

A nighttime photograph of a stone bridge with multiple arches spanning a river. The bridge is illuminated by streetlights, and the lights create starburst effects in the water. In the background, a large, ornate church with a dome and two towers is visible, also illuminated. The sky is a deep purple and blue, and the water reflects the lights and the buildings.

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Accelerating BIM adoption

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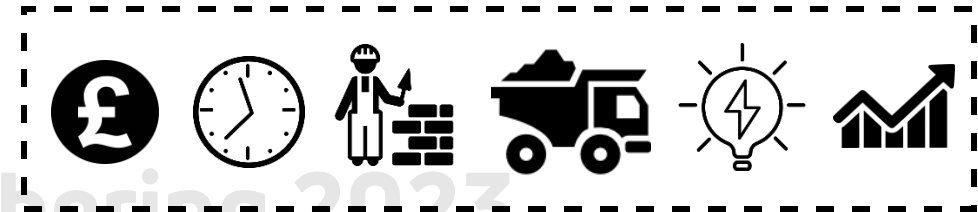
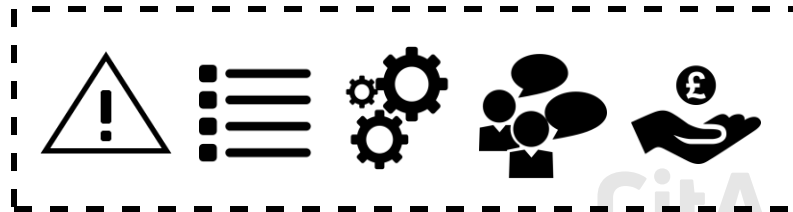
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The Development of a Lean Digital Construction (BIM)
innovation framework for Irish Construction SMEs.

Marina Andreou, Barry McAuley and Alan Hore

Low productivity and waste in the AEC Industry



Reasons that lead to low productivity

- Defects in construction
- Not Identifying the reasons that cause delays
- Bad communication and collaboration
- Failure of enterprises to deliver projects on time and within budget.

Different forms of waste

- Waste of money
- Waste of time
- Waste of effort
- Waste of materials
- Waste of energy
- Waste of opportunities

BIM and Lean construction

BIM

Advantages

- Reduced projects' costs
- Reduced breakdowns and minimise rework
- Better reputation
- Enable professionals to deliver projects on time
- Improved management of information
- Better collaboration

Disadvantages

- Cost to implement
- Upfront time to collect information
- Training needed and expectations
- Security and ownership

Lean construction

Advantages

- Eliminate waste.
- Amplify learning.
- The possibility of making decisions as late as possible.
- Delivering as fast as possible.
- Empowering, motivating and trusting team members.
- Build integrity and add value.

Disadvantages

- Cost to implement
- Training needed and expectations

The future of BIM in Ireland

- The third national survey about the level of BIM adoption in Ireland (2017) revealed that 85% of the enterprises that took part in the survey believe that Ireland should follow the United Kingdom's example and mandate BIM.
- Nevertheless, the Irish government has actively promoted the use of BIM for major complex projects. Continuously, as of 2019, the Irish government has stated it will require a BIM Level 2 implementation on complex projects.
- From January 2024, the construction of public works contracts with a value exceeding €100m will include BIM requirements.
- The BIM adoption strategy includes digital delivery requirements as part of the overall Government strategy to digitalise the construction sector by 2030.

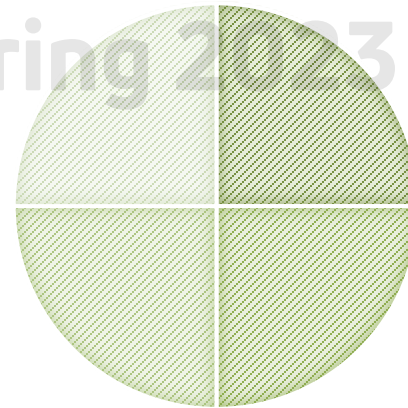


The four pillars that were
used to categorise BIM
and Lean capabilities.

COMMON EU PERFORMANCE LEVEL FOR THE IMPLEMENTATION OF BIM

■ Technical ■ Policy ■ Process ■ People and Skills

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EUBIM task group. Handbook for the introduction of Building Information
Modelling by the European Public Sector

- New BIM and Lean skills
- Use 3D modelling
- Intergrade cost estimations
- Intergrade scheduling

- Better collaboration and coordination
- Improved workflow
- Sharing risk and reward is a practice that can give incentives linked to process improvement objectives.

Technical

People

Processes

Policies

- Reduce variations
- Reduce rework
- Better analysis of processes
- Promote innovation
- Use a CDE

- Use an execution plan
- Use Integrated Project Delivery (IPD), which enhances collaboration.

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Lean and BIM implementation barriers



Enterprises need to modernise their workflows and adopt new working methods, such as Lean and BIM. At the same time they need to find ways to overcome all the barriers along the way.

