

# Ireland's National Research Centre for **Construction Technology and Innovation** - MMC Developments

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Member of Centre Executive Management Committee Construct  
Innovate & Challenge Theme Leader



# Overview of Presentation

- Overview of Construct Innovate
- MMC relevant projects
- Next steps in MMC

## Associate members


The **interface** between academia and industry in the Irish construction & built environment ecosystem, **facilitating** industry's **transition** through **impactful** research and innovation.



## RPO members

University of Galway



OLLSCOIL NA GAILLIMHE  
UNIVERSITY OF GALWAY

Irish Green Building Council



IRISH GREEN BUILDING COUNCIL

University College Dublin



University College Dublin  
Ireland's Global University

Trinity College Dublin



Trinity College | Coláiste na Tríonóide  
The University of Dublin

University College Cork



UCC  
Coláiste na hOllscoile Corcaigh, Éire  
University College Cork, Ireland

TU Dublin





# Developing the Industry Led Research Programme



**30<sup>th</sup> April 2024  
(UCD) 30<sup>th</sup>  
May 2023 (TCD) &  
24<sup>th</sup> October 2023  
(UoG)**

AIMday<sup>®</sup> - workshop model where challenge questions (problems!) from industry are discussed with academic researchers from relevant university disciplines.



- **Thematic Working groups** will be formed by stakeholders (e.g. RPO's, Industry Members, Universities, professional bodies, government agencies, etc)

First Member-Led Working Groups
1. Sustainable Concrete and Cements
2. Modern Methods of Construction (MMC)
3. Mass Timber Construction
4. Materials & Technology Testing
5. Innovative Materials & Technology Adoption
6. Whole Lifecycle Carbon (WLC) Accounting
7. Lean Construction & Digital Tools
8. Socioeconomic analysis of sustainable construction
9. Overheating in Irish Dwellings

## Completed Projects

1. Design for Manufacture and Assembly and Design for Reuse
2. Increasing use of home grown C16 timber in housing
3. Behavioural Attitudes to MMC
4. Testbed for envelope solutions
5. Practical guidance for planners and developers for carbon optimisation of constructions and developments
6. Sustainable Living Houses/apartments – Performance Data
7. Residential stock (energy) consumption model to inform climate policy
8. Review System for Standards, Testing, Certification and Accreditation for the delivery of housing
9. Sustainable Cement and Concrete



## Sample New Seed Funded Projects

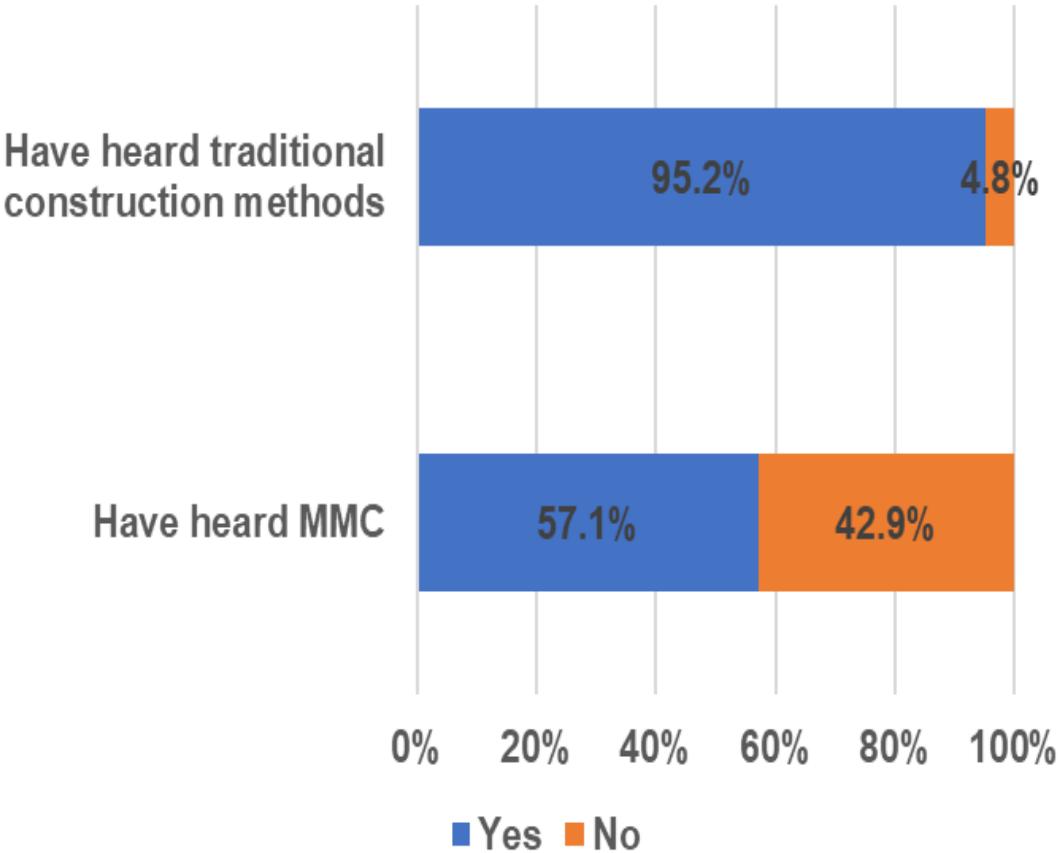
1. Certification of Innovative Construction Products and Systems
2. Advancing Indoor Acoustic Quality
3. Enhancing Efficiency in Mass Timber Construction Through Innovative Design Practices
4. Building Regenerative Towns & Cities
5. Mass Timber Demonstrator Buildings
6. Development and 3D Printing Reinforcement from Waste Composites for Concrete Structures
7. Mobile Construction Robot Project
8. Commercialisation of Low Carbon Cements
9. Sustainable Cement and Concrete
10. Investigating Polymers as Pipe-jacking Lubricants
11. Decarbonisation of Construction Process for Buildings in Ireland

