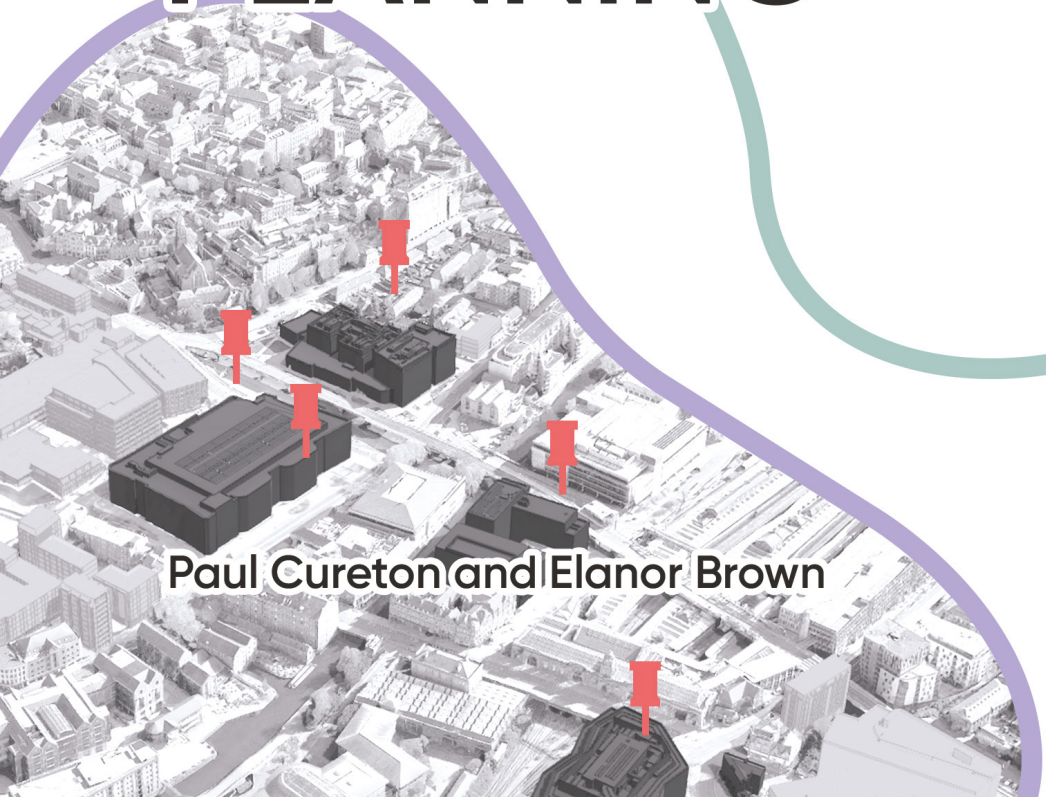
The Little Book of DIGITAL PLANNING



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What this Little Book tells you

This *Little Book* is the result of a project funded by the UK Ministry of Housing, Communities and Local Government (MHCLG) as part of PropTech Innovation Fund Round 4. This work has been delivered in the Mill Race area, Lancaster, UK in 2024 between Lancaster City Council, Imagination Lancaster, Lancaster University and Garsdale Design Limited.

Digital Planning is about upskilling, streamlining and engaging the public in the planning process using digital tools and services for placemaking, development and enhancement of our environment.

Introduction

This *Little Book* discusses digital planning and the use of data, tools, models and platforms to improve plan-making, community engagement and decision-making. Its purpose is to provide an informed readership with a short guide and overview of a research area and topic, alongside sources for further reading. The subject of planning is contentious, political and multi-disciplinary, with several specialisms such as transport planning, conservation planning, rural planning, etc. These specialisms in contemporary settings all concentrate on aspects of sustainable development and working locally and nationally to deliver U.N. Sustainable Development Goals. This *Little Book* focuses on digital planning, presenting:

- a short history of planning
- a definition of UK digital planning
- the Digital Task Force (an independent organisation setting the framework for the digitisation of the planning profession) and
- a number of case studies.

