictive capabilities can lead to more accurate assessments, allowing practitioners to anticipate and address potential environmental impacts more effectively.

Building upon the EA practice as described in Section 1, Figure 2 illustrates where in the EA process the researchers so far see opportunities for AI.

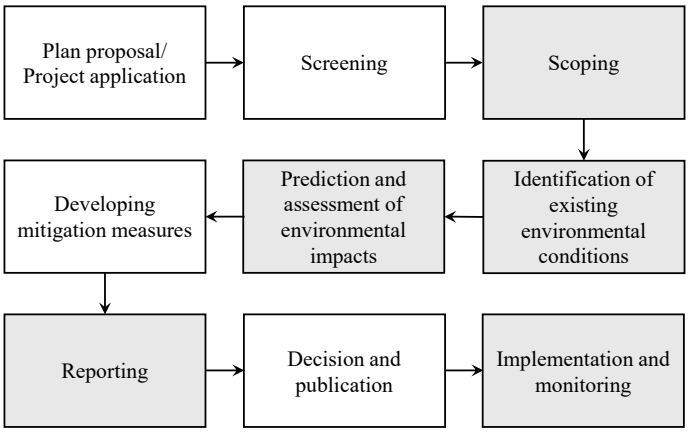

Figure 2. An illustration of where researchers see opportunities for AI in the EA process

1.1.2 Challenges in integrating AI into IA practice

While current research highlights opportunities for AI in EA practice, several challenges and concerns remain. One of the most frequently mentioned issues in the literature is data availability and algorithmic biases. Questions have been raised about who decides which values and assumptions are prioritised when applying AI tools, as this can impact the objectivity of AI-supported assessments (Bond et al., 2024a,b, Fothergill and Murphy, 2021, Laverde-Salazar et al., 2024).Bice and Fischer (2020) further highlights that the use of AI in IA may be perceived as a "black box" by some stakeholders, which can reduce trust in the process.

Another challenge is the reliance on AI in published data and documented professional judgments. While AI can process vast amounts of data, it lacks the nuanced understanding and context-specific expertise that human practitioners bring to the assessment process (Fothergill and Murphy, 2021, Khan et al., 2024). Lee et al. (2025) and Khan et al. (2024) warn that there is a risk of EA practice becoming more automated and less reflective if practitioners rely too heavily on AI outputs without applying their critical thinking. Since current EA practice is based on expert evaluation, over-reliance on AI-generated results could decrease the depth of analysis and weaken the reliability of EAs (Bond et al., 2024a, Lee et al., 2025).

The issue of transparency remains a key concern. Bond et al. (2024a) points out that users often do not fully understand how AI models function, which raises questions about the validity of AI-driven findings. Lauridsen (2025) adds that AI-assisted decision-making shifts the role of practitioners from direct problem-solving to a more supervisory function, where they must verify and adjust AI-generated outputs rather than relying on them.

1.1.2.1 Practitioners vs. AI

As AI becomes more integrated into EA processes and the technology advances, questions arise about whether some EA processes, as we know them, will become redundant and what role the practitioners will play (Bice and Fischer, 2020). Bice and Fischer (2020) introduces this debate, noting that the role of practitioners is evolving, as AI has the potential to take over more analytical tasks. Bond et al. (2024a) and Sandfort et al. (2024) state that these questions have sparked considerable interest among practitioners and stakeholders keen to explore AI's practical application in EA practice. However, Bond et al. (2024a) also identifies a lack of awareness about the latest technological developments as a limiting factor in AI's adoption in practice.

1.2 Future needs

Uhlhorn et al. (2024) revealed that only a little application of advanced digital approaches was in EA practice today. This could indicate that there are still some future needs that have to be fulfilled before advanced digital approaches such as AI can be implemented into practice. As a response to this, a need for clear guidance and best practices has grown (Bond et al., 2024a, Khan and Nawaz Chaudhry, 2023, Laverde-Salazar et al., 2024). Lee et al. (2025) emphasises that AI-supported assessments must continue to include personal, contextual, critical, and reflective judgments to avoid oversimplification and maintain the quality of IA outcomes.

In response to this need, the International Association for Impact Assessment (IAIA) has begun developing best practice principles for using AI in IA (Bond et al., 2024a, Khan et al., 2024). Sandfort et al. (2024) highlights that discussions within the IAIA working group reflect practitioners' concerns about AI, particularly its practical implications and the need for increased awareness within the IA community. Furthermore, the literature suggests that practitioners must develop new competencies to ensure accurate data interpretation and maintain quality control in AI-assisted assessments (Sandfort et al., 2024).

This shift will require technical skills and a deeper understanding of how AI can complement, rather than replace, human expertise. Trust, collaboration, and promoting transparency will be essential to ensuring the successful integration of AI into EA practice (Fothergill and Murphy, 2021).

Furthermore, Bond et al. (2024b) stresses that having

reliable, publicly available data is crucial for building confidence in AI applications. Sandfort et al. (2024) also points out that AI technologies will lead to a broader set of baseline data at lower costs and higher speeds, which calls for updates to legislation and guidance related to data management.

Moreover, as AI continues to evolve, the need for current and future preparedness is crucial. Khan and Nawaz Chaudhry (2023, p. 4) notes that *"AI is such a rapidly evolving and dynamic phenomenon that its impacts on the future of IA are yet to be seen"*. This underscores the importance of ongoing adaptation and policy development to ensure that AI tools are effectively integrated into IA practices while maintaining reliability and transparency. This requires continuous learning, flexible regulatory frameworks, and proactive engagement with emerging AI technologies (Bond et al., 2024a, Khan and Nawaz Chaudhry, 2023).

1.3 Research justification and aim

Current literature has increasingly focused on AI's potential opportunities and challenges for EA practice. While research highlights promising opportunities for AI to be applied within EA practice, its actual integration into practice remains limited (Uhlhorn et al., 2024). Therefore, this discrepancy raises a crucial and underexplored question: *why is there still a limited application of AI within EA practice, despite its demonstrated opportunities in academic research?*

This question points to a significant knowledge gap: Although the literature has outlined both the opportunities and challenges of applying AI in EA, there remains limited understanding of the practical conditions and constraints that shape AI's implementation. Practitioners play a key role in this context, as they are central to shaping EA practice through their attitudes and expertise, as highlighted by Zhang et al. (2018). Thus, before the opportunities identified in the literature can be fully realised, it is essential to understand which conditions practitioners themselves consider necessary for AI's implementation into EA practice.

