

**Cambridge** Centre  
for Housing &  
Planning Research

# Housing Digital Built Britain Network

Seminar 1: What are the key things  
we need to know in order to deliver  
affordable, sustainable housing in a  
Digital Built Britain?

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## 1. Introduction

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The Cambridge Centre for Housing and Planning Research (CCHPR) is a research centre within the University of Cambridge, with over 25 years' experience of research in policy evaluation and analysis, and expertise in housing, poverty and welfare reforms. It sits within the Department of Land Economy at the University of Cambridge. Since its inception, the Centre has attracted over £12m in external research grants, carrying out over 150 research projects for a variety of sponsors, ranging from the Economic and Social Research Council, EU Horizon 2020, the Ministry of Housing, Communities and Local Government and its forerunners, the Welsh Government, Shelter, the Joseph Rowntree Foundation, and a wide range of other bodies including industry bodies, local authorities and housing associations.

Housing sits at the heart of many wider social issues, and it will sit at the heart of the development of a Digital Built Britain (DBB). The Housing DBB Network addresses the Centre for Digital Built Britain's (CDBB) framework and focuses its attention on residential housing. Delivering DBB is not simply about technological solutions to make supply and maintenance more efficient, although this is important, it is also about understanding how those solutions and efficiency gains interact with wider social policy issues to address UK housing inequalities.

## 2. Aims of the Network

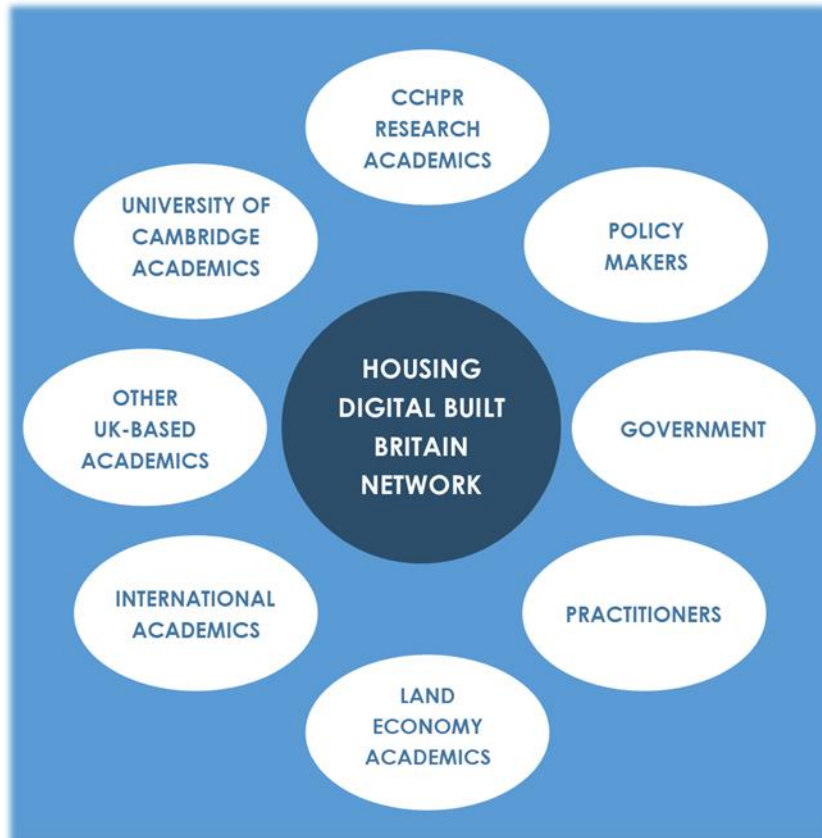
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The Housing Digital Built Britain Network brings together academics, practitioners, policy makers and government to determine the key areas of inquiry in relation to residential housing and DBB. The objectives of the network are to:

1. Facilitate dialogue between key stakeholders in relation to the construction, management, servicing and lived experience of housing in the development of DBB;
2. To determine the key questions that should be the priority for investigation;
3. To scope out the existing literature in relation to these questions;
4. To identify the gaps in knowledge and gaps in capabilities;

