AI in Construction

Proposal for New Task Group

Background Information

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Introduction

It has been observed that AI in Construction is an emerging megatrend, and there is currently no dedicated task group within CIB focusing on this area. Extensive research and innovation work is being conducted globally in the field of AI in construction. Therefore, it is time to establish a new task group that brings together researchers and companies around this topic.

Artificial intelligence (AI) is transforming various sectors, including construction. In workplaces, AI automates routine tasks, boosting efficiency and allowing workers to focus on strategic roles. In construction, AI can be applied at all project stages, from pre-design to post-construction. Economically, the global AI market is expected to grow by 15.8% annually from 2024 to 2030, reaching $739 billion (€680 billion) by 2030.

Top 20 countries in the Stanford Institute for Human-Centered AI's Global Vibrancy Ranking are presented in figure 1. The classification is based on eight main pillars: research and development, responsible AI, economy, education, diversity, policy, public opinion, and infrastructure (aiindex.stanford.edu/vibrancy/).

Globally the construction sector is crucial for economic growth, creating jobs and stimulating related industries. It contributes over $10 trillion annually to the global GDP, and digitalization could increase its market capitalization by $1.6 trillion each year. Despite AI's adoption in various industries, construction lags behind due to complex project management involving multiple stakeholders and fragmented operations. Data management is challenging due to scattered, unstructured data and sometimes limited or unknown quality data leading to inefficiencies. The insufficiently skilled workforce may also benefit from the advantages that AI may offer, and it may lead better productivity in different tasks.

According to a report by McKinsey, the construction industry is worth more than $10 trillion a year, equivalent to 13% of the world's global gross domestic product (GDP). By implementing more digitalization technologies, the potential market capitalization could increase by $1.6 trillion each year, further establishing the construction sector as one of the largest sectors in the global economy.

AI can address these challenges by improving data management, data quality and reliability, integration, and analysis, potentially saving 10-15% of total construction costs. AI solutions can automate data collection, ensure consistency, and analyze unstructured data, enhancing decision-making and project management. Furthermore,
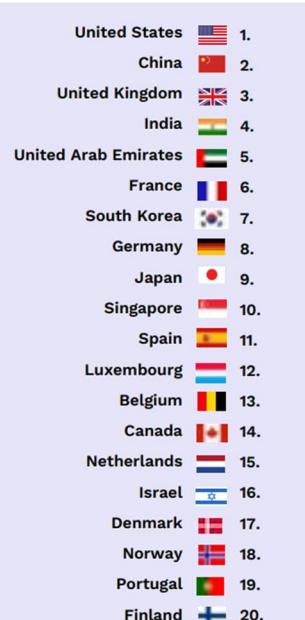
it may be used to optimize the full supply chain, including logistics, and maximize the lifetime of structures or assure the circular re-use of structural components after end-of-life.

The development, innovation, and research in AI for the construction sector play a significant role. Research lays the foundation for the digitalization and industrialization of the construction industry. Without research, progress would be too slow.

The upcoming CIB Task Group is expected to significantly impact the development of the construction industry. This group will focus on advancing research and innovation in AI and digitalization within the sector. By fostering collaboration among international experts and stakeholders, the task group aims to simulate knowledge sharing and promote AI skills development, accelerate the adoption of AI technologies, improve data management practices, and enhance overall project efficiency. Their efforts will help establish standardized processes and best practices, driving the construction industry towards a more digital and industrialized future.(https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/why-agents-are-the-next-frontier-of-generative-ai)

AI in Construction survey

The interests of the new task group work were clarified by questionary in March-April 2025. The link was delivered in LinkedIn and AI in AEC congress 2025 in Helsinki. The brief summary of the questionnaire results is attached (Appendix 1).

The CIB AI survey provided valuable insights into the current state and future direction of AI applications in the construction industry, with responses representing a broad geographical spread, including countries from the United Kingdom, Netherlands, Finland, Portugal, Denmark, Italy, the United States, New Zealand, Malaysia, Indonesia, and Australia. The participants represented diverse organizational roles and varying degrees of involvement with artificial intelligence technologies. Many organizations are actively involved in ongoing AI construction projects. Some are in the planning phase, preparing to implement AI solutions soon. Only a small number reported no current or planned AI activities.