# General Public & Construction Sector Attitudes and Perceptions to MMC

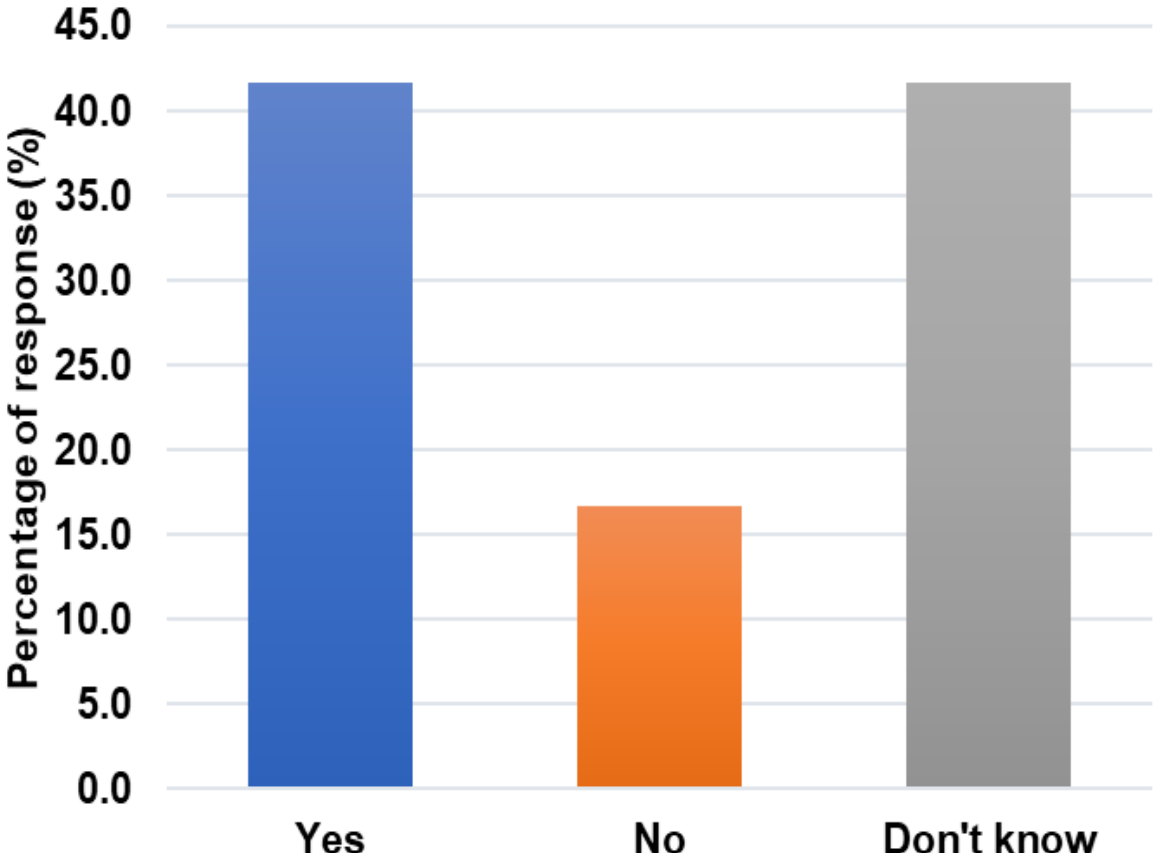




# General Public Attitudes to MMC – Awareness

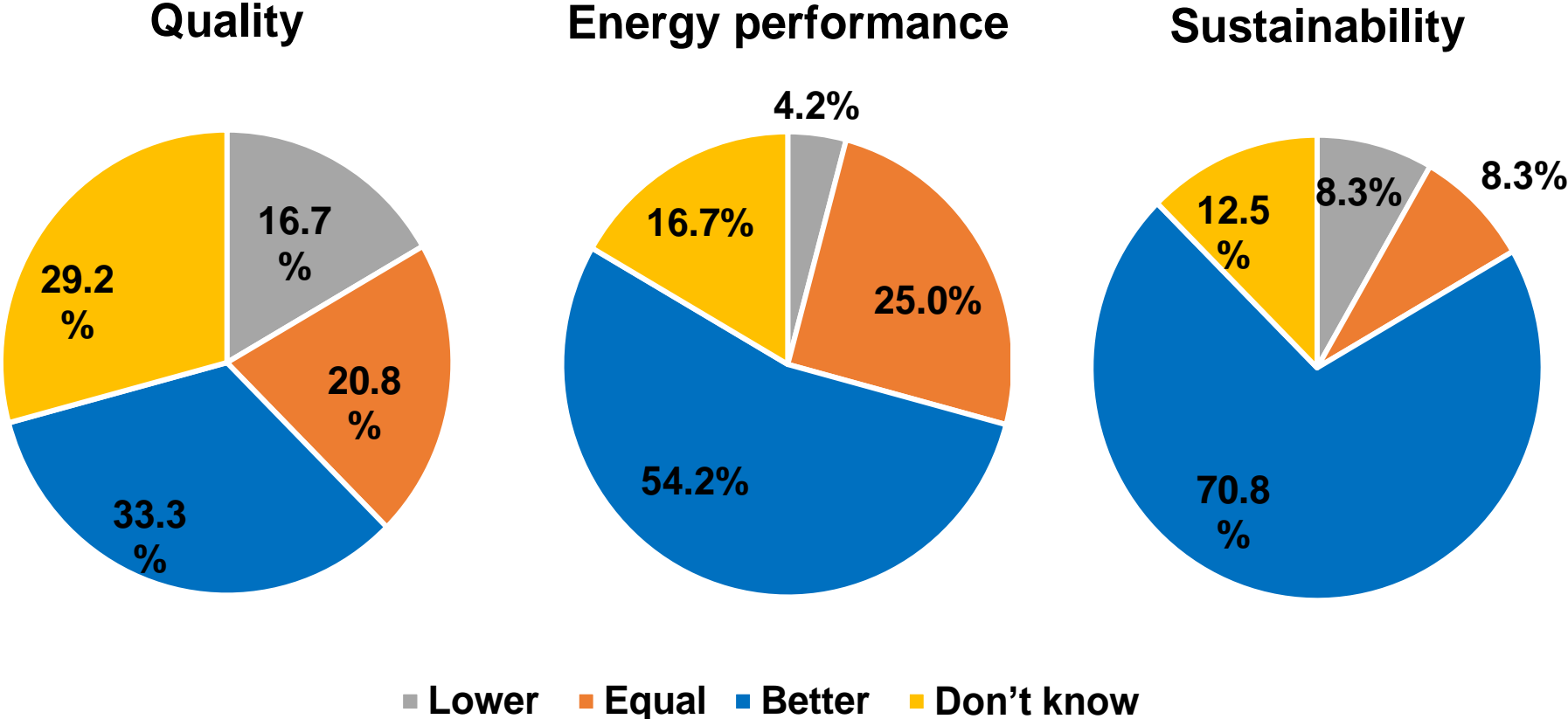


General public respondents' knowledge about different construction methods (42 respondents).



Willingness of general public respondents who had previous awareness