BUILDING LEADERS BRIEF INDUSTRY 2022

19TH MAY, 2022

# Prefab Innovation Hub

Mr Damien Crough

*Co-founder & Executive Chairman - prefabAUS*

prefabAUS is the peak body for Australia's off-site construction industry and acts as the hub for building prefabrication technology and design.

www.prefabaus.org.au

**prefabAUS Sustaining Partners**




*The primary object for which the Company as a not-for-profit organisation is established is to:*

**represent**, **showcase** and **advance** Australia's prefabricated building Industry through **collaboration**, **innovation** and **education**.

Extract from the prefabAUS Constitution 2013

## WHO WE ARE - 2022/23 Directors

Damien Crough – Advanced Offsite Group (Executive Chair)

Brad Denison – Development Solutions

Rob Colquhoun – Prebuilt

Joyce Ferng – AECOM

Jason Kunkler - Fleetwood

Paul Kremer – Boss Polymer (Company Secretary)

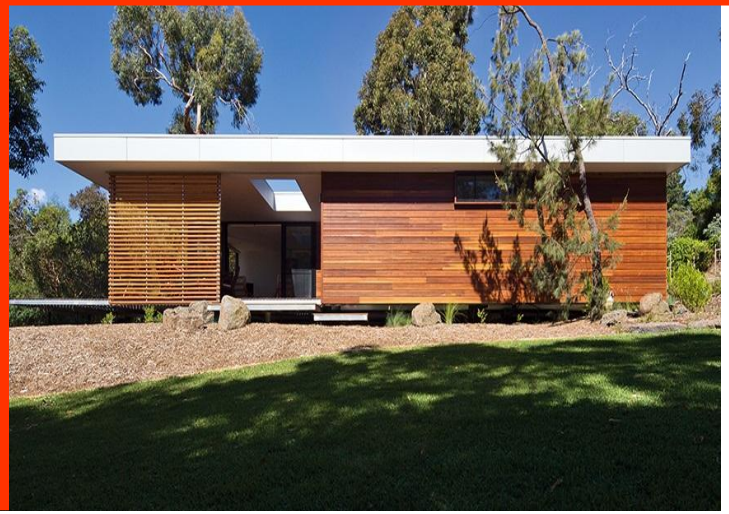
John Lucchetti – Stantec

Tuan Ngo – University of Melbourne

Nick Strongman – Sensum

David Haller – Mirvac

# Mission and Vision – inclusive



Mission and Vision – inclusive

**Components + Sub-Assemblies**

**Panels**

**Modules**

**Whole Buildings**

# Prefabrication & Off-site Construction

## Definition:

Any part of a building that has been fabricated at a place other than its final location

## Other terms in use:

Modular, Unitised, Volumetric

Kit of parts, Flat pack

System-built

Modern Methods of Construction (MMC)

*From this*:

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*To this*:

PROJECT
**One9**

ADDRESS
**19 Hall St,**
**Moonee Ponds Vic**

MODULES
**36**

APARTMENTS
**34**

VALUE
**$4.5m**

# Advantages of prefabrication

**The main benefits include:**

- shorter program times
- increased construction precision
- reduced defects/rectification works
- reduced site disruption
- factory not affected by adverse weather
- reduced materials wastage
- improved worker safety

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# Where has the take-up been?

**Prefabricated project examples:**

- Transport – suburban train stations
- Hospitality – hotels, restaurants
- Healthcare – medical centres, hospitals
- Education – schools, universities, child-care centres
- Residential - detached houses, townhouses, affordable housing, apartments

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# Market Opportunity

- By 2025 market expected to grow from current 5% to 15%
- $30 Billion value added
- 20,000 new jobs

