Increasing Demand Through Kit of Parts Design & Collaboration

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Modular Matters
20 March 2024

HLM
Architects

Contents

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National Manufacturing Institute of Scotland, MMC construction

Our design philosophy puts people at its centre. We approach every design with a creative, thoughtful, and fun process that allows the character and ideas of each project flourish in their own delightful way.

One Team

200 Employees

1964 Since 1964

6 Studios

Values

Transparency

Creativity

Expertise

Commitment

FOUNDING MEMBER OF MMC IRELAND

OFFSITE ALLIANCE
Delivering change for the industry

OFFSITE AWARDS 2023 WINNER
ARCHITECT OF THE YEAR

The Opportunity

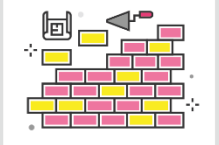
REDUCES


ENVIRONMENTAL IMPACT


PROGRAMME


DISRUPTION


WASTE


ON-SITE ACTIVITY


RISK

IMPROVES


PRODUCTIVITY


SAFETY


WORKING CONDITIONS


QUALITY + PERFORMANCE


COST CERTAINTY

JOBS WITH DIGITAL SKILLS


MAINTENANCE + LIFESPAN


SOCIAL VALUE

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The Question

"Our purpose is to understand why something that looks so promising and that should, on the face of it, be a roaring success, is running into so many difficulties, especially at the category 1 end of the spectrum..."

~ Chair of the House of Lords Enquiry

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MMC Demand Equation

Cost

Perception:

Traditional construction < Volumetric construction

Capital Cost vs. Capital + prelims

Volumetric is faster and reduces programme...
Reduces prelims, Faster ROI, and achieves better cost surety.
It usually provides better fabric performance and increased sustainability.

Reality:

Traditional construction = Volumetric construction (+/- 5-10%)[1]

and sometimes significantly cheaper if ROI is factored in

Achieves:

- ❑ Better Performance & Quality
- ❑ Improved Sustainability
- ❑ Faster Return on Investment (ROI)

Better Value!

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1 .Constructing Excellence

MMC Demand Equation

Cost

Perception:

Traditional = Volumetric (+/- 5-10%) + Risk

Manufacturer specific design does carry some risk
- ❑ risk of design change
- ❑ risk of insolvency

Reality:

Traditional + Risk = Volumetric (+/- 5-10%) + Risk

Contractor Risk vs. **Client** Risk

Significant barrier for house builder clients and designers

Risk that projects don't proceed…
And (+/- 5-10%)…
Clients choose traditional

Clients don't want risk

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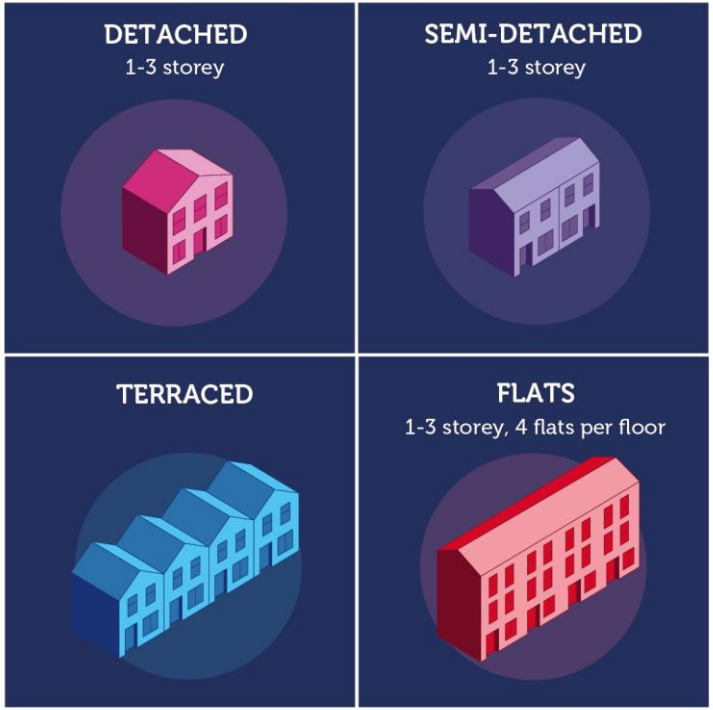
The Research

Modern Methods of Construction Research Standardisation & Kit of Parts Project for the Department for Levelling Up, Housing & Communities (DLUHC)