Each section also contains suggestions for further reading and links to additional case studies.

A Short History of UK Planning

The history of UK planning has moved from a philanthropic and social mode of reform of urbanisation and industrialisation to becoming state policy — the catalyst for spatial and societal change. The professional formation of town planning in the UK involved idealistic models of future towns (utopian and socialistic). These were integral in creating the UK Town Planning Institute which, in turn, professionalised planners, becoming the Royal Town Planning Institute (RTPI) in 1914.

Alongside this was the creation of pressure groups, such as The Campaign to Protect Rural England (CPRE) in 1926 and, following this, the state apparatus for planning was developed (Ward, 2004: 9). Notions of land were intrinsically linked to these movements — agrarian utopias, allotments and communal areas, as seen in places such as Port Sunlight in Wirral, Merseyside (1887) and Bournville in Cadbury, Birmingham (1878). These planning movements were a response to the multiple health concerns caused by dire poverty in cities, such as overcrowding and poor sanitation. They were also a by-product of Britain's emerging industrial capitalism which sought

fairer distribution of resources, homes and an improved quality of life. These UK movements created settlement models for export to Europe, such as the Garden City Movement.

There were also social movements, such as the work of German landscape architect Leberecht Migge (1881–1935), who promoted sustainable gardens designed with strict geometries (Haney, 2010). For UK planning, a book by Raymond Unwin, *Town Planning in Practice: An Introduction to the Art of Designing Cities and Suburbs* (1909), created a large impact on the concerns of planners on citizen health and development and led to the formation of the RTPI.

In Denmark, from the 1770s, we also see the development of 'kolonihave' or colony gardens as the antithesis of urban life. During the same period, at the end of Victorian Industrialisation, significant railway infrastructure would also shape UK regional spatial development, while providing new mobility for the UK population (López Galviz, 2019). The Garden City concept of Ebenezer Howard was not just a business case. Its diagrammatic city was intended to be regional through its inter-connected municipal railway. Today, this concept is reflected in the string of garden cities and new town settlements of Hertfordshire, including Hatfield New Town (1951), Welwyn Garden City (1920), Stevenage New Town (1946), which was the first Government New Town, and Letchworth Garden City (1905). Howard's vision of a connected network of garden cities linked by an inter-municipal railway remains partially preserved by the surrounding green belt land.

The concept of satellite towns was introduced by Raymond Unwin in 1915, as well as Graham Taylor, Charles B. Purdom and Fredric J. Osborn in around 1915–1925 (Ward, 2016: 159–168). The satellite town was exported to Germany by Ernst May. Satellite towns were later endorsed by the influential Barlow Report, *Royal Commission on the Distribution of the Industrial Population* (1936–1940), and The Greater London Plan of 1944 as an anti-suburbanisation and dispersal device for the southeast.

The planning system has evolved dramatically since this early formation, especially post-Second World War. Andrew Gilg defines four significant acts of the period which enabled a full operational planning structure in the UK:

- The New Towns Act 1946
- The Agriculture Act 1947
- The National Parks and Access to the Countryside Act 1949
- The Town and Country Planning Act 1947 (Gilg, p.9).

During the same period, with the technological developments of land surveying and early remote sensing (air photography began commercially in 1909 in the UK), the Ordnance Survey began comprehensive aerial photography in 1951. This provided aerial maps for development planning following directions for priority areas from The Ministry of Town and Country Planning (Seymour, 1980, ch.29). Changes in planning policy would also embrace new methods and techniques, using modelling for regional land use planning and its policy translation.

While UK planning history is well accounted for, new technologies also emerged and supported the plan-making process and development control. These were some of the first digital planning aspects that emerged from 1971 through the Ordnance Survey's digital maps in the UK.

