CDBB
Capability Framework and
Research Landscape Scoping Workshop

Workshop: Capability to understand and predict the CONTEXTUAL TRENDS AND DRIVERS and their interplay with digital built Britain

Centre for Digital Built Britain

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UNIVERSITY OF CAMBRIDGE

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Centre for Digital Built Britain

This document captures the working notes from the workshop "Workshop: Capability to understand and predict the CONTEXTUAL TRENDS AND DRIVERS and their interplay with digital built Britain", held at Churchill College Cambridge on 10-11 April 2018

The summary sheets are assembled from the separate working groups from each of two streams; Research and Applications.

The details of the outputs from the individual working groups are captured in turn.

This material was used as a starting point for the creation and development of the Capability Framework and the Research Landscape. It is provided as source material for the interested reader.

Contextual trends and drivers - Research summary		
Rank order	Topic title	
1	Impact of disruptive technologies	- e.g. electrical vehicles/ fire response/ bridge/ tunnels (deliver/operate), - Integration --> regulators, - Modularity as a mitigator
2	New business models	- Investor types /behaviours (shared aspects?; sustainability) - Adaptability/ Flexed assets - Response to demand - Attributes for management
3	DBB in a post-truth world (what does it mean for communications and engagement)	
4	How to orchestrate research (uni, outside, overseas)that is transdisciplinary and policy neutral, and exploitation routes	- DBB as a model for this - Collaborative working as a driver (and trend) for DBB
5	Social inclusion/inequality (as an increasing influence - impact on DBB?)	
6	Investment strategy and incentives (spatial effects and differences; Governance of investment and purpose)	
7	Efficiency/ costs - more needed (Top level drivers: purpose vs cost)	
8	Well-being for citizens and environment (Top level drivers: purpose vs cost)	
9	Shared/ circular economy	
10	Differential effects on each of inclusion/ spatial/ regional	
11	Housing market is a driver (Good/Ill)	
12	Ageing population (Healthcare demands; spatial: rural-urban split /behaviours)	
13	Resource shortage is a driver	
14	Changing social norms and work patterns (and their impact on DBB)	
15	The influence of politics (cycles, events), including the international context	
16	Environment: extreme event/ mitigation	
17	Technology trends & Capacity for legislation to keep up (Standards - what is their role in the face of fast-changing technology)	- Pace of change - Disruption/unpredictable - International
18	The move from data scarcity to data abundance (Bias --> adjacent group)	
19	Demographic: impact on asset demand	- Response to change - Coupling (close coupled or loosely/implicit links - Influence trends through assets/ services (incl. tax base) - Regional
Other notes		
	An eclectic mix of research topics	- Well-being and Inclusion - Better/faster cheaper e.g. energy infrastructure optimisation - Resources and Investment - Brexit - Cross sector - Designing out crime - Integration of world views

Research Topic: …	
Understand and predict the Contextual Trends and Drivers and their interplay with DBB to determine the purposes of DBB	

Scope:						

Scope - In/out					NOTE	What sub-topics might overlap with other topics?

• Financialisation of built env:
  - institutional investors
  - pension funds
• Impact of big asset portfolio owners (eg big builders) and their behaviour
• Data/research in post-truth world
• Data availability:
a. Historical data (hard to build trends analysis on)
b. Future data (flood of data) & sensors
• Legislation Cant keep up with change !n:
  - standards
  - politics
  - social
   so ---> Make standards imposs
	• Technologies:
	  - accelerating change (platform effect)
	  - disruption
	  - international influence
	• Politics:
	  - 5 year cycle
	  - Brexit (sudden events)
	• Devolution
	  - Scotland
	  - Irish border! (Brexit??)
	• Post-truth politics:
	  - how to prevent DBB being dismissed?
		• Hard to re-appropriate govt assets:
		  - data
		  - skills/capability
		  - lost via privatisation
		• Int organisations
		  - UN
		  - EU
		• Climate change
		  - SDGs
		  - Extreme events
		  - Forecasting
		  - Costs
		• Loss of options
			• National Service Provision:
			  - As a motive for investment
			  - Legitimacy
			
			• Collaborative working - a new norm? or too complex to make it work?
			
