



Certification of various MMC Systems

Martin Searson

31st January 2024



Martin Searson



Head of Modern Methods of Construction (MMC)

CSG – MMC Action Leader

Author of 3Nr. MMC Industry Research reports



+25 years Mechanical and Electrical (M&E) and Construction sector industry experience.

Previously, Group M&E Quality & Lean Manager for a large engineering & construction firm, with operations in Ireland, UK and Mainland Europe (>€600m Turnover) – *NSAI certified*.

Extensive experience on key projects: **Semiconductor, Data Centres, Biopharmaceuticals, Windfarms, Substations up to 400kV, Industrial Manufacturing, Commercial fit-outs and Residential projects**, across Ireland, UK and Mainland Europe.

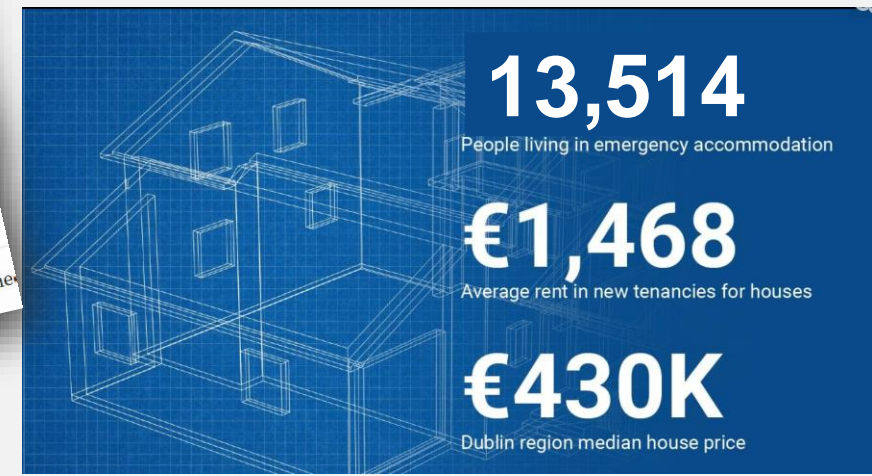
Past winner of six National Quality Awards (with 7 consecutive nominations) and a Lean Business Ireland Award in 2019 for an approach to Operational Excellence.

- MSc. in Quantity Surveying,
- BSc. in Applied Science
- Diploma in Quality Management
- Certificate in Quality Assurance
- Certificate in Process Instrumentation and Controls
- Certificate in Quality Risk Management (QRM)
- ISO 9001 QMS Auditor (*certified*) / ISO 9001 QMS Lead Auditor (*certified*)
- LEED Green Associate certified / Lean Six Sigma

Why MMC?



Ireland Numbers (3 days ago)



[Recorded 13,514 people homeless in November \(rte.ie\)](https://www.rte.ie)



1

About NSAI



2

MMC Overview



3

MMC Drivers



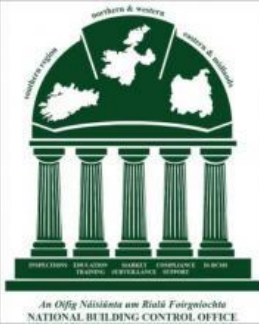
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MMC Agrément



5

MMC Agrément
service & Agrément
Cert. Steps





About NSAI



About NSAI

Four Main Divisions



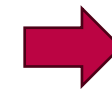
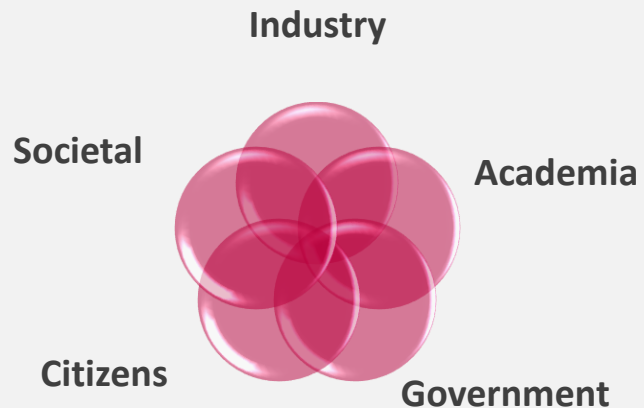
As Ireland's official **Standards body**, NSAI aims to inspire consumer confidence and create the infrastructure for products and services to be recognized and relied on, all over the world.

About NSAI

Connect & Facilitate

NSAI Role

Irish Stakeholders



Standards Committees

ICT
Advanced Manufacturing
Healthcare
Energy & Sustainability
Food
Construction
Services & Business
Processes

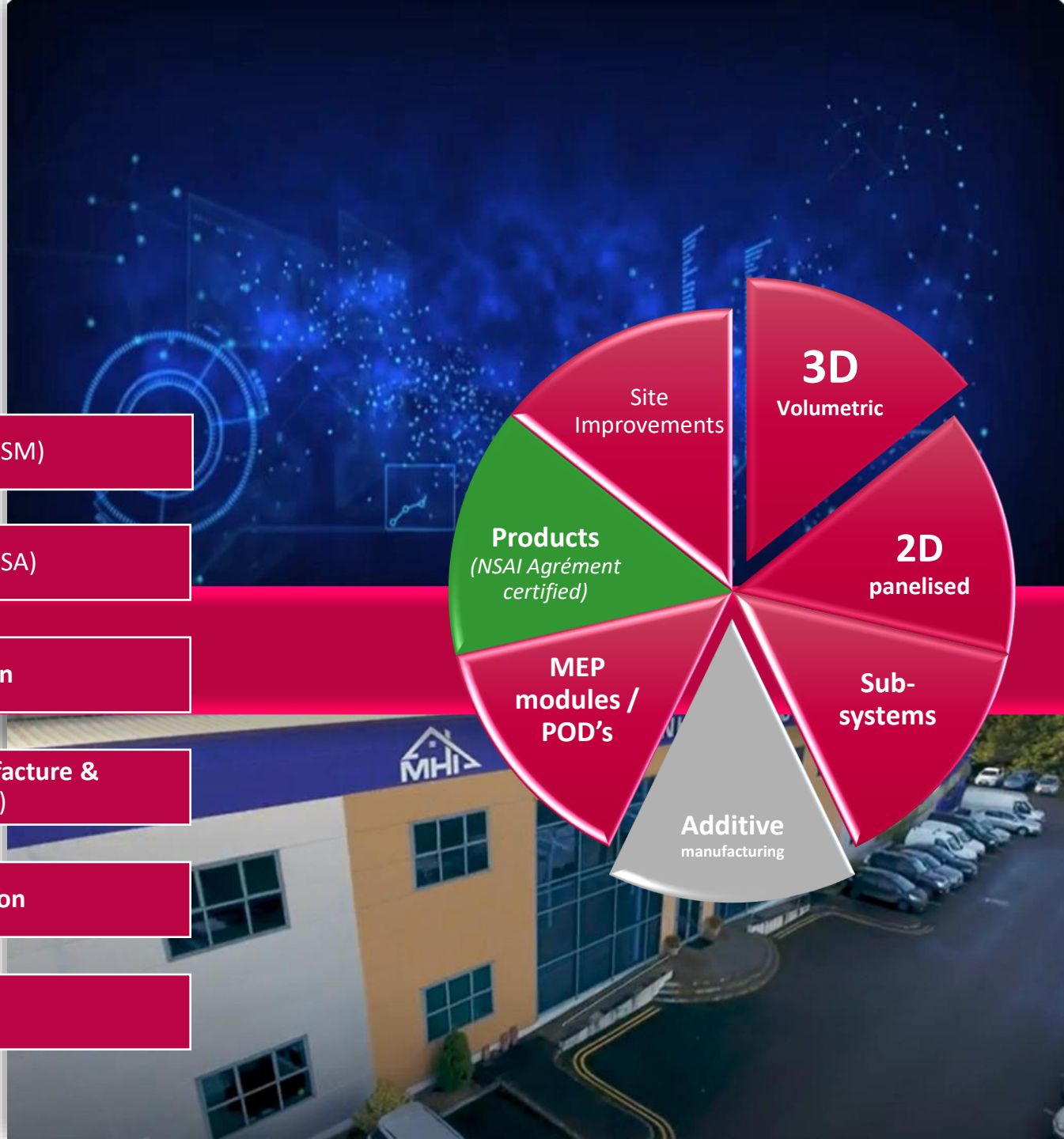
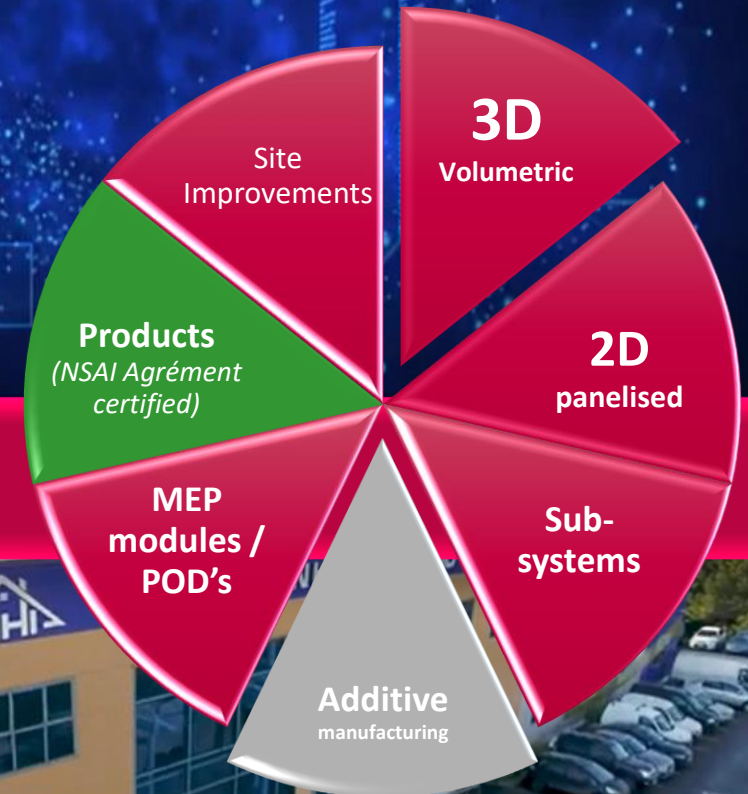
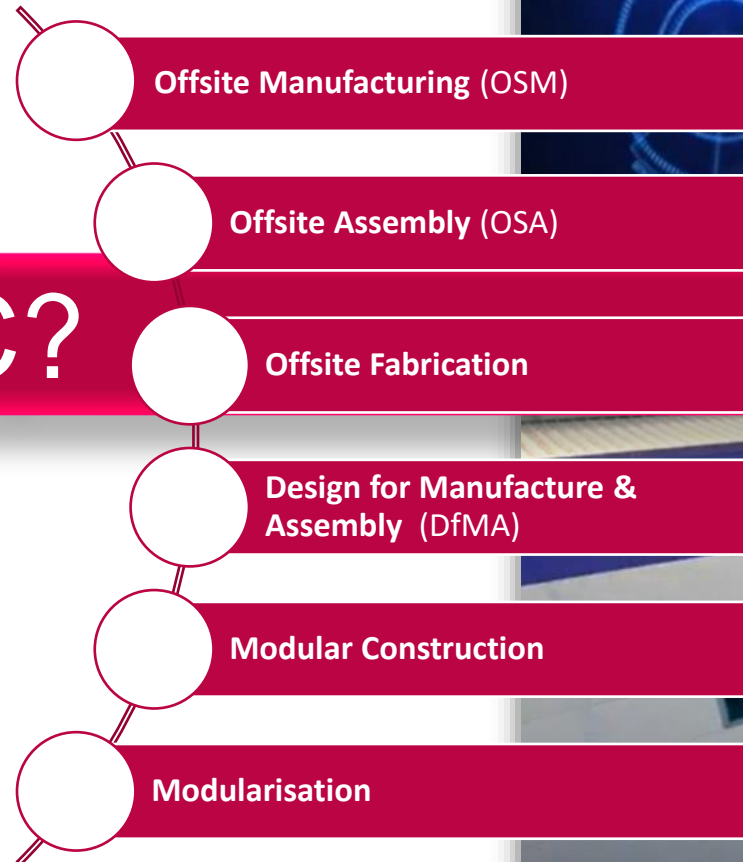
NSAI improves the performance of Irish business and protects consumers through the setting of standards and issuing of certification in the quality and safety of goods and services.