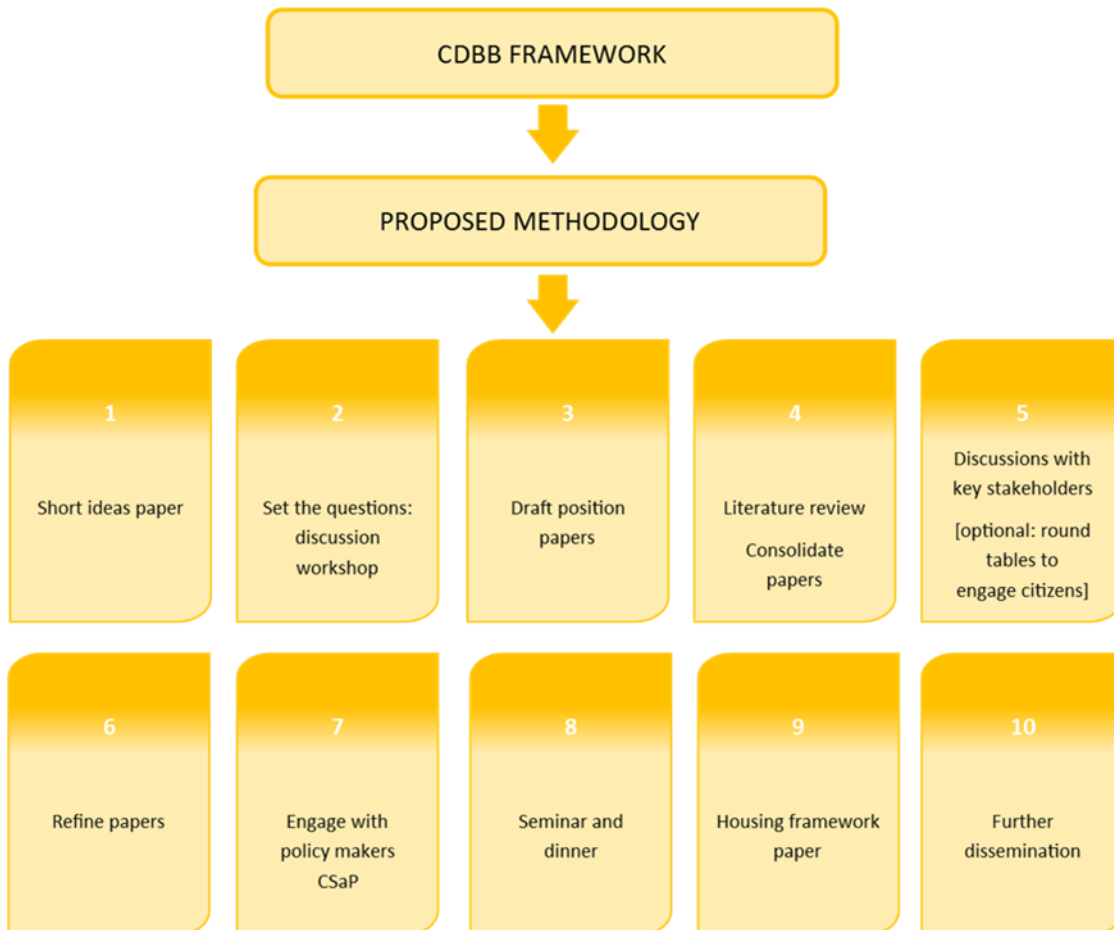
5. To use this evidence base to scope out a research programme to meet the needs of UK plc in delivering affordable, sustainable and inclusive housing in a DBB.

The Housing Digital Built Britain Network will bring together academics, practitioners, policy makers and government to determine the key areas of inquiry in relation to residential housing and DBB.



### 3. Methodology

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### 4. Outputs

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The key outputs from the project will be:

1. A network of stakeholders interested in housing and DBB.
2. Scoping report from workshop 1.
3. Short position papers on priority topics.
4. Interim report.
5. DBB Housing Framework Paper as the final report.

The interim report is due by 16th September 2018 and the final report by 20th December 2018.

In terms of outputs to date, [our mini-project for the Centre for Digital Built Britain](#) explored the use of Building Information Modelling (BIM) in the UK house building industry, and considered the opportunities and barriers to its wider uptake.

Our first [Position Paper](#) from the Housing Network considers how digital tools and technologies can support independent living for older people, now and into the future.

## 5. Seminar 1

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### 5.1 Aim of the seminar

The first seminar of the Network was held at Trinity Hall College, Cambridge on 31 July 2018. It brought together 27 academics, practitioners and policy makers to work on the key issues in delivering affordable, sustainable housing in a Digital Built Britain. The aim of the seminar was to discuss:

1. Key research questions and capabilities
2. The current research landscape
3. Discuss a priority list of topics for further focus
4. Identify potential collaborations and areas of interest

### 5.2 Key research questions and capabilities

We began with a discussion around the key questions that would need to be addressed for housing in a DBB. Initial conversations and scoping work had developed these questions:

1. What is the scope for off-site production of housing in the UK, what might the impact be on housing affordability, and what can we learn from (international) case studies?
2. How can digital tools and technologies support independent living for older people, now and into the future?
3. What should the role of digital technologies and data be in the planning system for the delivery of housing?

