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My academic research focuses on the developers' perspective of AI ethics. The responsibility of the tech industry rises, and we should start to understand and value the ethical agency of the AI developers. In my lecturing, the essential perspective is ethical design and its methodologies. Affiliations: Future Ethics research group, AI Ethics work group by The Finnish Ministry of Economic Affairs and Employment.

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Creating an ethical framework for applying artificial intelligence in FM

Facility management faces new opportunities and challenges through the emerging solutions of artificial intelligence (AI) technologies. The rise of AI technologies attaches to the continuum of digitalization and thus is the other grand challenge of facility management's future along with sustainability (Bröchner et al., 2019).

With powerful technologies, great responsibility follows. Ethics of AI technologies has been recognized as an essential field of research and an integral part of applying AI. By creating an ethical framework, we can ensure both ethically aligned conduct and efficient and innovative adoption of AI technologies in facility management.

Ethics of AI is not an overriding field in ethics, but adheres to the tradition of information technology ethics. Many themes debated might be familiar from the earlier experiences and ethical implications of digital and information technology, big data, analytics, and modeling systems. However, ethics of AI forms an vital development of ethical analysis and thinking, and thus awareness towards the field's themes and concerns can be crucial for the practitioners and scholars of facility management. Knowing the topics of ethics of AI can help to form an overall ethical awareness, called for by Grimshaw, B. (2001).

AI Technologies for Facility Management

AI technology can impact facility management's structure, business logic, organization, and culture thoroughly. To clarify the starting points of this paper, the term of facility management refers to the definition by Barrett & Baldry (2003): *"an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organization in order to create an environment that strongly supports the primary objectives of that organization."*

Possible application areas of AI in FM include: security robots, control and surveillance systems, autonomous guidance, catering and cleaning, and intelligent maintenance applications. (Hoar et al., 2017). Definition of AI is still under debate - and often challenged by the computer scientists and engineers - but some baseline specifications of AI will make the societal and ethical discussion more valuable.

The definition of AI by the European High-Level Expert Group is a good starting point:

"Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals.

AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications)."

The report "Artificial intelligence: What it means for the built environment" (2017) desribes broadly various opportunities that AI technologies provide for facility management. In addition to the advanced methods in construction modeling and design, AI can support, boost and change the basic functions of everyday facility management like catering, cleaning, helpdesk and reception services, security functions, and maintenance. AI also helps to advance the automation and connect devices and sensors in smart city and smart buildings solutions.

Ethical grounds for applying AI

Several ethics report and ethical frameworks has been published about the emerging AI technologies. To mention a few: IEEE published Ethically Aligned Design (2018); ACM updated its code of ethics (2018); France (2018), the UK (2018), Canada (2019) and Finland (2019) published their national report of AI ethics. An important and encouraging report for this paper, "Ethics guidelines for trustworthy AI" (2019) by the European Union's High-Level Expert Group on AI, came out in April, 2019.

After the formulation of principles and guidelines, even more critical phase is the following: how to start bringing the guidelines alive and integrating principle-level conduct to the practice. Ethical assessment and evaluation, ethics by design, and organization-wide awareness of ethical issues related to AI technologies become the key issues. The humble but profound goal of this paper is to bring a first few thoughts and ideas about those key issues to the discipline of facility management.

AI is a general-purpose technological change, and it will dramatically affect most industries. When approaching industry-specific ethical alignment, the first step could be the transformation of general and high-level guidelines to suit the industry-specific requirements. For the level of ethical alignment in AI solutions, an example can be found from the earlier sustainability thinking. Alexander and Brown (2006) present in their paper five levels for sustainability: compliant, environmentally aware, balanced performance, socially responsible and corporate citizen. Just by replacing "environmentally aware" with "aware of ICT and AI ethics", a preliminary measurement scale can be proposed.

Creating an ethical framework for AI in FM

As Michael May (2018) states, the sector of facility management should acquire necessary skills to utilize AI technologies, but at the same time remember the ethical concerns and questions related to AI solutions.

There is a strong tradition of ethical conduct and guidelines in facility management, and similar approach should be applied to the AI technology from the beginning.

The European Guidelines for Trustworthy Artificial Intellingence offers a good opportunity to adapt the presented ethical principles and requirements into more practical sector. While the research literature bursts over with the overall level principles of ethical AI, industry-specific application of these principles should be greeted with joy.