Scope:

- **1 year research project**
- Focusing on **MMC Categories 2 & 5**
- **Research barriers** to the use of MMC and how these can be mitigated
- Develop a **“digital kit of parts”** for low-rise housing (as defined in image)
- **Encourage design consolidation and DfMA**
- Improve **efficiency and quality** of new homes



LIMBERGER ASSOCIATES

BURO HAPPOLD

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The Process & Methodology

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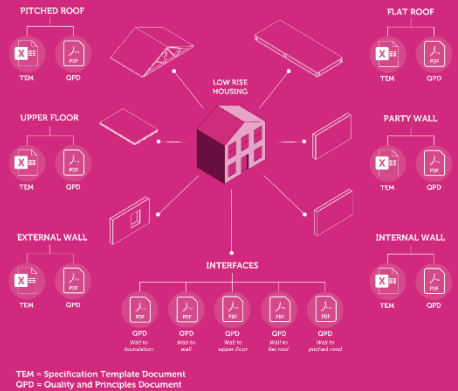
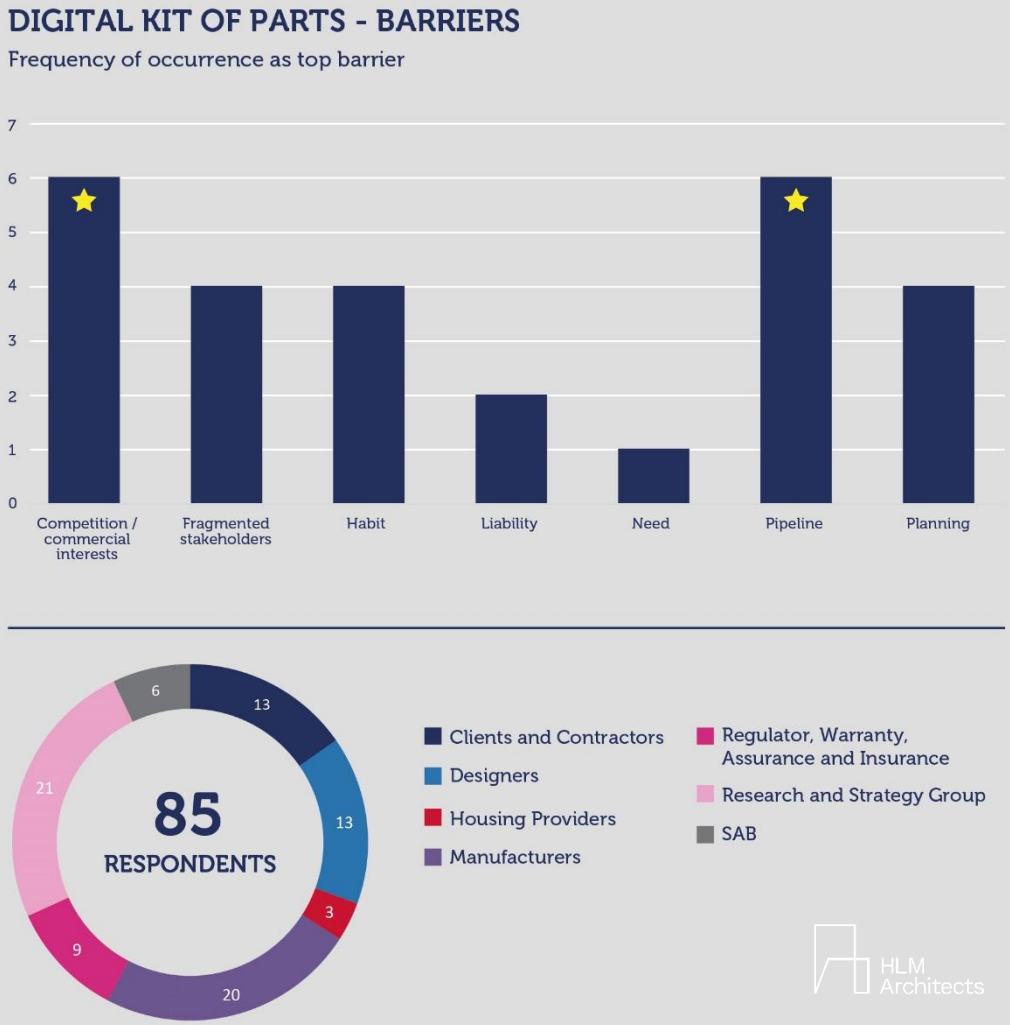
	LITERATURE REVIEW to understand past research	STAKEHOLDER ENGAGEMENT to understand current industry knowledge	STANDARDISATION ANALYSIS to understand what is in the market	DIGITAL KIT OF PARTS
RESULTS	• MMC barriers identified • Mitigation strategies identified • Recommendations for kit of parts identified • Recommendations for future and supporting research identified	• MMC barriers ranked • Mitigation strategies prioritised • Priorities for kit of parts identified • Digital requirements identified • Recommendations for future supporting research and initiatives highlighted	• Relevant construction products identified • Research on existing standardisation in existing UK housing market identified • DLUHC-compliant MMC products identified	developed to support the MMC construction industry
SCOPE	**15** sources reviewed... representing over **10** years of research 	Engagement with... **9** stakeholder groups Research & Strategy Group Manufacturers Designers Clients & Contractors Digital Housing Providers Regulator, Warranty, Assurance & Insurance Strategic Advisory Board Government, Policy Makers & Planning	Assessment of standardisation potential in: • Existing construction products • Existing low-rise housing • Existing MMC product dimensions, performance	D-KOP: A SET OF DIGITAL ASSETS  TEM = Specification Template Document QPD = Quality and Principles Document