of MMC to buy a new build MMC residential property (24 respondents).

# General Public Attitudes to MMC vs Traditional



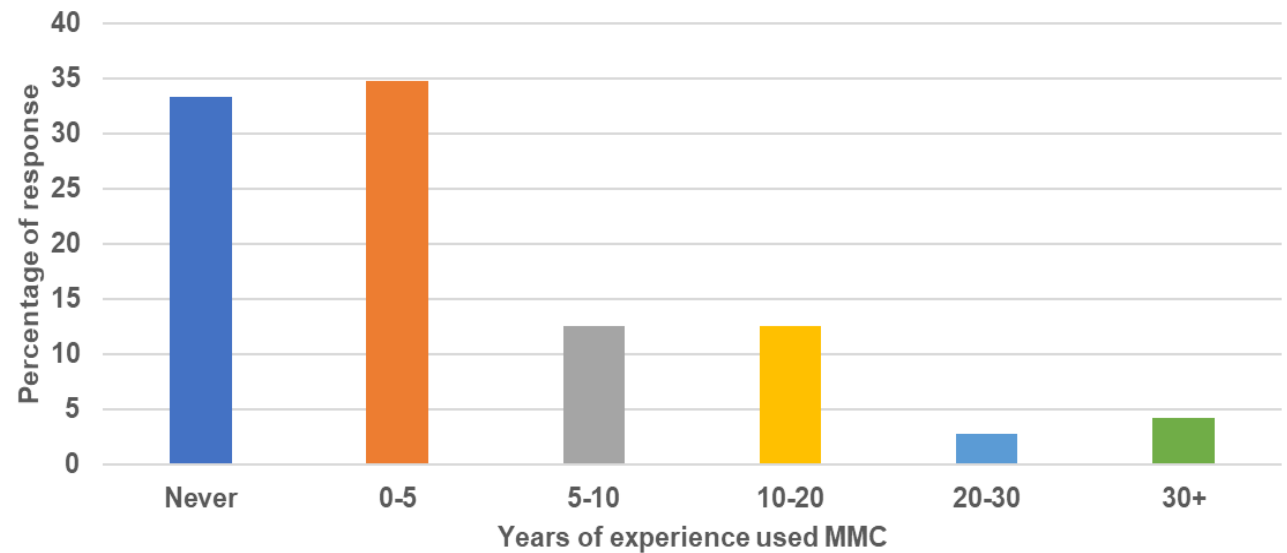
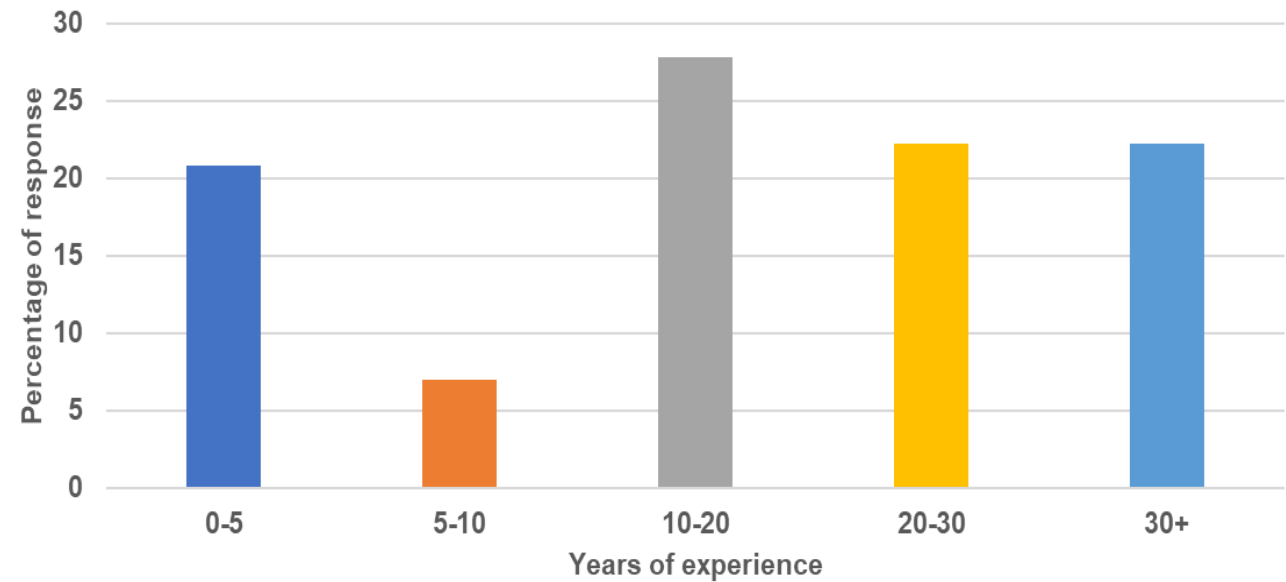
General public respondents who had previous awareness of MMC perception about how MMC properties performance compared to traditional built properties (24 respondents).



