SECNewgate Research

# Planning and Housing Landscape Review.

Geospatial Commission

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## Disclaimer

The views, opinions and implications detailed in this report are those of the authors (Newgate Research) and do not necessarily reflect the official policy or position of the Geospatial Commission or Cabinet Office.



# **Section 1.**
# Executive Summary.

# 1. Executive Summary

Geospatial data, or location data, comprises attribute data that is tied to a specific location. Over recent years there has been a huge increase in the volume and quality of location data that can be gathered and combined with other sources of information, helping inform decision making. The recent Geospatial Data Market Study highlights how the UK geospatial data market has been transformed through the evolution of data collection mechanisms.

Following the publication in 2020 of the UK Geospatial Strategy, and the National Data Strategy, the Geospatial Commission is leading a Planning and Housing programme that seeks to 'unlock' economic and social value through better use of geospatial data. This includes interventions to improve the accessibility of geospatial data, and the capabilities, skills and awareness.

The Geospatial Commission engaged Newgate Research in 2020 to undertake a Planning and Housing Landscape review to provide a baseline understanding of:

> What geospatial data was being used in support of planning and housing

> How geospatial data was being used and managed

> Where the challenges and opportunities are for better leveraging geospatial data in planning and housing

> What current and forthcoming geospatial initiatives participants were aware of

This independent research involved a targeted literature review, interviews with representatives of 100 organisations involved in different stages of the planning and housing 'journey' across the UK, and a telephone survey of 126 Local Planning Authorities from across the UK.





Across sectors, the core foundational geospatial data used in planning and housing are:

1. The Local Development Plans produced by Local Authorities, which set out the volume and type of housing needed, informing land promotion and allocation
2. The land and property gazetteer maintained by each Local Authority which uses a Unique Property Reference Number (UPRN) and a Unique Street Reference Number (USRN) for each record. These records are collated by GeoPlace and made available under licence by Ordnance Survey
3. Land ownership and leasehold titles collated by HM Land Registry, enabling the identification of who owns land and property
4. Constraints data, including environmental data available from various members of the Geo6 and utility asset data (energy, water and telecommunications) to understand the viability of housing development
5. Topographic landscapes on which the above data can be overlaid and represented visually and within GIS systems

Beyond this, there is a vast array of data that can be tied back to a specific property or locality that are used by Local Authorities and companies involved in the planning, construction, sales and marketing of housing to inform decisions. This is all seen as geospatial data: attribute data that is tied to a specific location. The level of sophistication with which this data is used varies not just between 'sectors' but within these sectors due to issues with data quality, data accessibility and the skills of those collecting and managing the data.

The single biggest issue identified through this research was that the local-level building blocks of geospatial data - produced by local planning authorities - are difficult to access in a standardised, machine-readable format.



The UK Geospatial Strategy includes two strategic missions for improving access to better location data and for enhancing capabilities and skills. The strategy acknowledges these opportunities, with wider work commissioned to promote and safeguard the use of location data, and to support innovation.

The UKs National Data Strategy, published in September 2020, similarly summarises the challenges that exist in unlocking the true value of data, geospatial or otherwise. Namely that data has strong foundations, that it is available to access, and that people have the skills to use it. These both align with the areas of opportunity for geospatial data identified in this review, which related to data standards, that data was FAIR (Findable, Accessible, Interoperable and Reusable), and that the necessary skills and resources were in place to leverage the data.

Outside of the core publicly available, standardised and quality assured data provided by the Geo6, key data in a geospatial format (notably from Local Authorities and utilities) was variable in the extent to which it could be considered FAIR. A lack of agreed and controlled standards was seen to have resulted in widespread differences in the collection, collation and availability of geospatial data. Furthermore, changes in technology and the inherent value of geospatial data have led to differences in the accuracy of data in reflecting a given location, property, asset or characteristic.

The lack of interconnectedness and interoperability between related datasets – due to a historical lack of common identifiers, differences in standard and the intended use for data – was seen to impact on the quality and objectivity of planning decision making. Restrictions to GIS functionality and interoperability within much planning software and Local Authority systems further compound issues by locking users into systems that can't talk to one another, impacting the management of geospatial data.

Overall, there is an opportunity to create massive efficiencies through standardising metadata and schema within (and ideally between) sectors involved in planning and housing. A key implication of this review is that standardisation is a critical first step for unlocking the potential of geospatial data, but sitting alongside this, and of equivalent importance, is promoting awareness of the value of geospatial data. Through greater awareness of the how geospatial data can be applied to solve challenges and to create value, there is much greater scope for collaboration and interoperability of data.