To gain a nuanced understanding of a specific context and the perspectives of EA practitioners, this research focuses on the Danish EA practice and draws on insights from Danish practitioners. The study explores the opportunities and limitations Danish practitioners associate with using AI in EA and the challenges and enabling factors they associate with to implement AI into practice. This research provides an empirical foundation for understanding how AI adoption is perceived and navigated in practice. The aim is to map out a more detailed picture of how Danish EA practitioners believe what is required for AI to be integrated into an already well-established practice, and what factors may prevent that from happening.

Therefore, the following research question has been formulated: *What perspectives do Danish EA practitioners have on the integration of AI in EA practice, and how are these reflected in their role in enabling the integration of AI into existing EA practice?*

Furthermore, to support the research question, two sub-questions have been formulated: *What opportunities and limitations do Danish EA practitioners associate with the use of AI in EA practice?* and *What challenges and enabling factors do Danish EA practitioners perceive when implementing AI in EA practice?*

Additionally, the research builds upon the hypothesis that different types of practitioners may have varying views on AI. Therefore, the study includes various perspectives from Danish consultants, authorities, and developers. Exploring these differences is expected to provide a more comprehensive picture of the current state of AI in Danish EA.

This article is structured by first outlining the theoretical framework and how it contributes to the research. Second, the methods are presented. This includes a description of the literature review described in this introduction, a description of the data collection method, semi-structured interviews, and a description of the analytical framework. Furthermore, the analysis and its results is presented. Lastly, a discussion will be given.

2 Theories

Integrating AI into EA practice requires a thorough evaluation and a reevaluation of how EA practice is understood and executed in the context of AI. AI represents a radical shift from traditional methods, and it is therefore crucial to rethink both the adoption of new approaches and the practical implementation of AI. This transformation could disrupt existing routines and perceptions of practice, prompting practitioners to reflect on how AI-driven approaches can be effectively integrated into their work. Therefore, this research adopts a theoretical perspective, 'spaces for practice', presented in Ravn Boess (2023). This theoretical framework enables a deeper understanding of how practitioners' motivations interact with their perceptions of opportunities and capacities in practice, thereby helping to understand not only whether

practitioners are motivated to adopt AI, but also why, how, and under what conditions such motivation arises or is hindered.

2.1 Spaces for practice

The theoretical framework, Space for Practice, contextualises the practitioner's role in establishing and adapting their practice by understanding that practice is not only shaped by formal regulatory structures but is also informal and interpretive. The theory states that the practitioner's practice encompasses various types of "spaces" that influence how they perceive and engage with their practice. In particular, it distinguishes between:

- 'Spaces for motivation' concern how practitioners make sense of their practice and what drives them to act the way they do.
- 'Spaces for action' refer to the contexts in which decisions are made and actions are carried out based on their motivation.

Since this research investigates what motivates practitioners to integrate AI into EA practice, it focuses exclusively on the 'spaces for motivation' and does not comment further on the 'spaces for action'.

Motivation can be viewed as the initial driver behind decisions, defining the reason for pursuing a particular practice. It shapes how practitioners perceive their practice and determines the intentions behind their actions. These motivations are formed not only by formal rules and structures but also by informal, interpretative processes.

Multiple practitioners are involved in conducting an EA. Therefore, the motivational spaces can differ depending on the practitioner in question, and the individual's 'spaces for practice' may overlap with or be influenced by the spaces of others. Therefore, the theory distinguishes between two types of motivational sources: intrinsic and extrinsic. This implies that there are spaces for both intrinsic motivation (individual practitioners) and extrinsic motivation (external practitioners).

Within these motivational spaces, practitioners' perceptions of their opportunities and capacities play a central role in shaping how they interpret and engage with their work. The original motivation can be restricted or expanded through perceived opportunities and capacities, shaping how practice is perceived. These perceptions then become the point of departure for action space, and are influenced by preconceived notions of what is (in)appropriate, (im)possible, or (non)accepted within a given context.

Perceived capacities can be perceived as restrictions. For example, when a consultant lacks the necessary resources to carry out a task, when low motivation among stakeholders hinders the practitioner's work, or when a particular practice is deemed inappropriate for the EA being conducted. On the other hand, perceived opportunities can lead to expanded motivation. These may arise when new roles or responsibilities are identified, such as completing the EA using an alternative, previously unexplored approach, or new ambitions and engagement emerge from other stakeholder groups.

Inspired by Ravn Boess and Del Campo (2023) and Ravn Boess (2023), Figure 3 illustrates the perceived opportunities and capacities in both the intrinsic and extrinsic 'spaces for motivation'. Moreover, the figure illustrates that intrinsic and extrinsic 'spaces for motivation' are interrelated, indicating that an individual's motivation is influenced by their perception of others' motivations (Ravn Boess, 2023). This means that an individual practitioner's motivation is influenced by presumptions about the motivation of extrinsic others before these are either confirmed or disconfirmed in practice.

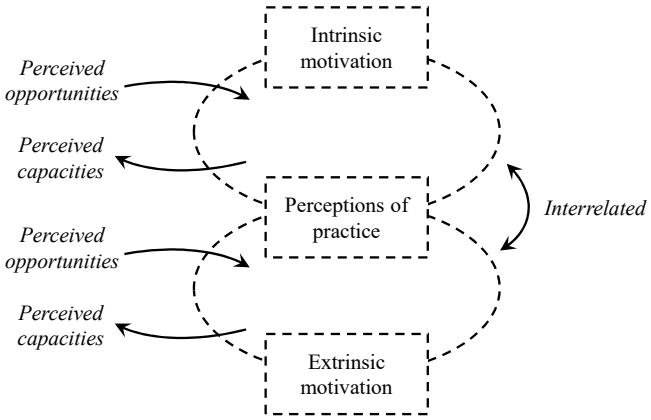

Figure 3. The 'spaces for motivation' shows how perceived opportunities and capacities influence intrinsic and extrinsic 'spaces for motivation' (Inspired by Ravn Boess (2023), Ravn Boess and Del Campo (2023)

2.1.1 *Contextualising practitioners' role in integrating AI in EA practice*

This theoretical framework serves, in this research, to contextualise and understand the perceived opportunities and capacities that EA practitioners experience when integrating AI into their current practice. It serves not only to describe what practitioners see as possible or impossible within current practice, but also to understand how these perceptions influence their willingness or resistance to

change. Specifically, the framework allows to explore how practitioners interpret the role of AI in their practice, both in terms of perceived opportunities and capacities. It highlights what they believe AI can contribute to, as well as the structural, institutional, or interpretive capacities that may hinder of enhance the practitioner's integration of AI.

Furthermore, the theory also helps contextualise how practitioners perceive their peers' views. These perceptions are not neutral, as they are part of a dynamic, interrelated process in which one practitioner's perceptions of what others think and do can shape their motivation. This means that perceived extrinsic motivations can influence and shape intrinsic motivation.

