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# **INNOVATION WORKSTREAM**

**Roadmapping to improve productivity,  
capacity and innovation in the housing sector**



## FOREWORD

Improving capacity, productivity and innovation in construction are key aspirations for government. Success in these areas will have enormous benefits for the UK economy at large and for the construction and housing sectors most specifically. More homes can be built, more efficiently.

Innovation can lead to job creation and new methods of construction which can have a direct impact on improving the performance of buildings which account for at least a third of

UK carbon emissions. With new and smart methods of construction the UK can also lead the way in exporting skills, know-how, technology and construction solutions.

These ambitions need planning through collective thought and collaboration across the industry. I'm delighted with the work of a wide range of colleagues from industry and academia in contributing to this strategic planning and roadmapping process. This will begin to set-out how we can achieve our goals – where we need to focus our efforts on addressing issues that block our progress, and creating or releasing enabling activity that can accelerate our adoption of smart construction.

Although this is the beginning of this planning, there is so much already in our industry to build on, learn from, help accelerate or support greater adoption. It's an exciting time for the industry, with an enormous opportunity, challenge and responsibility. I'm happy to receive feedback from all those interested and to continue to receive active contributions – this process is vital if we are to achieve our aims collectively and with strong collaboration.

### Mike Chaldecott

Innovation in Buildings Workstream Leader,  
Construction Leadership Council and General Delegate  
of Saint-Gobain UK & Ireland



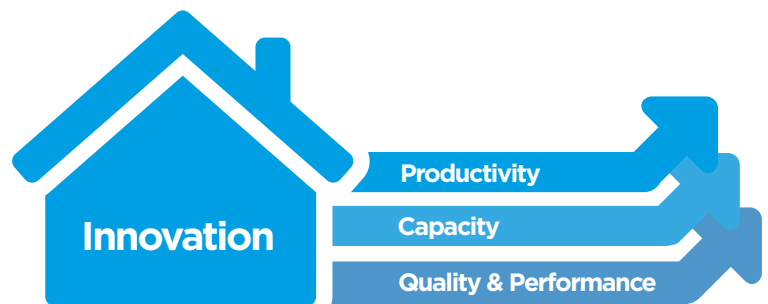
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## INTRODUCTION

The Construction Leadership Council's Innovation in buildings workstream, which Mike Chaldecott from Saint-Gobain is leading on, aims to embed new approaches to all phases of the construction process for buildings, utilising work already in progress such as the Digital Built Britain strategy and Modern Methods of Construction (MMC) – Smart Construction, to achieve enhanced productivity in the industry. Smart Construction is defined as:

**"Building design, construction and operation, that through collaborative partnerships makes full use of digital technologies and industrialised manufacturing techniques to improve productivity, minimise whole life cost, improve sustainability and maximise user benefits."**

A Roadmapping event was held on the 7th April, facilitated by Cambridge University's Institute for Manufacturing, with over 40 experts from across the industry. The aim of the workshop was to help develop a strategic roadmap of barriers to the take-up and commercialisation of Smart Construction, as well as identifying how to improve productivity, capacity and the use of innovation in the housing sector by removing barriers to progress, helping the industry to move the new methods from development to actual commercial use and thereby increase housing supply.



A summary of the findings is outlined below and the [full report](#) is being made publicly available at [www.saint-gobain.co.uk/info-contacts/literature-industry-reports](http://www.saint-gobain.co.uk/info-contacts/literature-industry-reports). It is intended that this be used as a reference document for future work by the Construction Leadership Council and others in the industry.

## RESULTS

A number of key external drivers were identified which will shape the adoption of Smart Construction, together with identification of the barriers and major issues in the value-chain, and also potential new technologies and solutions. The most significant result was the roadmap itself which can be seen in the photograph overleaf. In addition the roadmapping session culminated in a number of volunteers agreeing to participate in ongoing working groups. It also began the work of developing work plans to address the key barriers.

**11 key barriers were identified in the roadmapping workshop and are listed below in priority order:**

- Lack of collaboration
- Lack of demand
- Investment in suppliers who can support Smart Construction
- Lending, valuation & insurance
- Immature supply chain
- Risk-averse culture in construction
- Procurement models
- Business case for change
- Requires economies of scale
- Lack of performance data
- Skills shortage

**Key external drivers which will shape the adoption of Smart Construction include:**

- Housing supply shortage
- Government target for 1 million new homes by 2020
- Growth of inner-city developments
- New digital generation
- Environmental factors such as adaptation to climate change and resource efficiency