The interest areas

The interest areas in AI in Construction were defined according to responses. The main interest areas were the following:

Digital permitting processes: Streamlining and automating the approval and compliance procedures.

Circular construction: Enhancing sustainability through efficient resource use and waste reduction.

Optimization of design processes: Improving design accuracy and efficiency using AI tools.

Mechanical, electrical, and plumbing (MEP) design: Automating and optimizing MEP systems in buildings.

Housing renovation: Utilizing AI for planning and executing renovation projects.

Real estate development: AI-driven insights for property development and management.

Infrastructure development: Enhancing the planning, construction, and maintenance of infrastructure projects.

Experimental data handling: Managing and analyzing experimental data for better decision-making.

Microstructure modeling: Using AI to model and predict material behaviors at the microstructural level.

Diagnostic techniques: Assessing structural and material deterioration using AI.

Corrosion big data analysis: Improving durability and materials management through advanced data analysis.

Analytical AI solutions: Developing AI tools for complex data analysis and problem-solving.

3D data generation and simulation: Creating and simulating 3D models for construction projects.

Large language models (LLMs): Applying LLMs for data visualization and knowledge processing.

Natural Language Processing (NLP): Leveraging NLP for better communication and information retrieval.

Ontologies and Knowledge Graphs: Structuring and connecting data for enhanced knowledge management.

Generative AI: Innovating construction solutions through generative AI techniques.

Sustainability-driven AI applications: Focusing on AI solutions that promote sustainability in construction.

Socio-legal and ethical challenges: Addressing the implications of AI deployment throughout construction project lifecycles.

Three main key conclusions were made according to the survey.

Broad but Fragmented AI Engagement – The survey revealed diverse and growing interest in AI across construction, including areas such as digital permitting, sustainability, renovation, MEP design, and educational applications. However, the current landscape is characterized by fragmented efforts and a lack of approaches that address the sector's systemic challenges in a coordinated way.

Foundation for Future Automation – Unlocking next-generation process automation across the construction value chain will rely on the use of adaptable foundation models and AI agents that can be fine-tuned to different tasks and contexts mentioned in the survey.

Critical Role of Data – Standardized, interoperable data is essential for deploying AI effectively across various use cases. Enabling data flow across the value chain through standardized data and clearly defined data sources (e.g., product data, BIM, Knowledge Graph databases) can unlock next-generation process automation through the use of adaptable foundation models.

Objectives and scope of work

The main objective of the task group is to establish a unique global collaboration network in the field of AI in construction. This network aims to accelerate sustainability, enhance data management, and drive the industrialization of the construction sector. By focusing on these areas, the task group will address future needs for more efficient, ethical, and scalable AI systems, ensuring the construction industry is well-prepared to meet the challenges and opportunities of tomorrow.

The task group brings together AI developers and the construction industry to work collaboratively towards a common goal.

The task group will

- Promote international cooperation and knowledge exchange in the field of AI in construction research and innovation
- Develop and share the best practices and innovative solutions.
- Organize meetings and conferences where members can share research findings and ideas.
- Prepare reports and recommendations that support industry development and standardization in AI in Construction.

The scope of AI in construction will be defined during the first year of operation. The task group members will have a significant impact on the scope. However, it seems that the standardization of data, data flow enablement, foundation models, process

automation throughout the construction lifecycle, interoperability, and robust data infrastructure will play important roles in shaping the scope of work. These elements will be crucial from different perspectives in the design and construction of future ethical and scalable AI systems.

Name and affiliations of Coordinator

The coordinator candidate of the task group is Associate professor (1.5.2025->) Piia Sormunen from Tampere University, Faculty of Built Environment from Civil engineering department. Prof Sormunen is the member of the board, and she is nominated as a vice president in next board period 2025-2028. (Appendix 2. CV of Piia Sormunen)

Tampere University is committed to taking on the coordinator's role in the use of AI in construction. (Appendix 3. Support letter).

