





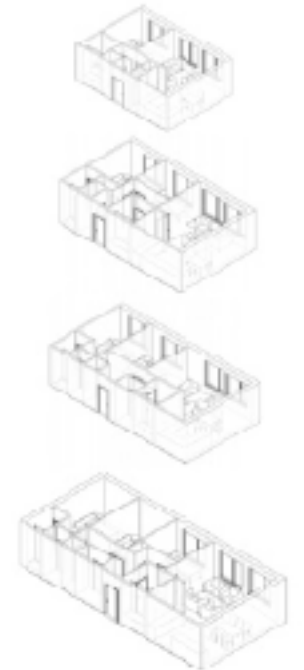
Agenda

- 13:30 – Welcome
- 14:00 – 14:10: Chair Introduction to the session – **Tom Eshelby**
- 14:10 – 14:45: Flagship Group presenting their progress to date and strategy for MMC delivery – **Andrew Yuill, Director of Business Growth**
- 14:45 – 15:00: Teesside University presenting their research project on “Putting people at the heart of future social housing design & manufacture” – **Professor Paul van Schaik**
- 15:00 – 15:20: Audience discussion – How we measure ‘quality’ of housing, with specific reference to the DfMA revolution. How do we improve on status quo to match tenant hopes?
- 15:20 – 15:30: Comfort Break
- 15:30 – 15:50: Osco Homes to present their business model for low cost manufactured housing and how they train and recruit ex-offenders to deliver their projects – **Gwen Beeken, MD of Osco Homes**
- 15:50 – 16:15: **Helen Greig, Project Director at Building Better** to present how they are aggregating demand among Housing Associations to optimise the path to MMC delivery for those members
- 16:15 – 16:30: Questions and summary of audience feedback



Our MMC progress so far and strategy for MMC delivery

Residential Hub
25 February 2020



7

countries...



4 homes in Newmarket...



30 manufacturers...



1 academic report...



1 3D printed bridge...



1 firm of architectural consultants...

SURFACE TO AIR

Agenda

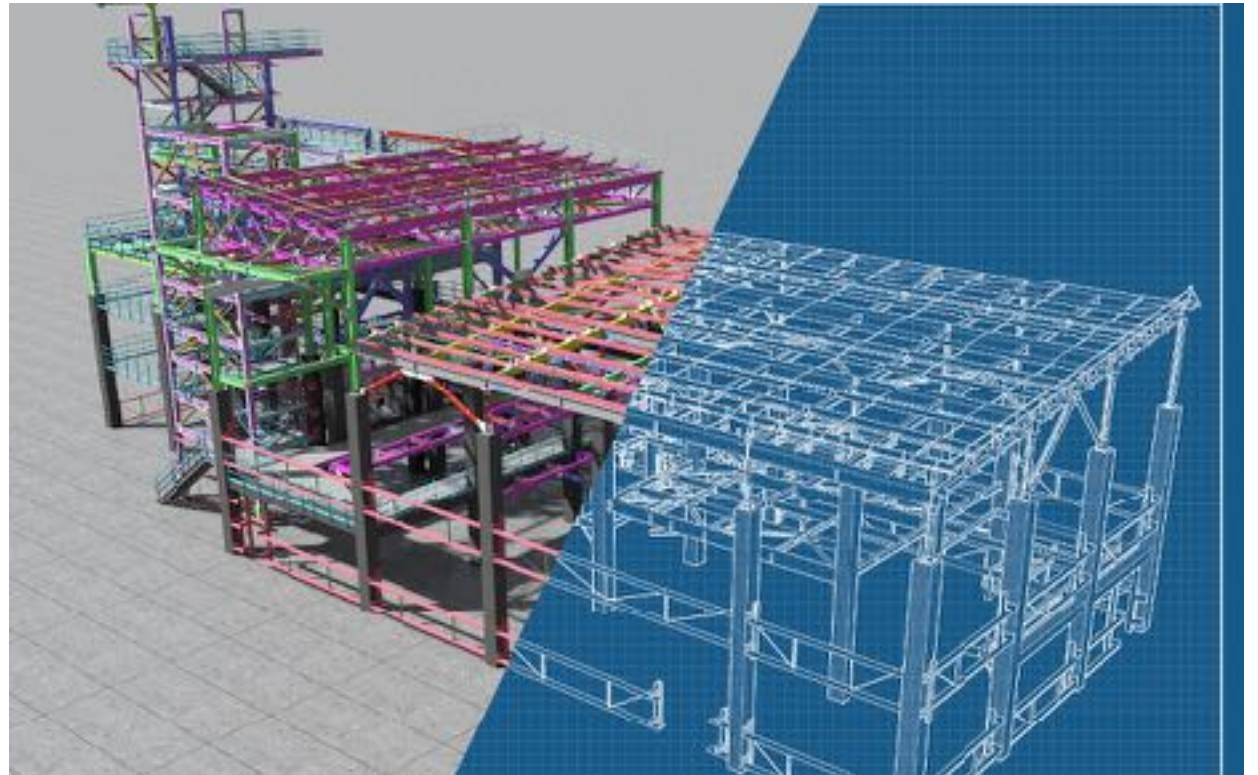
Context – introducing Flagship Group

Why are we interested in MMC?

Progress to date

Issues / questions we face

Our strategy





Context – a brief introduction to Flagship



31,000 homes across East of England

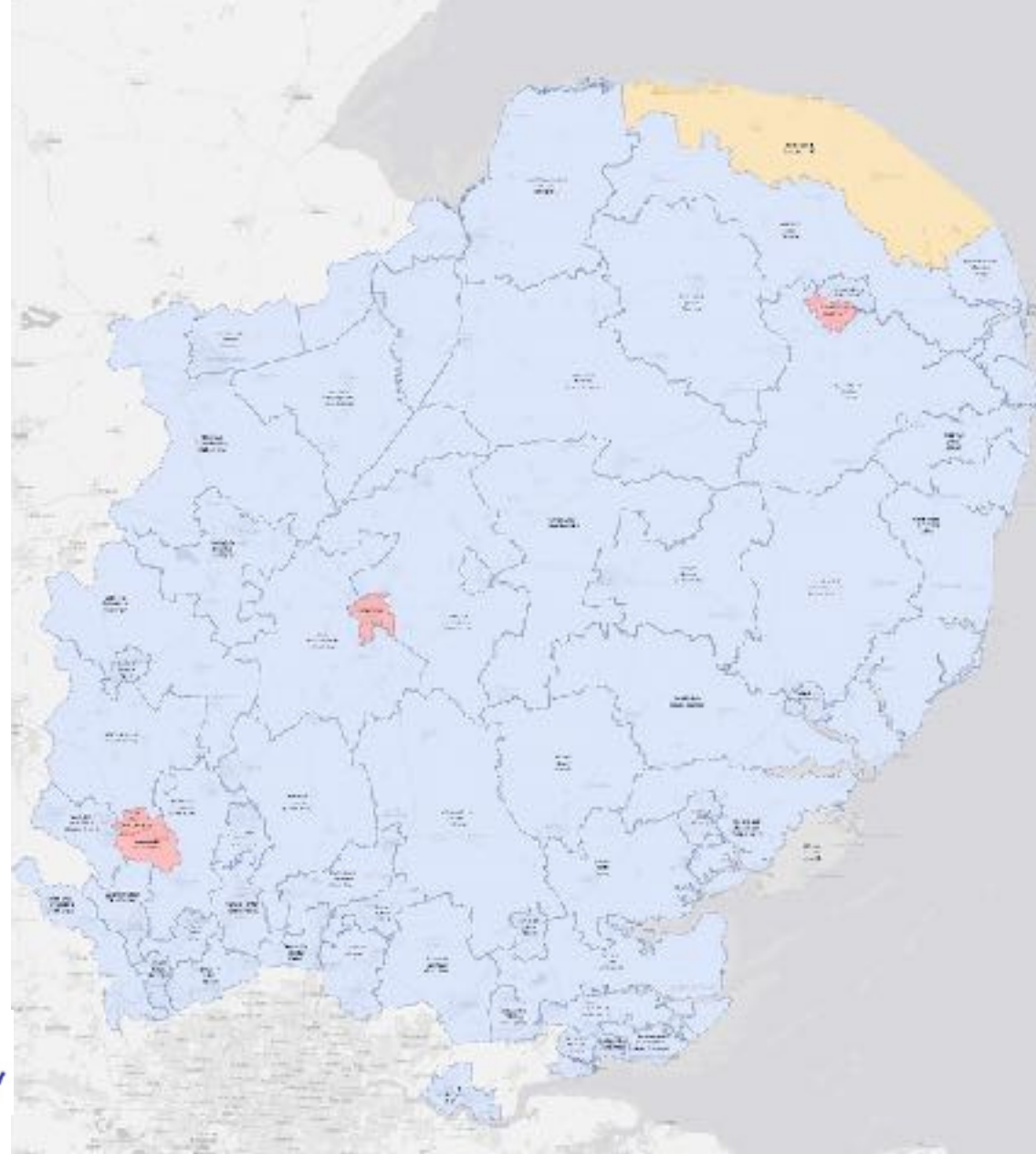
£220m turnover, 70% from social housing letting