MMC Overview



What is MMC?



MMC Overview

MMC Categories

PRECAST
CONCRETE
CONSTRUCTION



1 Pre-Manufacturing
(3D primary structural system)



2 Pre-Manufacturing
(2D primary structural system)



3 Pre-Manufacturing
components
(Non-systemised primary structure)






4 Additive Manufacturing
(Structural and non-structural)



5 Pre manufacturing
(Non-structural assemblies & Sub-
assemblies)



6 Traditional building product
led site labour reduction /
productivity improvements

-  = MMC certified
-  = Currently certified
-  = Potential to be certified



7 Site process led site labour
reduction / productivity /
assurance improvements

MMC Defined

MMC is a **seven-category system** focusing on offsite manufacturing processes from pre-manufacturing, to site led productivity process improvements.

#

CATEGORY DEFINITION

1



Pre-manufacturing (3D primary structural systems)

2



Pre-manufacturing (2D primary structural systems)

3



Pre-manufacturing components (non-systemised primary structure)

4



Additive manufacturing (structural and non-structural)

5



Pre-manufacturing (non structural assemblies & sub-assemblies)

6



Traditional building product led site labour reduction / productivity improvements

7

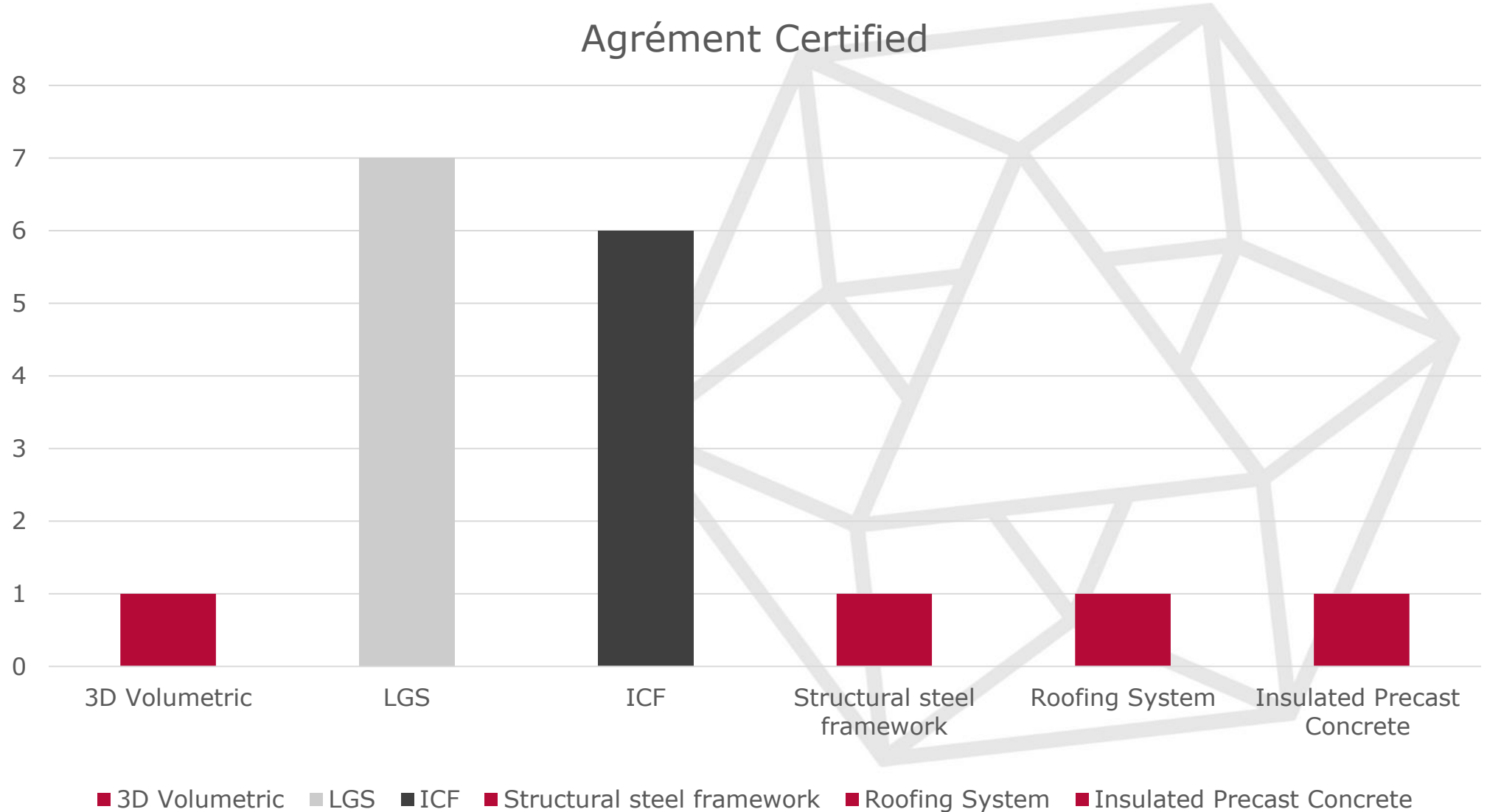


Site process led site labour reduction / productivity / assurance improvements



Ref: *UK Government's MHCLG Joint Industry Working Group on MMC).*

17Nr. MMC Agrément certificates



MMC Examples (2D-Panelised)



TJ O'Connor – Fermoy, Co. Cork Flood Alleviation Scheme. [Winner](#): ACEI Innovation Category Award in 2016.

MMC – CIVIL, STRUCTURAL & ARCHITECTURAL EXAMPLES

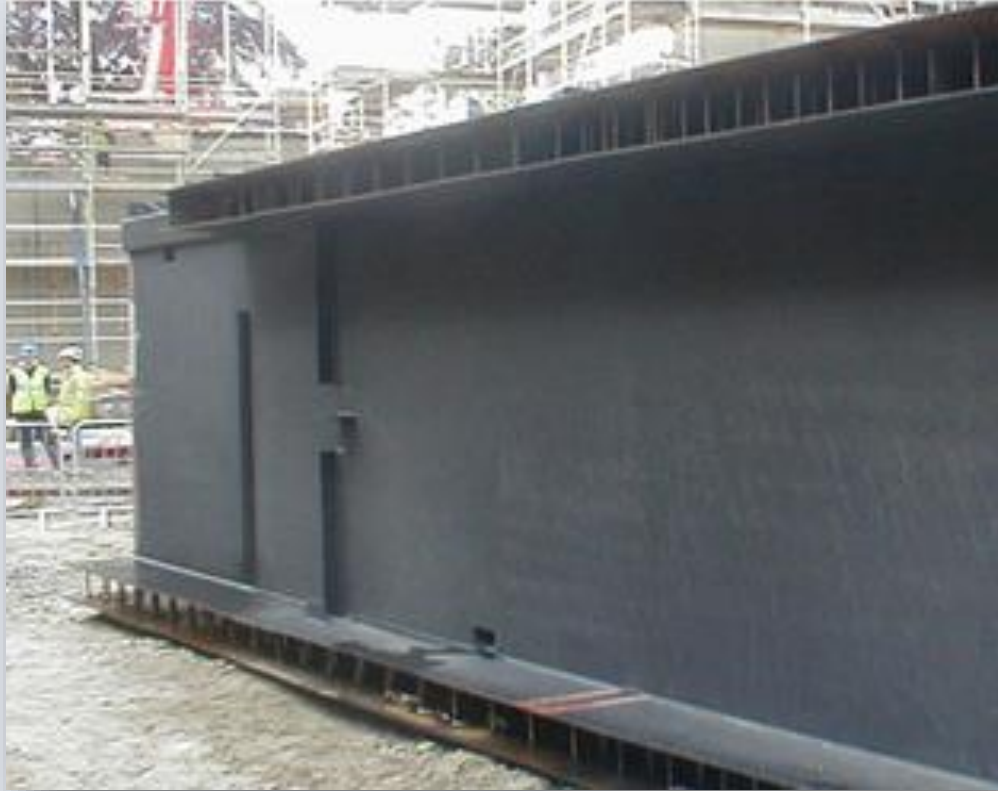
MMC Examples (2D-Panelised)



TJ O'Connor – Fermoy, Co. Cork, Flood Alleviation Scheme. [Winner](#): ACEI Innovation Category Award in 2016.