Barriers

1. **Pipeline** e.g. A lack of clear pipeline and / consolidated demand
2. **Competition / commercial interests** e.g. IP and the competitive nature of businesses
3. **Fragmented stakeholders** with multiple, varying requirements
4. **Habit** e.g. established ways of working, status quo, and cost of change
5. **Planning** e.g. Local, variable requirements, mainly driven by planning
6. **Liability** e.g. a lack of clarity on who would take design liability at interfaces
7. **Need** e.g. a lack of defined need or benefits to the market



MMC Housing Construction Now

START

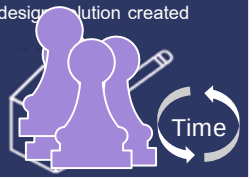
Housing provider / designer with their own pe[illegible]ance specification and [illegible]ndard house types.

Select & engage a single MMC Manufacturer early

Designing [illegible] manufacturer early does [illegible] align with tradition[illegible]ws or funding/ financing models.

Pay ££

Manufacturer specific desig[illegible]lution created



A new p[illegible]ct must be develope[illegible] meet your specifica[illegible]t requires fire testing

Significant delay/ funding fails. Game over.

Planning application submitted

Miss a turn

Construction can finally proceed efficiently, bu[illegible] financial impacts are apparent in overall productivity

Manufactu[illegible]solvency! Redesign w[illegible] new provider & apply fo[illegible]ges to planning[illegible].

Go Back 5 spaces & pay ££

Planning application approve[illegible] construction can proceed

Planners require changes your manufacturer cannot provide within cost envelope.

Go back 3 spaces

FINISH

CHALLENGES

- No Standardisation
- Requires early manufacturer engagement
- Design is manufacturer specific
- Manufacturers cannot anticipate & prepare compliant products due to lack of standardisation in pipeline.
- Planning changes can de-rail project.
- Insolvency can de-rail project.

Project Risk

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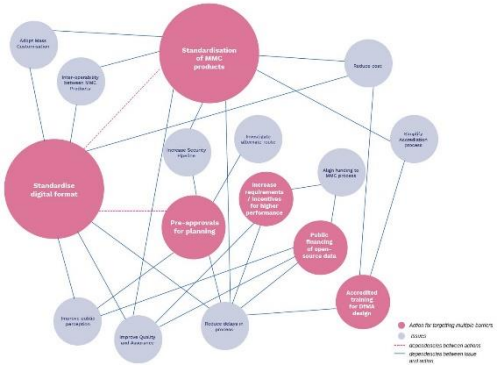
Key actions to reduce risk and improve uptake of MMC



- Standard dimensions
- Standard interfaces
- Standard performance

- Quality and environmental standards
- Common language
- Standard design process

- Standardised design team input
- Standardised manufacturer input
- DfMA principles
- Common language