Consequently, this research is not merely asking whether practitioners are motivated to adopt AI, but seeks to understand why they are motivated, or are not, how these motivations are formed, and under what conditions they emerge or are constrained. This makes the 'spaces for motivation' framework particularly relevant, as it focuses on how motivation is shaped through perceived opportunities and capacities within a specific context.

By adopting this particular theoretical lens, focusing on 'spaces for motivation', the research is also inherently limited to the dimensions of the framework. Hence, it focuses exclusively on how individual practitioners perceive their capacity to act and the opportunities they associate with implementing AI. This means that other factors or perspectives may not be fully captured within the scope of this study. However, this theoretical limitation also brings analytical strength. It ensures the results are embedded within a clearly defined conceptual framework that foregrounds the practitioner's interpretive and motivational reality. Thus, the study provides a focused and contextualised understanding of how EA practitioners engage with the concept of AI within the motivational space in which they operate.

2.2 Ontological and Epistemological assumptions

This research is grounded in a constructivist science theory, where knowledge is viewed as socially constructed rather than objective, resulting from human interaction, interpretation, and social contexts. In this study, the motivations behind practitioners' integration of AI into EA practice are understood as products of these social processes.

Ontologically, this research takes the point of departure in a relativist view of reality, recognising that there is not only one objective truth but multiple, co-existing interpretations. This means that the perspectives of AI in EA are different depending on who is involved and the context in which they operate (Al-Saadi, 2014). For example, consultants, authorities, and developers perceive the opportunities and capacities of AI differently, depending on their roles, experiences, and motivations.

Epistemologically, knowledge is viewed as relational, dynamic, and context-dependent (Al-Saadi, 2014, Sonne-Ragans, 2019). Knowledge is created through people's perceptions and interpretations, not as a neutral reflection of an objective reality, but as a result of social and individual constructions. The researcher is thus not a neutral observer but an active participant in creating and interpreting knowledge (Al-Saadi, 2014).

The theoretical framework, 'spaces for practice', aligns with this perspective by emphasising how formal and informal structures, as well as informal, interpretative processes, shape practice. Instead of viewing the practitioners' perspectives as representations of objective reality, this research views them as expressions of subjective sense-making. Understanding AI's role in EA, therefore, requires engaging with how practitioners interpret, negotiate, and enact in their practice.

3 Methods

Building on the literature review results and guided by the theoretical framework, Space for practice, this research adopts an abductive approach. The aim is to explore how practitioners perceive the integration of AI in IA practice and understand these perceptions through the lens of the theory. An abductive approach is used because it allows for an iterative movement between empirical observations and theoretical interpretation, allowing new understandings to emerge throughout the research process. The theory is therefore used as a lens through which the research findings can be explored and understood, rather than as a fixed framework to be confirmed or rejected. In other words, the theory helps guide the interpretations of the findings, but does not control them. This approach fits well with the overall understanding of knowledge in this research. This research sees the practitioners' views as shaped by their own experiences and interpretations and not as objective facts, but as meaningful reflections of their reality. Therefore, the methods were chosen to let these personal and practice-based perspectives come through, allowing new insights to develop throughout the research process.

The methods used in this research are as follows:

- First, a literature reviews were conducted to get an overview of current research on AI in EA practice, and to identify potential knowledge gaps within the field. Due to the limited research within the field, an extensive non-structured literature search was conducted to summarise some of the literature's key points and identify relevant insights into emerging trends in AI in EA practice, including their potential, barriers, and applications.
- Second, semi-structured interviews were conducted to collect nuanced insights from Danish EA practitioners and to gain an overview of their perspectives and perceptions on AI in EA practice.

3.1 Literature review

The first literature review focused on AI within EA practice to determine the current state of research and identify potential knowledge gaps. Table 1 illustrates the search string used for the literature review. The Scopus database was selected due to its daily updates and status as the largest citation and abstract database for peer-reviewed literature.

Table 1. Literature review's search string

Step	Stage	How
1	Database	Scopus
2	Filtering	Search string: (TITLE-ABS (artificial AND intelligence) AND TITLE-ABS ("Environmental Impact Assessment") OR TITLE-ABS ("Strategic Environmental Assessment") OR TITLE-ABS ("Environmental Assessment"))
3	Search	N = 104
4	Exclusion by title	N = 12
5	Exclusion by abstract	N =11
6	Exclusion by text	N = 6
7	Supplement	Snowball sampling and google search: N = 11
8	Selection	Data selected for review: N = 17

Several exclusions were made based on relevance. First, exclusions were made based on the title, followed by exclusions based on the abstract, and finally, by reviewing the full text. This resulted in a total of 6 relevant documents.

Due to the limited research in the field, an additional literature search was conducted. The aim was to identify relevant literature that may not have been indexed in the Scopus database and to explore further sources related to AI within EA practice. This supplementary search involved snowball sampling, examining references and citations from the initially identified literature. Additionally, searches were made using both Google Scholar and Google.com with keywords such as "Artificial Intelligence", "Environmental Assessment", "Environmental Impact Assessments", and "Strategic Impact Assessment". This yielded 11 supplementary documents, resulting in 17 sources included in the literature review.

3.2 Interviews

To investigate EA practitioners' perceptions in practice and generate empirical insights, a series of semi-structured interviews was conducted with 19 practitioners from Danish EA practice. The semi-structured interviews allowed going beyond the interview guide and asking follow-up questions if needed. These interviews form the primary empirical foundation of the study and provide a nuanced understanding of how AI is currently perceived and approached in the field.

The practitioners were identified from three stakeholder groups: Consultants, Authorities, and Developers. The interviews aimed to gain insights into how practitioners perceive the role of AI in EA practice and to uncover their motivations, perceived opportunities, and capacities associated with both the application of AI in EA practice and the integration of AI in EA practice. The study aimed not to target AI experts within EA practice but to capture general practitioner perspectives from across the field.

The interviewees were identified in collaboration with Associate Professor Ivar Lyhne from Aalborg University, who contributed to selecting relevant practitioners based on his extensive knowledge of Danish EA practice. The selection also considered the organisations that the practitioners represent. For instance, in the case of consultants, the most widely used consultancy firms in Denmark were chosen. This included large and smaller consultancy firms to explore whether company size might influence perspectives or approaches. A similar approach was used to select authorities, where practitioners were chosen from larger municipalities and organisations as well as from smaller municipalities. For project developers, the focus was primarily on practitioners from larger project developers.