# Construction Sector Attitudes to MMC - Experience

Only 19.5% of construction sector participants had greater than 10 years' experience working on projects with MMC and 33.3% have never used MMC in projects

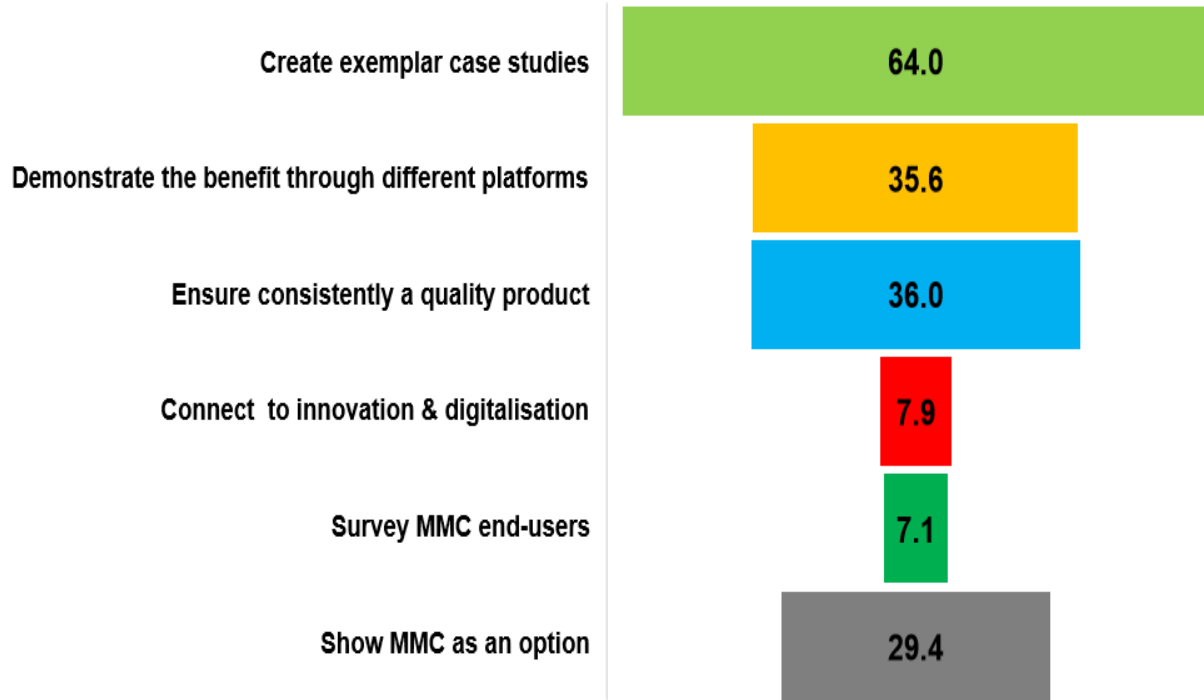
Category 2 is the most used MMC type in Ireland, with 74.5% of MMC-aware construction industry respondents having experience of it.