As the Coordinator candidate for the upcoming CIB Task Group on AI in Construction, Piia Sormunen is deeply committed to advancing the integration of artificial intelligence within the construction sector. Research and innovation are the cornerstones of progress in AI for construction. Sormunen will focus on advancing these areas, driving the digitalization and industrialization of industry. By fostering collaboration among international experts and stakeholders, we aim to establish standardized processes and best practices, propelling the construction sector towards a more digital and industrialized future.

Membership

The proposal of the new task group was presented to the CIB board by Prof Piia Sormunen by email in November 2024. The proposal got wide support from CIB board members.

In the survey the interest in joining the task group was asked. Nearly all responders wanted to stay informed or were interested in to participate the task group. The survey showed that there is a very wide range of interests in AI in construction and will bring hopefully new members to CIB and task group. The negotiations with couple of possible new members have been started (Granlund Ltd and Aalto university, Finland)

The kick-off will be held at the World Building Congress in May 2025 at Purdue University as a hybrid event. The invitation to join the task group will be targeted at CIB member organizations and members in the form of a LinkedIn invitation, once the task group receives approval from the CIB working commission. WBC2025 will be the perfect place and time for further marketing of the task group.

Planned Meetings or schedule

Preliminary yearly planned meetings are the following:

- On-line workshop (twice a year)
- Yearly AI in AEC congress ([AI in AEC 2025 - RIL - Finnish Association of Civil Engineers](#)) in Helsinki, Finland. The task group will join the congress and have parallel hybrid workshops during the congress. The discussion with organization RIL, Finland and CEO Janne Tähtikungas has been held.
- World Building Congress every third year

The meetings and schedules will be decided in more detail in the first year.

Planned research outputs

The task group will publish yearly report of AI in Construction projects outputs worldwide. The report will be written based on yearly surveys and workshop/meeting materials.

Proposed CIB Encouraged Journal relationships

Will be defined later

Proposed Student Chapter relationships

Will be defined later

Communication proposal

The task group will build up an informatic Web-Page in CIB world.org. Besides, LinkedIn will be used sharing information and the latest news in web-pages. Other channels also will be considered and defined.

Envisaged lifetime

The work will start with Task group first three years and the aim is to establish commission group later.

Appendix 1. AI in Construction: Findings from the CIB Survey

Osku Torro, Piia Sormunen

Key Conclusions

1. **Broad but Fragmented AI Engagement** – The survey revealed diverse and growing interest in AI across construction, including areas such as digital permitting, sustainability, renovation, MEP design, and educational applications. However, the current landscape is characterized by fragmented efforts and a lack of approaches that address the sector's systemic challenges in a coordinated way.
2. **Foundation for Future Automation** – Unlocking next-generation process automation across the construction value chain will rely on the use of adaptable foundation models and AI agents that can be fine-tuned to different tasks and contexts mentioned in the survey.
3. **Critical Role of Data** – Standardized, interoperable data is essential for deploying AI effectively across various use cases. Enabling data flow across the value chain through standardized data and clearly defined data sources (e.g., product data, BIM, Knowledge Graph databases) can unlock next-generation process automation through the use of adaptable foundation models.

The CIB AI survey provided valuable insights into the current state and future direction of AI applications in the construction industry, with responses representing a broad geographical spread, including countries from the United Kingdom, Netherlands, Finland, Portugal, Denmark, Italy, the United States, New Zealand, Malaysia, Indonesia, and Australia. The participants represented diverse organizational roles and varying degrees of involvement with artificial intelligence technologies.

Organizations indicated significant engagement with AI projects. Several are actively involved in ongoing AI construction projects, while others are in the planning phase, preparing to implement AI solutions in the near future. Only a small number reported no current engagement or planned activities related to AI. This illustrates a strong trend toward the adoption and integration of AI within the sector.

The areas of AI applications highlighted by respondents are diverse, underscoring the broad potential impact of these technologies. Notable areas mentioned include socio-legal and ethical challenges related to AI deployment throughout construction project lifecycles, digital permitting processes, circular construction, and optimization of design processes. Additionally, mechanical, electrical, and plumbing (MEP) design, housing renovation, real estate, and infrastructure development were also identified as key areas of focus.