1,200 local people employed

‘not for profit’

700+ new homes

£60m maintaining homes



Our housing stock

- Low rise – 2 or 3 storey houses or blocks of flats
- Rural / market towns
- Buying c70% of our affordable stock from developers under S106
- Development sites of 25-300 homes
- Regeneration – estates and garage sites
- 22 different local authorities – huge variety in planning requirements





Why are we pursuing MMC?



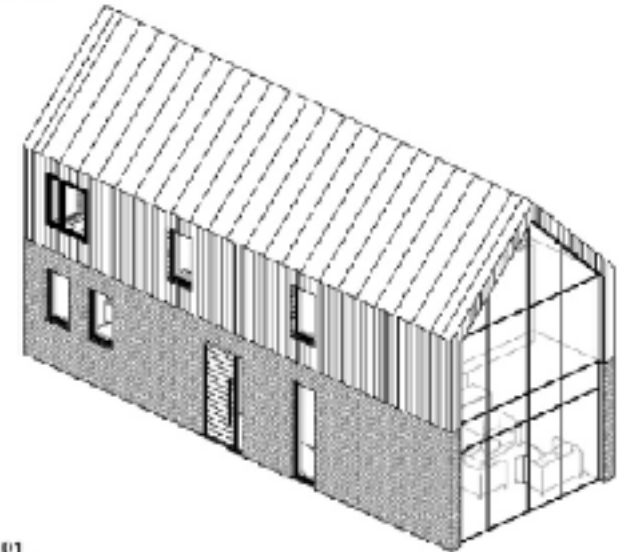
Housing Associations compared to commercial developers

According to a major landowner....

- HA build costs typically 25% higher
- Sales values 5% lower
- Overheads 10% higher
- Professional fees 400% higher
- Finance costs 200% higher
- HA contingency usually 3-5% but zero (declared!) for commercial developers
- BUT – HA's don't need to build at sales pace; can build at construction pace



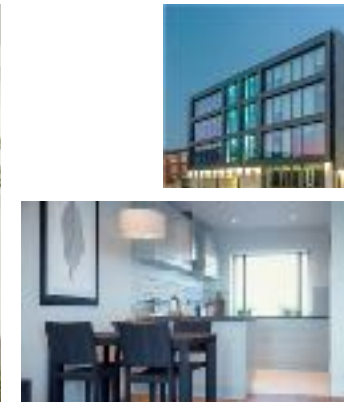
Section 01
1:50



AK0 U1

“Architects like Frank Lloyd Wright and Walter Gropius believed passionately in the **life-enhancing potential** of prefabrication as a **sustainable housing** system. In other words, as a means to more means, **not the devalued and impoverished** architecture-of-the last resort that came to be associated with prefabs. Today, with this new market opening up, **we are** once again **at the forefront** of engineering new ways of living.”

Ima Ebong



What are we looking to achieve?

- Improved quality – S106 acquisition issues
- Greater sustainability / environmentally better
- Moving towards net carbon zero
- Improved energy efficiency – reduced costs for our customers
- Quicker build times and improved timetable certainty
- Workforce availability (& improved gender balance)
- Better working conditions, fewer accidents
- Lower build costs
- *To be ambitious, bold, at the forefront, to do it better, to do the very best for our customers*