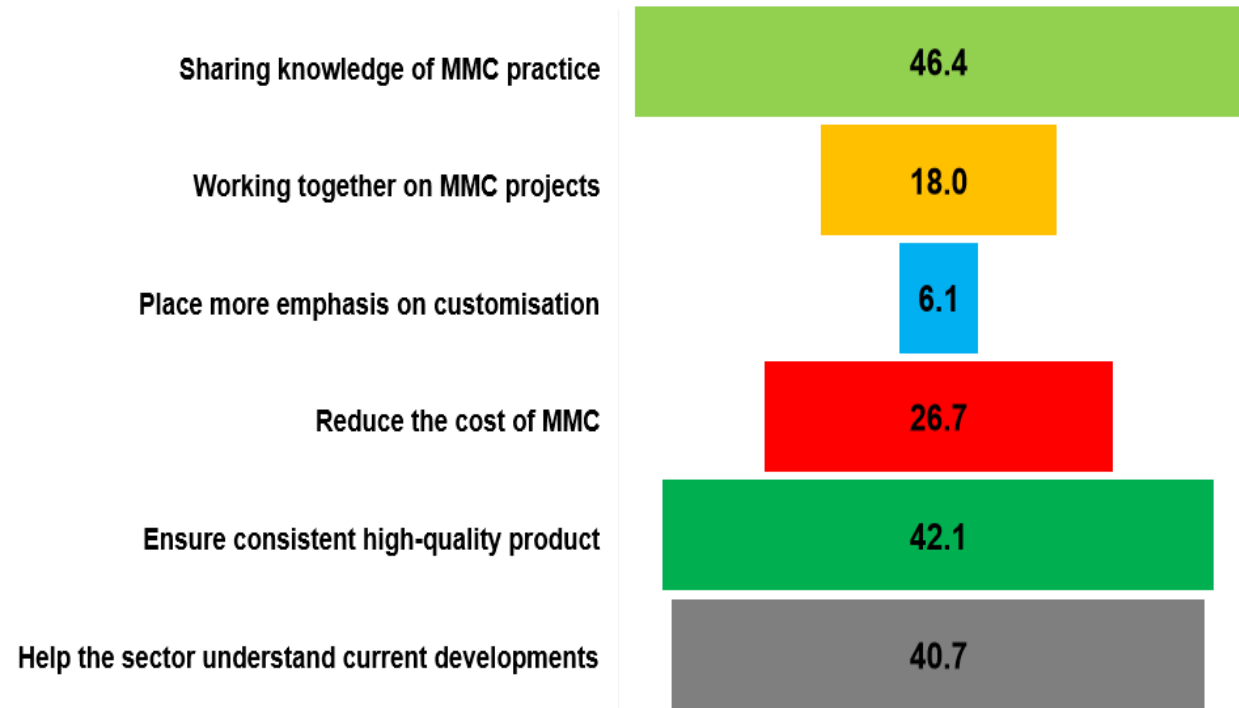
Construction industry respondents years of experience working in (top) construction, and (bottom) MMC projects (72 respondents).



# Construction Sector Attitudes to MMC – Improve Adoption



Construction industry respondents scoring of ways to improve the general public's understanding of MMC (47 respondents).



Construction industry respondents scoring of ways that industry could improve the adoption of MMC (47 respondents).