			• Shared economy
			• Circular economy
			• Collaborative working as a(n):
			  - driver
			  - enabler
			• Urbanisation will continue
				• Ageing population:
				  - care costs
				  - tax burden
				  - new (social) needs
				• Changing social norms:
				  - home ownership
				  - car ownership
				  - new work patterns
				• Sudden Events - Brexit. Economic stock - 2008. Floods - hard to predict.
				• Long-term histories of a location
				• Migration:
				  - trends
				  - shocks
					• DBB project iterations - what are inherent 'biases', eg DBB is only urban?	

• Investors
• Govt:
  - policy
  - legislation
  - privatisation
• Citizen
• Tech disruption:
  - Google, Samsung, etc
  - influences eg Digital watch
	• Investors:
	- tech hub
	- hackathon
	- funding
	• Those that are not here (yet): Migrants before they move

Step 3. Scope change by thinking about spatial differences		
e.g. National/Regional	e.g. City/local	e.g. Asset specific

•Strategic/policy driver thinking - how does this impact at local level	• How does local need influence national policy?
	• Better environment: Air, Noise, Water'
		• How do I generate value from an asset that adjusts to local and national need?
		• Less frictions, more efficient markets:
		  - sales
		  - tenants
		  - information
		• What was there before influencing the design and production of the BE

• More efficient use of assets ←→		

Step 4. Scope change by thinking about the lifecycle of assets and services						
Articulate user needs and requirements	Conceive, plan and design (including optimisation and integration)	Build and commission (including optimisation and integration)	Manage and Operate (refine and enhance, optimise and integrate)	Provide valued services to users (and minimise downsides for non-users)	Retrofit / Renew / Decommission (with attention to the whole cycle)	…Assess, feedback and optimisation

Research Topic: … Trends, Drivers, Context	
Understand and predict the Contextual Trends and Drivers and their interplay with DBB to determine the purposes of DBB	

Scope:			
Scope - In		**Scope out**	**What sub-topics might overlap with other topics?**

• Resource shortage (water, energy, data, space, clean air …) + money
• Investment strategies to optimise use of major assets (eg energy
• Incentives (or lack of) to encourage change
• Trade offs. Are there conflicts/contradictions, ie does one agenda/issue compete with other?
• Competing initiatives & policies. Impact of ice policy vs energy strategy.
• Predicting social behaviours and their impact on built env (eg energy
• How DBB contributes to/impacts upon inequality/wellbeing
• Consider abuser as well as users. Those who will exploit
	• Unpack and make available prior knowledge and drivers - national and international
	• Social inclusion/balancing inequality
	• Migration. Impact on built Britain & DBB
	• Spatial inequality eg regional inequality
	• Housing market pressure
	  --> ↓ in home ownership
	  --> ↑ PRS, worsening affordability …
	• Improve efficiency - reduce costs
	• Improve the wellbeing of citizens & the environment
		• Financial mechanism/business models	• Describe what DBB can influence and what it is influenced by

Step 2. Scope change by thinking about stakeholders	

• Ageing population - health, care, loneliness …
• Context: social trends needs to encompass/include crime risk:
  - housing → burglary
  - → ASB
  - transport → terrorist risk
  - retail → terrorism/crime
• Fear/safety
	• Engagement of stakeholders:
	  - inclusive?
	  - democratic?
	• Mechanism for stakeholder involvement
	• Imbalance of power in decision making
	• Changing role of regulation
	• Sectorial differences: rail, water

Step 3. Scope change by thinking about spatial differences		
e.g. National/Regional	**e.g. City/local**	**e.g. Asset specific**
• Changing work patterns mobility - impact? + collecting data on this predicting human behaviour • Varied impact of migration → urban? • Internal migration ageing population → rural?	• Variations in local/regional power/governance • Integration between decision makers at spatial level • Different priorities/concerns at spatial level • Unknown predicting human behaviour vs perceived behaviour • Nudge	