The semi-structured interviews followed a prepared interview guide, which was developed based on the theoretical framework aimed to explore the following themes:

- The practitioner's role in EA practice
- Experience with AI in EA practice.
- Perceptions of opportunities and challenges regarding AI in EA.
- Motivations for integrating AI in EA practice.
- Perceived capacities and competencies related to AI.
- Observations across practitioners.
- Future perspectives on AI in EA practice.

The interview guide has been attached as an appendix. It should be noted that no consistent distinction was made between EIA and SEA during the interviews, as the focus was on EA practice in general, encompassing both EIA and SEA perspectives. However, when referring to developers, it is assumed that their experiences and perspectives are solely on EIA practice.

The interviews were conducted via video call or in person, depending on the interviewees' preferences. All interviews were recorded and subsequently transcribed for analysis.

The interviews continued until thematic saturation was achieved. After conducting 19 interviews, no new information or themes emerged, indicating that additional interviews were unlikely to provide further insights. This suggested that the sample size was adequate for the study (Saunders et al., 2018).

However, it is essential to reflect on the selection of interviewees, as they represent only a limited perspective of practice. There is a bias in the sample, as the participating practitioners are likely those who are willing to engage in the interviews due to a personal interest in topics such as the development of EA practice or the use of AI in EA. Consequently, practitioners less interested in changing existing practices or adopting advanced digital approaches may have been more reluctant to participate. Thus, their perspectives are not captured in this study.

3.2.1 Interview coding

After conducting the interviews, all recordings were transcribed to create a comprehensive dataset for analysis.

Following the transcriptions of the interviews, a thematic analysis was conducted. An Excel spreadsheet with multiple tabs was created to organise the data, with each tab representing one of the main categories from the theoretical framework: Intrinsic Opportunities, Intrinsic Capacities, Extrinsic Opportunities, and Extrinsic Capacities. Codes were developed through an iterative analysis process, as recurring patterns and themes related to opportunities and capacities emerged during the review of the transcripts. The transcriptions were repeatedly read to facilitate this, and codes and topics were identified. These topics were then divided into sub-categories, reflecting either practitioners' perspectives on AI implementation into EA practice or their perceptions of AI's opportunities and capacities within EA practice. Relevant quotes were inserted into the appropriate cells in the spreadsheet, allowing for a structured and systematic approach to data interpretation. Interviewee codes were included alongside the quotes to indicate the source of each quote. Their interview codes are divided into three categories: C = consultants, A = authorities, and D = developers. The same interviewee codes are also used in Section 4 to indicate which practitioner made each finding presented in the results. The interview guide has been attached as an appendix.

3.3 Use of artificial intelligence

Throughout the writing process of this thesis, generative AI tools such as Grammarly and ChatGPT have been utilised to support the writing process. Grammarly was used consistently throughout the thesis to correct spelling, improve grammar, and optimise sentence structure, contributing to overall readability and clarity. ChatGPT was used as a writing aid and sparring partner, primarily to explore alternative phrasings, refine sentence formulations, and occasionally to clarify concepts or gain additional perspectives on specific topics. At all times, the content, structure, and arguments presented in the thesis were developed and written by the author. AI tools served only as support for language refinement and did not contribute to the original writing or analysis.

4 Results from interviews: Practitioners' perspectives on motivation

The following sections present the results of the analysis. As outlined in Section 2, the analysis takes its point of departure in the 'space for practice' framework, focusing on the 'space for motivation' and both intrinsic and extrinsic motivation.

Based on the interviews, the perceived opportunities and capacities related to AI have been categorised to distinguish between the two main perspectives. First, a significant part of the practitioner's motivation for implementing AI stems from their perceptions of the opportunities and capacities tied to AI's actual application in EA. Therefore, this perspective is also crucial, as it reveals why practitioners believe AI could or should be implemented. Second, the

analysis considers the opportunities and capacities that practitioners perceive as necessary for implementing AI into EA practice. The analysis is therefore divided into two perspectives: The opportunities and capacities related to the use of AI within EA practice itself, and the opportunities and capacities practitioners face in implementing AI into practice. The findings will be elaborated on in the following sections.

4.1 Intrinsic motivation

This section explores intrinsic motivation, specifically the practitioners' perceptions of the opportunities and capacities for using AI in EA practice, as well as the perceived opportunities and capacities for implementing AI into EA practice.

4.1.1 Perceived opportunities and capacities for AI in EA practice

When the interviewed practitioners were asked about their motivation for integrating AI into EA practice, they also described how AI could be applied explicitly in practice, which echoed some of the points from Section 1. This highlights the importance of understanding the underlying motivations for adopting AI, specifically the perceived opportunities and capacities associated with its use. These perceptions are also crucial, as they provide insights into the foundations of practitioners' motivation to integrate AI into EA practice. The following section presents these opportunities and capacities in more detail, and Table 2 provides an overview of the key findings.

Table 2. Perceived opportunities and capacities for AI's application in EA practice. In parentheses, the practitioners are indicated to show who expressed each perspective (C: Consultants, A: Authorities, D: Developers)

Motivation	Findings
Perceived opportunities	1. Time and resource optimisation (C,A,D) 2. Streamlining the EA report (C,A,D) 3. Value-driven task prioritisation (C,A,D) 4. Learning from and building upon existing knowledge and practices (C,A,D) 5. Competitive advantage (C)
Perceived capacities	1. Human oversight (C,A,D) 2. Data uncertainties (C,A,D) 3. Loss of practical experience (C)

4.1.1.1 Perceived opportunities

Several practitioners mentioned time and resource optimisation as being an opportunity for utilising AI in EA practice (C2,C3,C4,C5,C6,C7,C8,A1,A2,A4,A5,A6,D1,D3,D5). Examples of where AI could help optimise time and resources could include handling repetitive tasks such as writing introductory and general sections, generating non-technical summaries, or reusing standard content (D1,D3,D5). Developers also visualised that AI could help with data collection, screening, and scoping tasks (D3). Furthermore, two authorities pointed out an example of hearing statements, where they could find AI relevant for data processing, organising, and summarising the points, which sometimes can be time-consuming due to the many statements that must be processed (A4,A5).

The practitioners suggested the opportunity to streamline EA reports through AI (C2,C3,A4,D1,D2,D3,D4). They suggested that AI could help ensure consistency, validate assumptions, and provide quality assurance (C2,C3,A4). Developers emphasised that when many practitioners conduct the EA, it is inevitable that there are multiple ways to write it. The developers envisioned that AI could help standardise and streamline the text written by multiple practitioners (D4). Furthermore, developers also saw a potential in having AI as a screening tool to *"get an overview of whether, compared to a similar assessment and expectations, it roughly falls within the expected range or not, or if something is missing"* (D1). This suggests that practitioners see the potential of AI as a tool for streamlining the EA report.