**MMC – CIVIL, STRUCTURAL & ARCHITECTURAL
EXAMPLES**

MMC Overview (3D Volumetric)



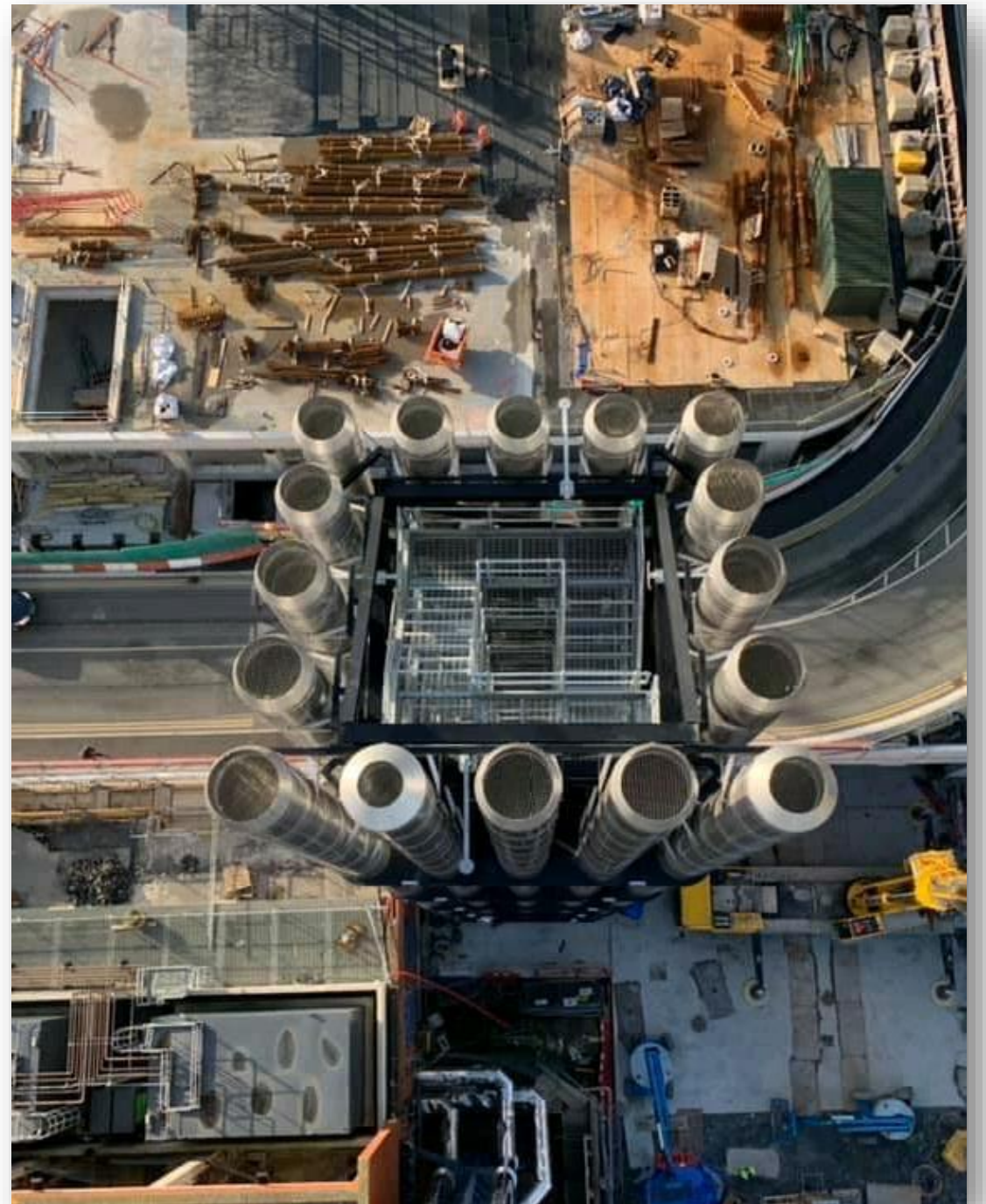
TJ O'Connor – Dundrum Town Centre, Bi-Steel Composite Lift Core, Dublin

**MMC – CIVIL, STRUCTURAL & ARCHITECTURAL
EXAMPLES**



BAM Ireland – National Children's Hospital Modular Flue stack

MMC – CIVIL, STRUCTURAL & ARCHITECTURAL EXAMPLES



MMC Overview (3D Volumetric)



Modern Homes Ireland – 3D Modular housing scheme (*NSAI certified*)

MMC – CIVIL, STRUCTURAL & ARCHITECTURAL EXAMPLES



MEP



PRE-CAST ELEMENTS



VESSELS / TANKS



MEP



TIMBER FRAME



CLT / GLULAM



Pre-manufacturing
(non structural assemblies
& sub-assemblies)

IRISH MODULAR EXAMPLES



2D PANELS



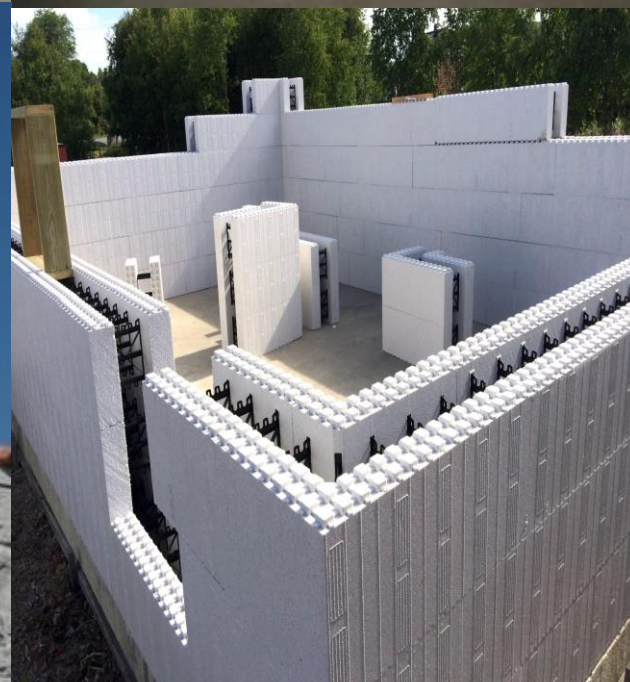
BATHROOM PODS



LIGHT GAUGE STEEL



2D PANELS



ICF

MMC Systems by material type

Timber



EN 1995
I.S. 440

NSAI Timber
Frame
Quality
Approval
Scheme

Other
regulatory
standards

LGS



Eurocodes
EN 1993

SCI(UK)
standards

Other
regulatory
standards

Pre-cast



Eurocodes
EN 1992
EN 1996

Factory
Production
Control
System 2+

EN 12794

Welded Steel



EN 1090
FPC

Registered
Weld Co-
Ordinator

Weld
Documentation
(WPS / WPQR)