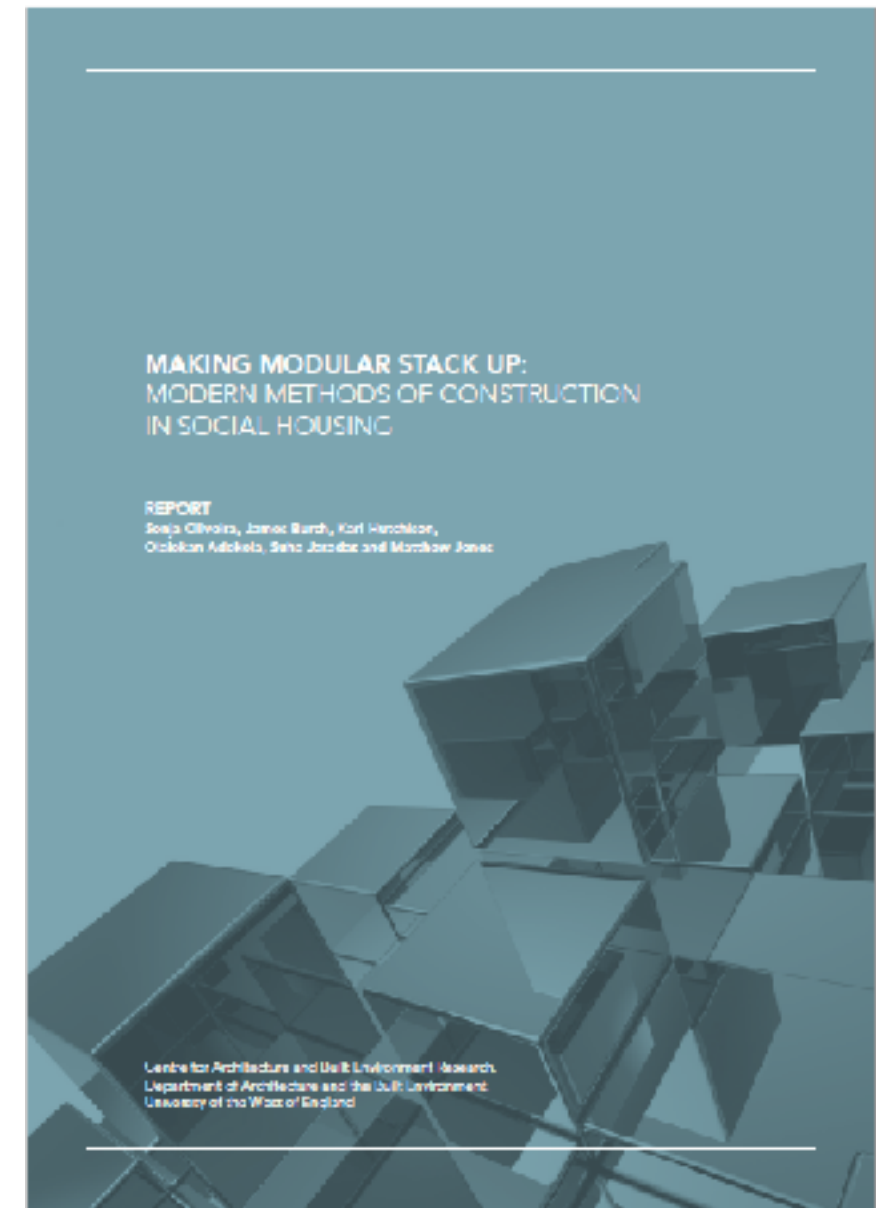


Progress to date



Research

- Review of previous MMC experience (houses built in the 'noughties')
- 2017 UWE research paper
- Multiple manufacturer / site meetings and visits
 - UK first
 - 2019: widened to Europe (Germany, Netherlands, Sweden) and Japan
- Team drawn from Development, Housing, Asset Management, Business Growth, Finance, IT, working with Surface to Air



Building Better

- Part of the NHF Creating Our Future innovation programme
- Bringing Housing Associations together to aggregate their MMC efforts
- Flagship was part of the original team in 2018 ... now umming and ahing about whether we join
- Will Housing Associations play together well?
 - Are we ready to accept standardisation at scale?



Newmarket – A Pilot



Newmarket – A Pilot



Newmarket – A Pilot

- Specific issues we encountered
 - Think MMC from the outset
 - Cost v 'traditional' build methods
 - Pre-manufactured proportion
 - Supply chain
 - QA in the factory
 - Site access requirements
 - Selection of main contractor and contractor relationships
 - Use an architect with experience of MMC and retained for post-contract works
- 4 Shared Ownership homes – all sold on day 1





Issues we face, questions we have
to ask



Which flavour of MMC?

MMC is commonly perceived as an 'all or nothing' construction option. In reality there is a sliding scale for the client to choose from when utilising MMC – from 10% to 100%.

TRADITIONAL

FACTORY
PRODUCTION



2 - INSTALLATION ON-SITE

SITE INTENSIVE (KIT SYSTEMS)

FACTORY PRODUCTION



2 - INSTALLATION ON-SITE

PART FACTORY / PART SITE (HYBRID)

FACTORY PRODUCTION



SITE INSTALLATION/ASSEMBLY

FACTORY INTENSIVE (VOLUMETRIC)

FACTORY PRODUCTION



SITE ASSEMBLY

MODULAR METHODS OF CONSTRUCTION (MMC)

SITE INTENSIVE (KIT SYSTEMS)

1. GLU LAM TIMBER FRAME
2. LIGHT GAUGE STEEL (LGS)
3. TIMBER FRAME
4. PRECAST CONCRETE STRUCTURE

PART FACTORY / PART SITE (HYBRID)

1. CROSS LAMINATED TIMBER (CLT)
2. STRUCTURAL INSULATED PANEL SYSTEM (SIPS)
3. WALL PANEL SYSTEMS (CLOSED & OPEN)
4. PRECAST CONCRETE PANELS

FACTORY INTENSIVE (VOLUMETRIC)

1. TIMBER MODULAR UNITS
2. METAL MODULAR UNITS
3. POD BATHROOMS (HYBRID)

Asset

- Performance of the asset
- Maintenance – training for repairs staff
- Standardisation – producing a detailed spec
- Accreditations

Finance

- Cost
 - Do we build fewer at higher cost / quality?
- Procurement
- Borrowing against the properties we build and retain



Cultural change

- Board support?
- Development reticence?
- Change management required
- Are these houses not for sale products?
- Planners' views



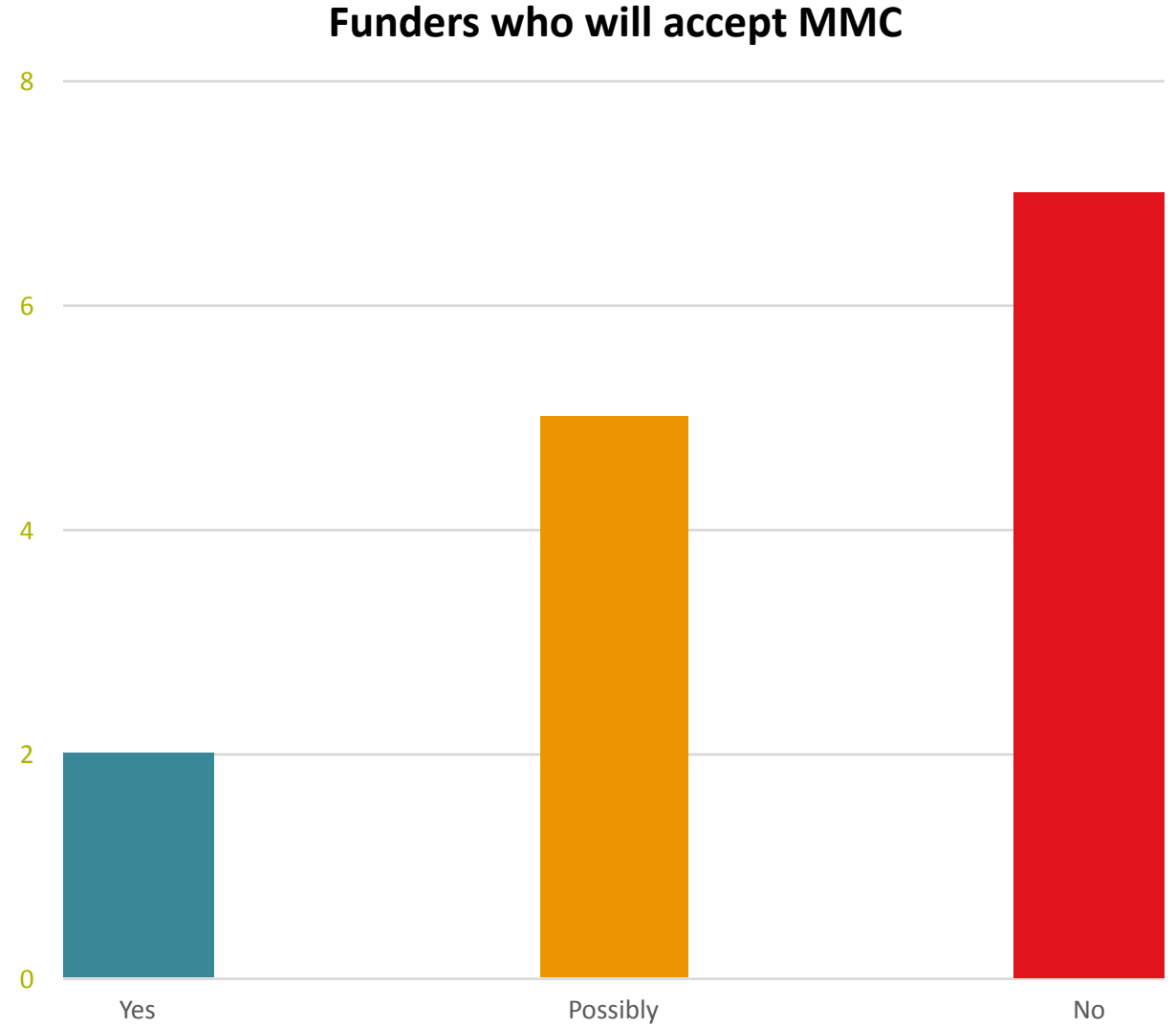
Implementation

- Construction management and contractual arrangements
- Use of BIM / VR
- Training (staff and users)
- Immaturity of the UK market
- Own manufacturing facility? Arms length buyer? Partnership?