In the mid-1970s, the UK government also created the National Land Use Database (NLUD) for planning which addressed land cover and established the classification of land use as a standard. In addition, various models were developed across a range of planning areas, including transport models, such as Simulation and Assignment of Traffic in Urban Road Networks (SATURN) in 1976. The use of microcomputers and the application of Geographic Information Systems (GIS) provided various options for the analysis of land use and transport, as well as emergent visualisation techniques for urban designers (Batty, 2001). The history of UK planning can be seen to have been motivated by three main political reasons:

1. changing and adapting to growth
2. improving the urban realm and rural setting and
3. planning for the future.

Supporting this is also the underpinning technology, which provides tools for planning through a series of assumptions, techniques, models and methods, including digital planning (Parker and Doak, 2012, p.17).

Further Reading

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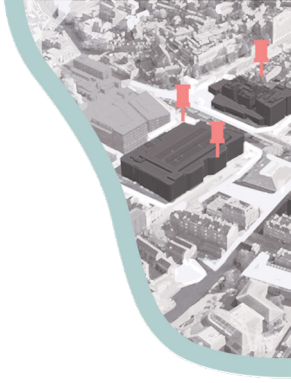

Digital Planning Definition

Digital Planning, according to Alexander Wilson and Mark Tewdwr-Jones, consists of:

> [the] [d]esign, deployment, and adoption of technology to provide innovative ways that assist professional planners, elected politicians, businesses, community groups and citizens: to understand changes in urban and rural areas; to help communicate change to all those interested in their places, past, present, and future …
>
> (Wilson and Tewdwr-Jones, 2021, p.3).

Wilson and Tewdwr-Jones have accounted for the history of citizen engagement, which was limited in early planning history, to the current contemporary position featuring in the National Planning Policy Framework (NPPF). They argue that digital planning should engage people, and that data and tools should not be used to just sense people (Wilson and Tewdwr-Jones, 2021, p.245). The Ministry of Housing, Communities and Local Government (MHCLG), formerly the Department for Levelling Up, Housing and Communities (DLUHC), define digital planning in four strands:

1. better access to planning data, through the creation of a national planning data platform
2. faster and more efficient planning decisions through the introduction of streamlined services to speed up decision-making for applicants and planning officers
3. improved local community engagement through new community engagement toolkits, both digital and analogue
4. simpler, faster, more accessible plan-making through improved digital tools and data to speed up plan production (DLUHC, 2020).

The MHCLG definitions have two aspects:

- first: planning support mechanisms, and
- second: digital transformation of processes and services.

Together, they are intended to achieve efficiencies internally, in local government functions, and externally, by engaging communities in the plan-making process (**Table 1**).

Table 1: Digital planning resources

MHCLG Digital Planning Overview	https://media.localdigital.gov.uk/uploads/2023/10/17091341/DLUHC_Digital_Planning_Programme_Overview.pdf
Planning Data Platform	https://www.planning.data.gov.uk/
Digital Citizen Engagement toolkit	https://www.localdigital.gov.uk/digital-planning/proptech/funding/proptech-toolkit/
Open Digital Planning	https://opendigitalplanning.org/

Digital planning as a process is defined by a wide range of technologies, including:

- 3D Geographic Information Systems (GIS)
- generative AI
- machine learning (ML)
- gamification (game design elements applied to non-game contexts (Deterding et al., 2011)) and
- digital twins (DTs).

Digital twins are virtual replicas of real-world places. They are supported by sensors and models which enable predictions and scenarios alongside extended reality experiences of models, simulations and environments. This is achieved via the Metaverse, the convergence of physical and virtual spaces, Augmented Reality (AR) or Virtual Reality (VR).

A wide range of technologies and processes have been applied to various planning policy areas, including housing, regeneration, mobility and the environment. Some of these applied technologies are fundamentally entwined with 'Smart City' projects (ICT-led projects with embedded sensors, and data for digital services and operations) while others are not.