NDT required

Novel Material



Concrete 3D
printing

End-of-
Waste
(EoW)
materials

By-Product
materials



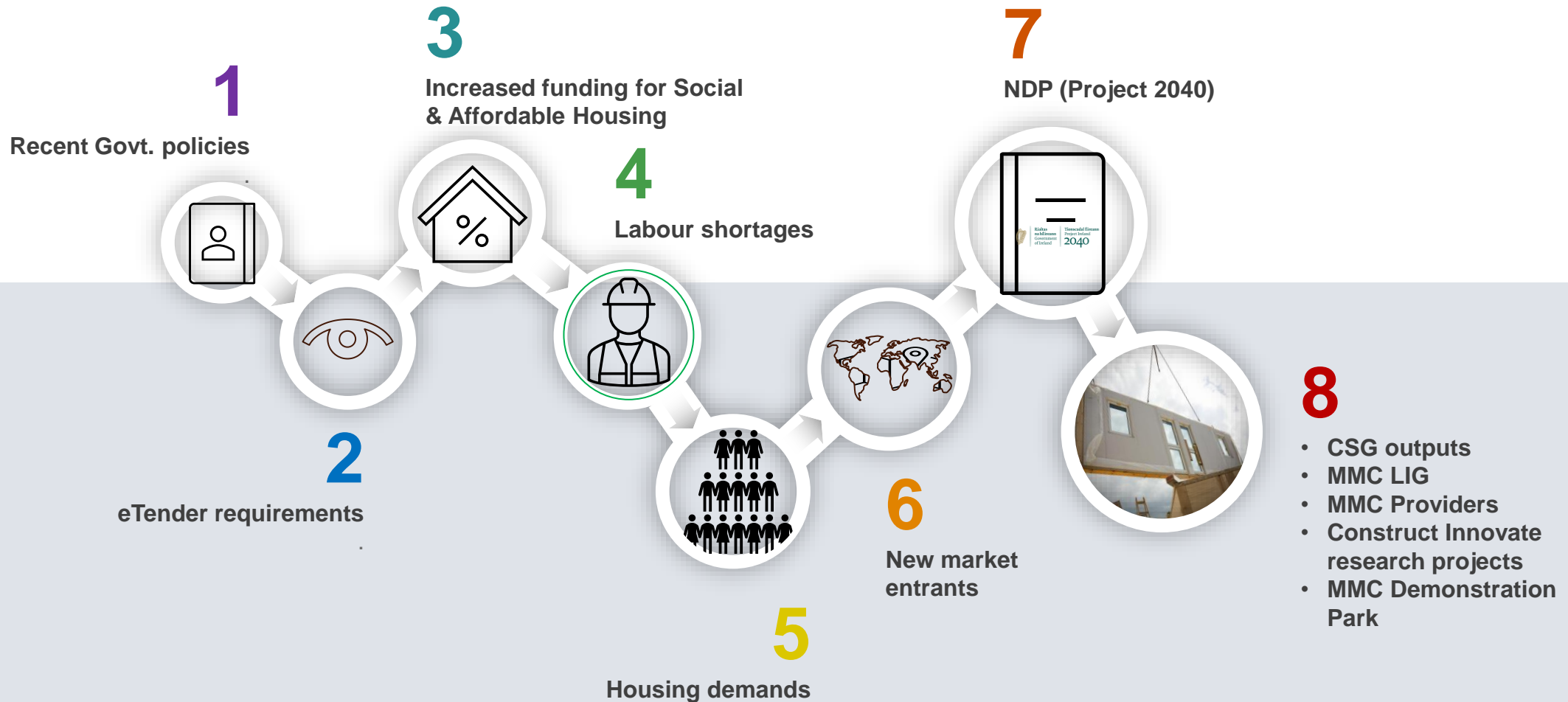
NSAI

MMC Drivers



MMC Drivers

Government Policies & Actions



MMC Drivers



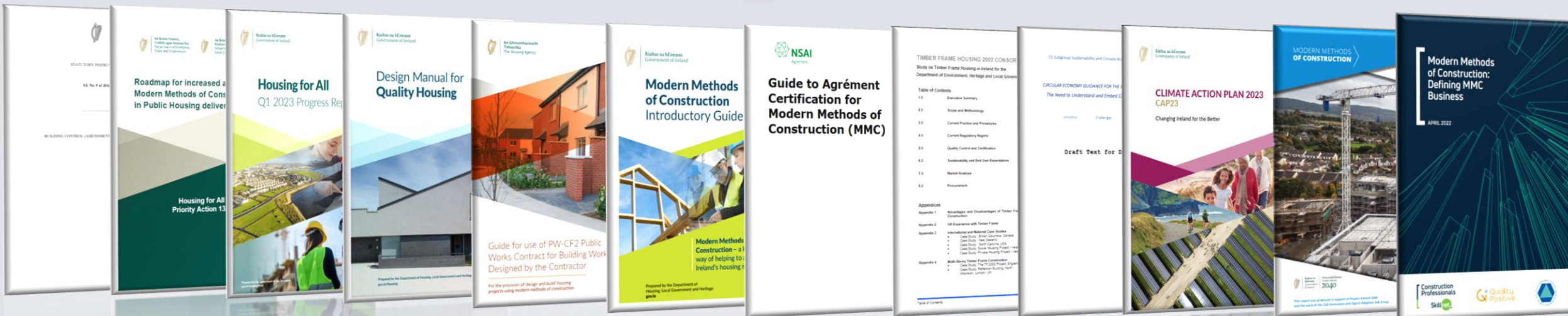
Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

Drivers - Government Policies & Actions

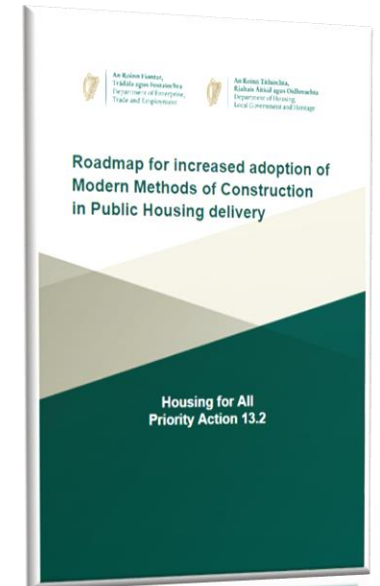


- MMC Demonstration Park
- CP Skillnet – Micro-credential training courses (coming up for this September 2023)



MMC Drivers

Drivers - Government Policies & Actions



Regulation and Standards			
11	Strengthened capacity within the NSAI to support an efficient Agrément process.	Q2 2023	NSAI
12	Assessment of the efficiency of current Agrément Certification process in an international comparative context.	Q3 2023	NSAI
13	Communication of NSAI Agrément Certification and Inspection in the context of the broader regulatory system for residential construction.	Q2 2023	NSAI
14	Stakeholder engagement and contribution to related international and European standardisation developments, and consultation on specific national needs, if any, and progress as appropriate.	Ongoing	NSAI

No.	Action	Delivery Date	Reporting Dept
61.	Drive further process improvements and cycle time efficiencies in NSAI Agrément certification for MMC in residential construction, including development of information supports to assist applicants to prepare for the certification process.	Q3 2024	DETE



NSAI

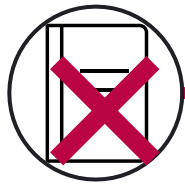
MMC & NSAI Agrément



MMC Agrément

Why Agrément Certificate?

Agrément Certification is designed specifically for new innovative building materials, products and systems that do not yet have a long history of use.



Products and systems for which there may be **no national standard**



Products and systems for which there may be **no harmonised European product standard (hEN)**



Products and systems for which there may be **no European Technical Assessment (ETA)**

Part D of the Second Schedule to the **Building Regulations** states: **Materials and workmanship D1**- All works to which these Regulations apply shall be carried out with **proper materials and in a workmanlike manner**. "proper materials" means materials which are fit for the use for which they are intended and for the conditions in which they are to be used, and includes materials which:

(a) **bear a CE Marking** in accordance with the provisions of the Construction Products Regulation;

(b) **comply with an appropriate harmonised standard or European Technical Assessment** in accordance with the provisions of the Construction Products Regulation;

(c) **comply with an appropriate Irish Standard or Irish Agrément Certificate or with an alternative national technical specification** contracting party to the Agreement on the European Economic Area, which provides in use an equivalent level of safety and suitability

NSAI MMC Agrément

Our Mission:

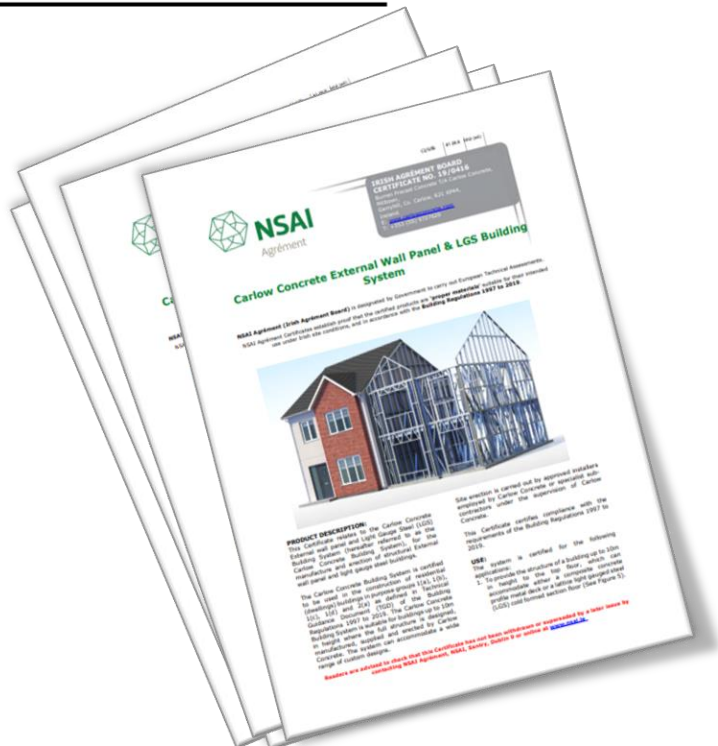


To ensure that certified products and building systems use ‘proper materials’ suitable for their **intended use** under Irish site conditions, and per the Building Regulations 1997 to subsequent revisions.

Our emphasis is on **Quality Assurance** ensures compliance with established standards and provides reliable and precise building materials to the construction industry here.