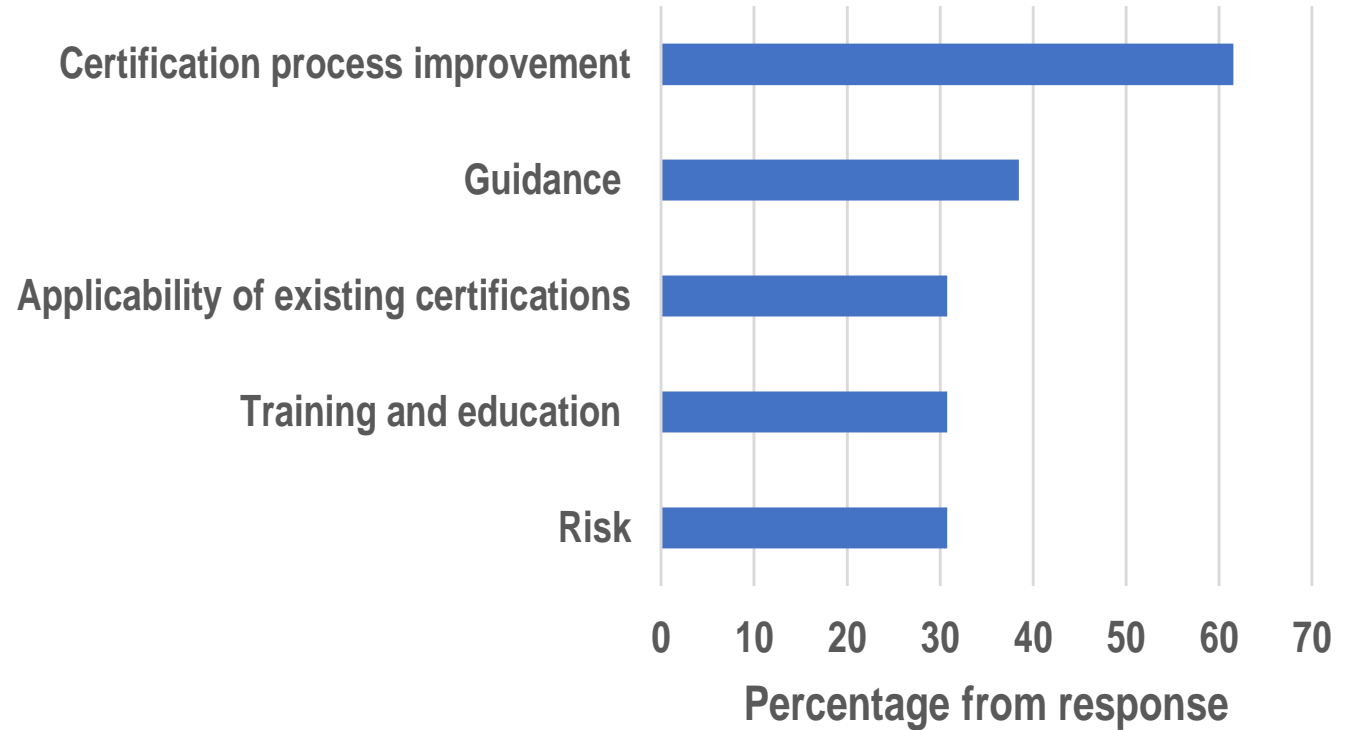
The image shows the interior of a large industrial building under construction. The most prominent feature is the intricate blue steel truss roof structure, which consists of a series of interconnected beams forming a grid-like pattern. Below the roof, the walls and partitions are made of light-colored wood framing. On the right side, there are sections of grey metal siding and large black-framed windows. In the center, there are stacks of wooden pallets and a silver step ladder. The floor is a smooth, light-colored concrete. The overall scene is well-lit, with natural light coming from the windows and possibly from skylights in the roof.

# Review the System of Standards, Testing & Certification

# System of Certification in Ireland

## Potential improvements

- NSAI Agrément most widely recognized certification system, but 61.5% think it needs improvement
- Guidance: when Agrément is required rather than an ETA, supplementary design guidance, guidance to the Agrément process, guidance on clarity between product and system.
- Training & education: for industry but also for local authorities, specifically on regulations, BCAR and NSAI Agrément
- Using existing certification from other jurisdictions would help the current system