The European High Level Expert Group's report "Ethical Guidelines for Trustworthy AI" describes seven high-level principles and ethical categories as the key requirements of ethical AI. Writing these principles open and reflecting them to the field of facility management, it is possible to find key remarks and control points for ensuring ethical AI in facility management. The following key points from the report seem to be important to ask and analyze also when it comes to TM:

Human agency and oversight

AI solutions should promote fundamental rights and support human autonomy. AI technologies offer powerful tools for the implementor, and their use should be assessed and monitored to minimize the possibility of misuse, e.g. violating the right to privacy or discrimating based on age or gender, abilities or characteristics when it is not justified. Another essential point is to ensure human oversight: although the autonomy level of AI solutions rises, we have to ensure the capability for human intervention and control of all the AI systems.

Technical robustness and safety

To some extent, we have to rely on it that technology vendors pursue technical robustness, but buyer-side evalution is necessary as well. What is the skill set needed for evalution of technical robustness and safety? Do the facility management community and facility managers have enough knowledge, insight and experience for the evaluation? We need to ensure that they do, or can find suitable people to do so.

Privacy and data governance

Technological development during the past decades has challenged our right to privacy. The implementors of technology solutions are extensively capable of collecting data about us. AI technologies increase these capabilities and reinforce the ability to build a wide range of applications on top of the collected data. Defending privacy can easily conflict with other purposes: As described by Bröchner et al. (2019), privacy and personal integrity might clash with e.g. other themes of sustainability, like environmental development for lowering energy consumption based on data-heavy analysis. These situations require careful analysis and decision-making.

Transparency

Transparency includes traceability, explainability and strong call for communication. How to enable transparent conduct to all technology solutions? How to use co-creation to involve all the stakeholders? Transparency has been recognized as an essential principle in various ethical guidelines and codes, but in practice, achieving transparent organization culture and practices seems difficult. Are your organization's facility managers prepared to be transparent in the planning and implementation of AI solutions? And most importantly, are they prepared to be transparent if the AI solutions fail?

Diversity, non-discrimination and fairness

AI technologies make some of our societies' biases and injustices visible, and AI solutions should be monitored against discriminating effects. For example, facial and object recognition systems might recognize white male persons better than anyone else (Buolamwini & Gebru, 2018), as the makers and internal test subjects have mostly been white males. Also accessibility design appears essential: when implementing autonomous and complex AI systems for helpdesk, access control or catering, the needs of different people and groups have to be taken into account as comprehensively as possible.

Societal and environmental wellbeing

AI solutions should promote societal and environmental wellbeing. How is facility management answering to the societal challenges of AI technologies? How to optimize workplaces to human-robot-interaction? Virtual and augmented reality offers efficiency for meeting and face-to-face collaboration, but how to ensure socially viable environment for work and life?

Accountability

Who will be responsible and accountable? For a data breach? Security failures or safety issues? Mistakes in access control or recognition systems discrimating certain population groups? Accountability and responsibility should be negotiated and agreed clearly in every AI implemention. Accountability should be communicated clearly, and responsibility should be real, not vanishing under bureaucracy.

Closing remarks

We are still in the phase where the facility management community sorts out and plans how and where to utilize AI solutions. Ethics has to emerge alongside these concerns from the beginning, and industry-specific ethical guidelines should be defined and agreed together with the community so that ethical concerns are solved with the introduction of the technology, rather than added as a band-aid after implementation. Strong ethical aligment will likely result in the most valuable, societally viable and long-lasting achievements.

In the AI ethics community, we are moving to analyze and solve how to integrate the ethical guidelines as well as possible to the practices in the more specific industries affected by AI. Technology industry should carry a strong responsibility for the emerging technologies, but other industries should follow the ethical conduct when integrating AI technology to their everyday solutions. This paper functions as a start of the debate and analysis.

Ethics of AI is not about mystical fear-mongering, but about the challenging transformation affecting most industries. Awareness about the themes and concerns of AI ethics helps to integrate ethical thinking to the existing models of handling innovation, change and professional conduct. Innovation, change and professionality are core themes for facility management, and aligning AI ethics to the themes and the discipline itself is compulsory.

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