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# PREFAB INNOVATION HUB

amgc.org.au

AMGC
ADVANCED MANUFACTURING GROWTH CENTRE LTD

# PRE-FAB INNOVATION HUB MILESTONES

- **June 2019:** PreFab Innovation Hub announced
- **Sept 2019:** Industry consultation begins
  - National in-person consultation
- **February 2020:** Feasibility study issued
  - Bushfire/Disaster relief included in plans
- **March 2020:** Building 4.0 CRC approved
  - PreFab Innovation Hub endorsed
- **July 2020:** PreFab Innovation Hubs established
- **October 2020:** National Manufacturing Priorities launched
  - Building sustainability separated out
- **2021:** Interim reports completed
  - DfMA
  - PreFab funding and financing
- **June 2022:** Phase 2 of PreFab Innovation Hub launched

The Hon Karen Andrews MP

Minister for Industry, Science and Technology

Media Releases Speeches Transcripts

Home > KarenAndrews > Media Releases > Pre-fab innovation lab for building industry

**Pre-fab innovation lab for building industry**

*16 June 2019*

The Morrison Government is backing Australia's manufacturing and building and construction sectors, with support for the prefabricated building industry.

Up to $2 million will be spent developing a new collaborative lab to help manufacturers design innovative new prefabricated buildings that are more eco-friendly, affordable and can significantly reduce times for construction.

Minister for Industry, Science and Technology Karen Andrews said the new lab would support work on a wide range of buildings, including tiny houses, larger homes and offices and strengthen Australia's position in the global prefabricated building market.





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# ESTABLISHED INDUSTRY-LED ADVISORY BOARD

PrefabAUS

Queensland University of Technology

Housing Industry Association

University of Wollongong Australia

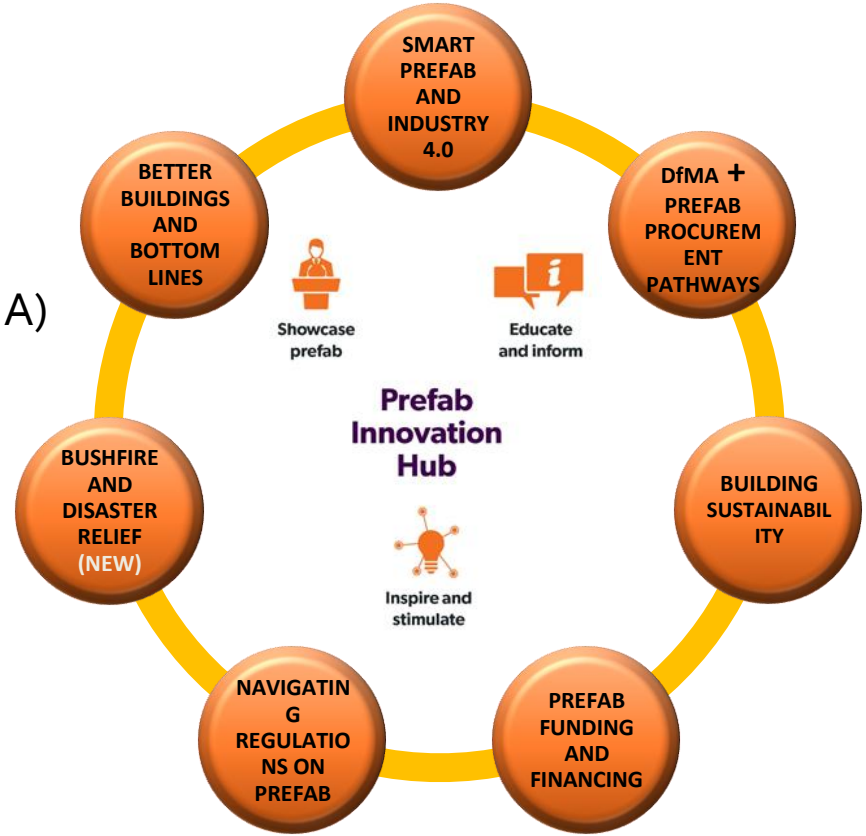
Asia Pacific Research Network for Resilient and Affordable Housing

Advanced Manufacturing Growth Centre (Chair)