How do we understand digital planning? As part of digital planning decision-making, GIS officers often use remotely sensed data, or national cartographic maps, to prepare planning maps and assets for planning officers and policy managers. This data is used for various purposes, including developing planning policies, conducting land use analysis, ensuring regulatory compliance, assessing heritage and environmental impacts and creating local development plans, amongst others. National mapping agencies often provide remotely sensed data, providing access to spatial planning datasets. The standards for these maps and data are developed by each country, for example, in Europe they are developed via the INSPIRE Directive. Remote sensors (from a distance or removed) collect data from Earth. These sensors can be based on satellites or mounted on aircraft. Post-processing via digital cartography then provides a national

series of cartographic styles for use across sectors.

Remote sensing has been developed to such an extent that we now possess more fine-scale data about human impacts on the landscape than we ever have in any period in history. However, in this area, land use decisions and data science are critical, and there are tensions between these standard organisations as they often cause fragmentation and siloed situations.

The Geospatial Commission policy paper, 'Finding common ground: Integrating data, science and innovation for better use of land' (2023), makes recommendations in terms of improving land use modelling, specification and land data in a holistic way. The report recommends the establishment of a Land Use task force, a decision support tool and visualisation suite for multifunctional benefits, co-production across policy design, academia and industry and a standard national land use database. In this case, planners and GIS officers could benefit immensely from the Geospatial Commission's recommendations concerning a national standard and decision support system that breaks down siloed approaches by bridging organisational working patterns and encouraging collaboration.

In unlocking digital transformations of processes and services as part of the MHCLG, the range of technologies, processes, models and methods is abundant. Many of these areas are in the early phases of development or use established techniques. For example, Demoland by Professor Mark Birkin and Dr Dani Arribas-Bel from Urban Analytics (The Alan Turing Institute), created a spatial modelling application that creates scenarios and compares them to the current baseline of Newcastle City Center (**Figure 1**). The model uses machine learning of land use, creating predictive models based on four indicators: air pollution, house price, job accessibility and green space accessibility.

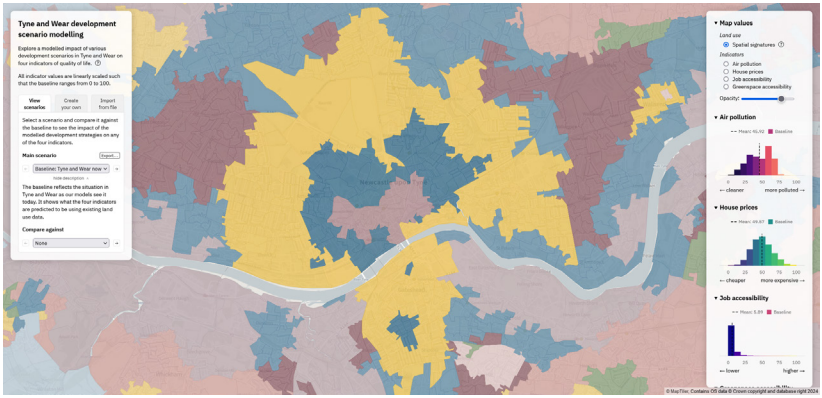

Figure 1: Development Scenarios in Tyne and Wear. https://www.turing.ac.uk/research/research-projects/demoland

In another case, the Planning London Datahub, Mayors Office, Greater London Authority, is a collaborative project that brings data from various indicators across all London authorities. This federated system brings together all 35 borough councils' planning data. Of the 44 million calls on the Greater London Authority that held spatial data in 2023, 11 million were on the planning data map (up from six million in 2022), evidencing the value of such digital planning initiatives and platforms (**Figure 2**).