Step 4. Scope change by thinking about the lifecycle of assets and services						
Articulate user needs and requirements	**Conceive, plan and design (including optimisation and integration)**	**Build and commission (including optimisation and integration)**	**Manage and Operate (refine and enhance, optimise and integrate)**	**Provide valued services to users (and minimise downsides for non-users)**	**Retrofit / Renew / Decommission (with attention to the whole cycle)**	**…Assess, feedback and optimisation**

Research Topic	
Understand and predict the Contextual Trends and Drivers and their interplay with DBB to determine the purposes of DBB	

Step 1. What are the major research clusters/themes?	What are capabilities and research that will be needed as DBB matures from 'deliver' to 'operate' to 'integrate'?					
	Deliver *(create the built asset)*		***Operate*** *(manage asset through life and deliver the services that derive from and depend on the asset)*		***Integrate*** *(deliver services and benefits based on integrated systems and organisations)*	
	What capabilities and enabling research?	*Which people / institutions are working on this?*	*What extra capabilities and enabling research?*	*Which people / institutions are working on this?*	*What extra capabilities and enabling research?*	*Which people / institutions are working on this?*
• Influence of demographic change on asset demand	• Identify future demand from data • Are we able to influence demographic trends: - migration - population decline		• Change of data: - what is normal change and what is change that is significant (eg sudden events) • Ability to deliver services: - employment/skills (NHS) - tax base decline (OAPs!)		• Coupling of assets to outcomes: - easy for transport - hard for health • Devaluation: - agility to cope with demand change regionally	
• New business/finance models to support societal friend of 'shared' outcomes (circular/shared economy)	• Recognising different type of investors and investments have different impact on "shape" of assets in UK • Which assets are best "shared" & suitable for this approach?		• Influence of "station" assets form shape of future economy, eg HS2 will influence economic transport for 100 years +!		• Managing change of assets in response to external drivers: - eg does ownership model of asset change its management?	
• Impact of disruptive technologies and adoption rates	• How adaptable is a new/planned asset to upcoming changes, eg HS2 flexible to new CAV demands • On site manufacturing and modular building helps flexibility		• eg Electric cars will have impact on fire and safety regulations of all existing tunnels/bridges. What is the impact and cost?		• How to keep all informed about rewarding impact of new technology - wide and early discussion • Regulatory tool to inform new impact from new technology on the appropriate assets	
• 'Wall of capital' searching for investment opportunities	• Impact of capital on assets that are built? • How - should we want to - influence this capital?		• Use of assets • More transparency of operations as a result of investor demand	• Asset manager	• Taxation	
• Explore interest biases of DBB - expose in collaborative approach to work	• Data flow and cycles - what's included, what isn't and why? • The ethics underlying DBB ... who funds, why and what's expected as a result	• Participants of DBB	• Ensuring agile forms of collaboration that are inclusive		• Ethics and DBBs ---- because of collaboration - more complex as a result	

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• Improving wellbeing - people & environment • Social inclusion/inequality - social modelling	• Predictive modelling - evidence base? • Research on social/spatial interfaces & inequalities - identify unintended consequences • How to be inclusive - views/experiences of different people in different places	• Modelling of possible futures - Oxford ++ • Cambridge Centre for Housing and Planning Research • Impact of climate change Newcastle Uni ++	• Where should responsibility lie for managing the components of DBB?	• ESC SSH programme (consumer insight)	• What does DBB mean to different people/places now and in the future?	
• Doing things: - better - faster - cheaper	• Follow the sun. Working. Collaborative Capabilities. • Digital quality checking	• AMRC. Sheffield, Warwick etc	• Understanding how to manage risks		• Future power systems arch (FPSA). Energy infrastructure optimisation + market arrangements	
• Resource investment incentive ??? • Brexit ↑ Policy impact ↓	• Policy & regulation - what exists, what works, what else might be needed?	• Value capture & public purpose UCL, Sussex, Surrey				
• Cross-sector alignment & impact on built environment	• Identifying trade offs	• Resilience & complexity Sheffield, UCL ++ • Criticality of data. Imperial, UCL, Cambs, Southampton	• [IOAF] Inter-sector inter-operability: - policy/regulation - investment plans - social impacts - economic impact	• Infrastructure Operators Adoptive Forum. Consortia ---- adoption effects		
• Terrorism prevention • Integration of world views for developed and developing societies	• Designing out crime-terrorism	• Uni of Huddersfield designing out terrorism/crime • UKCRIC. 14 universities UCL leading. UK collaboratorium for Research & Cities & Infrastructure			• Reward: Transdisciplinary research & development	• National infrastructure commission could do more here