Building 4.0 CRC

# INNOVATION LABS **RE-FOCUSED** ON GROWTH DRIVERS

1. Smart PreFab & Industry 4.0
2. Design for Manufacturer and Assembly (DfMA)
   - +PreFab Procurement Pathways
3. Building sustainability
4. PreFab Funding and Financing
5. Navigating Regulations on PreFab
6. Bushfire and disaster relief (NEW)
7. Better Buildings and Bottom Lines



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# Typology of Products

Everything that arrives at site is a product

Type 1

1. Concrete
2. Labor
3. Steel (reinforcement)
4. Operational site resources
5. Power tools and small equipment, parts

Type 2

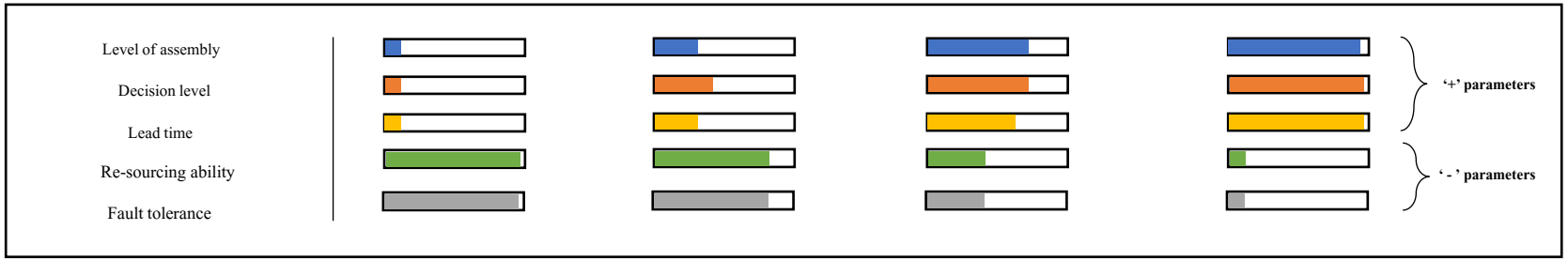
1. Standard structural steel, aluminum, timber sections
2. Lighting, ducting, pipes


Type 3

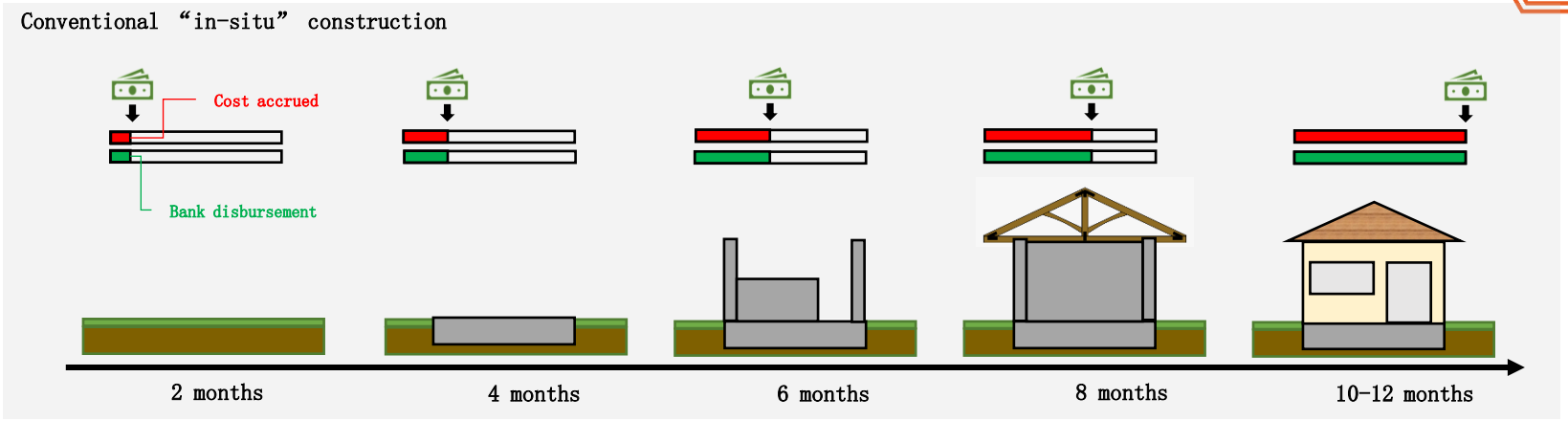
1. Prefabricated trusses
2. Prefab slab sections
3. Specialized equipment
4. MEP, HVAC systems