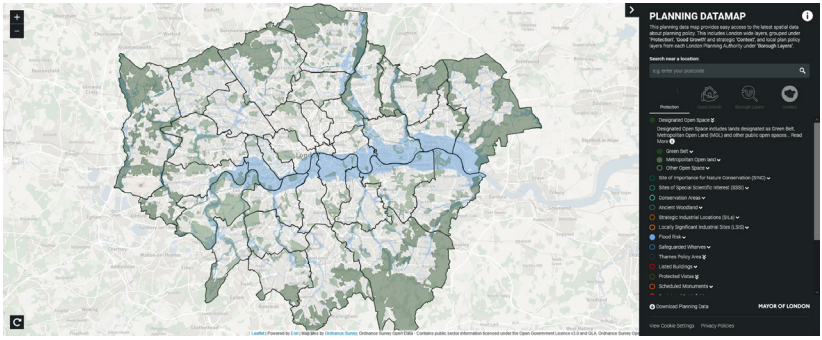

Figure 2: Greater London Authority, Planning Data Map, 2024 Esri and map tiles by Ordnance Survey. This planning data map provides users with the latest spatial data about planning policy. https://apps.london.gov.uk/planning/

The range of tools, techniques, systems, models and processes available in digital planning makes it an exciting area of growth, as

shown in these two cases. Each applied technology needs careful implementation, assessment and evaluation of benefits across a range of metrics, including social, cultural, organisational and economic factors. In essence, digital planning is a socio-technical area, bridging people and technology for planning future environments.

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Digital Task Force for Planning

Professor Michael Batty and Dr Wei Yang set up an independent Digital Task Force for Planning in the UK in 2021 to enable a digital approach to spatial planning (**Table 2**). A key report recommends introducing a new methodological approach after rigorously assessing the current limitations of UK planning policy through a systems analysis.

Table 2: Digital Task Force for Planning – resources

Digital Planning Task Force Report. A Digital Future for Planning: Spatial Planning Reimagined (February 2022)	https://digital4planning.com/a-digital-future-for-planning/
Digital Planning Task Force Methodology	https://digital4planning.com/wp-content/uploads/2022/02/A-Digital-Future-for-Planning-New-Methodlogy.pdf
Digital Planning Directory	https://digitalplanningdirectory.org/

The methodology and accompanying diagram feature an Evidence Analytics Loop, which is about the science of systems, and a Decision-Making Loop, which is about legislative planning procedures. The former is informed by multidisciplinary evidence empowered by data and digital technology. Such a methodology could unlock planning systems, enable digital planning processes, break down siloed approaches and upskill planners. As the RTPI 'State of the Profession' report of 2023 states:

> [o]verall, in all four nations we can observe a similar trend: underfunded, understaffed, overstretched planning departments struggling to keep up with their duties, a problem that has been further exacerbated by the pandemic
>
> (RTPI, 2023).

The conditions that the RTPI state through their analysis supports the key work of the task force to transform the current trajectory and enable supporting digital technology. Additionally, a report by Matthew Carmona and Valentina Giordano states there is a continuing design deficit for local authorities and a lack of landscape and urban designers in the UK, with two-fifths of local planning authorities still having no access to urban design advice, two thirds with no landscape advice and three quarters with no architectural advice (Carmona and Giordano, 2021). Ultimately, this new collaborative method offers a roadmap for digital planning instigation.

Supporting this vision is a comprehensive open planning directory of suppliers and technology companies, which provides local government with a wide range of services in a clear and transparent way while leveraging expertise. This *Little Book* has so far outlined UK planning as a structure, given working definitions of digital planning and described the work of the digital planning task force. Several case studies are presented to illustrate some applied aspects of larger policy ambitions at a local level.

3D Mill Race: Lancaster Area

Lancaster City Council (LCC) received funds from Historic England's Lancaster High Streets Heritage Action Zone Fund (HSHAZ). It funded building restoration, public realm improvements and a conservation management plan for one of Lancaster's most historic areas: The Mill Race area. The mill race has a culvert and stream that previously contributed to flooding in an extreme event in 2015, requiring restoration of the area. The brief was to provide interactive maps and display a heritage trail showcasing restored buildings and plaques. There was a significant need to use accessible StoryMaps, which are accessible GIS maps that narrate and annotate visual material. The collection of all the pages is available here: https://storymaps.arcgis.com/collections/5d1011c25b2c49628adc2b1f2e7f6799