Barriers			
Technology	People	Processes	Policies
<ul style="list-style-type: none"> -Too expensive investment. -Technology adaptation barriers. -Lack of BIM and I.T. Knowledge. 	<ul style="list-style-type: none"> - Difficulty changing the existing culture. -Client's traditional practice. -Lack of top management commitment. 	<ul style="list-style-type: none"> -Not strategically changing the organisational processes. -Not mapping the value of the Lean-BIM Capabilities. -Not facilitating employees in all hierarchy levels to support the BIM-Lean implementation. 	<ul style="list-style-type: none"> -Lack of understanding of how a BIM Execution Plan works. -Lack of understanding of BIM and Lean standards. -Lack of contractual requirements to support BIM.

**BIM and Lean
framework for SMEs**

Technology	People	Processes	Policies
Software & Hardware	Cultural Change and Responsibility	Bim-Lean Principles	Organisational Business Plan
Interoperability and Integration	BIM and Lean Execution Plan / Procedures	Management Procedures and Guidelines	Contracts
Simulation-FM Systems	Collaboration and Communication	Information Management	Standards
	Reduce Risks, Variations And Rework	Sustainable Solutions and Waste Reduction	

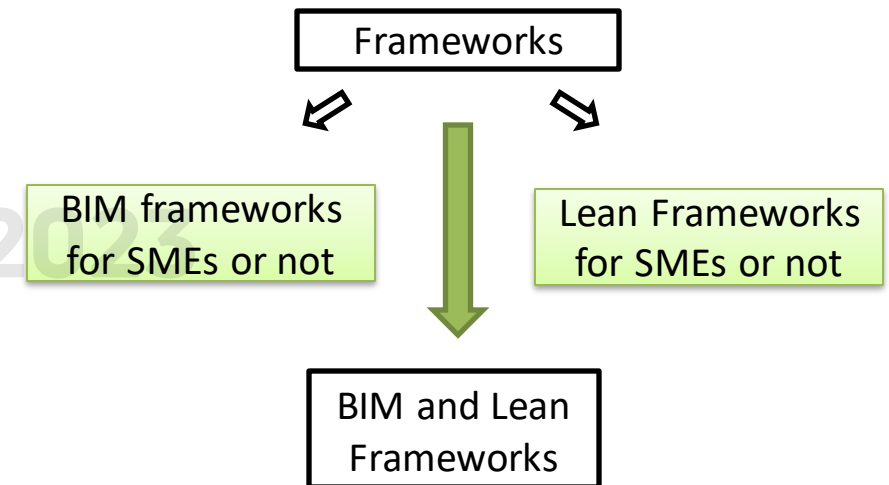
BIM and Lean framework for SMEs

- a) Stage 1 – New way of working.
- Cultural Change and Responsibility
 - BIM-Lean Principles
 - Organisational Business Plan
- b) Stage 2 – Preparing for implementation.
- Software & Hardware
 - Interoperability and Integration
 - Management Procedures, Training and Guidelines
- c) Stage 3 - Learn the processes and practices.
- Contracts
 - Standards
- d) Stage 4 – Start working together productively.
- BIM and Lean Execution Plan / Procedures
 - Collaboration and Communication
 - Information Management
- e) Stage 5 – New sustainable solutions.
- Simulation-FM Systems
 - Reduce Risks, Variations and Rework
 - Sustainable Solutions and Waste Reduction

BIM, Lean and BIM and Lean frameworks

An initial study found that focusing only on BIM, Lean, and BIM-Lean frameworks designed for SMEs resulted in a narrow search, so it was expanded to concentrate on all sizes of organisations. The research presents the methodology used for each study, whether the results were tested and useful conclusions that can contribute to the eventual draft of a BIM and Lean framework for SMEs. The findings were amalgamated in a table with the following sections.

- Title
- Source
- Type of Framework
- SMEs or General
- Methodology
- Framework's goals
- Framework Validation methods
- Conclusions



- The AEC industry should promote equal rights for each enterprise, regardless of size, and encourage innovation-enhancing BIM and Lean practices for SMEs.
- This paper put forward an initial framework for SMEs that will enable opportunities through the combined use of BIM and Lean for SMEs.
- The next research phase will focus on producing a 2nd draft by incorporating the findings from the literature review of existing frameworks.
- This will enable a more robust framework that will be tested through field research, stallholder analysis and surveys.
- It is hoped that the final framework will provide a scaffolded implementation structure for SMEs within Ireland to harness BIM and Lean capabilities to better position themselves for the 2024 mandate.

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A nighttime photograph of a stone bridge with multiple arches spanning a river. In the background, a large, illuminated church with a dome and two towers is visible. The scene is reflected in the calm water of the river. The sky is dark with some light clouds.

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THANK YOU