Through the Public Sector Geospatial Agreement (PSGA) the government has increased the range of core geolocation data that public sector organisations can access through Ordnance Survey, now including UPRNs, USRNs (now mandatory open standards for public sector data) and TOIDs. Similarly, the simplified common data catalogue and single data exploration licence launched by the Geospatial Commission have helped widen access to geospatial data. Other pathways include: direct access via innovation hubs such as Geovation or through licenced or open data sources, and via a wide variety of PropTech services and consultants. However, access to "raw" geospatial data, in an efficient manner, is still often a manual and time-consuming exercise to undertake.

The companies interviewed emphasised how they would benefit from more data, made available at greater speed, in a more granular form (postcode or asset level). The data sets that they would most welcome greater access to are land co-ordinates and public land ownership; building and planning data; residential lettings data; utilities and amenities data; traffic data; and demographics and household income level data.

As identified by both the Geospatial Commission in the UK Geospatial Strategy and in the recent Geospatial Data Market Study, increasing access is one of the most complex issues to address due to a range of challenges. This includes questions around who owns the data, who collects, manages, quality assures and secures that data, and under what conditions it can be processed, shared and accessed. There are considerable legal and commercial barriers in place that make this difficult, though it is an area where some progress is being made, at least within certain sectors (e.g. energy utilities).

Over half of Local Authorities (60%) interviewed as part of this research cited a lack of geospatial skills and resources as one of the top three barriers to their maximising the value of geospatial data; and over one-third reported challenges with recruitment and retention of staff with geospatial skills. This lack of capacity is compounded by commercial end-to-end planning  software which can restrict geospatial analysis.

Increasingly, companies are looking for data scientists and data engineers: people who can interpret and manipulate data as opposed to “simply” represent data geospatially within GIS applications. This is a major challenge for most organisations working in planning and housing, with companies that sit outside of the ‘PropTech’ banner struggling to recruit individuals with the skills required to really leverage geospatial data. This is compounded by little-to-no use of external professional development or membership of professional bodies that directly support the acquisition of geospatial skills.

Greater awareness of the value and application of ‘data’ in its broadest form would help to create opportunities for attracting qualified staff and leveraging geospatial data. This is needed both within organisations whose work directly or indirectly on geospatial data, and more broadly across the wider education system.

GIS capacity and skills vary across sectors and organisations, reflecting their size, budget and significance of geospatial data to the organisational objectives.



Direct and paid-for access to geospatial data has increased consistently over the past 10 years in line with technology for collating, managing and sharing data.

Companies have a wide variety of opportunities to access swathes of geospatial data. This includes direct access via innovation hubs such as Geovation, through licenced data such as Ordnance Survey or through data.gov and the Geo6 single data exploration licence, and indirect access through a wide variety of PropTech services and consultants. Access to “raw” geospatial data in an efficient manner is still often a manual and time-consuming exercise to undertake. Until data is collected with clear standards that enable interoperability this will continue to be a knotty issue.

Based on the evidence gathered in this review we would suggest there are four areas which should be prioritised to unlock the value of geospatial data:

1. Recognition that planning and housing data needs to be linked with spatial data from across related domains (e.g. transport, health, education etc.). This requires much greater collaboration and consultation within and between public and private sector organisations working toward the same goals of more effective planning, housing and construction. A starting point for this would be the principle of improving access and agreement on metadata standards, specifically spatial references, identifiers and dates.

2. Agreeing core data requirements and then supporting the development of a minimum degree of GIS-related competencies in relevant local planning authority staff. Allied to this would be the establishment of some shared fora for Local Authority staff to build networks of geospatial practice and professional development.

3. The next generation of geospatial planning and housing practitioners are in fact data practitioners. Engagement and communications activity should raise awareness of data engineers and software developers as to the opportunities that exist in the planning and housing sector.

4. Geospatial data is still little understood by leaders or prioritised for investment. There is a need to showcase the art of the possible (e.g. case studies with associated ROI measures) and make advocates of key decision makers across the public and private sector.



## Summary of research approach.

The Planning and Housing Landscape review involved a three-phase approach:

Phase One comprised a targeted literature review of relevant literature relating to planning and housing location data, tools and initiatives, supplemented by interviews with representatives of 19 organisations that hold a macro-level picture of the UK geospatial ecosystem as it relates to planning and housing. A full list of these organisations is included as an Appendix to this report.