Rank order	Topic title	
	Contextual trends and drivers (Application summary)	
1	Digital me (consent and consequences): its emergence and management AND interaction with built environment	- Spatial boundaries - Meaning
2	Policy-formation process	- Evidence based policy and decisions - Neutrality vs balance - Checking scope and completeness - "A seat at the table" - Legitimacy - Possible Demo: A new Policy-making forum (*local issue / local region*)
3	Comms politics, leading to increasing concern about (backlash and manipulation)	
4	Privacy concerns and data sharing	- Terrorism and malicious actors
5	Behaviours informed by data (what and how?)	- Demo: a gaming model - Demo: for a new policy-making forum
6	Trust violation - how it happens and how to avoid/recover	
7	National/ regional policy and its interaction with DBB	- Which leads/follows - What interaction - Agile: DBB listens; innovate within trends (respond not dampen)
8	Simulations	- Who 'owns' the big picture (the scenarios; the data; the decisions) - neutrality vs. vested interests - Spatial (aggregation; model complexity; data quality

Application Topic: …	
3A Understand and predict the Contextual Trends and Drivers and their interplay with DBB to determine the purposes of DBB	

Step 1. Scope: What topics should we include in this part of the framework – and what demonstrators would illustrate / stretch the boundaries?			
Scope - In		**Scope out**	**What sub-topics might overlap with other topics?**

• Horizon scanning
• Constrained resources & changing skills
• National productivity increase needed
• Best for now - land the plane, don't keep circling
• Increasing complexity
• Boundaries within the complex system
• Iterative (control) scope cheap phones as listening
• Service delivery choices
• T/D manipulated politics (backlash?)
	• Privacy;
	  - terrorism
	  - vulnerability (Built Environment /data)
	• User or customers customer
	• Driver pushing against trend
	• Digitisation and data focussed
	• Trend digitisation
	• Driver investment in infrastructure to pump prime
	
			- Contruction-linked
			• Ageing population - integration
			• Behaviour informed by data;
			  - short metering
			  - transport info
			• Changing behaviours of generations
			• Conflicting demands and trade offs

Step 2. Scope change by thinking about stakeholders (Are there new / different aspects of the topic and its demonstrators?)
• Some people want to be passengers and that's cool(?)

Step 2 content:

• Some people want to be passengers and that's cool(?)
• Question labels? --> Is "individuality" increasing or are more "hidden tribes" being created?
• AI and surveillance
• Misuse of data trust and misplaced trust
• AECO workers roles & responsibilities shared tools
• 'Fake news' credence trustworthy uncensored
• Bias in data which is freely available

• Digitally disengaged - spectrum
• IP vs open source
• The Digital ME ownership of data
• Information "prosumers"
• Levels of citizen skills
• Professional skills

> - not physical space specific

Step 3. Scope change by thinking about spatial differences (e.g. to consider how can scale make a difference to the demonstrators we would propose)		
e.g. National/Regional	**e.g. City/local**	**e.g. Asset specific**
• Pre-bigger data sets actually more reliable in DBB? For which topics? • Digital connections across nations '• How does 'corporation' fit spatially? Real & virtual	←------- Devolved cities -------→ '←------- Regulation across geographic boundaries -------→	• Digital speciality doesn't map to Built Environment