The heritage trail map takes the user on a tour around the new green heritage plaques, which were installed as part of the project. There is also a paper version, but the beauty of the StoryMap is that it will be available to anybody at any time, even when copies of the physical leaflet have run out. The StoryMap can also immerse the reader by showing them where they are now and where they are going next. The construction time was minimal, as it was made with an existing dataset. The HSHAZ design theme also cut down on design time and kept all the StoryMaps associated with the HSHAZ fully branded and consistent each time. One of the outputs from the HSHAZ was a Conservation Management Plan (CMP). The team used a StoryMap to display the plan because:

- StoryMaps are more accessible to build than traditional council websites, allowing for pictures and headings to be inserted
- it is easy to include consistent messaging and branding for the project
- StoryMaps can link to other pages and allow users to download official documents.

A spreadsheet held all the data collated and referenced in the conservation management plan. As a result, it could only be viewed by

a handful of people and was not particularly accessible. The GIS officer looked at the data and suggested plotting the photographs to create an engagement tool. After plotting and attributing attachments with copyright statements and descriptions, the map was inserted into Experience Builder. This meant there were widgets to search and a feature panel to show all the data and its attributes. It also allowed for a fully branded splash screen using Historic England and HSHAZ logos and colourings and enabled users to agree to terms and conditions. There were also tabs for the differing datasets: archive photographs, trade directory data and building footprints showing old planning application drawings from the late 1800s and early 1900s (**Figure 3**).

The Ministry of Housing, Communities and Local Government (MHCLG) released their PropTech Innovation Fund Round 4 funding in November 2024. LCC put in a bid to expand the above application to use a LoD2 3D open-source model called the Lancaster City Information Model (LCIM) (**Figure 4**).

Figure 3: 3D Mill Race QR Code.

Figure 4: Lancaster City Information Model. Elliot Hartley and Paul Cureton, 2019–2021.

This project also used leftover CAD drawings completed for buildings that did not receive the HSHAZ grant money. These were used to show:

- what Lancaster used to look like through the use of old archive photographs made 3D and extruded building footprints (polygons on a map)
- what it looks like now through Light Detection and Ranging (LiDAR) scans and
- what it should look like in the future through the use of converted CAD drawings (**Figures 5 and 6**).

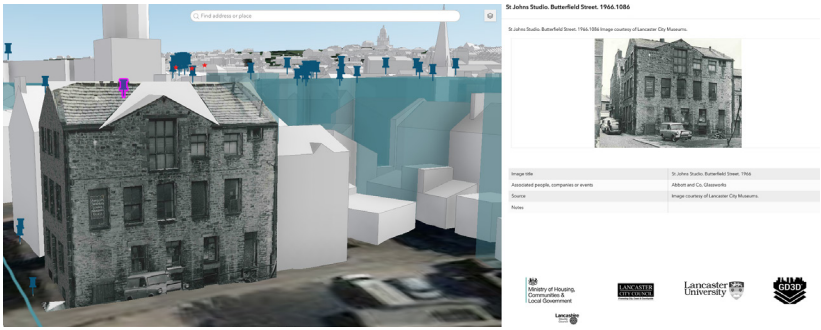

Figure 5: Screenshot of the 3D Lancaster: Mill Race Area app.

The aim was to bridge the gap between conservation management planning and engagement by making it easier to understand why buildings are meant to look a certain way, why they must have a certain type of window, etc. The CMP consultation received minimal submissions. During its soft launch with members of the public, we received positive comments regarding how easy it was to navigate and use the 3D app.

Figure 6: 3D Lancaster: Mill Race Area app, Elanor Brown.