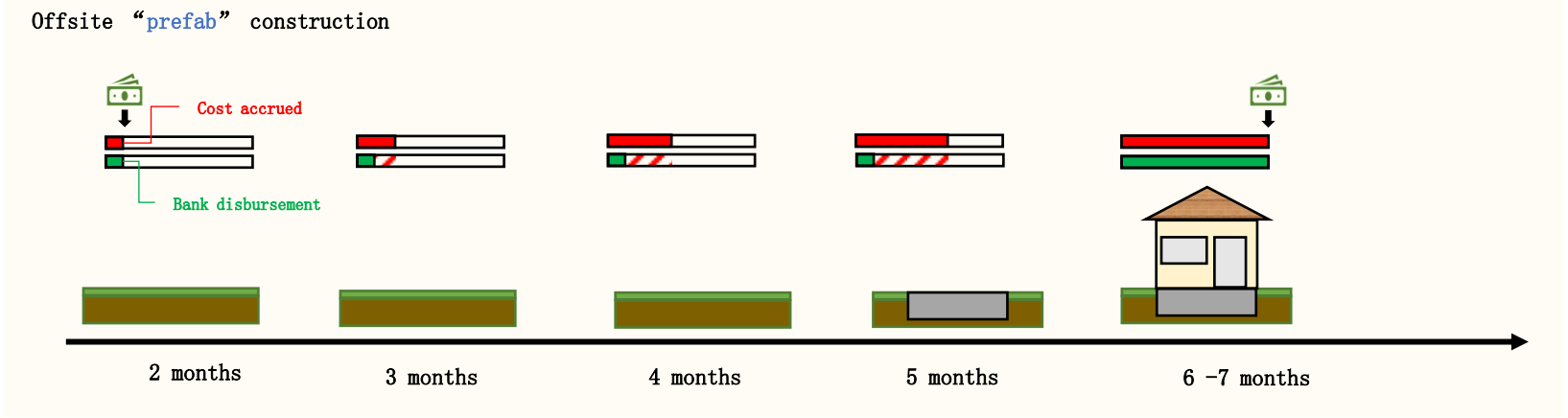
Type 4

1. Bathroom pods
2. Volumetric modular building units
3. Prefab wall panels
4. Prefab columns
5. Bespoke designs



# Scenario


Conventional “in-situ” construction
Cost accrued
Bank disbursement
2 months
4 months
6 months
8 months
10-12 months


Offsite “prefab” construction
Cost accrued
Bank disbursement
2 months
3 months
4 months
5 months
6 -7 months

# Hurdles to prefab lending

- **Big chunk of capital in small time:** Around 60% of the cost of a module is incurred before the actual manufacturing
  - Design, procurement, labor have to be paid about 6-8 months before modules are ready to be shipped to the site. Manufacturer must bear these costs before lenders can dispatch conventional draws
- **Ownership:** personal property of the manufacturer
  - Risk management, risk transfer
- **Validity of valuation:** Banks initial evaluation of the project can change on account of manufacturer's inability to meet the working and planning standards (inexperienced manufacturer)
- **Insufficient QS/monitoring:** Tools for progress monitoring are insufficient in their robustness and sophistication
- **Lender's risk portfolio:** Lending rates are kept higher due to Insufficiently developed business model around lending products.
  - Huge historical comfort in investing in traditional modes of lending for traditional built houses.
  - Unwillingness to diverge into a riskier market (prefab finance) with **unclear substantial benefits.**
- **Component of variable costs**
  - Transportation – that depends upon the design of the module, weight, distance from the site and jurisdiction
  - Legislative approvals for newer designs and materials used for building a house

# Prefab lending products

Westpac (NZ), BOPAS (UK), MHA (USA)