The practitioners emphasised that AI could help shift focus toward more valuable activities (C2,C3,C5,A1,A4,D2,D3,D4). The authorities expressed that their work often involves a lot of repetition and standard procedures. Moreover, they noted that they sometimes have to compromise the quality of their work due to many other tasks they must manage. They envisioned that if AI could handle repetitive tasks, it would free up more time for them to focus on vital tasks, such as having preliminary dialogue or visiting the site or company (A4). Developers also perceived these opportunities as motivation in a way that they *"can do a better job, and maybe we can allocate the resources we have to other areas where they create more value."* (D2). This indicates that the practitioners are motivated to utilise AI in their work to eliminate some of the repetitive work and then to prioritise some tasks that give more value.

The practitioners acknowledged the importance

of feeding previous assessments, datasets, and knowledge into AI systems to enhance future EA work (C4,C5,C7,C8,A1,A3,A5,A6,D1,D3). It was a general recognition that data from past EAs can provide valuable insights. Furthermore, the practitioners also highlighted the value of drawing on data from the board of appeal to understand appeal patterns (C8,A6). Examples of how previous knowledge could be utilised through AI in practice were suggested by a consultant who visualised having *"an AI system capable of retrieving and summarising past cases, that could facilitate an overview and enhance understanding of a topic"* (C7). Another example was mentioned by an authority, who states that *"it[AI] can search everything. It has all the environmental assessments it can go through and find the places where something related is mentioned. And then you can find a solution or see how others have solved that issue"* (A5).

Consultants viewed AI as a strategic move to enhance competitiveness. One consultant states that by using AI to reduce time and costs, they could deliver EAs faster without compromising quality (C3). Furthermore, consultants emphasised that AI might be essential to remain competitive (C5).

4.1.1.2 *Perceived capacities*

The practitioners emphasised that human oversight is still needed when integrating AI tools into EA practice (C2,C4,C6,C7,C8,A2,A5,A6,D1,D3). They stated that AI will not be able to conduct or write assessments independently, as their work is qualitative and heavily reliant on professional experience, which is difficult for AI to replicate. One consultant expressed concern, stating:*"The biggest danger is lowering your guard and not being sufficiently critical about whether what is done digitally is enough"* (C4). Additionally, consultants noted that if a practitioner lacks expertise in a specific topic, assessing the accuracy of AI-generated output can be challenging. In response to this challenge, both consultants and developers underscored the importance of human oversight and quality assurance (C6,C7,C8,D1).

Both consultants and authorities expressed their concern about whether AI's data samples will be based on outdated data due to an evolving practice. The data would no longer be useful, as the sample from previous projects would not accurately represent the current practice, which could result in incorrect outputs (C2,C6,A5). Another concern regarding data uncertainties was whether the data sample would be based on wrong data (C3,C4,D1,D2):

> *"There is a danger that you slowly introduce bias, establish sources of error, and then have AI search through new data based on that initial mistake. It gets gradually amplified through the processes that follow"* (C4)

Authorities pointed out the problem with relying too heavily on AI and automating the process. Here the authority concerns that there is as risk of authorities will receive EAs based on incorrect data, which from an authority's point of view could be a problem, since they have to approve these EAs. The authorities also concerned whether they can assess what they are getting is good enough, and whether they can filter what comes in (A3).

The consultants were concerned about the loss of practical experience. Here, one consultant expressed that:

> *"What you lose, and that is also a bit of my concern, is that I have done so many environmental assessments myself, a lot of grunt work. So learning where to find things, what is needed, and what level is sufficient to make an adequate assessment. That sense is lost if you are not hands-on."* (C2)

This suggests that there are also some concerns regarding losing the practical experience by utilising AI in EA practice, since AI has the ability to help with the so-called "grunt-work", which for the consultant is not necessarily a benefit, since that is also a part of the EA process.

4.1.2 *Practitioners' perceptions of opportunities and capacities for implementing AI in EA practice*

The following section focuses on what practitioners identify as opportunities or capacities in their ability to implement AI in their practice. Table 3 provides an overview of practitioners' intrinsic perceived opportunities and capacities for implementing AI in EA practice.

Table 3. Perceived opportunities and capacities for implementing AI in EA practice. In parentheses, the practitioners are indicated to show who expressed each perspective (C: Consultants, A: Authorities, D: Developers)

Motivation	Findings
Perceived opportunities	1. Shared database (C,A,D) 2. Organisational and internal interest (C,A) 3. External interest (C) 4. Collective effort (A)
Perceived capacities	1. Limited knowledge (C,A,D) 2. Absence of guidelines and methodologies (C,A,D) 3. Context specificity (C,D) 4. Lack of technological development (C,A) 5. Absence of ground rules among practitioners (A,D) 6. Organisational change (A,D) 7. Constraints from legislative frameworks (C) 8. Limited resources (A)

4.1.2.1 *Perceived opportunities*

The practitioners were motivated to establish a shared AI-accessible database containing previous EA reports and design data (C4,C8,A1,A6,D3). Several practitioners referred to existing platforms, such as Danmarks Miljøportal's EA-hub, a current Danish shared database with collected Danish EA reports (Danmarks Miljøportal, 2024), suggesting that platforms like EA-hub could serve as the foundation for the data sample applied in EA practice (C4,A1,A4,D3). One developer also noted that it is now required to publish EA reports into EA-hub, which allows EA-hub to be updated with the latest EA data and potentially enables practitioners to collect data from a large dataset (D3). One consultant also suggested that the shared platform could serve as a collective effort, so people do not all experiment individually (C8). This suggests a collective motivation to gather and continuously update knowledge through shared platforms.

Consultants revealed that their organisations have a broader strategic interest in digitalisation and innovation, which could indicate an internal interest in utilising AI (C1,C2,C6). Furthermore, the authorities also noted that their organisation encourages the use of AI tools, such as ChatGPT, for writing rulings, emails, and other repetitive tasks (A4). This suggests that, beyond individual interest, there is organisational motivation to explore AI integration in EA practice.

Consultants emphasised that the motivation to integrate AI does not necessarily have to be internal (C8). They noted that interest from a developer could serve as a strong incentive to explore AI. This could indicate that there might also be an opportunity to integrate AI into EA practice if there is an external interest. The consultant also highlighted the importance of learning from the experiences of others. They suggested that knowledge shared through peer interactions or from developers can be a motivational driver (C8).

One authority also states that AI is not utilised in EA practice because practitioners wait for each other to do something. Here, the authority suggests a collective effort, which could be across sectors, authorities, consultants, and developers, where each of them needs to put in some resources to push it forward (A1).

