

Digital Cities for Change: next-generation tools for city planning and management



The challenges for modern cities to deliver smart systems for its citizens are complex and cut across many traditional disciplines. CSIC's Digital Cities for Change project, funded by the Ove Arup Foundation and the Centre for Digital Built Britain, evaluates both the existing structures and systems of city and infrastructure management, and investigates how digital tools can help better decision-making within these areas.

Understanding limitations of the current approach

The planning, management and operation of assets, buildings and towns have traditionally operated in professional silos. Researchers are investigating the impact of these silos within city and infrastructure management and how this leads to departments following separate, and sometimes divergent, approaches to address common challenges.

We live in an era of increasing digital abundance, but industry and city governments lack the tools to understand and interpret the data to support smarter decision-making processes and deliver best value from them. In order to deliver on the transformative potential of this digital revolution, we need built environment professionals who are trained in a broader range of disciplines and tools, bridging infrastructure and city management solutions and developing the opportunities presented by the digital economy.

Working with local authorities

The use of data has huge potential to help deliver social, economic and political goals for cities. Digital Cities for Change researchers have built a working partnership with Smart Cambridge, a programme supported by Connecting Cambridgeshire, which is led by Cambridgeshire County Council, and are using the city as a pilot.

A workshop was held in December 2018 with officers from the council's transport, sustainability and planning departments to plan how digital technology and data can be used to support decisions and make improvements.

The aim of the workshop was to understand the current activities addressing two of the council's policy goals; improving air quality and reducing congestion, including the use of data to support policy measures related to the goals and to explore future requirements.

Researchers are also aiming to understand the possibilities for developing a digital twin prototype for the city which responds to imminent challenges and the delivery of the policy goals.

Developing a new digital strategy

The Digital Cities for Change team is now exploring the potential building blocks of a new digital strategy, with two key components:

1. A digital twin, combining traditional urban modelling techniques, new data sources and advanced data analytics, to support decision-making in different sectors.
2. A new governance framework which will ensure successful implementation through linking planning, management and operation.

The digital twin prototype will use technology and data to tackle air pollution and traffic congestion. It will include recent trends of journeys to work in Cambridge, including how people of different ages and employment status travel to work and how different factors affect their travel. It will also explore future possible journeys to work based on transport investment, housing developments and how flexible working and new technology may impact commuting. A web-based modelling platform will also visualise future development options and give people an opportunity for feedback.

The governance aspect of the strategy will map stakeholders of the digital twin and their relationships to each other across government and private sectors. It will incorporate legislation and regulation, sharing and security. A crucial part of the governance will be citizen engagement – to connect the physical to the data and provide evidence that can motivate people to change their behaviour. This will involve talking to employees about flexible working and community co-working spaces.

The vision for the city-level strategy

The Cambridge digital twin prototype, along with the governance recommendations is under development, with an initial version discussed with colleagues at Smart Cambridge in April. The project team is now planning to refine the strategy and develop the tool to explore different aspects of the collection, processing and use of data to improve various city functions.



The vision for the digital twin is to become the next-generation tool for smartening city planning and management. It is crucial to use digital technology to deepen our understanding of cities and urban societies. This knowledge will enable us to take advantage of opportunities, while recognising limitations and taking pre-emptive measures to contain the possible risks.

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