Funders

- Retail mortgageability vs our funders' attitudes
- Is it the funders or the valuers?
- Bond investors more accepting
- Work is going on to address the situation





Our strategy

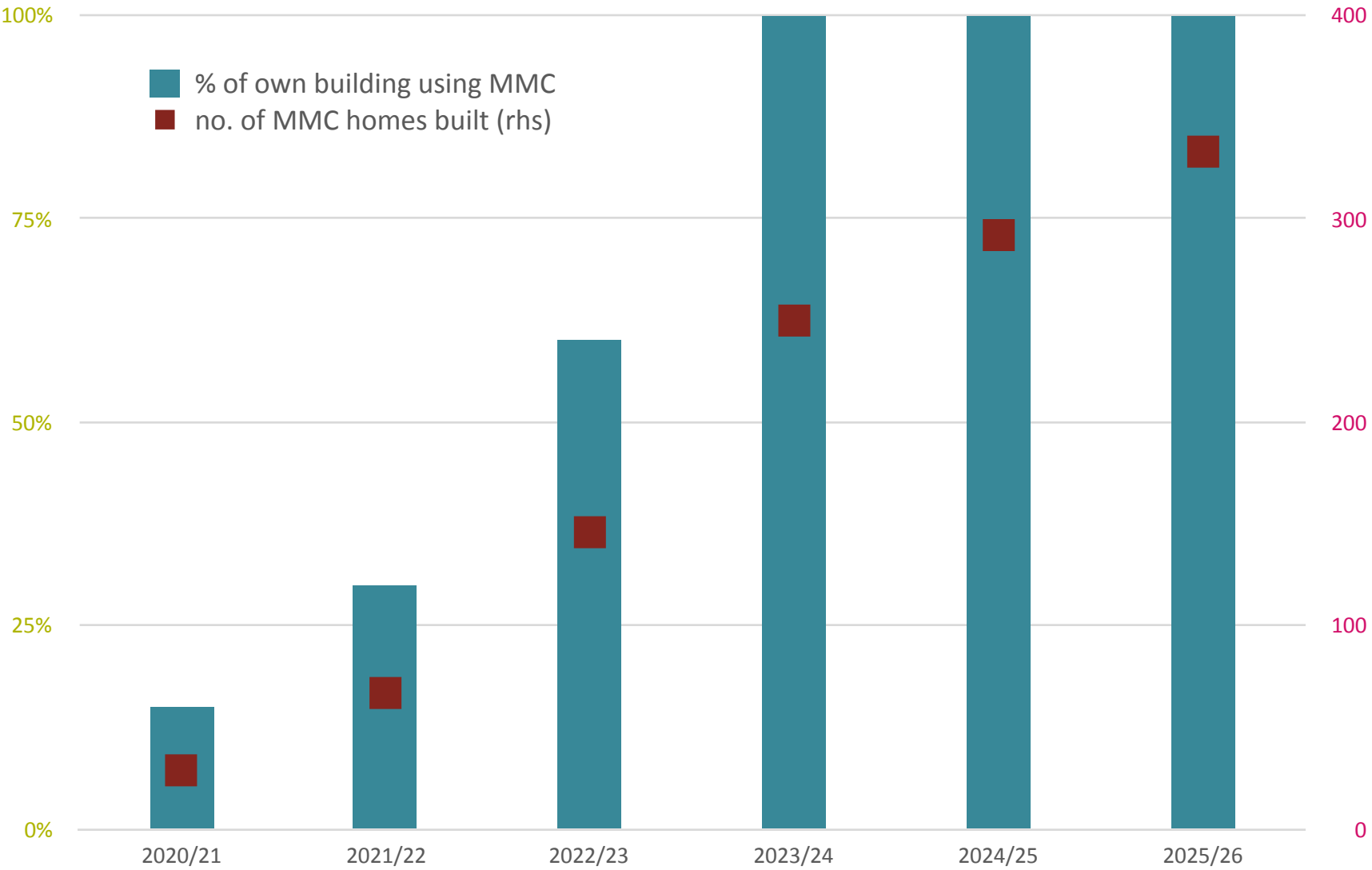


Our strategy

- Committed to using MMC on all land-led developments from 2023/24, unless there is a good reason not to
- Additional garage/ infill and regeneration sites



Potential MMC build programme*



*excludes major
regeneration & infill sites

Our strategy

- Committed to using MMC on all land-led developments from 2023/24, unless there is a good reason not to
- Additional garage/ infill and regeneration sites
- Not distinguishing between 'affordable' and open market sale homes
- Creating an outstanding living experience for our customers, cheaper to run
- Moving towards net carbon zero
- A number of decisions we still have to make / issues we face





Questions?

andrew.yuill@flagship-group.co.uk





TRANSFORMING CONSTRUCTION NETWORK PLUS

**PUTTING PEOPLE AT THE HEART OF
FUTURE SOCIAL HOUSING DESIGN AND
MANUFACTURE**

Professor Nashwan Dawood (Principal Investigator)

Professor Paul van Schaik (Co-Investigator)

Dr Sergio Rodriguez (Co-Investigator)

Dr Huda Dawood (Co-Investigator)

Dr Joao Patacas (Research Associate)

Mr Atif Hafeez (PhD Researcher)

THE TRANSFORMING CONSTRUCTION NETWORK PLUS

The Transforming Construction Network Plus is funded by UK Research and Innovation through the Industrial Strategy Challenge Fund.

The N+ unites construction's academic and industrial communities to create a new research and knowledge base, dedicated to addressing the systemic problems holding back the sector.

The N+ is a joint project between UCL, Imperial College London and WMG, University of Warwick.

More information about the N+ can be find:

www.bit.ly/transforming-construction-network-plus

PROJECT AIM

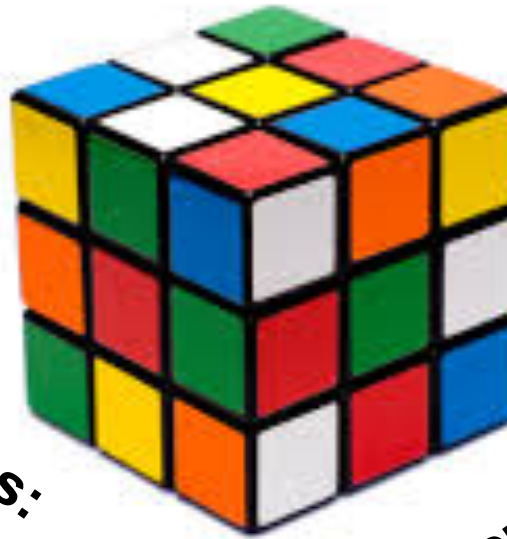
- **Project aim:** to systematically integrate user experience (UX) and design parameters in the design of social housing
- **User experience:** the extent to which residents' needs are fulfilled as the result of living in their home
- **Research question:** how can user needs be systematically incorporated in housing design?