4.1.2.2 *Perceived capacities*

There was strong consensus among the practitioners that a limited utilisation and implementation of AI in their practice was due to limited knowledge of how to use AI best in relation to their work (C1,C2,C5,C6,C7,A1,A2,A3,A6,D1,D2,D3). They emphasised the importance of knowing what AI can do in relation to EA and what it cannot (C1,C5,A2,D1,D2,D3). Similarly, they suggested that they need some training and are willing to allocate time to learn how to use it, including what to say to the system and how to feed it the correct information (C2,C6,C7,A1,A3,D3). However, one developer visualised that there will be more AI EA-related packaged solutions in the future, which will not require much from the user (D2). As a way of learning to work with AI in the best possible way, consultants and developers expressed their interest in having good examples, procedures and guidelines in practice (C2,C6,D2,D5).

A concern expressed by the practitioners was the context specificity that a specific project often has (C4,A5,D4). One authority worried that, *"it [AI] does not know what project it refers to, so it takes fragments from all kinds of projects and slaps them together, and nothing makes sense. That would not clarify the specific case"* (A5). Therefore, it is not always possible to rely on AI, since the decision-making process and impacts are often explicit to the project.

Both consultants and authorities emphasised the need to develop new technologies to enhance the utilisation of AI in EA practice (C3,C4,C5,C6,A1,A6).

The practitioners suggested that AI needs to be developed specifically for EA practice before it can be fully utilised (C3,C4,C6,A1). Furthermore, the consultants also expressed the need for AI experts in EA practice, so that data and prompts can be fed into the system in the best way possible (C3). This suggests that AI has not been fully developed into EA practice due to the lack of development of a specific EA AI tool.

Both authorities and developers expected that other practitioners already experiment with AI in EA practice (A1,D1). However, they did not sense any framework or expectation alignments that had been established in practice:

> *"I do not sense that there are any clear frameworks, conditions, or shared expectations in place. People use it without even noting whether they have used it or not. I think that is one of the problems. Having some ground rules would be most objective: Can it be trusted? Can it not? What exactly are we sending to each other?"* (D1)

The developers, therefore, state the importance of setting up some ground rules for what it is, whether they can trust it, what they, as developers, receive, and what they send to each other. This calls for being more transparent and setting up guidelines for how AI is utilised among practitioners to ensure transparency. Both authorities and developers state that an organisational change is needed before AI can be implemented (A3,D5). One authority states that they need to align with managers and colleagues, while one developer expressed that they were not allowed to use AI tools such as ChatGPT. Therefore, it calls for an organisational change and agreement among practitioners, even though the individual practitioner has the motivation for it, before it can be implemented into their practice.

One consultant points out that they have a hard time imagining AI will be fully integrated into practice, as the legislation also needs to be changed to accommodate the integration of information. This could imply that the consultants perceive that some legislative constraints need to be addressed before AI can be fully implemented into EA practice (C2).

Authorities expressed that limited resources could restrict their ability to implement AI into their work. The authorities claim that the new innovative projects require additional resources (A2), and to implement AI into their work, they need more development and attention than AI currently has (A3). The reason could be that smaller municipalities might not have the resources to be pioneers in AI innovation, and it is not often that they have the resources for development (A5,A6).

4.2 Extrinsic motivation

This section explores extrinsic motivation, specifically how the interviewed practitioners perceive the motivations of other practitioners regarding both the opportunities and capacities that other practitioners perceive AI to have in EA practice, as well as how other practitioners perceive the opportunities and capacities for implementing AI into EA practice. Thus, it reflects the individual practitioners' perceptions of others' motivations.

As an overall observation, many practitioners expressed uncertainty or a lack of understanding of how others perceive AI in EA. This could be due to the current limited integration of AI in EA practice. However, practitioners suggested that increased transparency and knowledge sharing could help build a better understanding of how AI is being applied and perceived by others. Despite this general uncertainty, some practitioners did express specific perceptions of how other practitioners might view opportunities and capacities related to AI in EA practice. This will be elaborated on in the following section.

Table 4. Perceived opportunities and capacities of other practitioners, divided into AI in EA practice and for implementing AI. In parentheses, the practitioners are indicated to show who expressed each perspective (C: Consultants, A: Authorities, D: Developers)

	Opportunities	Capacities
AI in EA practice	1. Resource optimisation (C,A)	1. Fear of job loss (C) 2. Professional pride (C) 3. Quality (C)
Implementing AI		1. Public perceptions (A) 2. Limited knowledge (D)

4.2.1 *Perceived opportunities and capacities for AI in EA practice*

4.2.1.1 *Perceived opportunities*

Regarding developers, consultants believed that developers often view EA as a regulatory formality. From this perspective, AI could be seen as a way to optimise time and resource use in fulfilling these requirements (C5).

One authority believed that consultants would be more inclined to adopt AI if it reduced the time and effort required to conduct EAs (A5). The same authority also believed that developers may seek to complete EAs as cost-effectively as possible, and therefore might turn to AI tools to streamline the process (A5).

One developer noted that developers' perceptions of AI's usefulness may differ depending on their priorities. The developer expressed that:

> *"It may also vary depending on the kind of developer you are, because if you are focused on saying 'this is my project' and you have drafted a project description, you might not care about it. It gives you some results, they look okay, and that is fine."* (D4)

This could indicate that some developers, perhaps those who mainly focus on getting their project approved, may see AI as a means to streamline the EA process and optimise time and cost.

4.2.1.2 *Perceived capacities*

One consultant had a perception that many of their colleagues were worried that AI would take some of their work. This could indicate that the extrinsic motivation for implementing AI in EA practice may be limited among some practitioners due to concerns about job loss (C1).

The same consultant also expressed concern that professional pride might be a concern for other consultants, meaning a robot could replace their professional expertise if the assessments can be run through AI (C1).

Another consultant suggests that other consultants may not trust the quality of AI-generated outputs for EA and prefer to conduct the work themselves (C6). This implies a perception that AI does not yet meet professional standards.

4.2.2 *Perceived opportunities and capacities for implementing AI in EA practice*

Table 4 provides an overview of the overall categories for the perceived capacities from external practitioners.

4.2.2.1 *Perceived capacities*

One authority expressed that authorities might worry about reputational risks. Specifically, they could fear that if AI-generated content became publicly visible, stakeholders might perceive it as impersonal or untrustworthy, negatively affecting how authorities are viewed (A4).

One developer observed that although other developers might be interested in using AI, they often lack the knowledge to utilise it effectively. This includes uncertainty about what AI can and cannot do, as well as the potential consequences of errors made by AI (D3). This reflects a capacity barrier resulting from a limited technical understanding.