Respondents emphasized the importance of utilizing AI to address experimental data handling, microstructure modeling, diagnostic techniques for assessing structural and material deterioration, and improving durability and materials management through corrosion big data analysis. Furthermore, the implications of AI for jobs, skills, transparency in decision-making, and biases inherent in AI technologies were recognized as significant considerations.

Educational considerations were also highlighted, with respondents noting the necessity to update pedagogical methods to better prepare students for AI-integrated industry environments, as well as adapt assessment practices to account for the increased use of generative AI by students.

Moreover, there is pronounced interest in analytical AI solutions, 3D data generation and simulation, and the application of large language models (LLMs) for data visualization and knowledge processing. Respondents indicated strong motivations to expand their research activities, particularly in leveraging Natural Language Processing (NLP), ontologies, Knowledge Graphs, and generative AI to develop innovative, knowledge-driven construction solutions.

Sustainability emerged as a significant theme, reflecting broader industry priorities. Several respondents specifically identified sustainability-driven AI applications as a key area for future exploration and development.

Regarding participation in future collaborative AI initiatives, there was clear enthusiasm among respondents. Many expressed active interest in contributing to collaborative projects, highlighting a robust willingness within the industry to cooperate and share expertise. Others expressed their intention to stay informed about developments, demonstrating broader interest and commitment to keeping pace with industry advancements.

Considering these survey results, there is clear momentum for advancing AI in the construction industry. A particularly promising direction involves the development and deployment of multipurpose foundation models—large, adaptable AI systems that can address a broad range of tasks across the construction value chain, including many of the application areas mentioned in the survey, from planning and design to operations, maintenance, and compliance. It is thus suggested that future research efforts focus on developing systemic solutions that enable seamless data flow (e.g., through AI agents) and the effective integration of foundation models across all phases of the construction lifecycle, as this is key to unlocking scalable and impactful AI solutions in the construction industry.

Furthermore, establishing standardized data (e.g., product data) and clearly defined data sources (e.g., BIM and Knowledge Graph databases) is critical for achieving interoperability across platforms, tools, and stakeholders. This kind of data

infrastructure not only improves operational efficiency but also unlocks the full potential of multipurpose foundation models that can be adapted to various roles within the construction value chain. A standardized, and trustworthy data also supports transparency, traceability, and accountability—ensuring that AI systems remain ethical, robust, and scalable as they become more deeply embedded in industry practice.

Appendix 2. CV of Piia Sormunen

CV Piia Sormunen

1. Personal details and the date of the CV

Sormunen, Piia Riitta (ex-l Lamberg) (female); Date of birth 12.4.1970; Finnish citizen

Date of the CV 8.11.2024

2. Degrees

Doctor of Science (in Technology), Helsinki University of Technology, Department of Mechanical Engineering, 2004

- Heating, Ventilating and Air Conditioning Technology
- Applied Thermodynamics and Structural Engineering and Building Physics

Master of Science in Engineering, Lappeenranta University of Technology, Department of Energy Engineering, 1994

- Energy economics
- Energy Procurement

3. Other education and expertise

Basic Studies in Educational Sciences (25 cr), Helsinki University

Vocational Pedagogical Studies (60 cr), Haaga-Helia School of Vocational Teacher Education, 2014

Future leader (TUJO)- Education program (26 cr), 22.11.2011-13.11.2012 Business leadership education, Kiinko Real Estate Education

4. Language skills

Finnish: Native; English: Excellent; Swedish: Moderate; French: Basics

5. Current employment

1.5.2025-> Tampere University, Faculty of Built environment, Civil engineering, Associate Professor, Building services (full-time)

1.5.2020-30.4.2025 Tampere University, Faculty of Built environment, Civil engineering, Industry Professor, Building services (part-time 60%),
Head of Building services research group

1.5.2020-> Granlund Oy, Development Director, Construction and Property Development (part-time), Executive Board member in corporate R&D board, South Finland business board and Construction and Property Development board

1.7.2022 -> Board member of The International Council for Research and Innovation in Building and Construction (CIB) 2022- 2025. ([CIB research and innovation in the built environment (cibworld.org)](#) Sormunen has been nominated for the position of Vice President in the upcoming board election for the 2025-2028 term.