THE DESIGN SPACE OF SOCIAL HOUSING

- **The design space**
- **Identifying factors** in the design space
- **Mapping factors** in the design space
- **Prioritising factors** in the design space
- **Prioritising mappings** in the design space
- **Representing** the design space

THE DESIGN SPACE

**Attributes:
the how-question**



**Values:
the why-question**

**Value creators:
the what-question**

IDENTIFYING FACTORS IN THE DESIGN SPACE BY **INTERVIEW** – METHOD

- **Aim:** identify values/UX factors, value creators and design factors and their relationships
- **Background:** literature review
- **Design:** laddering interview
- **Participants:** social-housing tenants, social-housing providers, architects, off-site construction manufacturers, others
- **Materials:** description, images and drawings of a social-housing development
- **Procedure:** working from the middle out (Moghimi et al., 2016)
 - Systematic procedure
 - Identified value creators are followed up with values/UX factors and design factors
- **Data preparation:** transcribe relevant answers

IDENTIFYING FACTORS IN THE DESIGN SPACE BY **INTERVIEW** – METHOD (2)



IDENTIFYING FACTORS IN THE DESIGN SPACE BY **INTERVIEW** – METHOD (3)



IDENTIFYING FACTORS IN THE DESIGN SPACE BY **INTERVIEW** – METHOD (5)

- **Value creators**
 - “Can you tell me *what* the indoor environment of the house should provide to if you were living in it?”
- **Values/UX factors**
 - “Can you tell me *why* this is important to you?”
- **Design attributes**
 - “Can you tell me *how* you think this can be achieved?”

IDENTIFYING FACTORS IN THE DESIGN SPACE BY INTERVIEW – ANALYSIS

- From the answers, **identify** value creators, values/UX factors and design attributes
- Use coding **categories** from **literature review** where appropriate and create new codes otherwise
- For each **value creator**, identify **related UX factor(s)** and **design attribute(s)**
- **Record results** in NVivo
- **Example** of interview coding

UX FACTORS

UX factors	Frequency	Example
Privacy	7	"The house looks like the minimum standards, not flexible, each piece of space is constraint to the purpose. This adds pressure to people, in terms of not having options to use their space. Also space is needed if people want to do separate activities - lack of space makes people like they're on top of each other."
Safety & Security	6	<ul style="list-style-type: none">• Creating safe spaces for parking.• Reduce street space and increase pedestrian space.• Safe space for children.
Mental health	5	"Interaction and engaging is important Evidence show that families together have better mental health, factor in stress, and wellness. Kitchens opened to the living room reduce these factors."
Family	3	"Space to live and eat for the family members and provide opportunities to spend time with the kids. "
Social	3	"Provide opportunities to convene together"

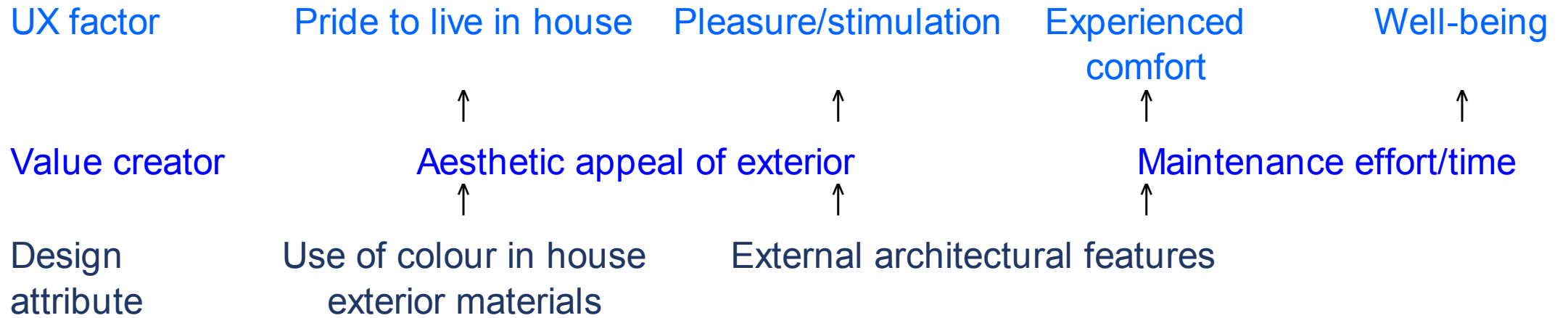
VALUE CREATORS

Name	Frequency	Example
Sufficient storage space	9	“Lack of storage space can lead to frustration and disorder” “People like to stay in the same place”
Flexibility of the use of living space	6	Starter home vs. home for life: e.g. “for a young couple a 2-bedroom house would be enough, but as families grow, so do their space requirements”
Natural light	4	“As much light as possible, bigger windows”
Layout	4	“Different families have different preferences and life style younger families prefer more modern houses; older families prefer traditional design/layout.” Different cultures/religions need to be catered for
Aesthetic appeal	3	“Aesthetically pleasing and attractive house leads to pride in where you live.”

DESIGN ATTRIBUTES

Design Factors	Frequency	Example
Interior Storage	9	“Typical storage provided in social housing is not sufficient (e.g. storage under the stairs). Dead spaces can be considered for additional internal storage. Purpose-built structures can be considered for external storage. “
Ventilation design	7	“Airy space in summer, ventilated space in winter Example: Positive Input Ventilation system to reduce/avoid dampness”
Consideration for quality public space	6	<p>“External or defensible space not clearly defined, and not appropriate for family houses.”</p> <p>Need to consider:</p> <ul style="list-style-type: none"> • Safety for pedestrians; • Clear pavements, limit parking within house space (one car per house); • Creating safe spaces for parking; • Reduce street space and increase pedestrian space.”
Bathroom	5	“Number of bathrooms depend on size of household. Consider walk in showers for elderly residents.”
Density of space	5	<p>“Feeling of being on top of each other. In typical housing each piece of space is constraint to the purpose.</p> <p>This adds pressure to people, in terms of not having options to use their space.”</p>

REPRESENTATION OF THE DESIGN SPACE



CONCLUSION

- Laddering **interview**
 - **Identify** values/UX factors, value creators and design attributes
 - **Map** values/UX factors, value creators and design attributes
- Analytical hierarchy process **survey**
 - **Prioritise** factors
 - **Prioritise** mappings
- **Representation** of design space
- Approach explicitly **links users' needs** with **building performance** and **housing design**

SMALL-GROUP EXERCISE: WHAT DOES 'QUALITY' MEAN IN SOCIAL HOUSING?