Agrément Certificate assessment



Irish Building Regulations (TGD's A –M) and European standards compliance verification



Laboratory test results checked



On-site evaluations of as constructed product / building system



Factory Production Control (FPC) inspection



Quality Management System verification – Installation procedures and on-site inspection plan check – Post construction maintenance program

MMC Agrément

Our Clients:



38
Nr.

New Enquires
(July to Dec):

- Unihouse Limited (t/a/ LJ Royal)
- Lidan Designs
- HTL (Harcourt Technologies Limited)
- Letaron Group (SIEC Group)
- Framespace (3D LGS solution)
- Tempohousing Limited
- Celuplast Building Solutions Limited
- Steeltech Modular Building Systems
- MurVize Limited (Pre-cast solution)
- EcoCocon Timber frame
- Tim Murphy & Partners (Steel system)
- Glenveagh PLC
- Sentarmax Oü
- Volumetric Building Companies (VBC)

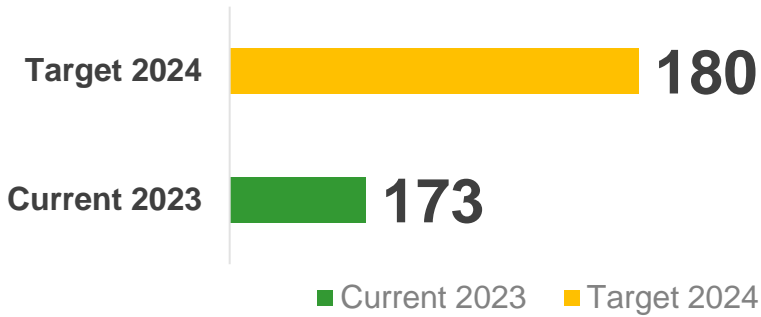
22 Nr.

NSAI Agrément 'Building systems'
certified (to date)

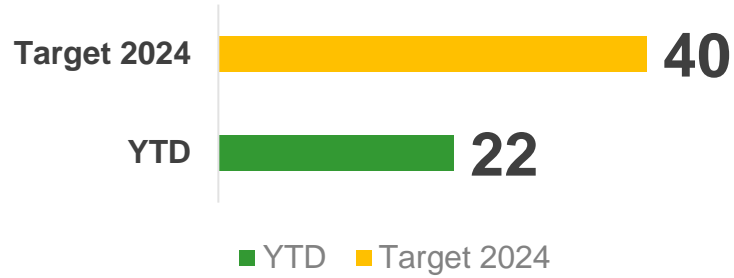


MMC Dashboard metrics

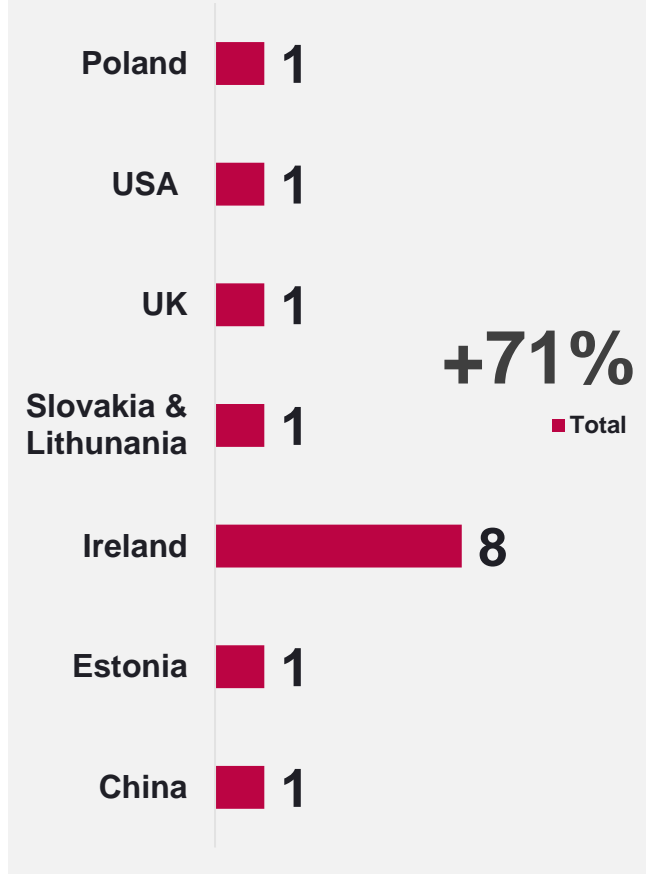
Irish MMC Providers



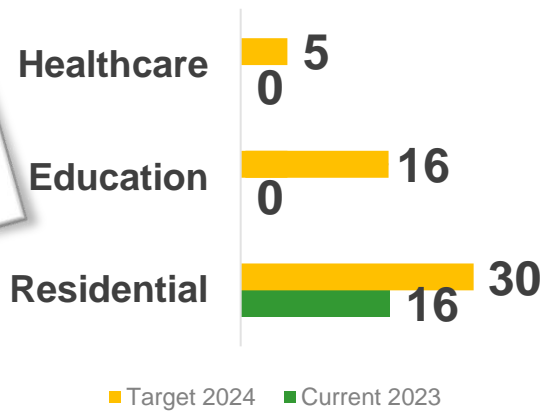
NSAI Agrément certified



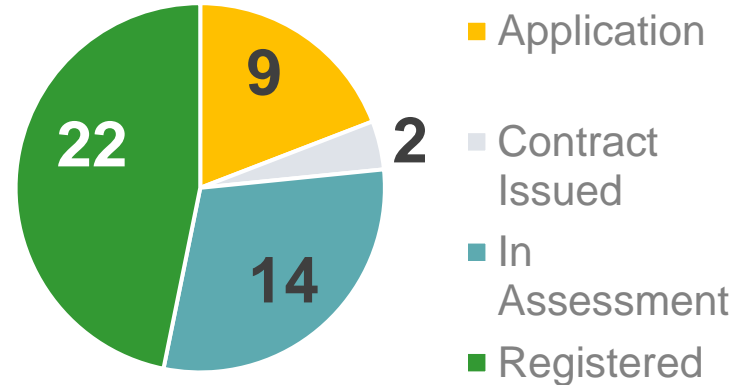
New Enquires



Sector



MMC Agreement Status Overview YTD





NSAI

MMC Agrément services & Agrément Certification Steps





MMC Agrément service

Our services:



1

Agrément Certification for MMC

- **Subject to Pre-Approval**
- Application/scope Analysis
- Technical Assessment: The system will be assessed **against Parts A to M to the Irish Buildings Regulations**
- Laboratory tests results checks
 - Min. 4Nr. Factory audits completed in 5-year period.
 - Audit report recorded.
 - Audit scoring applied (to assess maturity of facility).
 - Year 1 – incl. FPC assessment
 - **Valid for 5 years subject to surveillance audit**

2

Ancillary certification


- Ancillary certification of Modular Construction process
 - *As per current BC(A)R 2014 requirements and current Irish Building Regulations – i.e. TGD’s Parts A-M.
- Onsite assessment**
20-10%
(12-20 weeks)
- Offsite assessment**
80-90%
(1-2 weeks)

3

ISO 19650 (BIM) certification

- **Future service to support increased Digitalisation**
- **Irish BIM mandate announced in July 2023 (Now in effect since January 2024)**

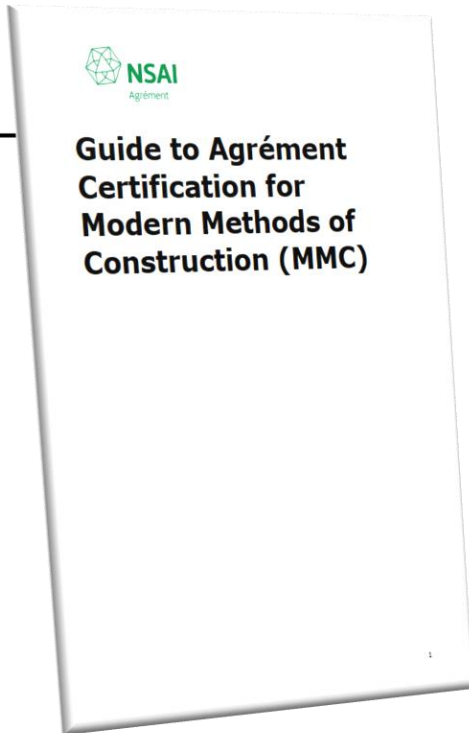
Pre-Approval

- Application Analysis
 - Offsite Factory **Pre-approval process.**
 - As per current FPC assessment.
 - Scoring mechanism applied.
- 

0

Pre-Approval

How to apply?



Before applying, verify your current **GAPS**. Do you have a Quality Management System in place? Do you have technical data/tests of your system? Are you ready?



Complete the NSAI Application form – for the application process by the manufacturer.



Upload your Technical Documentation Pack according to the "Guide to Agrément Certification for MMC"

<p>TGD A to M incl. Technical data, for importation and factory certification</p>		<p>Tests results Technical Calculations evidences of compliance against ALL applicable TGDs (Structural, thermal, sound etc.)</p>
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Incomplete or poor evidences can lead to failure



Pay the Fee : The application fee is **€1,800.00 plus VAT**, for Building Systems certification **Note:** The Application fees are non-refundable



Start of Pre-Assessment

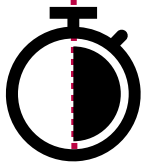
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Agrément Certification for MMC

NSAI Agrément
Form Title: TAS PROJECT PLAN AUDIT SHEET Reference: F-IAB-054 Page 1 of 9
Revision: 1

Application Details
File No:
TAS No:
Product Name: Building System (Steel Frame)
Product Type:
Intended Use:
Manufacturer: If different from Manufacturer
Distributor: Who is responsible for the structural design of the system
System Design By: Who is responsible for the structural design of the system
Installation By: Who is responsible for the structural design of the system
Exclusions: Who is responsible for the structural design of the system

Ref	Comment	Requirement
Part A Structure		
A1 Loading	Detailing, details and construction to show adequate strength and stability	Chartered Engineer
A2 Ground Movement	Building shall be designed and constructed, with due regard to the theory and practice of the structural engineering, so as to ensure that movements of the subsoil caused by subsidence, swelling, shrinkage or freezing will not impair the stability of any part of the building	Chartered Engineer
Part B Fire Safety		
B1.00 Means of Escape in Case of Fire		Statement that the certificate does not address: escape routes, alarms, electrical installations, mechanical equipment
B2.01 Internal Fire Spread (Lobbies)	Check fire classification of lobby - Class 0 may be used in all rooms groups without restriction	Look at manufacturer's processes and sign off
B3.01 Internal Fire Spread (Structure)	Design and construction so that stability is maintained for fire reasonable period in case of fire	Chartered Engineer (competent designer). Look at manufacturer's processes and sign off
B4.01 External Fire Spread	Check fire classification for external surface/cladding. Determine purpose of building heights	Look at manufacturer's processes and sign off
Part C Site Preparation and Resistance to Moisture		
C1 Dampness Substances	Ensure design permits for incorporation of radon sump and radon membrane	May fall outside the scope of building system manufacturer - i.e. scope out



1

NSAI will undertake an **initial assessment** of the information provided for the system, then agree the scope of the assessment with the MMC manufacturer and provide them with a contract

The NSAI assessment can commence when the contract is agreed and payment (either in full or partial – as agreed) has been made

An initial meeting is held with NSAI / MMC Manufacturer(s).