In addition to the fusion of various datasets within a 3D GIS map containing building models, we ran a series of engagement events. According to an RTPI report, 'The Future of Engagement', and a YouGOV survey, 80 per cent of young people aged 19–34 have not engaged with a local plan. A modified version of Colossal Order's 'Cities: Skylines' city building game using geo-data of Lancaster was used consisting of a digital elevation model and open street map and other assets (**Figure 7**). These modifications enabled a simulation of Lancaster in which children could play the game and design their own environments. We hosted a 'Gaming and the Future City' event and played this game with 140 children and adult parents and carers. Lancaster's planning policies could also be played in the game. The full process can be reviewed in Cureton and Coulton, 2024. We also trained the planning policy team in the game for potential use in the next local plan consultation in 2025. Following on from this, using AI tools, we were able to analyse the decisions of 'play' in the game, examining the planning decisions of the children and their preferences, such as green space, schools and hospitals, and density. The process is being refined, but reports will be created to provide feedback to planning officers. Any local authority can replicate these methods.

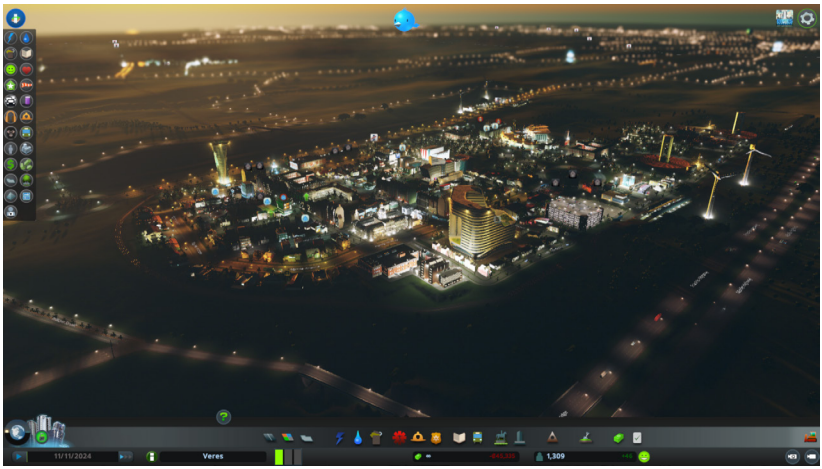

Figure 7: Colossal Order, Cities: Skylines, in-game screenshot of Lancaster.

We also trialled different methods of engagement, including ‘Data Walks’ in which the public engaged with a 3D-printed model of the Mill Race area and learnt how to 3D model in-situ, using LiDAR scanners on tablets (**Figure 8**). The participants reflected on the area and shared stories while touring the area, which was encouraged through the use of prompt cards via an open source card-deck called ‘PlanDeck’.

Figure 8: Data Walks of the Mill Race, with participants creating their own 3D models and responding to PlanDeck prompt cards.

The range of tools developed is undergoing further refinement, though this is a good demonstration of how to present the past, present and future in a heritage area. Two additional cases of digital planning are also pertinent to describe this research area and space.

Nottingham

Nottingham City Council (NCC) and Nottingham University funded the Ministry of Housing, Communities and Local Government via the Regional Innovation Fund. They collaborated on a range of 3D GIS initiatives, including the Projection Augmented Relief Model (PARM) created by Dr Gary Priestnall, University of Nottingham. The PARM is being used for analytics for urban heat (led by Simon Gosling and Emily O'Donnell) and carbon storage (led by Sam Booth), amongst a range of analytical activities.

In addition, a major developments app was created, underpinned by International Limited's Bluesky MetroVista's product, the 'Reality Mesh' model. The app showcases submitted applications, those under consideration and those complete, concerning submitted official documents (**Figure 9**).

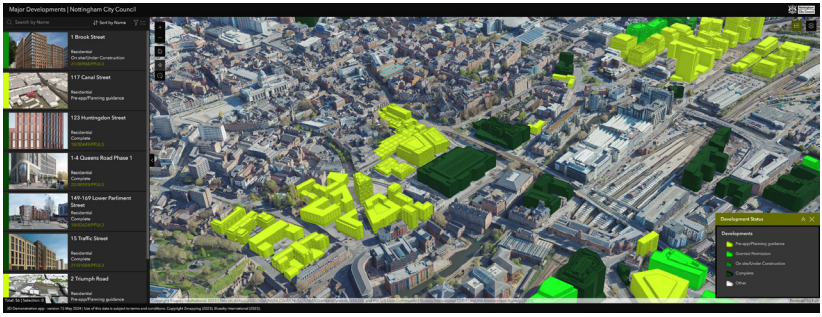

Figure 9: Major Developments portal, Nottingham City Council. Source: Nottingham City Council, 2024.