Phase Two encompassed interviews with representatives of 81 organisations involved in different stages of the planning and housing ‘journey’. These stages included:

- Land and housing development (including identification and acquisition, land promotion and allocation, planning control and construction)
- Housing sales (including conveyancing, property sales and marketing)
- Property management

These organisations were selected to be broadly representative of the sectors involved in each of the different stages, from across the UK, and included:

- Construction companies
- Housebuilders
- Housing Associations
- Planning and development consultancies
- Architecture practices
- Licenced distribution network operators
- Gas distribution networks
- Independent gas transporters
- Water and sewerage companies
- Telecommunications companies
- Conveyancers
- PropTech firms involved in different stages of the planning and housing journey

A standardised topic guide was used to undertake interviews with representatives of these organisations, lasting between 30 and 60 minutes. This is included as an Appendix to this report. A full list of these organisations is also included as an Appendix to this report.

A final phase of research Phase Three involved a telephone survey of 126 Local Authorities from across England, Wales and Northern Ireland. Interviews were undertaken with either the Head of Planning or a representative from Local Authorities’ GIS or planning teams. Telephone interviews were undertaken between 24th August and 2nd October 2020. The full list of survey questions is included as an Appendix to this report. These were also addressed to representatives from the Scottish Improvement Service.

**Section 2.**
Planning and housing data use in the UK.

# Section 2. Planning and housing data use in the UK.

The ecosystem for geospatial data.
The planning and housing geospatial ecosystem refers to the network of organisations involved in the supply and demand of geospatial data. It is a busy network of public and private organisations variously gathering, providing, managing, interpreting and using location data. The type of geospatial data used by organisations varies hugely depending on need and availability, with geospatial data seen to comprise any form of data that has a spatial, location-based element to it.
At the heart of this network sit the primary sources of geospatial data relevant for planning and housing. Key among these are Local Authorities who accumulate evidence at the beginning of the journey as the basis for drafting and justifying Local Plans. Local Authorities also provide crucial data to architects, developers, conveyancers and the general public in the property development and sales lifecycle. The tiered nature of local government should also be recognised, including the powers that some combined authorities have to produce regional spatial strategies (again incorporating geospatial data).

Alongside Local Authorities, a wide range of other organisations collect data tied to a location. These range from public bodies - such as Ordnance Survey, the British Geological Survey, Coal Authority, HM Land Registry, the Valuation Office and the UK Hydrographic Office (the Geo6) - through to commercial businesses involved in the planning process, construction of properties and utilities, and the marketing and sales of properties. In addition, a range of sectors and professions are then involved in collating, manipulating and analysing this data to inform planning and housing decisions.

Much geospatial data is now publicly available, through work ranging from initiatives such as Geovation to the recent opening of over 300 datasets produced by the Geo6 and other public bodies. However, to truly maximise the value of spatially-related data, we need to start by understanding the organisations that produce and utilize this data.

To best understand the ecosystem for geospatial data it is helpful to view it through the prism of the planning and housing ‘journey’.

There are two broad phases of this journey:

#1 Land and housing development
(including identification and acquisition, land promotion and allocation, planning control, and construction)

#2 Housing sales
(including conveyancing, property sales and marketing)

There is also a further phase that relates to the ongoing management of residential property post-sales. This was not part of the remit for this research.