# Prefab lending products

**Service one - Alliance Bank (AUS)**

- Staged loan for kit home financing
- Progressive draws for land acquisition, material procurement and product disbursement with installation

**Westpac (NZ)**

- Prefab home loan products up to 90% LVR
- Additional insurance during the stages of construction

**Fannie Mae (US)**

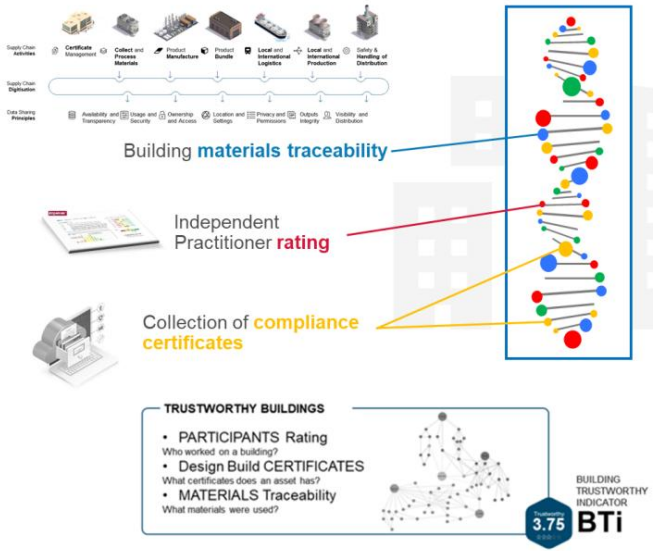
- Manufactured housing MH housing program (https://singlefamily.fanniemae.com/originating-underwriting/mortgage-products/manufactured-housing-product-matrix)
- Certified houses are eligible for Fannie Mae home loans (https://singlefamily.fanniemae.com/media/7706/display)
- Manufacturers that are in agreement with FM (https://singlefamily.fanniemae.com/media/30191/display)

**BOPAS (UK)**

- Provides assurance of the integrity of offsite construction systems
- Accreditation includes business operations, handover interfaces, design, manufacture, construction, assembly, client handover

# NSW (Australia)

## Building Trustworthy Index




**WHAT**… materials have been used in the building?

**WHO**… has been involved in building and installing the products?

**HOW** … has the compliance been verified, by whom and to what standards?

**SUPPORT** … consumers to make better informed decisions.


**INFORM** … regulators to make effective policy decisions, manage assets and enforce compliance.

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(Office of Building Commissioner, NSW)

# Summary

- Understanding the **risk allocations** in off-site construction & ownership
- Production **method benchmarking**, product **performance accreditations**
- Financial **risk assessment for lending** products
- Need to invent **streamlined lending** products
- Enable **consumer driven demand** pipelines
- Use of **technology** such as
  - IoT,
  - smart contracts on blockchain,
  - product platforms
  - ML and risk assessment, ….


# Design for Manufacture and Assembly

## Design for Manufacture (DfM)

- Apply the best design processes
- Explore the best material types for the application
- Understand the specification and tolerances of the object
- Optimise the process through and iterative, or looping, review

## Design for Assembly (DfA)

- Reduce and minimise the number of parts in the object
- Consider the assembly/construction process
- Optimise to the maximum efficiency