6. Previous work experience

2015-2020 Granlund Consulting Oy, Member of the Executive Team, Division Director of Lean construction

2012 - 2015 Metropolia University of Applied Sciences
Head of Department, Energy Smart Environment,
Senior Lecturer, Building Services Engineering, Energy Engineering

2010-2012 Granlund Oy
Member of the Executive Board,
Director of the Energy and Environment Division

2002-2009 Insinööritoimisto Olof Granlund Ltd, Granlund Ltd
R&D engineer and
Group Manager in R&D department

1997-2002 Helsinki University of Technology
Researcher
Doctoral Student in Building Physics doctoral school

7. Awards and honours

Teknillisten Tieteiden Akatemia membership – Life-time membership ([ttatv.fi)](#)

Piia Sormunen, one of the Finland 100, women leaders! The campaign selected 365 women leaders. 2017 [Nostamme naisjohtajat esiin! - Naisjohtajat](#)

HVAC woman of the year in Finland, 2015

Women's Idea and Innovation competition in 1999, 1st prize (PCM cooling system)

8. Other key academic merits

Lean Construction Finland, LCI Finland, board member 2021-2022, chair of the board 2022-2023.

Referee for scientific publications such as Solar Energy, Energy and Buildings, International Journal of Heat and Mass Transfer.

9. Other merits

Sormunen is coordinator of Talotekniikka 2030 consortium. She is responsible of MEP CEO work group and leading vision work in this group. ([Talotekniikka 2030 - Yhdessä kohti uudistavaa visiota | Aalto-yliopisto](#)). She acts as a PI in Tampere University in this consortium.

She has worked as a Lean construction trainer at Granlund as well as for clients in construction sector. She has worked as a trainer for construction companies Skanska, SRV, Lujatalo, and Hartela in Lean construction (a total of 1500 person-hours from 2015 to 2020

She has delivered lectures at Aalto University, Kiinko, and various MEP industry seminars and workshops throughout her career, both in Finland and internationally.

During the year 2022-2024 she has been invited as a keynote speaker in the following Symposium and Conferences:

- R3 Symposium (2002), Naantali, Finland
- Infectious Diseases Symposium (2023), Bukarest, Romania
- Innova Med Forum (2023), Warsow, Poland
- Italo- Finnish Future Hospital Forum (2024) Milan, Italy
- Empowering Sustainability with Digital Solutions (2024) Munich, Germany
- Talotekniikka Next (2023,2024) Helsinki, Finland

In addition, Sormunen has been invited different kinds of finnish construction sector seminars as a session leader or speaker (e.g Lean rakentamisen päivät 2022, 2023, 2024).

10. Publications

[Piia Sormunen (0000-0002-6983-2353) - ORCID](#)

Tampere University

27.4.2025
Civil engineering

Support Letter for Piia Sormunen's Appointment as Coordinator in "AI in Construction" task group

Sami Pajunen, Faculty of Built Environment, Civil Engineering

To the esteemed CIB Programme Committee,

It is my pleasure to recommend Piia Sormunen for the role of Coordinator within the CIB Task Group AI in Construction. Piia has consistently demonstrated exceptional leadership, strategic thinking, and an unwavering commitment to fostering international collaboration in the built environment research domain. Her expertise and dedication make her an outstanding candidate for this position.

Piia has extensive experience in research and has actively contributed to the advancement of task groups. Her ability to organize, support members, and build meaningful international networks is evident. She possesses a strong vision for enhancing the impact of the task groups and understands the essential responsibilities of a Coordinator.

Piia's keen ability to identify and promote opportunities for growth ensures that she can lead the CIB task group with confidence.

For these reasons, I recommend Piia Sormunen for this role. She has all the qualities necessary to fulfill CIB's expectations and contribute significantly to the success of the Task Group.

Sincerely,

Sami Pajunen

Professor, Head on the Unit
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Sami Pajunen

professori Kevyt- ja erikoisrakenteet

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