Improvement of current procedure identified from interviews

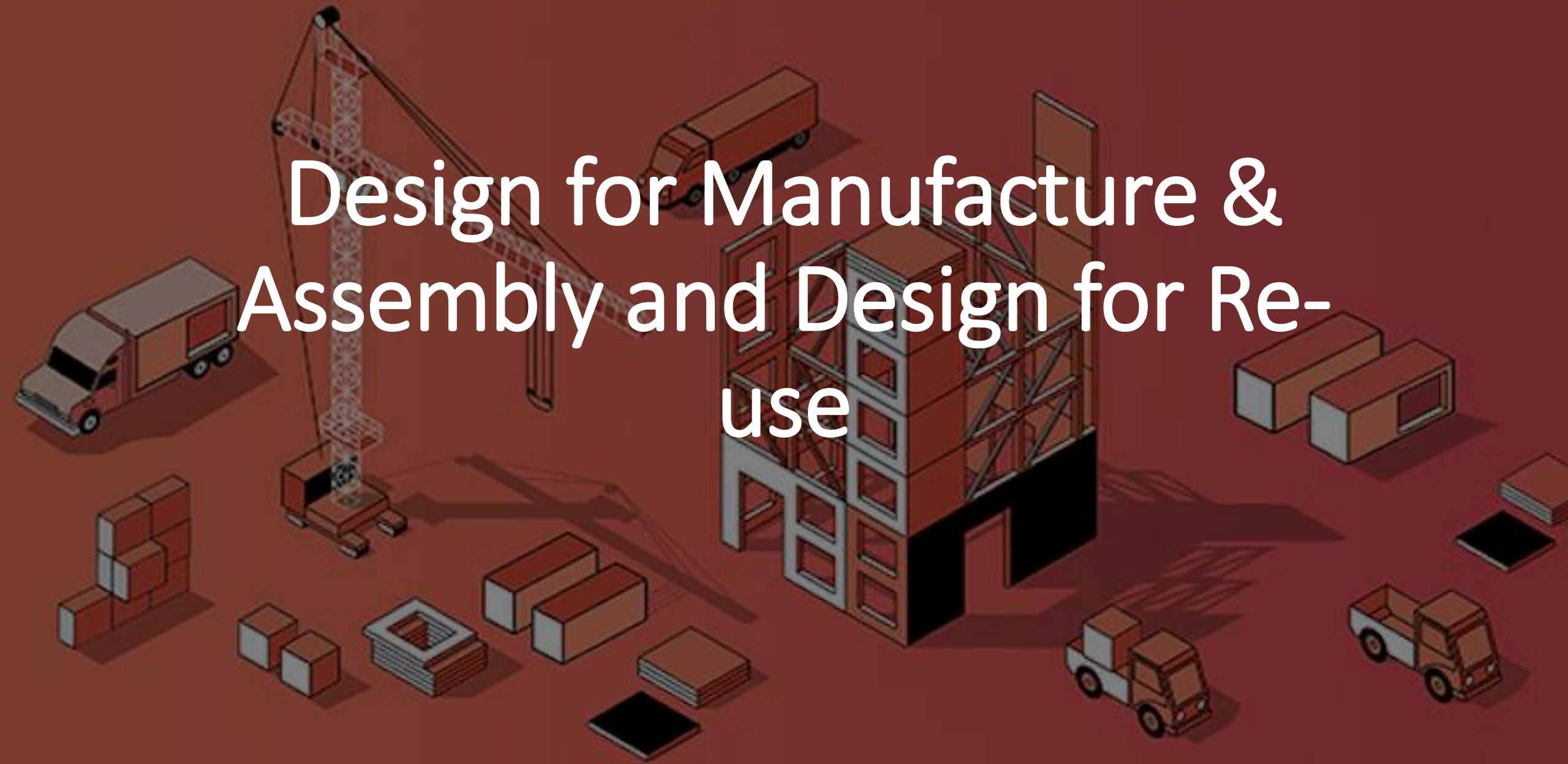


# Recommendations to improve system

- **Routes to certification guidance:** Provide an overall guidance/roadmap to help navigate the use of innovative/new housing construction materials, products or systems. Confusion around BCAR, Agrément, CE marking etc.
- **Clarity on certification from other jurisdictions:** Participants in interviews were unsure why certification from other jurisdictions is not applicable here in Ireland, for example, why ETAs do not comply with Irish Building Regulations?
- **Reduce cost of achieving Agrément & speed up Agrément**
- **Third-party testing and/or certification:** Possibility of developing third-party testing and certification should be explored
- **Exploring alternative approaches to certification**



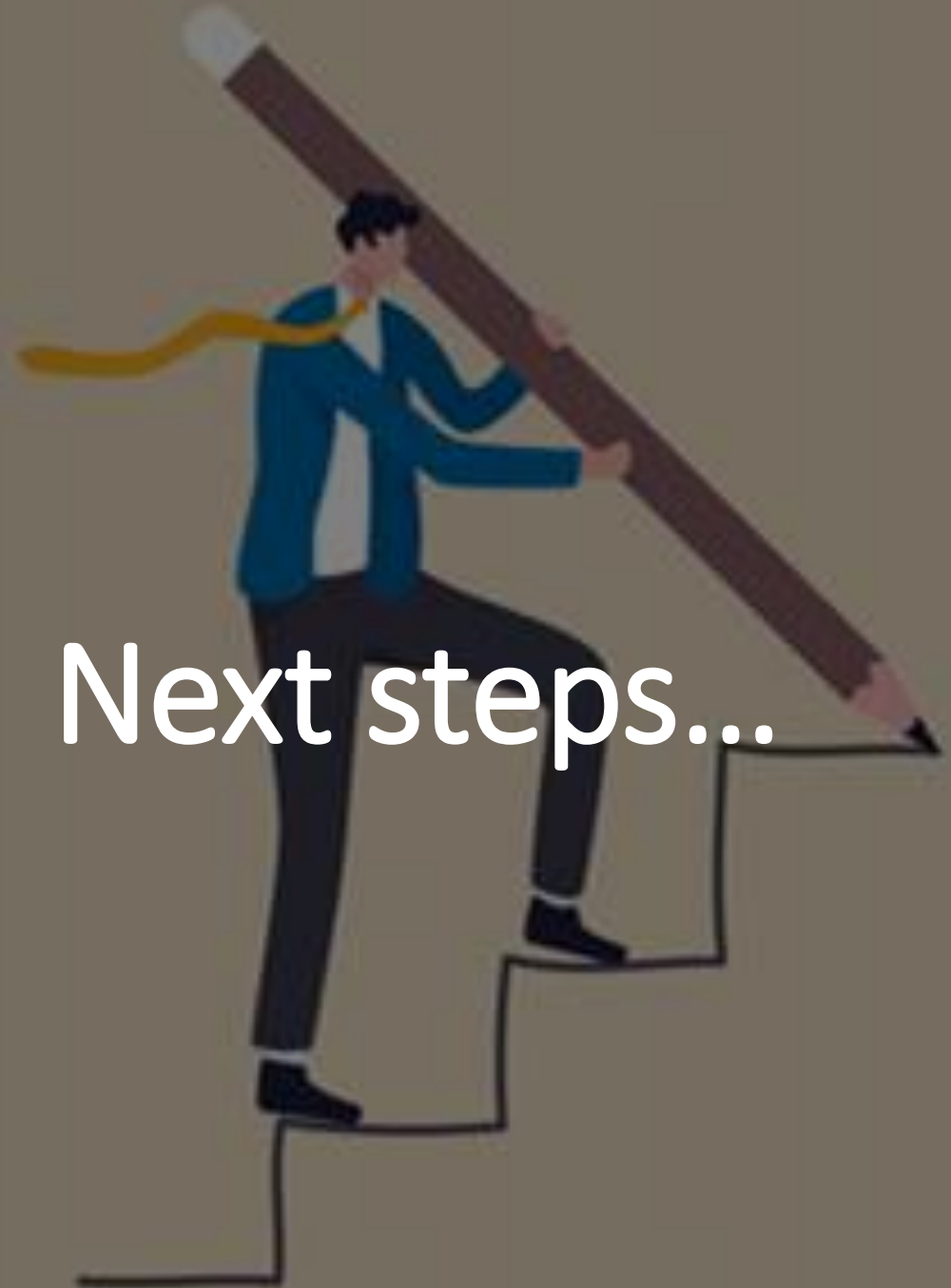
# Design for Manufacture & Assembly and Design for Re-use