4. What are the key issues in operating and maintaining the housing stock and of through-life management and governance of housing stock that DBB could support?
5. What are the supply chain issues in delivering new build housing more efficiently in DBB? What are the enablers and barriers to positive change across the supply chain?
6. What are the barriers and enablers of knowledge and best practice sharing between sectors, and within the sector, to develop DBB in the housing sector?
7. What is the role of digitisation in property transactions over the lifetime of a property? This might include papers (valuation, sale/letting, credit (mortgage processing), deposits (safeguarding) and land registration).
8. How do we think about value in the context of housing and DBB?
9. What is the potential for DBB to help tackle housing inequalities, e.g. homelessness?
10. How can data, digital tools and technologies help to deliver sustainable e.g. energy efficient yet affordable homes?
11. What is the potential for digital technologies and data to improve home safety and utility, but what are also the risks and ethics of such developments?
12. How might the practical and ontological meaning of home change in a DBB – will people still want to live in houses as we do currently in a digital future?

During the seminar discussion, further pressing questions were raised that would need to be answered to deliver housing in a DBB:

- How can we collect and manage data about the existing housing stock?
- How do we understand residents' aspirations and attitudes? How should the residents of homes of all tenures be engaged in data collection and in the sharing of the resulting information? Are incentives needed for residents to facilitate data access? How can we understand how different people might engage in digitisation?
- Stakeholders such as local authorities hold a lot of data – how can this realistically be digitised, and what are the barriers to access?

- What would the benefits be of introducing planning requirements for data collection and sharing through the life-cycle of properties? Would this be feasible?
- What is the current state of retrospective BIM for existing housing and infrastructure, and how might this be facilitated going forward?
- Is SMEs adoption of BIM slower than uptake by medium and large house builders? How can different sized organisations in the housing supply chain be encouraged to adopt it?
- What impact would regulation, data collection and increased transparency have on individual and organisational behaviour?
- How can social indicators, e.g. affordability, be integrated into BIM models and what are the potential benefits?
- How can data be processed accurately if it involves predicting human behaviour? 'Digital twins' can be used for predictive modelling, but to what extent will these always be inaccurate, as people are 'irrational' in their behaviour?
- What can we learn from international case studies? But also how can our digital and BIM knowledge be applied in developing country contexts, and to what extent is this already taking place?
- How can the housing sector learn from other sectors, e.g. corporate real-estate and telecommunications?
- Can a feedback loop be created, harvesting data from existing homes to inform the development of new houses in the future?
- What are the current real or perceived legislative and regulatory constraints on data sharing?
- Which data should be available to home occupants, to researchers and to private organisations? Who should regulate this, for example, if data held is inaccurate? How should we manage digital technology so that it is transparent and fair?
- How can data sharing be facilitated between the public and private sectors?
- How can data and digital technologies help to efficiently manage housing with shared facilities?
- How can digital technology address issues in the built environment, such as poor air quality indoors?



## 5.3 Discussion sessions

In four groups, members of the network selected the question they felt to be most pressing for in depth discussion around the following areas:

- What are the key issues and why is this important?
- What does current research and evidence tell us?
- What are the gaps in knowledge where further research is needed?

### **Question 1: What is the scope for off-site production of housing in the UK, what might the impact be on housing affordability, and what can we learn from (international) case studies?**

There are different models of off-site manufacture that should be considered. It is a form of manufacturing that might suit one-off, complex projects best. It is possible to have larger production runs for certain elements of a housing build, e.g. bathroom pods, but larger runs have greater potential risks of inherent defects. Temporary factories could be built on-site, which offers advantages of a controlled environment and greater accuracy without high transport costs. In terms of self-build, there are examples where homeowners can build a property using standard components which reduces the need for professional inputs. It was discussed whether housing co-operatives offer opportunities for greater flexibility and change.