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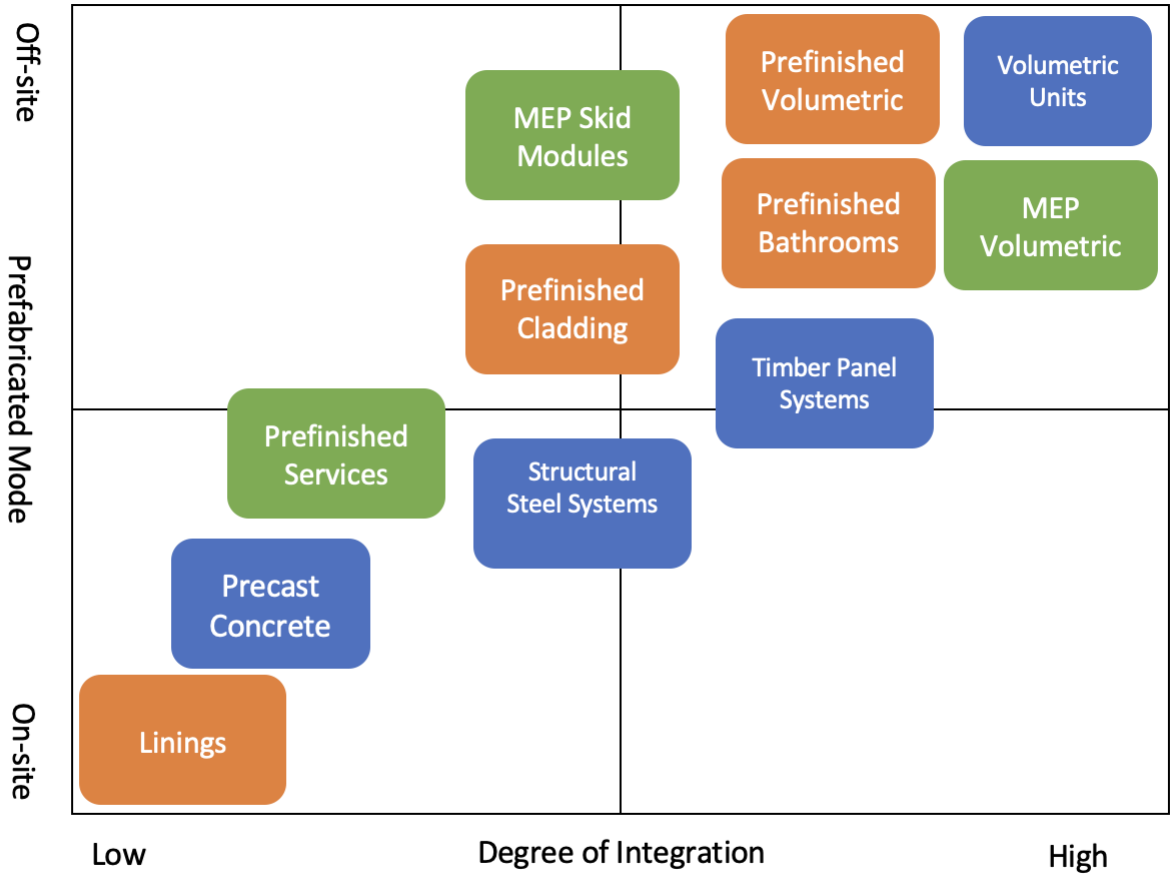
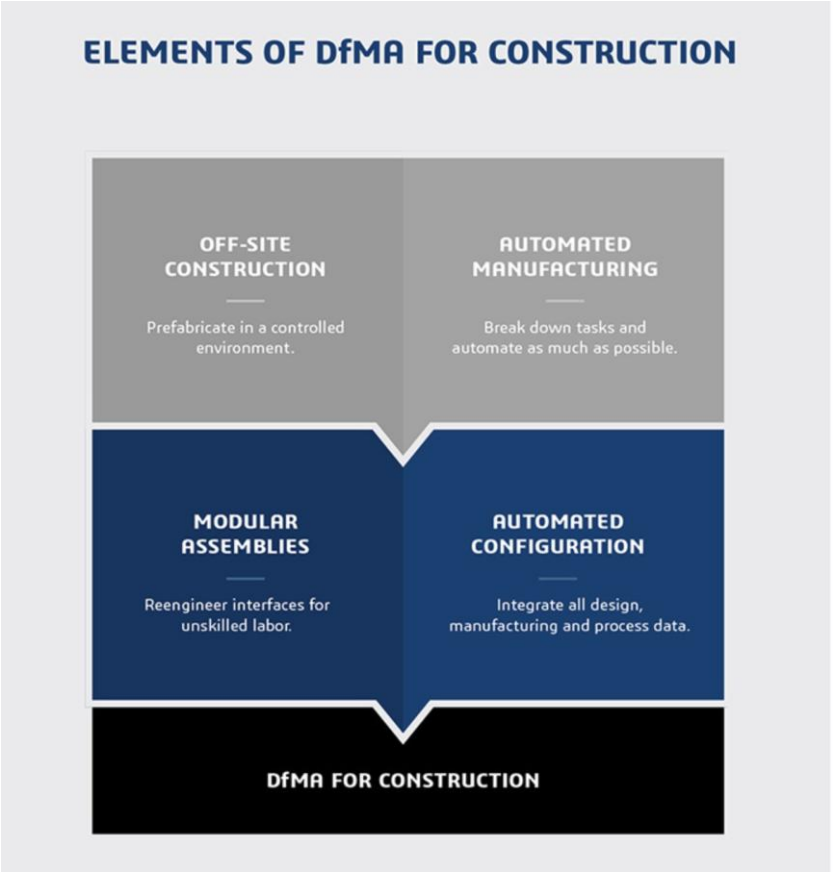
Design for Manufacture and Assembly in Prefabricated Construction