# Comparison of Challenges and Supporting Activities for DfMA and MMC

- Good coverage of **Studies and Reports**.
- **Guidance and Rules** well covered, except for finance and procurement.
- **Education and Training** activities show a bias towards operational challenges.
- **Conferences and Meetings** well covered, except for finance and procurement.
- **Centres** well covered except for contractual framework.

Challenge Category	Organisational Structures				Contractual Framework			Operatnl Systems			
	Stakeholder Integration	Stakeholder Relationships	Client Requirements	Market Capacity	Contract and Procurement	Roles and Responsibilities	Financial	Market Demand	Additional Co-ord Demands	Technical Knowledge	Certification
Activity											
<b>Studies and Reports</b>											
Economic Analysis of Productivity in Irish Construct Sector											
A Detailed Description of Needs for Irish Const/BE Sector											
Modern Methods of Construction: CIF Report											
Modern Methods of Construct: Defining MMC Business											
<b>Guidance and Rules</b>											
RIAI DfMA Overlay to the Plan of Work											
RIAI Design for Manufacture and Assembly Report											
Digital Construction Pack											
Design Manual for Quality Housing											
Building Regulations, Inspection and Control Initiatives											
Guide to Agrément Certification for MMC											
Guide to PW-CF2 Public Works Contract											
Supports for BIM Adoption											
<b>Education and Training</b>											
Skills for Zero Carbon											
RIAI DfMA Training Prospectus											
Training Needs Identified in Roadmap Adoption of MMC											
What is MMC Video Series											
MMC Courses at the National MMC Demonstration Park											
Micro-Credentials and CPD in MMC											
Postgraduate Diploma in Construction Innovation											
CitA Skillnet Training											



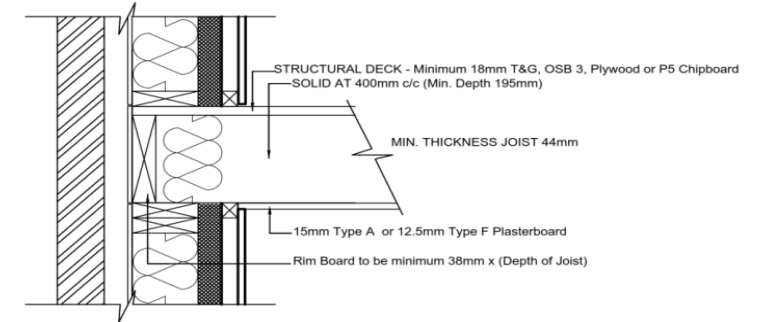
Next steps...



# CI & DHLGH – MMC Standard Construction Detail

- Feedback from industry around the need for standardised details for residential construction.
- **Produce open-source MMC standardised construction performance / details** (Structure, Fire, Energy, Durability, Resistance to Moisture and Sound) for all key junctions.
- The design and testing of the details are intended to **achieve the performance requirements of the Building Regulations to support the mainstream development and uptake of the identified MMC system**. Designers will still have design responsibility for compliance.
- DHLGH funding proposal for Construct Innovate to achieve this.

## Solid Joists - External Wall Junction



Section

Figure 1(a) Solid Joists @ 400mm c/c

(1) WALLS: INSULATION IN CAVITY	Concrete Intermediate Floor Between Dwellings
<p><b>THERMAL PERFORMANCE CHECKLIST (TICK ALL)</b></p> <p>Ensure partial fill insulation is secured firmly against inner leaf of cavity wall <input type="checkbox"/></p> <p>Continue cavity wall insulation across floor abutment zone. (Use appropriate material where cavity barrier or full-fill insulation is employed) <input type="checkbox"/></p>	<p>A technical cross-section diagram showing the junction between a cavity wall and a concrete intermediate floor. The wall is on the left, and the floor is on the right. The wall has two leaves with insulation in the cavity. The floor is a concrete slab. The diagram shows the insulation extending across the floor abutment zone. The diagram is labeled with the following components:</p> <ul style="list-style-type: none"><li>Concrete Intermediate Floor</li><li>Insulation in Cavity</li><li>Inner Leaf of Cavity Wall</li><li>Outer Leaf of Cavity Wall</li><li>Concrete Slab</li></ul>

# Construct Innovate MMC

- Workshop on fire compliance of MMC (AIMDay)
- Routes to certification for innovative construction products (Seed funded project)
- Durability of sustainable lightweight façade materials (Seed funded project)
- Mass timber construction (Seed funded project) & naturally grown timber pilot project (Seed funded project)
- 3D printed concrete (Seed funded project) & robotics
- Inventory of experimental facilities in Ireland (with Materials & Testing WG)

  
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