Technical Assessment Specification (TAS) Development :

- **Irish Building Regulations (TGD Parts A - M inclusive) and European standards compliance verification**
Additional Regulations Compliance – as determined by NSAI in the Technical Assessment Specification document (as drafted up)
- **Laboratory tests results / checks / Engineering calculations**
- **On-site evaluations of the as constructed MMC product/system i.e.**
- **Factory Production Control (FPC) inspection/Manufacturing – Quality management system verification**
- **MMC Installation procedures/MMC Off-site factory inspection plan/Post-construction maintenance program**

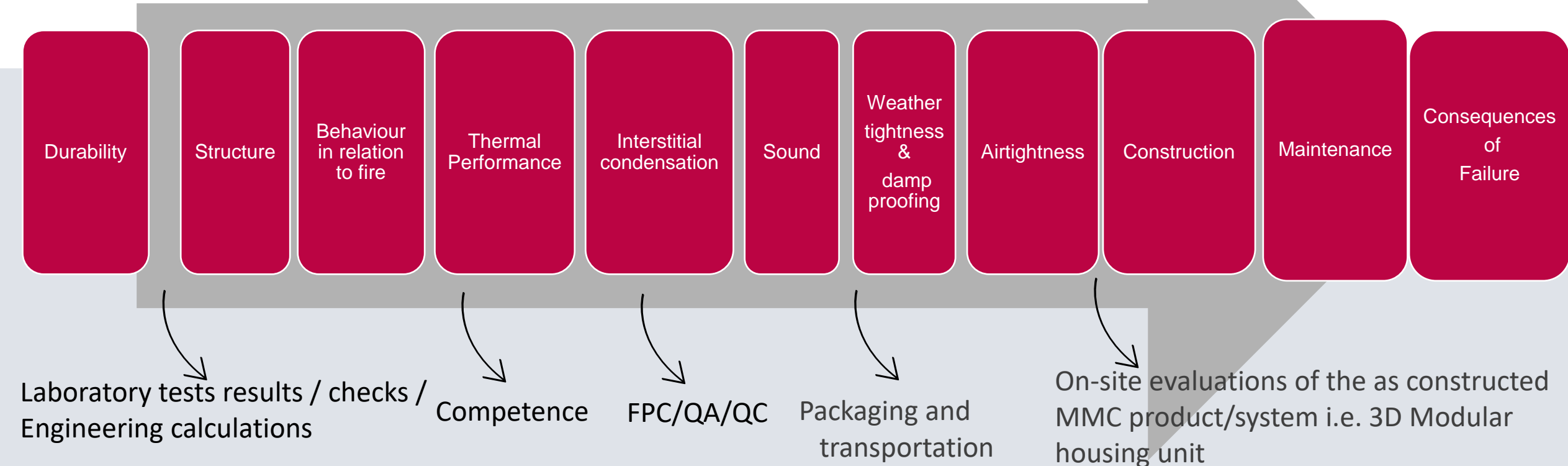
2

Subject to the results of the assessment, the NSAI Agrément Certificate is published. Valid for 5 years subject to annual surveillance audits.

MMC Agrément service

The Technical Assessment Specification (TAS) overview

The system will be assessed **against Parts A to M to the Irish Buildings Regulations and European standards compliance verification**



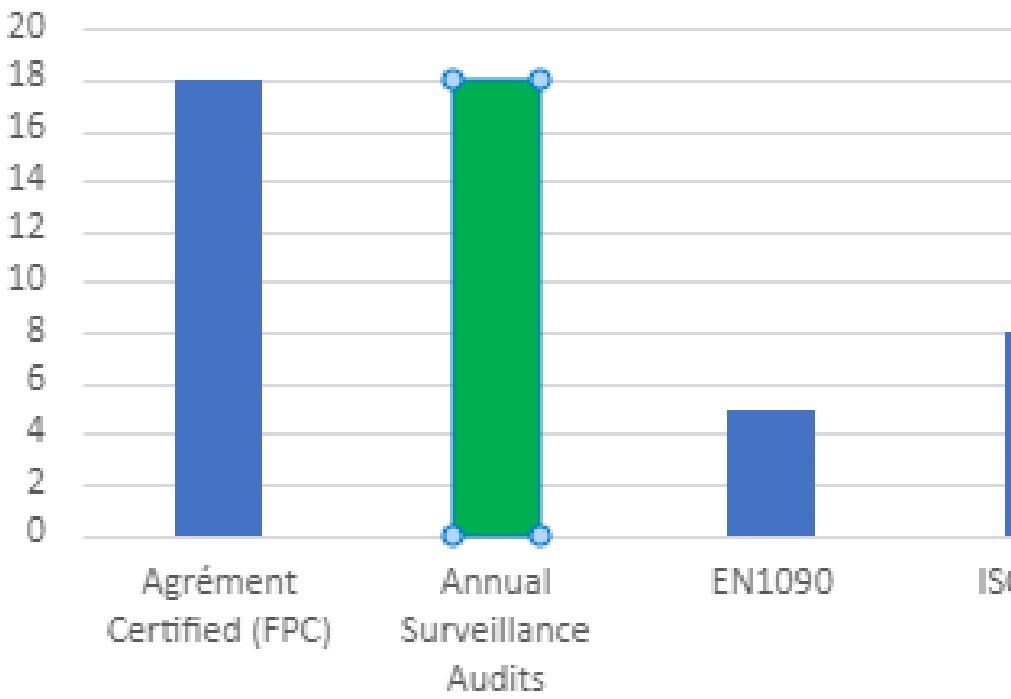


MMC Audits – QA Oversight

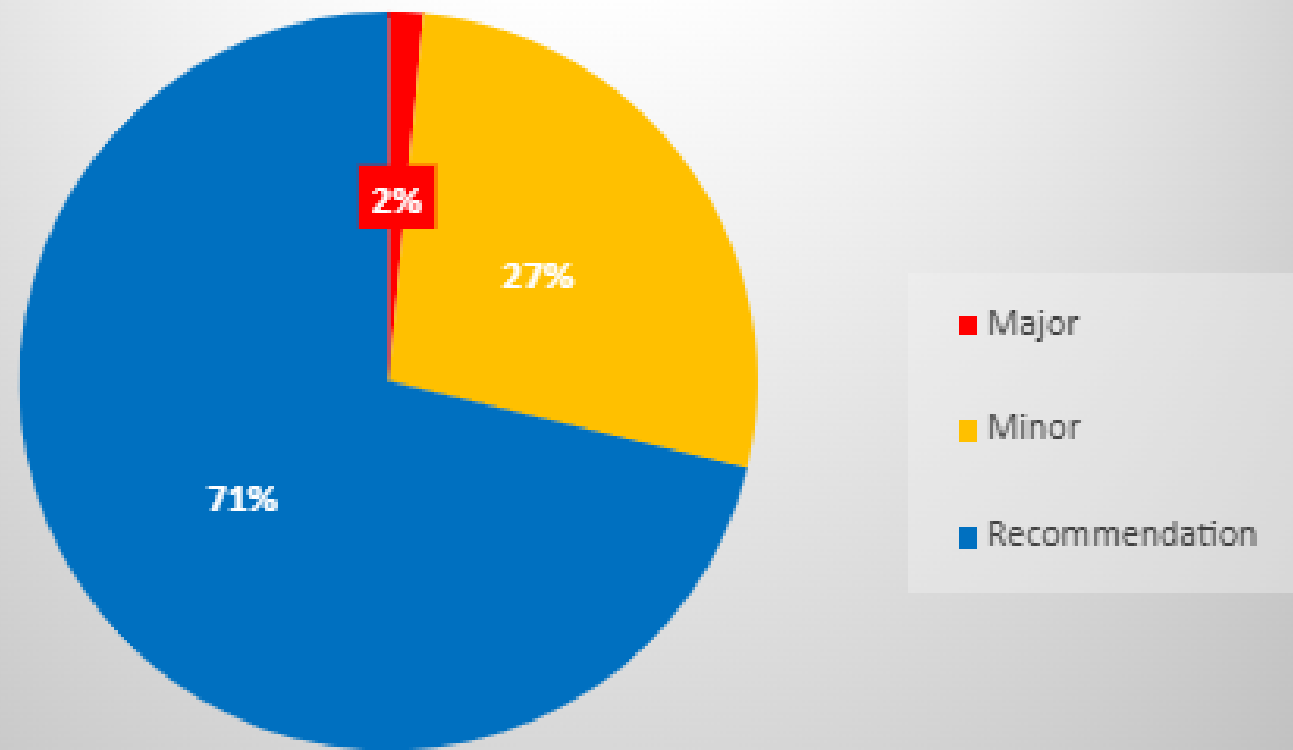
MMC Surveillance Audits 2023

Audit Finding Categories			
Major	Minor	Recommendation	Compliant
Major non-conformance. Follow-up required from the Client. Evidence of corrective action required.	Minor finding. Follow-up required from the Client on corrective action. Evidence of corrective action required.	Suggestion for improvement. Auditor did not identify any non-conformances for a particular item.	Based on the evidence provided Auditor did not find any non-conformances for a particular item and did not suggest any improvements.