Physical models have been used to strong effect, both as a public consultation tool in providing a tangible model of Nottingham as a city and, through data overlays and projections, by critically examining a range of scenarios for sustainability. The 3D major developments app also supports public consultation, viewable via various tablets and smartphone devices.

Bradford

Bradford city centre also undertook 3D modelling from Virtual Bradford (University of Bradford – Visualising Heritage and City of Bradford Metropolitan District Council). Virtual Bradford was supplemented by a level of detail (LoD1) derived from Ordnance Survey mapping and data, Bluesky International's National Tree Maps (NTM) data and One City Park Bradford Building Information Model (BIM) courtesy of Sheppard Robson. Virtual Bradford was published in Esri's ArcGIS Online to highlight development opportunities at the UK's Real Estate Investment and Infrastructure Forum (UKREiiF) 2023.

One aspect of the project involved capturing the Little Germany Conservation Area as part of Virtual Bradford, combining surveying techniques representing meshed point cloud data to form a digital model. This was captured using drone imagery and mobile mapping which fed through to a textured model. This open digital twin helps to underpin data-driven decision-making for the City of Bradford and represents a strategic partnership between the University of Bradford (Visualising Heritage) and the City of Bradford Metropolitan District Council (Department of Place), made possible with initial seed funding from the European Scalable Offshore Renewable Energy Sources (EU-SCORES) programme. The digital planning benefits of both Nottingham and Bradford councils work can be seen via a MHCLG cost-benefit analysis report (see Bibliography).

Additional MHCLG cases include:

- the use of Natural Language Processing (NLP) by Plymouth City Council
- South Hams District Council and
- West Devon Borough Council, who partnered with Commonplace to improve the processing and validation of public consultation responses, reducing officer processing time and resourcing.

Finally, another case by Cornwall Council enhanced the 3D virtual

reality model of Newquay for the new Mid Cornwall Metro route. The proposed rail upgrade aims to transform travel across Cornwall by improving the links between Cornwall's largest towns, such as Newquay, St Austell, Truro and Falmouth/Penryn. A virtual reality experience was created using physical props, such as a virtual balloon ride where users sat in a balloon basket. These playful scene settings provide an immersive experience to visualise the proposals and scale of a large infrastructure project. The range of applications of digital planning is broad and is focused on needs of local planning authorities, whether streamlining back-end processes or engaging underrepresented groups in planning consultations.

Further Reading

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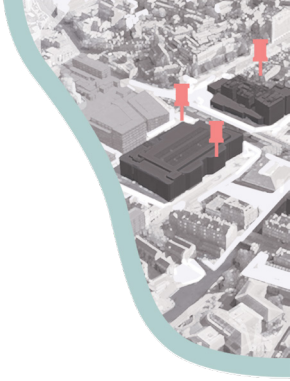
UK Ministry of Housing, Communities and Local Government (MHCLG, 2023). *Digital Planning Case Studies*. Available at: https://www.localdigital.gov.uk/digital-planning/case-studies/

Conclusion



Digital planning is a pragmatic research area in which the socio-technical relationships between local planning authorities and the public can be a space for experimentation, validation and streamlining of services, platforms and consultation experiences. Digital planning is a fundamental democratic apparatus that helps to transform, protect and enhance future places for sustainability. However, this pragmatic space must embrace the agenda-setting and social transformation goals set in the early years of the establishment of the planning profession. This dynamism is key in addressing a profession which requires large-scale training, expanded services and investment, as well as novel ways of delivering the National Planning Policy Framework (NPPF).

Digital planning has the potential to unlock a wide variety of technologies for decision support and we hope that the cases presented and further reading signpost a range of possibilities, methods and approaches for use in the future of digital planning.

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