5 Discussion

The aim of this research was to gain insight into the motivations and demotivations of Danish practitioners regarding the use of AI in EA practice. The interview results clearly showed that Danish practitioners are strongly motivated to implement AI in their work and perceive both opportunities for AI applications and its implementation in EA practice. However, the results also indicated that many perceived capacities were connected to barriers practitioners view as limiting factors for implementing AI in practice. Therefore, even though the practitioners recognise the potential and opportunities for AI, certain capacities continue to restrict its integration into practice.

The following discussion will begin by exploring the opportunities associated with AI in the EA process and place these within the broader context of global developments that put pressure on EA practice, as introduced in Section 1. Furthermore, the theoretical framework will be elaborated upon, particularly in relation to practitioners' ability to influence and change practice. Lastly, the discussion will consider directions for future research.

5.1 EA's role in the 21st century

As outlined in Section 1.1.1, current research suggests several opportunities for utilising AI in the EA process. Based on the analysis, additional opportunities have emerged that complement the existing opportunities for using AI in the EA process. Figure 4 presents an overview of the newest findings. Opportunities identified in this research are marked in grey, while steps where literature and practitioner insights overlap are shown in darker grey.

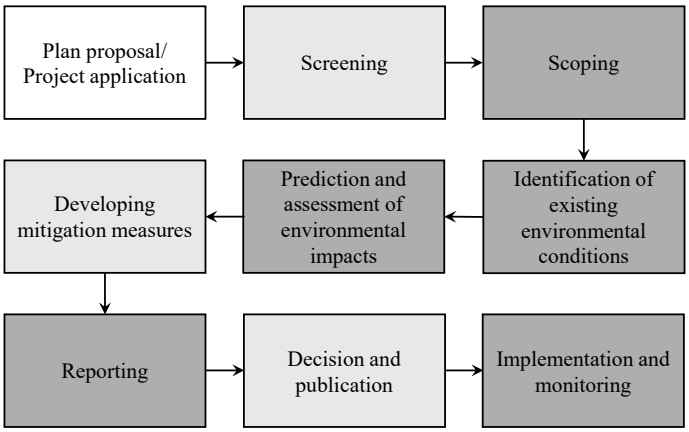

Figure 4. An illustration of where current literature and the interviewed practitioners see opportunities for AI in the EA process

These findings suggest that Danish practitioners perceive opportunities for applying AI throughout nearly the entire EA process, from screening to implementation and monitoring. This indicates that practitioners can see the value of utilising AI in their practice, which enhances their motivation to apply AI in EA practice. For example, additions to the figure include the screening phase, where practitioners identify the potential for AI to support the early detection of likely impacts using existing datasets. Similarly, in the mitigation phase, practitioners emphasise that AI could identify relevant mitigation strategies based on comparable cases.

However, no specific AI-related capacities were linked to the steps in the EA process. This may be because the perceived capacities mentioned by practitioners were primarily perceived as limitations to their ability to implement AI into their practice, such as limited knowledge or resources, as well as a lack of organisational interest. Therefore, even though practitioners perceive numerous opportunities for AI in the EA process, they also perceive capacities and barriers that limit their autonomy in implementing AI-driven changes. These barriers may indicate that practitioners have not yet reached the point where they can assess potential issues that may arise at individual stages of the EA process.

A broader concern emphasised in the literature was whether current IA practices are adequate to meet 21st-century challenges. For instance, Morrison-Saunders et al. (2014) argued that IA can support sustainable development by evolving toward more effective practices. Likewise, Bond et al. (2024b) suggested that IA practice should be optimised through reflective evaluation, knowledge sharing, producing constructively critical comparison studies, and stronger integration of sustainability principles and goals into planning. Interestingly, the practitioners' perspectives appear to align with these viewpoints. The practitioners suggested that AI could free up time by automating repetitive tasks, allowing them to focus on tasks that add more value to the EA process.

Furthermore, they also expressed interest in streamlining the process to improve the quality of the EA report. These views could reflect the optimisation goals highlighted in the literature. Moreover, practitioners emphasised the potential of AI to enable better knowledge sharing across practice, for example by learning from previous assessments. This aligns with Bond et al. (2024b) call for enhanced knowledge sharing within EA practice. These findings suggest that AI could improve processing efficiency and contribute to the broader evolution of EA, ultimately supporting a sustainable future. However, Morrison-Saunders et al. (2014) cautioned that efforts to streamline EA often prioritise efficiency over effectiveness. While practitioners view AI as a tool to reduce workloads and resources, there is a risk that such efficiency-driven applications could undermine the deeper goals of environmental protection and sustainable development. This could have a contradicting effect, if the focus is only on saving money and time, since it may reinforce procedural compliance rather than enhance meaningful EAs.

5.2 The practitioner's ability to integrate AI

This research has demonstrated that practitioners are highly motivated to integrate AI into their practice. However, their perceived capacities reveal that certain factors decide whether implementation is feasible. This contradicts the assumptions by Zhang et al. (2018), emphasising the practitioners' autonomy to act subjectively and fulfil their motivations for changing practice. This suggests that there are practical limitations that hinder practitioners' ability to act on their motivation to implement AI.

These capacities include both the individual's perception and their perceptions of others. Still, there are indications that practitioners not only consider their capacities but also those of other practitioners, which may further restrict their ability to act. For example, some authorities expressed that, among their colleagues, being transparent about their use could result in a negative public perception and a lack of trust among stakeholders. This suggests an interrelation between individual motivation and external perceptions, which may undermine the practitioner's autonomy to change their practice. Even

when an authority sees potential in adopting AI, perceptions of other practitioners can shape their sense of what is realistically possible to change.

A similar dynamic was observed among consultants, who emphasised other consultants' concerns about potential job losses and scepticism regarding the quality and professionalism of AI. However, there was also a clear organisational interest among some consultants, with a few organisations already experimenting with and implementing AI in their work. This could indicate that, despite external concern, there are also motivating factors that could enhance the individual practitioner's motivation to adopt AI into their practice. On the other hand, several practitioners expressed that there were some organisational barriers, such as the AI implementation requiring internal motivation and endorsement from the top management. Limited organisational endorsement can therefore negatively influence the practitioner's motivation by restricting their willingness or ability to integrate AI into their work.

As a result, practitioners tended to wait for one another to take the first step. This implies that something fundamental is missing in practice before AI can be fully utilised. The practitioners are holding back, waiting for clear guidelines, specific EA-related AI databases, and others to take initiative. This hesitancy could also explain why AI has not yet been widely implemented, since some overall structural framework appears to be required before AI can be integrated into the EA process. These structural gaps can also be viewed as capacities that limit the individual practitioner's ability to act on their motivation.