- **Background:** three-dimensional design space
 - **Design attributes:** aspects of the actual building design or building design requirements
 - **Example:** size of windows
 - **Value creators:** aspects of actual building performance or building performance requirements
 - **Example:** natural lighting
 - **Values:** actual user experience or user needs
 - **Example:** well-being

WHAT DOES 'QUALITY' MEAN IN SOCIAL HOUSING? – INSTRUCTIONS

- **Before answering** the questions
 - In the top-left hand corner of your work sheet, write the **business types** that are represented in your group –
H = housing association; **A** = architecture; **M** = manufacturing
 - **divide** the separately provided work sheet **into three columns** to record your answers:

Question 2: user needs	Question 1: building performance	Question 3: design attributes

- **Images** of a social-housing development are provided separately
- **When answering** the questions, **imagine** and bear in mind how **residents** would **live** in this social-housing development

WHAT DOES 'QUALITY' MEAN IN SOCIAL HOUSING? – QUESTION 1

- ***What*** should the indoor environment of the house provide to its residents?
- Produce **a few answers** as you find useful before going to the next question
- **Record** your **answers** in **Column 2**

Question 2: user needs	Question 1: building performance	Question 3: design attributes
	Natural lighting	

WHAT DOES 'QUALITY' MEAN IN SOCIAL HOUSING? – QUESTION 2

- **Follow up each of your answers** to Question 1 regarding building performance by answering the following question.
- ***Why*** this is important from the perspective of social-housing tenants?
- **Record** each of your **answers** in **Column 1**
- **Connect** each answer in **Column 1** with your linked answer(s) in **Column 2**

Question 2: user needs	Question 1: building performance	Question 3: design attributes
Well-being —————	Natural lighting	

WHAT DOES 'QUALITY' MEAN IN SOCIAL HOUSING? – QUESTION 3

- **Follow up each of your answers** to Question 1 regarding building performance by answering the following question.
- ***How*** can this be achieved?
- **Record** each of your **answers** in **Column 3**
- **Connect** each answer in **Column 3** with your linked answer(s) in **Column 2**

Question 2: user needs	Question 1: building performance	Question 3: design attributes
Well-being	Natural lighting	Size of windows
		Placement of windows

WHAT DOES 'QUALITY' MEAN IN SOCIAL HOUSING? – BEFORE WE START

- Any **questions?**
- Taking part in the exercise is **voluntary**
- The **information** that you provide on the work sheets will be analysed **confidentially** only by the research team
- Please **raise your hand** if you would like to take part

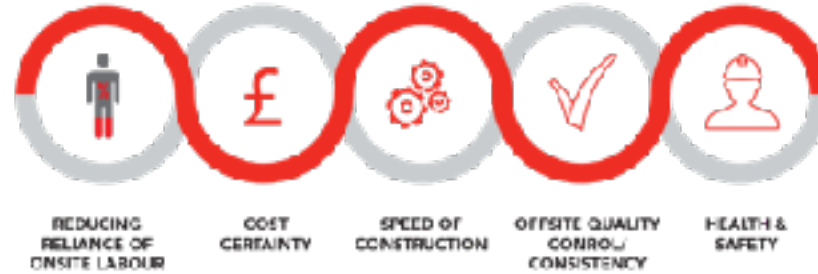
XXXXXX XXXXXX

- XXXXXX **XXXXX**
- XXXXXX **XXXXX**
- XXXXXX **XXXXX**
- XXXXXX **XXXXX**



HOMES

The Beginning



- Analysis of different offsite technologies
- Costs & build times
- DfMA
- Single contractor, field to handover
- Time & cost certainty
- NHBC & HCA requirements

Oscos Homes

- Design led to intelligent supply chain facilitates mixed skill build
- Quality controlled
- Field to front door solution
- If a bin lorry can get there, so can we!
- Comparable(?) cost to traditional construction
- Faster?
- Reduced re-offending to <6% against national average of 60%





HOMES

St Hilda's

Location

Leeds, West Yorkshire

Time-lapse build

Over 3x days



**Andy Hatcliffe Major Projects
Manager at the NHBC commented**

“In terms of on-time delivery and a minimal number of reportable items, this project was very successful. The site team were a pleasure to work with, always attentive and keen to take on advice and act upon it.”

“My new home is nice and cosy, I would recommend an Osco House 100%”

- Mia Fay Maudson

“The speed and quality achieved as the homes came together towards the end of the project was impressive”



Skills & People



- Skills shortage



- Construction Strategy, Construction leadership council - offsite



- SMEs



- Quality

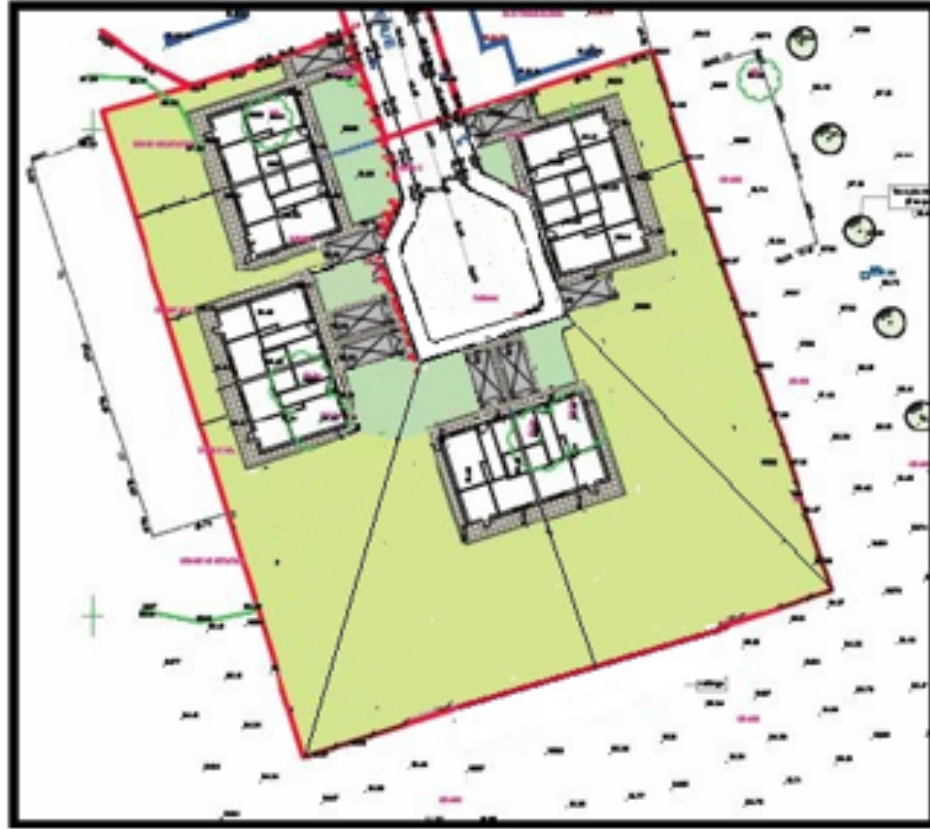
Skills & People



Total number engaged in factory	Completed 6 months training	Employed by Osco	Supported into alternative employment	Referred to LEG	Re-offended
75	19	6	6	5	1