Gaps in knowledge where further research is needed:

- What people currently know about their own homes, and what they want to know.
- The role of digital technology in enabling design, e.g. a situation where the customer designs their home online by selecting different components, and it is then constructed in the factory and delivered to site. The Ikea kitchen planner is a good example of this at a smaller scale.
- The problem of ownership of data such as smart meters or water usage.
- Practicalities – should the property be wired with sensors, or the person? (e.g. smart watch)
- Example of digitised planning and building regulation approval in Singapore – speeds up the process, but does it encourage uniformity?

### **Question 2: What should the role of digital technologies and data be in the planning system for the delivery of housing?**

The planning system is broken because of a lack of accountability/transparency, a lack of speed and NIMBYism hindering the process. Historic data/land titles are the most digitised area so far. If more digital technologies are introduced to the planning system, they could enable:

- Integration with infrastructure, etc.
- Risk assessments for things like flooding, pollution, archaeology
- Integration/consideration of all stakeholders
- More objective decision making (will the case-based approach prevail?)

Gaps in knowledge where further research is needed:

- Databases are often outdated and not really knowledge bases
- Tools and research are often specific to scale (e.g. building/block/neighbourhood) and not integrated
- Framework and protocols for data collection and management are missing
- Interoperability is an issue
- Artificial intelligence/big data: can it help?
- How big is the damage of dysfunctional planning system on the economy/wider society?

### **Question 3: What are the key issues in operating and maintaining the housing stock and of through-life management and governance of housing stock that DBB could support?**

The existing stock varies in terms of age and construction type. There is a lack of knowledge about what data is collected, and how to access this data. There is no consolidation of data, e.g. Building Control data is collected and not used. There is a lack of information on renovations in existing stock. Individual owners may never get information about their property, as information only becomes available when stock is sold. It was discussed whether more information could be included with Energy Performance Certificates. In terms of planned and reactive renovations and maintenance, digital services and clipboards are helpful if stock is owned. The history of renovation information is decentralised. It was

questioned whether, for housing at the end of its life, BIM data could be used to demolish buildings and reuse materials, generating a circular economy. Across all data issues, there are challenges of data sensitivity and privacy.

Gaps in knowledge where further research is needed:

- The circular economy and the housing market
- Efficient use of in-use-data during a building's lifetime
- Public and private sector roles, responsibilities and interactions
- How to incentivise house builders to have life-long involvement
- How to deliver services in an integrated way to optimise resources e.g. water and energy

**Question 4: What is the role of digitisation in property transactions over the lifetime of a property? This might include papers (valuation, sale/letting, credit (mortgage processing), deposits (safeguarding) and land registration).**

There is currently fragmentation of transactions, stakeholders and data types. There are many challenges in the operation of the data market, around trust and validation, relationships between providers and data users, and issues of scale. The security and encryption of data is a challenge, and how to incentivise residents to collect data, or data holders to share it, is also an issue.

There is potential for technology to collect data automatically through home sensors, but these raise issues of privacy and trust. There is currently a lack of an integrated interface with the range of suppliers, but the potential benefits of achieving this would be better performance in mortgage and insurance markets, and also improved safety in the ability for stakeholders to demonstrate that a building is safe and well managed.

Better data sharing and more property information might increase housing market transactions. It might also reduce transaction costs, for example, if it prevents the need for ordering repeat surveys. The issue was raised about inaccurate and false data and where residents of a property would go for help if data about them or their home was inaccurate, possibly requiring a digital ombudsman.

Gaps in knowledge where further research is needed:

- More needs to be understood about the barriers to implementation, which might include legislation, the role of key actors such as government, and the costs incurred by third parties in response to changes in process, such as changes to the planning process and costs incurred by resource strapped local authorities.
- Who are the stakeholders? What data is needed? Why and how will it be used? How much will they pay?
- What are the sources of data, what is available, what is the quality of data, and in what formats/structure is data available?
- What are the unintended consequences of changing the data market?
- What are the costs to incumbents of changing data standards?

## 6. Next steps

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The next stage in the work of the network is to draw on the work of members in the seminar and to draft position papers on some of the key issues. These will be discussed with members and wider stakeholders. Further conversations and collaborations will be developed between network members. We will hold a second seminar in Autumn 2018 to discuss the draft final report and proposals for further research.

The report will set out the priority capabilities and questions we focused on in relation to housing. It will review the existing research and practice landscape and identify gaps. It will outline the programme of knowledge exchange, changes to practice, and further research that is needed to meet the needs of UK plc in delivering affordable, sustainable and inclusive housing in a DBB. It will detail the capabilities relating to residential housing that will be required for the UK to adopt and deliver on the vision for DBB and will define the research required to enable those capabilities.