Therefore, the question now is: what should happen next, and who should lead the implementation of AI? The results implied that consultants have already been introduced to AI tools within their organisations. However, the initial purpose of these tools was primarily to provide practitioners with insight into the potential applications of AI in practice. They also expressed that these tools are not yet fully developed and cannot be fully implemented in their everyday practice. As technology evolves and consultants fully integrate AI into their practices, they may become the frontrunners. It will only be a matter of time before consultants are expected to be transparent with developers about their use of AI. This transparency could initiate the shared discussion, practitioners emphasised, helping to establish common ground rules for navigating this technological development.

Furthermore, as mentioned in Section 1, IAIA is currently working on developing best practice principles for AI in IA. Practitioners in this research also identified the lack of such guidelines as a key barrier to implementation, as clear standards for effectively using AI are currently missing. These IAIA principles could serve as a valuable guide for future AI use, helping to define a framework within which different practitioners can integrate AI into their work. The hope could be that, by incorporating these guidelines into practice, a set of shared norms and frameworks can be established. This could support consensus among practitioners, ensuring that AI is applied consistently and thoughtfully across the field.

5.3 Future research

This research serves as an initial investigation of the practitioner's role in shaping practice, focusing on how AI is perceived and how its opportunities and capacities may facilitate its integration into EA practice. Therefore, the study identified emerging trends and laid the groundwork for more in-depth future research. The following section will elaborate on the potential directions for future research, particularly regarding the role of AI in EA practice and the influence of practitioners in shaping this development.

First and foremost, this research highlighted several trends among practitioners, including a strong interest in collaboration and the development of shared guidelines and databases, which could serve as a foundation for future research on AI in EA practice.

Within the theoretical framework, 'spaces for practice', this research did not explore the dimension of 'spaces for action' due to the absence of discussions and interactions among practitioners. Figure 5 illustrates the other dimension of the theoretical framework, 'spaces for action', where experienced opportunities are included in the action space and experienced capacities are filtered out. Future research could incorporate this additional perspective of collaboration among practitioners, an action that practitioners in this research hope for. This collaboration could include workshops where different practitioners meet to discuss how AI should be adapted in Danish EA practice, share experiences, and potentially explore how to establish a shared AI data sample that includes previous EAs and their shared EA knowledge. It would be valuable to investigate which perceived opportunities and capacities the practitioners bring into action spaces, which are filtered out, and what new experienced opportunities and capacities may emerge from interactions and discussions among practitioners.

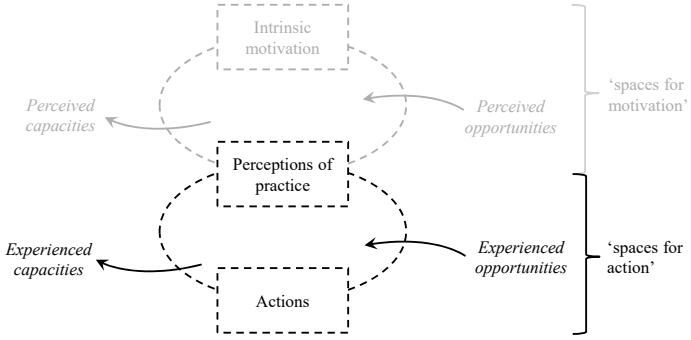

Figure 5. The 'spaces for practice' illustration, both 'spaces for motivation' and 'spaces for action'. This Figure highlights 'spaces for action', since this dimension could be a focus for future research (Inspired by Ravn Boess (2023)).

This would offer an interesting extension to the current research by examining how the perceived opportunities and capacities identified in this research will be managed within the action space. It would also help determine whether these perceptions will remain in the space for motivation or if it is something the practitioner will bring into practice.

External validity was limited in this research due to a specific national context. However, the findings are analytically generalisable and may inform similar debates in other EA practices. The study offers insights into the motivations of Danish practitioners for AI, which may be applicable to EA practices in other countries. Future studies could test the transferability of these findings through comparative research. It could be relevant to conduct similar research in other countries and compare the Danish results with results from other countries' EA practices. Such a comparison would allow to assess practitioner's motivations and demotivations for implementing AI in other countries' EA practices, identify whether AI has already been integrated elsewhere, and explore common opportunities and capacities for implementation. This cross-country comparison could provide a more nuanced understanding of EA practice globally, rather than from a single national perspective. This approach is particularly relevant because EA systems differ significantly across countries in terms of procedures, stakeholder priorities, and available resources. Conducting similar analyses in other countries would reveal both shared challenges and distinct practices, highlighting where and why differences occur. Furthermore, as individual practitioners shape and evolve practice through their interpretations and expertise, gathering diverse practitioner perspectives from other countries would deepen the understanding of practitioners' roles in shaping EA practice.

6 Conclusion

This research has explored Danish EA practitioners' perceptions of AI's integration in EA practice. The research captured the opportunities and capacities that shape their motivation to implement AI and highlighted the role of these perceptions in enabling or restricting their motivation and ability to change practice. Findings clearly showed a strong motivation to integrate AI across practitioners, driven by perceived opportunities such as increased efficiency, knowledge sharing, and streamlined processes.

However, the research also revealed several perceived capacities that restrict practitioners' ability to act on the motivation. These include limited knowledge of AI, the absence of shared methodologies or guidelines, a lack of organisational support, and uncertainty about the trustworthiness and applicability of AI-generated outputs. Furthermore, a noticeable hesitancy to take initiative, often linked to expectations that others should lead, illustrates how practitioners' interrelations are central in shaping the space for motivation and ultimately influencing what is perceived as possible in practice. This hesitancy highlights the role of underlying practice norms, structural limitations and unspoken expectations, which together can restrict innovation even when motivation is high.

Applying the 'spaces for practice' theoretical framework, this research revealed how perceived opportunities and capacities influence how practitioners interpret what is realistic or appropriate within their role. While many are internally motivated to explore AI, their actions are shared by external structures, expectations and perceived norms. These findings reinforce that innovation in EA practice depends not only on individual readiness but also on collective conditions that enable or restrict change.

To move forward, there is a clear need for stronger collaboration among practitioners. Creating shared databases, developing practical guidelines for AI use and promoting spaces for open dialogue could help practitioners translate motivation into meaningful change. It is not enough for individual practitioners to believe in AI's opportunities; they must also be supported by systems that allow experimentation, ensure consistency and legitimise new ways of working. Further research should explore how such collaborations might take shape in practice and how different practitioner groups respond to and influence the evolving role of AI.

Ultimately, this research shows that Danish EA practitioners are open to change and eager to explore

AI's potential. The task ahead is to create the practical, institutional, and collaborative conditions in which these motivations can be translated into practice.

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