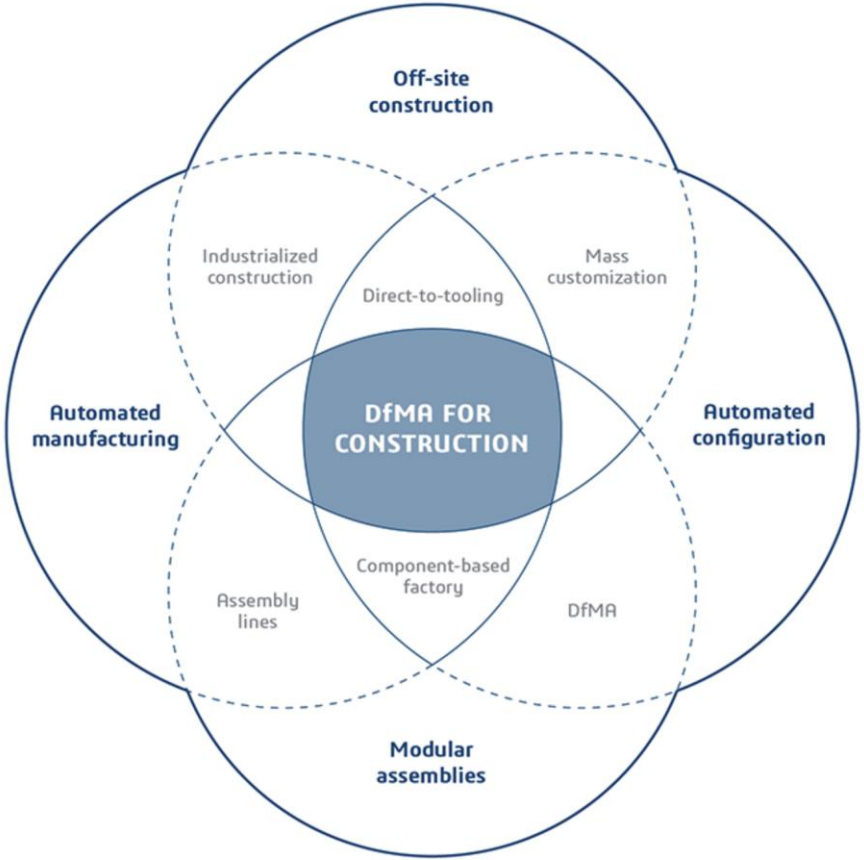

Legend: Blue = Structural Stream, Orange = Cladding/Finishing and Green = MEP Stream

**Digital Integration of the Supply Chain**

The supply chain is limited so we aim to bring the intelligence about the capabilities to the prefabricated construction sector




https://ifwe.3ds.com/construction-cities-territories/game-changing-strategy-rapid-urban-development




https://ifwe.3ds.com/construction-cities-territories/game-changing-strategy-rapid-urban-development

# DfMA Process

Construction Standards, Engineering, Architecture and Performance

Design Concept


Design for Assembly


Design for Manufacture

How will the structure be assembled? Digital Twin

How will the structure be be manufactured and in what sequence?