Step 4. Scope change by thinking about the lifecycle of assets and services: Are there new / different aspects of the topic and its demonstrators if we think through the lifecycle of the assets and the services?						
Articulate user needs and requirements	**Conceive, plan and design (including optimisation and integration)**	**Build and commission (including optimisation and integration)**	**Manage and Operate (refine and enhance, optimise and integrate)**	**Provide valued services to users (and minimise downsides for non-users)**	**Retrofit / Renew / Decommission (with attention to the whole cycle)**	**…Assess, feedback and optimisation**
			• How to communicate terms and conditions of DBB	• Brian - UCL Uni as convenors		• Software & tech firms - social media

Application Topic: …	
3A Understand and predict the Contextual Trends and Drivers and their interplay with DBB to determine the purposes of DBB	

Step 1. Scope: What topics should we include in this part of the framework – and what demonstrators would illustrate / stretch the boundaries?			
Scope - In		**Scope out**	**What sub-topics might overlap with other topics?**
• National - local policy & frameworks not explicitly tied to DBB • Is DBB the leader or the follower to policy & frameworks? • Active listening mode • Policy, does it: - lead tech adoption (or) - follow adoption	• Does DBB have to be defined to be agile enough to allow innovation in relation to trends? • Determine who understands & holds "the big picture"? Perhaps define who owns the what ifs?		• Creation of built assets • Automation to access data

Step 2. Scope change by thinking about stakeholders (Are there new / different aspects of the topic and its demonstrators?)
• How is neutrality kept for the data and output?

Step 3. Scope change by thinking about spatial differences (e.g. to consider how can scale make a difference to the demonstrators we would propose)		
e.g. National/Regional	**e.g. City/local**	**e.g. Asset specific**
• How is the data aggregated the more nations you go?	• Eco system to develop a gaming to show impact of development	

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Application Topic						
3A Understand and predict the Contextual Trends and Drivers and their interplay with DBB to determine the purposes of DBB						

Step 1. What are major demonstrators that are required?	What capabilities / functionalities of the demonstrators illustrate the maturing of DBB from 'deliver' to 'operate' to 'integrate'?					
	Deliver (create the built asset)		*Operate* (manage asset through life and deliver the services that derive from and depend on the asset)		*Integrate* (deliver services and benefits based on integrated systems and organisations)	
	What would be the big challenges?	*How?*	*What would be the big challenges?*	*How?*	*What would be the big challenges?*	*How?*

• Digital ME vs B Env data
• Global, continental, national, regional, urban/district, street, address, occupants
• Spectrum of willingness to share data (MF) spectrum to show data generated & shared in B Env
• A telephone preference service for data
	• Data req: need, like, unspecified
	• Who has data conflict openness vs GDPR
	• Power of corporations vs individual (dispersed is powerless)
		• Data aggregation - 'white hat' at system level
		• Consent mechanisms - granularity
			• Supply vs demand mgt:
			  - household
			  - device
			• Do consumers pay for private service, do users get paid for data - non binary
			• What services are we entitled to? Human rights
				• Trade off kettle (*consumer good value?*) vs. connectivity
				• £50 per user value on eg Whatsapp data premium or free
				• Listening to users through digital:
				  - hear /emojis
				  - non-digital
				• Digital etiquette face to face vs digital "road rage"
					• Understanding of digital 'me' in B Env
					• Who do we trust to manage this? Plural who?
					• Who do we trust? Sources of information
					• Anxiety vs engagement levels (apathy)
						• Not constrained by geography - scale
						• Current state of play in the existing smart city scale demonstrators on these topics
						• Department for data regulatory env
						• Thematic domains: sectors, services etc..

• Fighting presumptions - defining means:
  - efficiency
  - value
• Consents & consequences
		• Insurance companies recording - profiling				

Application Topic	
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	What would be the big challenges?	*How?*	*What would be the big challenges?*	*How?*	*What would be the big challenges?*	*How?*
Innovating the policy formation process	Cultural challenge → Who are you to say this?	Comparison to other sectors that use evidence/data based decisions eg medicine	Neutrality - ensure process is balanced/neutral	• Regulatory framework that is neutral and self sufficient • Metadata checks & verification on areas of impact	Arguing for a seat at the table of government policy	Through improved evidence based policy