NSAI Agrément Certification
Building Systems Surveillance 2023

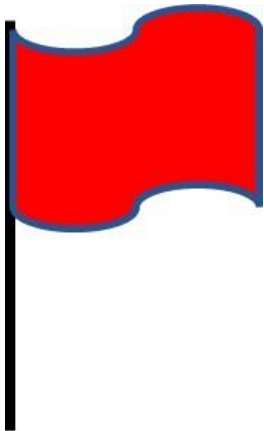


Summary of Audit Findings



MMC Building Systems

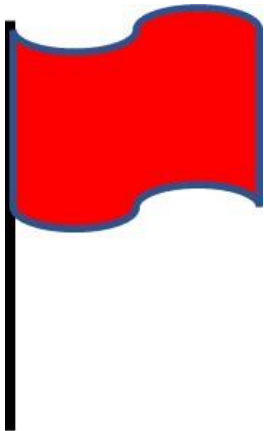
Top 10 items



1. Manufacturers, Designers, Specifiers not reading or understanding the hierarchy of EU Directives, CE marking, EN, IS and BS standards and TGD parts A to M (*also not sectorially aware of other additional regulatory requirements e.g. DoES School Design Guides (SDG), etc.*)
2. Applications are a) not detailed enough, or b) lacking supporting evidence, certificates, test record documentation, etc.
3. Applicants **'suspend'** , **'pause'** or **'do not continue'** with their original application, as previously submitted to NSAI (*for various unknown reasons*).
4. MMC Applicants **do not fully read or understand** the MMC Agrément Guide document or follow the process steps involved.
5. The legal entity of the Offsite Factory versus the MMC Client / Main Contractor is not clear **OR** their relationship(s) are not defined.

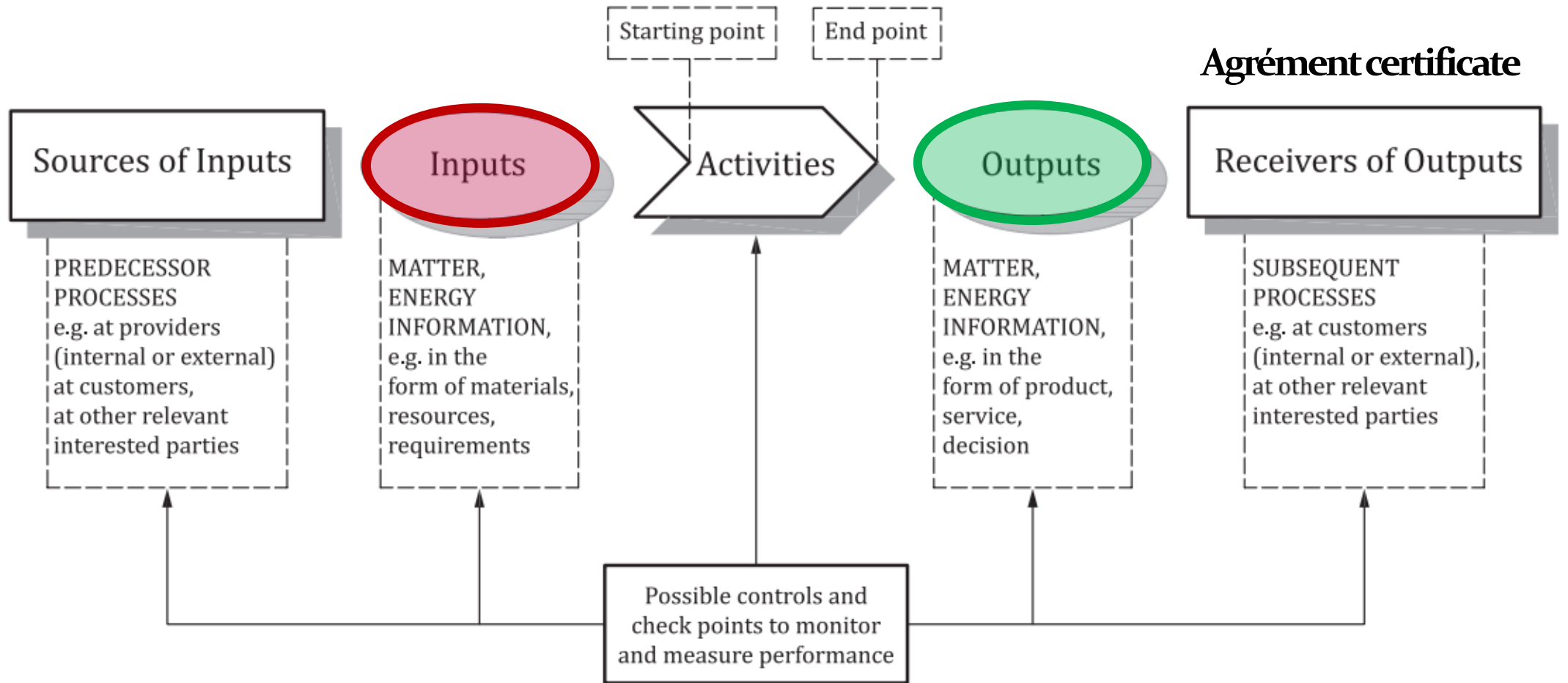
MMC Building Systems

Top 10 items



6. A lot of speculative Enquiries, particularly from outside Ireland and very little if any review has been completed of the regulatory environment.
7. MMC Applicants **do not demonstrate** how their Building System aligns or complies with the current TGD Parts A to M, with little evidence provided.
8. Frequently asked of NSAI as to: ***“Who do you recommend as a consultant for MMC.”*** NSAI cannot provide consultation or advise.
9. Lack of CE marking / Declaration of Performance (DoP) certification being provided in support of materials used, that comply with (CPR) EU/305/2011.
10. MEP services - By Others. Yet services installed in the factory / other installation is outsourced. ***(sometimes not considered in the Modular Building system being fabricated)***

MMC Certification Approach



Design/Construction

- Project specific design
- Competencies (Structure, thermal, safety, etc.)
- Method Statements
- Erection (Stability, H&S, weather...)
- Inspection plan / Check points
- Final sign off
- Maintain records
- Training

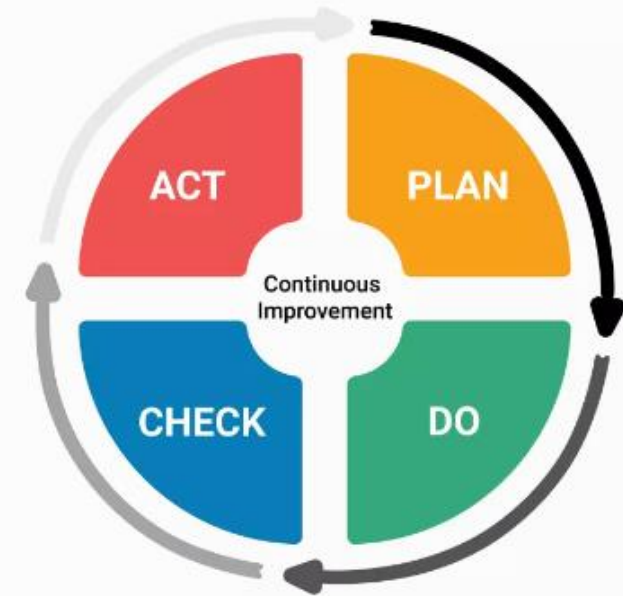


Factory Production Control (FPC)

- Competencies
- Material Specifications
- Traceability
- FPC Records
- Testing and measuring equipment
- Maintenance records
- Inspection points
- Final release
- Packaging and transportation



QMS / Operational processes



- Quality Policy
- Operational Objectives
- Operational processes
- Competencies (Production / Back Office staff)
- Manufacturing procedures
- QC Inspections
- Documented records
- Competencies
- Training
- Continual Improvement



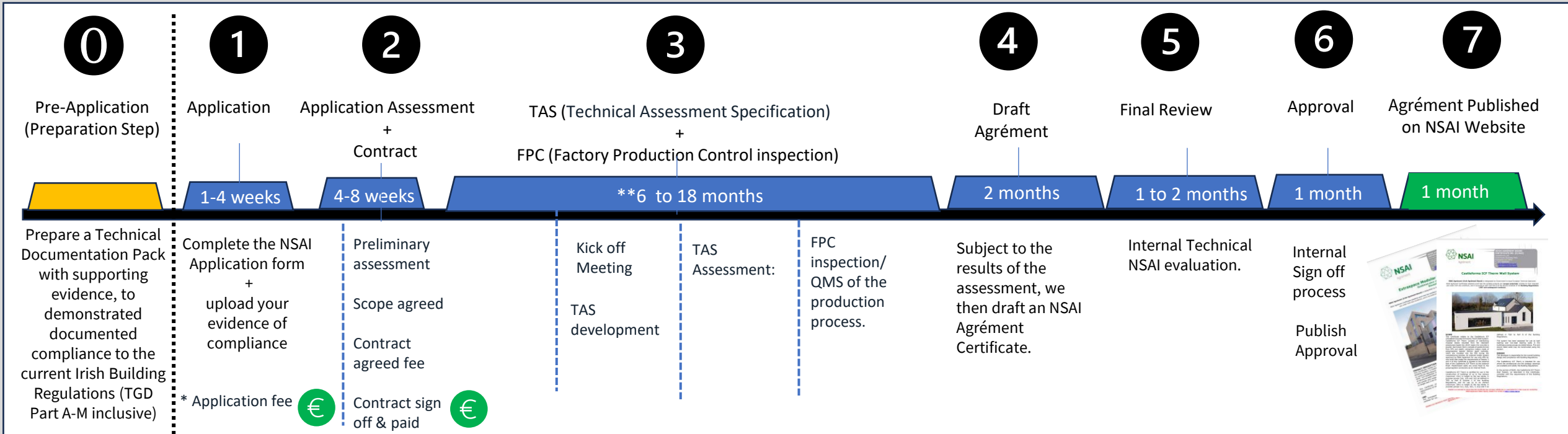
QC Responsibilities:

- Senior Management
- Operations Director
- Production Supervisor
- Production personnel
 - Procurement

QA Support:

- Quality Manager
- Technical Engineers
 - EHS Advisors

Pathway for NSAI MMC Agrément



*The annual fee is €4,400.00 plus VAT, for Building Systems certification (non-refundable) ** The timeline will depend on the availability and results of evidences provided to demonstrate compliance



The manufacturer applying for Agrément Certification will be required to provide evidence of compliance with Part A to M of Buildings Regulations and required EU standards.