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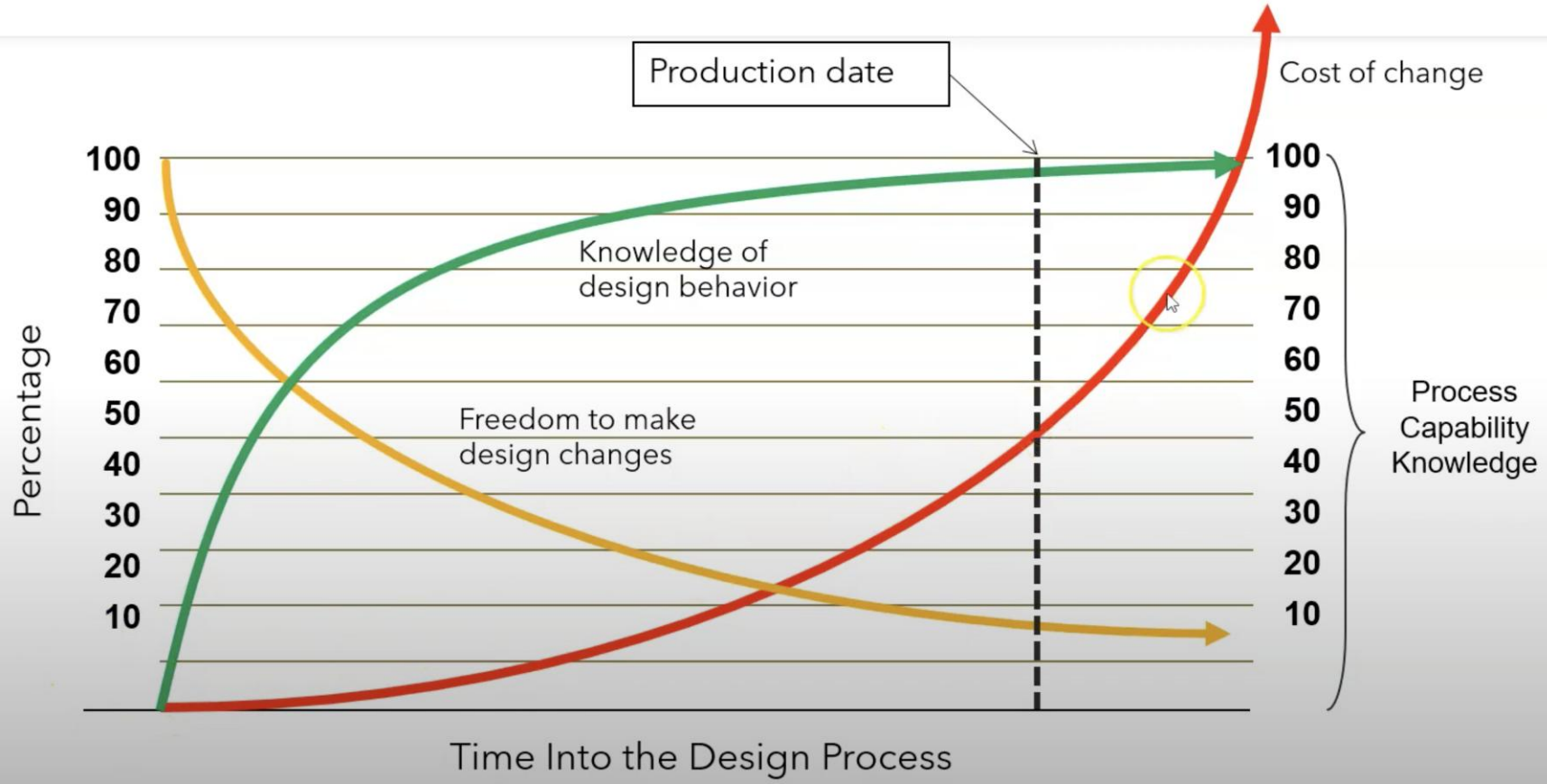
# Deadline Management is the Key



# Thank you

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