Ideas to Construction

Develop the Brief



Visualise



Visualise



Flexible internal design

Jurby Avenue, Blackley

Model Types



Option 1: GIFA= 70sqm

Separate Kitchen/Dining from Living Room

1 x Double Bedroom and 1 x Twin bedroom Layout 1



Option 2: GIFA= 70sqm

Joint Kitchen/Dining and Living Room with single door

1x Double Bedroom and 1x Twin Bedroom Layout 2

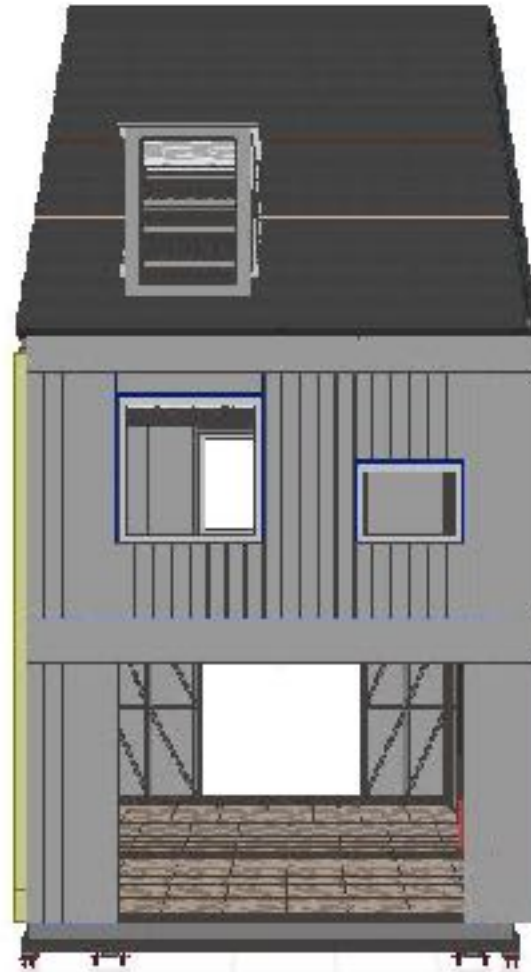


Option 3: GIFA= 70sqm

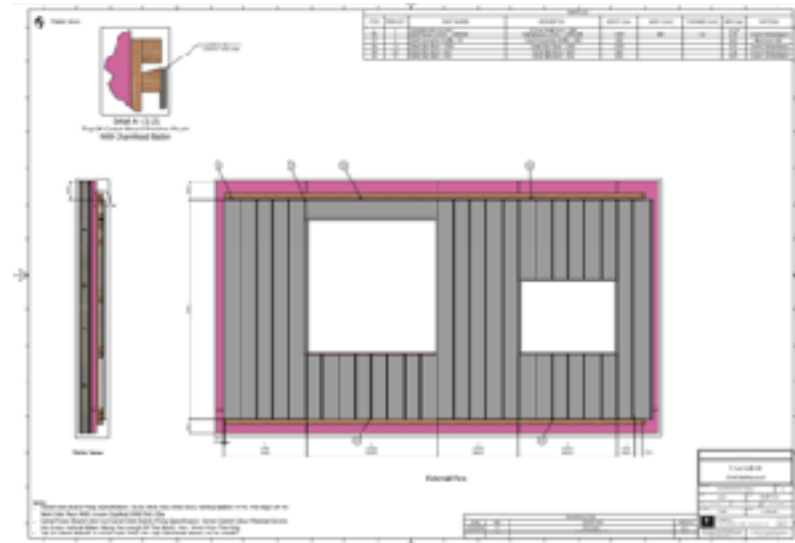
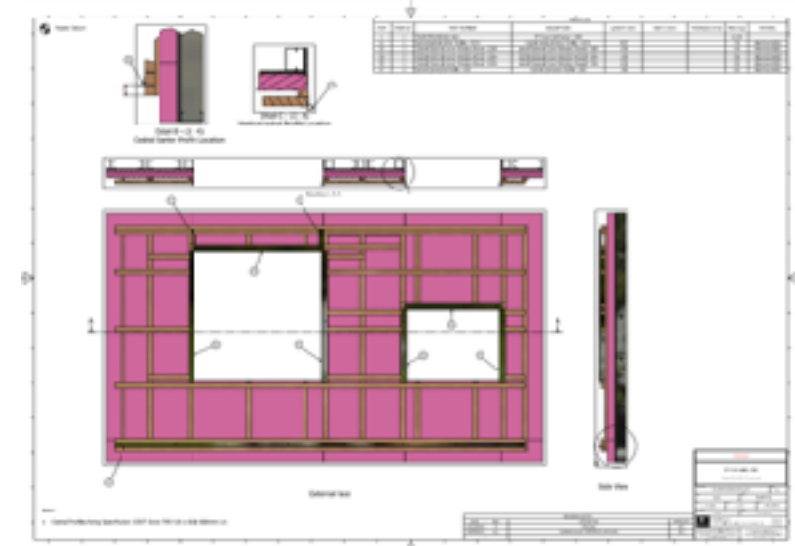
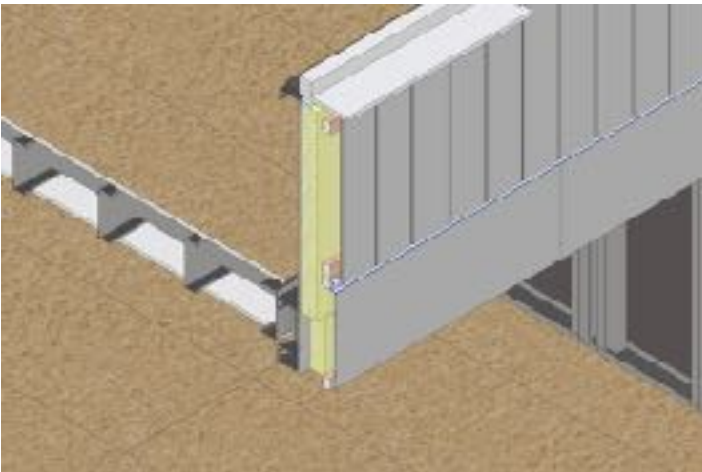
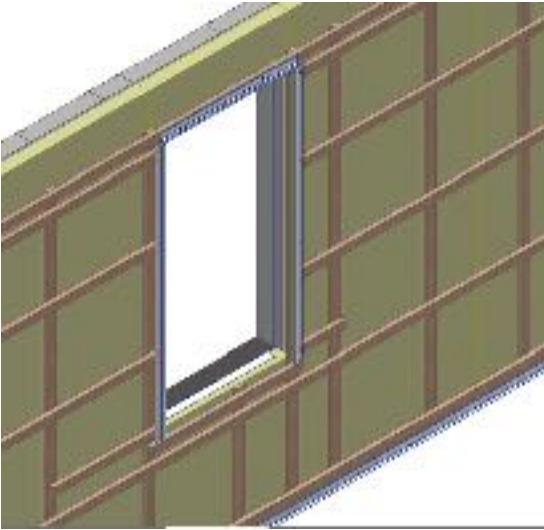
Joint Kitchen/Dining and Living Room with separate doors

1x Double Bedroom and 1x Twin Bedroom Layout 3

Production Engineering



Manufacturing Packs



Factory Manufacture





Factory on a Site

What Next?



ZERO
Carbon



NEVER STOP
IMPROVING



Increase
PMV



Website

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Great big bedrooms
provide plenty of space
for little monsters to
play.



Osco Homes works in an entirely new way. We deliver tomorrow's housing solutions today, uniting new thinking, engineering expertise and the latest technology.



bb.

BUILDING BETTER

Ensuring quality sits at the heart of the home-building process through collaborating from concept to completion

@BuildingBetterX

What we'll be covering

- What is Building Better?
- Primary ambition: pipeline aggregation & how we'll get there
- Wider ambition: better design & better data

What is Building Better?