TARGETS

TARGETS

Aggregation of demand

Manufacturer growth and steady supply chain

Steady pipeline

Investment in product with standards and quality

Insurers / warranty providers buy in

Confidence in use and change in habit

Designers incorporate DfMA

Smooth communication and approvals process

Fewer design changes, fast programme, steady production

RESULTS

FASTER, GREENER, BETTER HOMES

STEADY PIPELINE ACTIVATED

Input from digital Kit of Parts

Actions

Results

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Standardisation Analysis

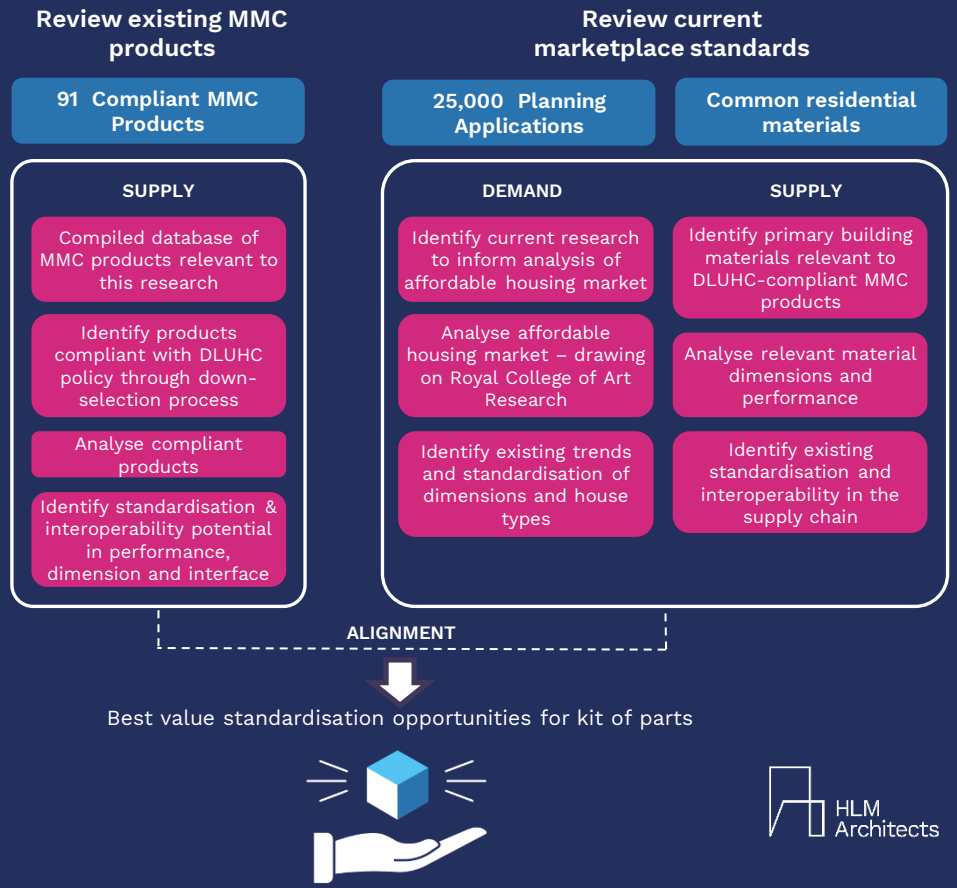
Identify the best value standardisation to inform the d-KoP

Analysis of

- Supply & Demand
- Product database
- House types
- Materials

To Answer:

- What standardisation adds value?
- Where are the natural intersections?
- How do we ensure baseline performance standards?



The Solution

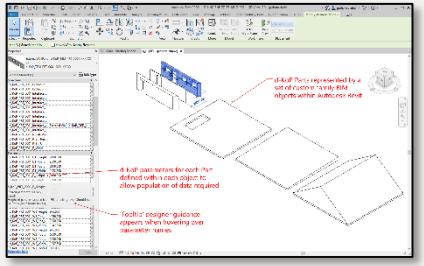
Digital Assets:

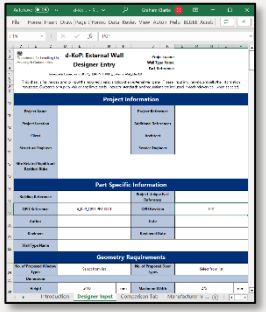
Standardized specification templates for each part within the kit comprising