**Major issues within the construction value-chain relating to Smart Construction include:**

- Lack of Smart Construction skills
- Consumer demand for higher quality and performance
- Growth in the build-to-rent and private rented sectors where investor need for speed and certainty to demonstrate return on investment, make it an ideal target market
- Mass customisation of house types based on a “platform approach” together with the emergence of standard housing components (based on the automotive-industry model)
- Automation of construction processes will become commonplace
- A real challenge for the industry is to overcome a risk-averse culture, especially at this time of rising demand

**Innovations and Technologies which are applicable to overcome these barriers include:**

- Building Information Modelling as a digitally enabling platform
- Standardisation BUT with choice
- Integrated Computer-aided design/Computer-aided Manufacture from design to site
- Factory productivity drives down component costs
- Cost modelling tools and performance data
- Robotics and automation
- Project and building assembly sequencing
- Sensors, communications and Radio-Frequency Identification technologies
- Smart / Intelligent buildings
- New homes designed to balance energy demand





## Other Enablers necessary for success to overcome these barriers include:

- Supply chain collaborative innovation
- Demonstration schemes and sites
- Insurance industry to support Smart Construction
- Support for construction R&D
- Long-term partnering and pipeline visibility which enables supply chain investment
- New development and business models
- Technology and knowledge transfer from outside the sector
- Case studies for clients
- Off-site manufacturing standards
- Mortgage-ability e.g. Buildoffsite Property Assurance Scheme

## NEXT STEPS – THE ESTABLISHMENT OF WORKING GROUPS AND DELIVERY OF THE ACTION PLAN

Following the roadmapping session the workstream has decided to use 'Smart Construction' as opposed to MMC, as a term which better reflects the combination of digital technologies, off-site manufacturing and broader innovation in building products, methods and processes required for the future of the construction sector.

The key barriers have been identified which, along with all the innovation workstream activities, have been developed into an action plan (see overleaf). Formal working groups need to be established to deliver the action plan and continue the work started on the day.

The right people need to work on the correct de-blockers to improve productivity, performance and housing volume increase. Where there is complimentary activity in other areas of government and industry developments this should be aligned with the relevant organisations to minimise duplication of efforts and accelerate progress.

The intention is not to recreate work which is already happening, but compliment it, so the Steering Group would welcome hearing from anyone in the industry already making headway or planning to take action in these areas.



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### GET INVOLVED

It is essential industry support the future activity of the working groups and help us to overcome the barriers to smart construction and innovation. Companies and organisations already working on these solutions are encouraged to come forward and collaborate with us.

## ACTION PLAN

### Measures

Ongoing measurement and reporting of progress against the targets.

Demand		Supply	
Barriers	Actions	Barriers	Actions
Business case for change, and the ability to demonstrate benefits through in-use performance data.	→ Supporting and promoting demonstrator projects to raise awareness with consumers, aid industry learning and demonstrate the benefits of smart construction. Also to prove the business case for change, and the ability to demonstrate benefits through in-use performance data.	Lack of collaboration, and a need for strategic partnerships within the supply chain.	→ Supporting and creating Centres of Excellence for skills and knowledge to share best practice, inspire collaboration and showcase new opportunities. Also to address the lack of collaboration, and a need for strategic partnerships within the supply chain.
Lack of demand; with consumers unaware of smart construction or the potential benefits including poor perception of "pre-fab".	→ Influence housing clients to increase demand for smart construction and provide volume surety amidst volatile demand to address the lack of investment.	Risk-averse culture in construction including the link to lending, valuation and insurance - Concerns over product durability and equity retention.	→ Work with the finance sector to improve availability and affordability of finance and insurance products for homes built using smart construction, considering concerns over product durability and equity retention, to address the risk-averse culture in construction.
Investment needed in smart construction. This requires volume surety amidst volatile demand.	→		

### Skills and Culture

Action to be taken by the CLC skills workstream.

## CLC INNOVATION WORKSTREAM STEERING GROUP:

- Mike Chaldecott (Chair) Saint-Gobain  
UK & Ireland
- Simon Cross BRE
- Darren Dancey Crest Nicholson
- Thomas Faulkner Skanska UK
- Shelagh Grant The Housing Forum
- Simon Hart Innovate UK
- Jade Lewis Saint-Gobain
- Adam Locke Laing O'Rourke
- Trudie McCormick Keepmoat
- Diana Montgomery Construction Product  
Association
- Jessica Moore BEIS
- Richard Ogden Buildoffsite
- John Pelton CH2M
- Jennifer Schooling Cambridge University
- Martin Wood Bryden Wood

## PROJECT WORKING GROUPS:

- Centres of excellence and collaboration
- Demonstrator projects and business case
- Demand creation, investment and volume surety
- Risk-averse culture, lending, valuation and insurance
- Definition, targets and measures



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