18 months ago



5 people

100
interviews
over
4 months



1 idea

**Housing associations
can become
lead housebuilders
within a generation**

3 aims achieved by HAs working together

- 1. Deliver more homes with MMC**
- 2. Reduce operating costs by using
data effectively**
- 3. Happier tenants involved in the
design process**

- Team of 1.5**
- Full time project director**
 - Part time project manager**

We work in partnership with Mark Farmer & Cast Consultancy



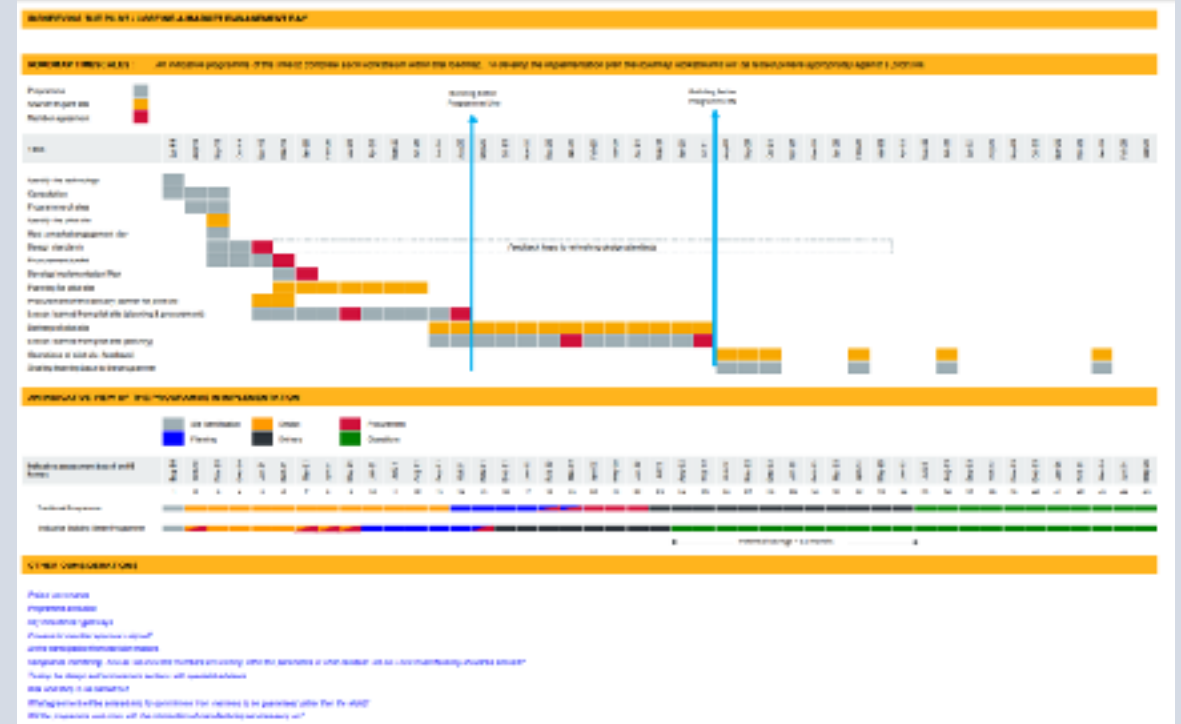
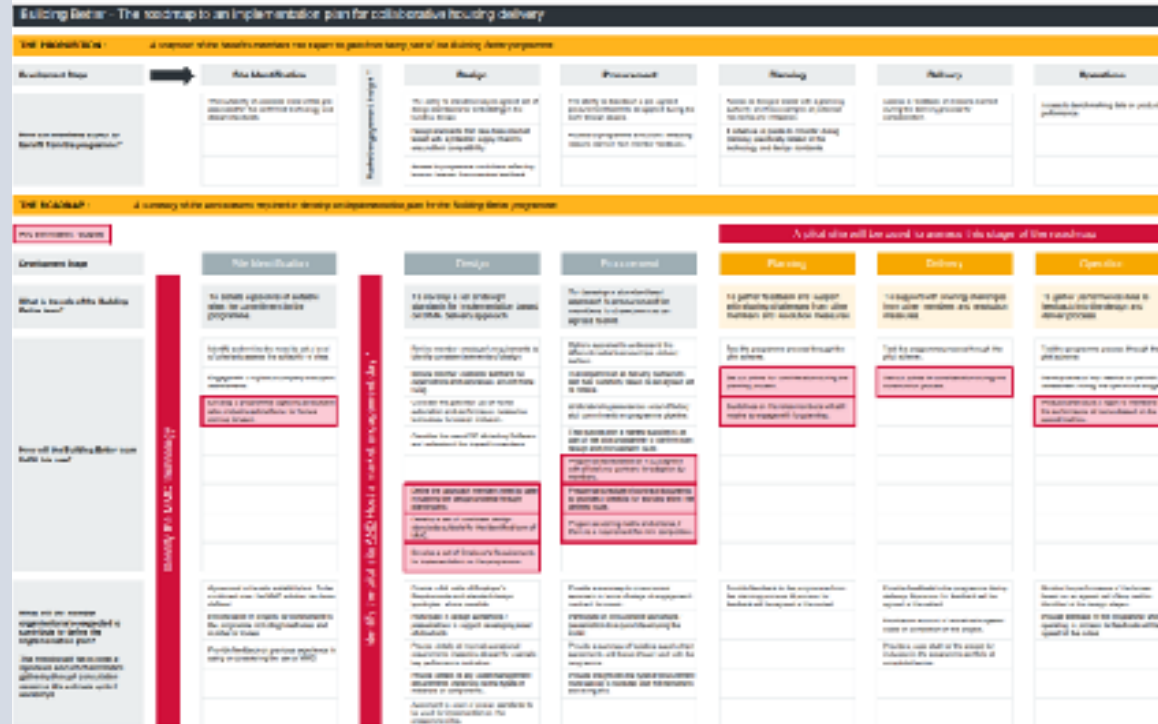
**1 road map setting out the
BB vision & how we'll get
there produced in
partnership with Cast**

**We've pitched BB up & down the
country**

9 housing associations committed



Pilots are testing the road map



**Primary ambition: sign deal
with manufacturer (& how we'll
get there)**

Places for People bets £100m on modular housing

Investment represents a "huge vote of confidence" in modern prefabs, says Homes England



Modular units are becoming more popular as skills shortages and rising materials costs hamper traditional housebuilding

George Hammond in London MAY 31 2019



Places for People, one of the UK's biggest housing associations, has agreed to buy 750 factory-built homes in a £100m deal.

FINANCIAL TIMES

Places for People announces £100m modular homes deal

750 units will be purchased under the partnership to develop affordable and market-priced housing.



bB.
BUILDING BETTER

**Building Better consortium to
procure minimum of 500 homes
from manufacturer
(June 2020)**

How we'll get there

1. Scale of the opportunity
2. Product & specification
3. Market engagement
4. Legal structure

Scale of the opportunity

Product & specification

AIREMILLER

bB.

BUILDING BETTER

Market engagement

Legal structure

How we'll get there

1. Scale of the opportunity (January)
2. Product & specification (end of February)
3. Market engagement (February-June)
4. Legal structure (February-June)

Wider ambition: better design & better data

Design event with Ilke

Data event with Amazon

Get involved

Questions

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