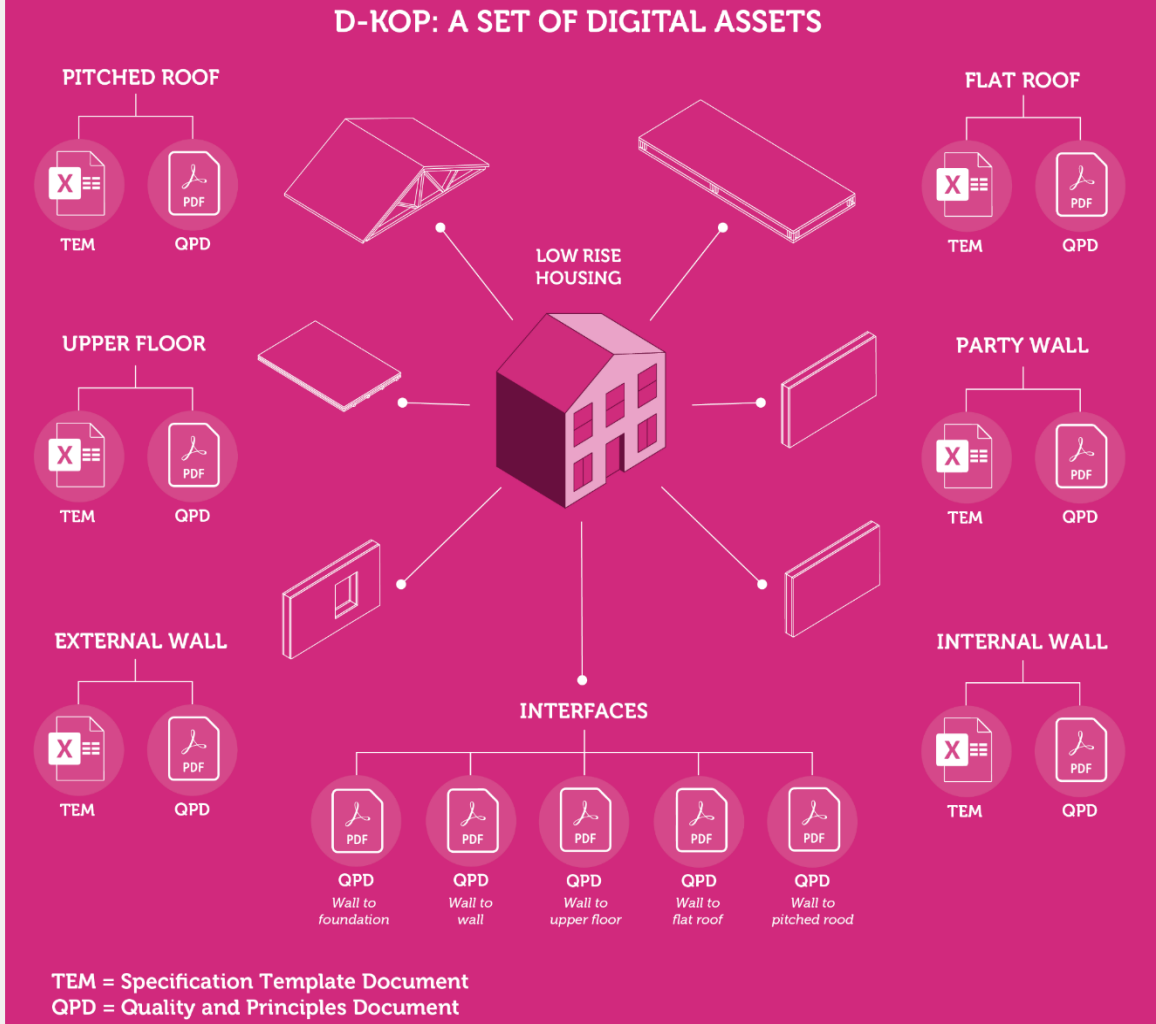
1. Quality and Principles Document
2. Data template

Digital Tools:

Can be created from the digital assets in any software. An example tool in Revit will be provided and can be exported to IFC with all DLUHC data.