NSAI Application form link – <https://www.nsa.ie/certification/agrement-certification/application-form-foragrement-certification/>

NSAI MMC Agrément guide link: https://www.nsa.ie/images/uploads/certificationagrement/Guide_to_Agr%C3%A9ment_Certification_for_MMC.pdf

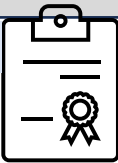
- TAS Assessment:
- ✓ Irish Building Regulations (TGD Parts A - M inclusive) and European standards compliance verification
 - ✓ Laboratory tests results checks / Engineering calculations
 - ✓ MMC Installation procedures

- FPC includes:
- ✓ On-site evaluations of the as constructed MMC product/system i.e. 3D Modular housing unit
 - ✓ Factory / Manufacturing – Quality management system verification (ISO9001 to EN1090)
 - ✓ Assessment of MMC Transportation, Storage, Handling, and Installation approaches taken

5 Years reassessment:

Evaluation of the current Agrément and verification of any changes to the product specification including manufacture, delivery and installation instructions.

In case of Changes, Steps 1 to 7 need to be followed.

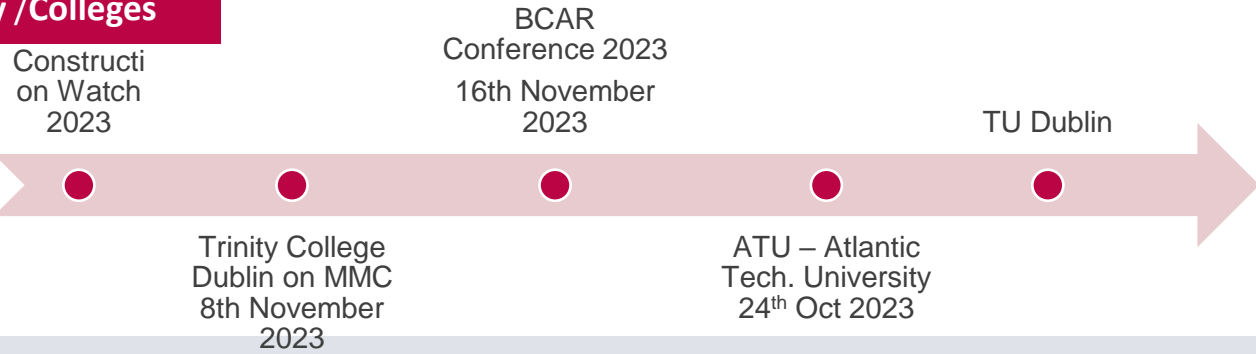


MMC Agrément next steps



Recent Stakeholder Engagement

1 Presentations: Events & University /Colleges

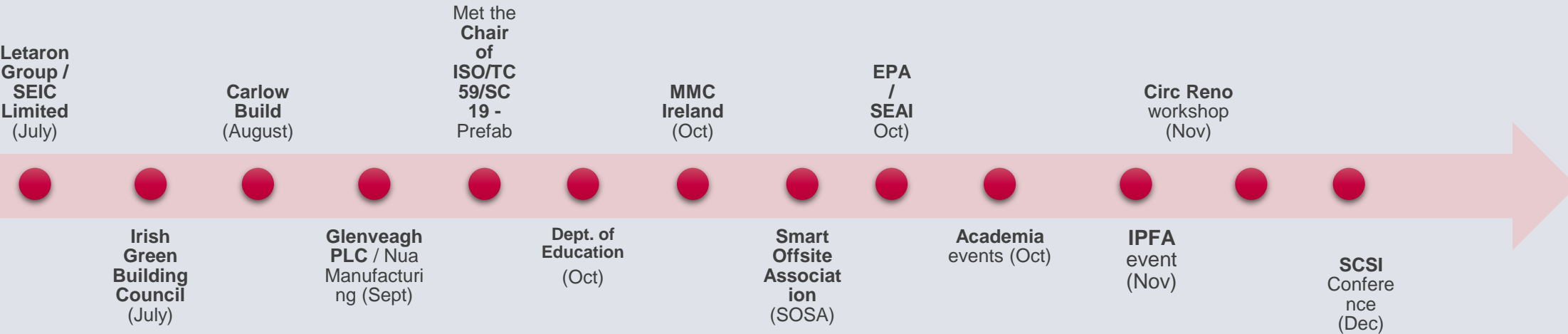


3 Surveillance Audits



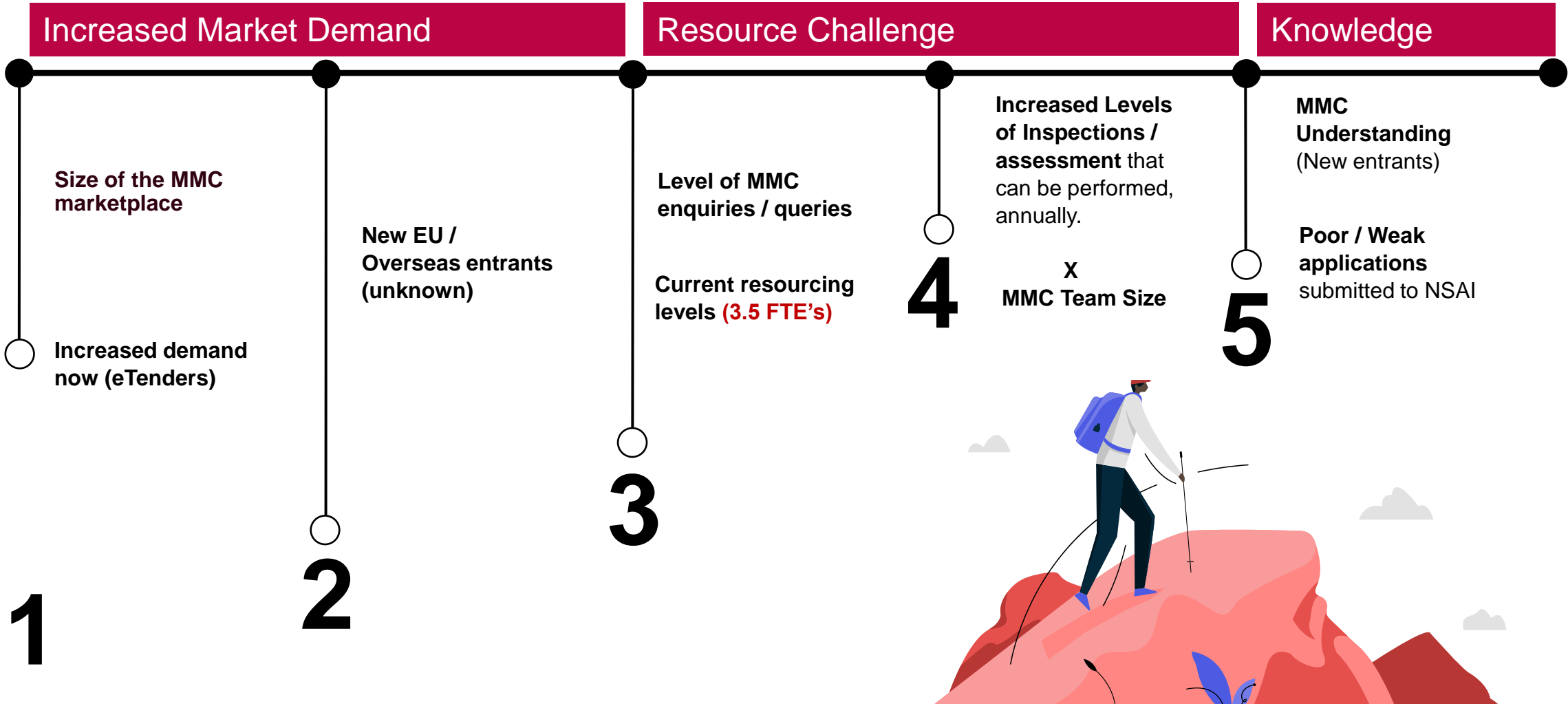
18Nr. Surveillance Audits completed by Q4, 2023 on certified Agrément clients.

2 MMC meetings held in person



MMC Agrément challenges

Certification



MMC Agrément

Opportunities arising:



Addressing the
Housing Shortages



Enhancing
Construction
Productivity: using
MMC techniques



Cost savings



Stimulating
Economic Growth



Sustainability and
Environmental
Benefits



**Increased Industry
Standards** – *through
the NSAI Agrément
certification process*

Thank you.

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Q&A