FUTURE - STANDARDISATION AND AN ALIGNED INDUSTRY

= RESIDUAL RISK (planning)

= D-KoP BENEFIT

INDUSTRY GUIDANCE AND STANDARDISATION INPUT EMBEDDED IN **DLUHC KIT OF PARTS**

MANUFACTURER A SYSTEM (CHOSEN)

MANUFACTURER B SYSTEM

MANUFACTURER C SYSTEM (ALTERNATIVE)

DEVELOP BRIEF AND ADOPT D-KOP → DESIGN → PLANNING → APPROVAL → TENDER AWARD

WITH STANDARDISED GEOMETRY AND PERFORMANCE REQUIREMENTS

ALIGNED WITH MULTPLE SYSTEMS

MULTIPLE MANUFACTURERS ABLE TO DELIVER PROJECT AS DESIGNED - TENDER AWARD TO ONE OR MORE (BASELINE PERFORMANCE AND STANDARDISATION ENSURED)

CAPACITY TO CONSTRUCT MORE AND BETTER HOMES

CONTINUOUS IMPROVEMENT POST OCCUPANCY PERFORMANCE DATA INFORMS FUTURE VERSIONS OF THE D-KOP

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MMC Housing Construction with DLUHC d-KoP

START

Standard language and digital format in the DLUHC d-KoP improve communicatio create efficiencies.

Take another turn

Standard performance specification and dimensions in the DLUHC d-K P ensure quality & design inter bility

Go forward 2 ces

Housing provider/ designer uses free DLUHC d-KoP to create manufacturer informed MMC house types.

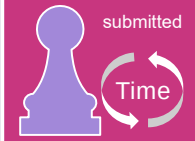
Go forward 1 space

Interoperable / Agnostic design solution created

Manufacturers know the standard specifications ahead of your proj & can prepare & test prod in advance!.

Go forw space

Planning application submitted



Miss a turn

Planners require changes. The DLUHC d-KoP informs revised design to impr deliverability.

Go forward 1 space.

Select & engage an MMC Mfr. later in process - aligns more closely with traditional workflows, funding & finance models.

Save ££

Digital standardisation allows for faster & more accurate MMC provider selection.

Go forward 1 space

Planning application approved – construction can proceed

Manufa rer insolvency! Stand tion & design inte y allows you to quickly select new provider & resume construction.

Construction proceeds efficiently, with increased productivity, quality, and sustainability.

Go forward to finish

More, Better, Greener Homes!

FINISH

Residual Risk

BENEFITS

- Embedded Standardisation in designs.
- Later manufacturer engagement aligns better with workflows & funding.
- Design is interoperable with multiple manufacturers – reducing insolvency risk.
- Manufacturers can anticipate & develop compliant products to meet the standard performance & dimensions.
- Reduced risk of planning changes de-railing project.
- Reduced cost of developing schemes.
- Reduced overall risk increases uptake of MMC, improving productivity and sustainability of new homes.

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MMC Demand Equation

Reducing cost & client risk are key to driving demand

Traditional + <u>Contractor Risk</u> = Volumetric (+/- 5-10%) + <u>Client Risk</u>

Client avoids taking on risk.

Slight increase in cost of MMC balanced by consistent quality and programme benefits.

Reduced Client risk.

Balance is tipped toward traditional construction.

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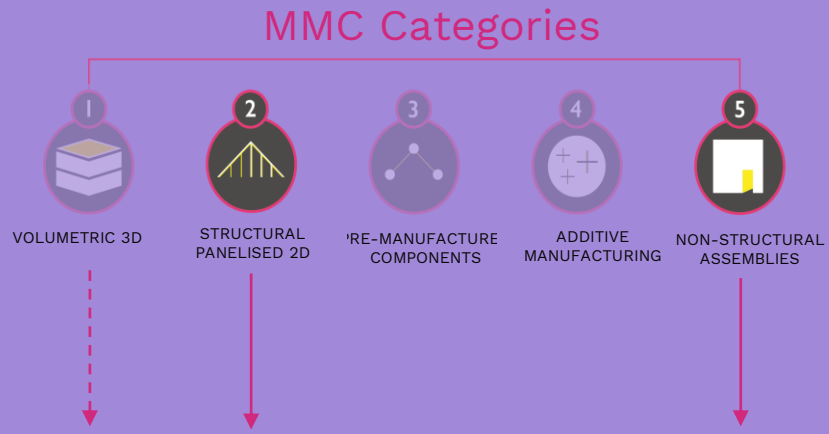
Application to Category 1 Volumetric

Industry collaboration & support for consolidated design principles is essential for all MMC growth



1. **Digital standardisation principles** – improves communication and accuracy
2. **Performance standards** – provides baseline quality standards
3. **Consolidated design principles** – improves DfMA, consolidates demand and informs manufacturers
4. **Consolidated dimensions** – improves DfMA, consolidates demand, and reduces client risk

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