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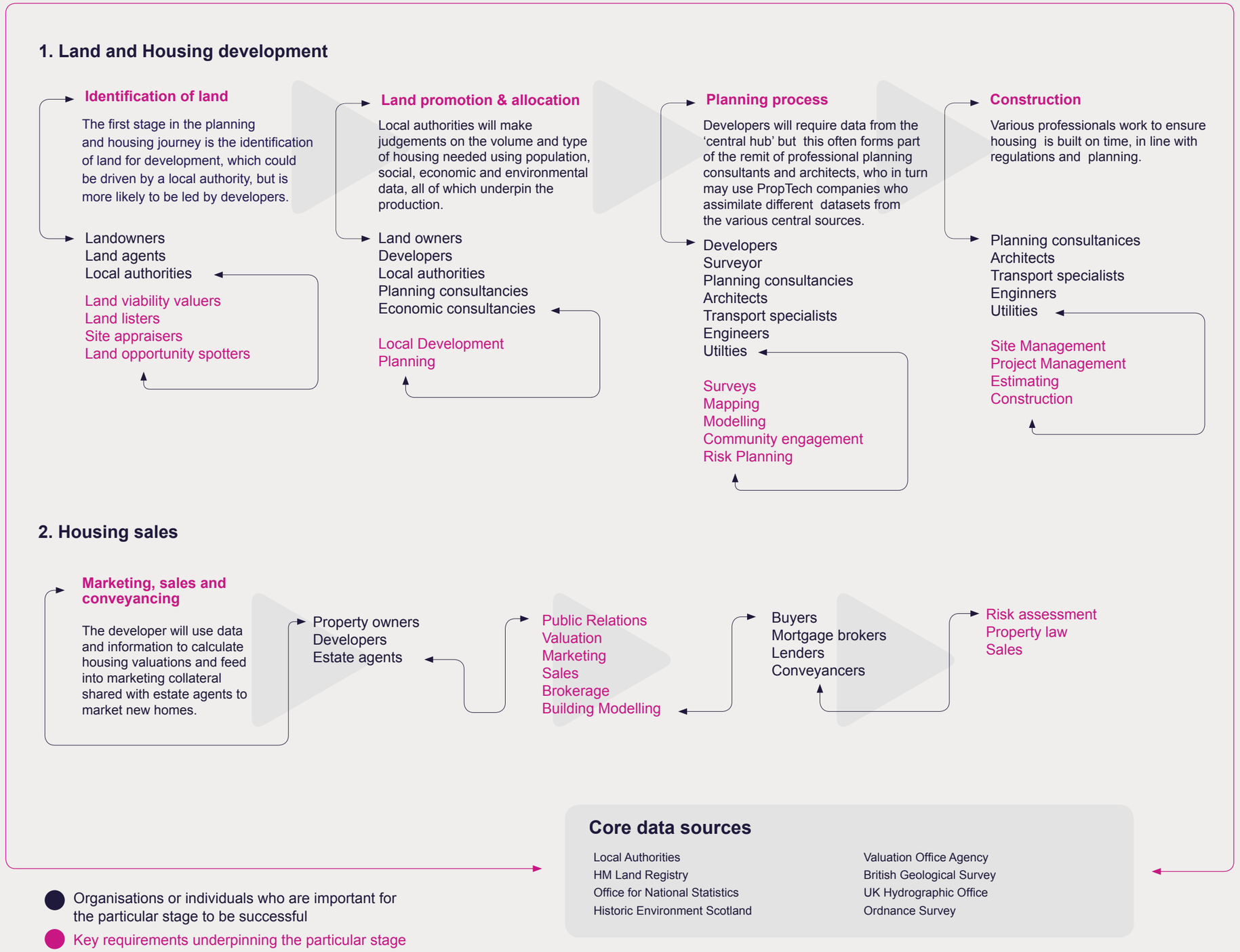
# The Geospatial Ecosystem

The planning and housing geospatial ecosystem is a busy network of organisations that gather, manage, analyse and provide spatial data across different stages of the planning and housing process. Their roles are frequently blurred and the same organisation may source, interpret or make available a number of different datasets, each with its own internal and external access rules and licencing arrangements attached.

To best understand the ecosystem for geospatial data it is helpful to view it through the prism of the planning and housing 'journey'. There are two broad phases of this journey:

1. **Land and Housing development**
   Including the identification of land to construction

2. **Housing sales**
   From marketing homes to mortgages and sales.



## Land and housing development.

# 241,130

**The number of new homes built in England during 2018/19** (including ‘change of use’ conversions) - the highest number recorded in the past 30 years and moving in the direction of government targets to build 300,000 homes per year by the mid 2020s. **A further 5,777** homes were built in Wales, 7,809 in Northern Ireland, and 21,292 in Scotland. There are many hundreds of developers and housebuilders in the UK, ranging from small companies who may build only a handful of properties to those such as Barratt Homes, Persimmon and Taylor Wimpey, who jointly develop almost one in five new UK homes.

The first stage in the planning and housing journey is the identification of land for development. This can be driven by a Local Authority, but is more commonly led by developers, informed by Local Development Plans (a distillation of the policies and proposals and constraints maps) produced by Local Planning Authorities. Developers will use multiple approaches to identify land including engaging with landowners, land agents and Local Authorities; using GIS software (drawing on proprietary, licenced and public geospatial data); and working with data aggregators such as Landmark and Nimbus Maps.





There is also a wide range of consultancies and ‘PropTech’ companies that leverage geospatial data to provide land identification and acquisition support for developers, including:

- Addressable market sizing
- Identifying land and property, both on market and off market opportunities, including underdeveloped sites
- Assessing the viability of opportunities, including potential environmental risks and risks to development posed by utility assets, likely success of planning applications, predictions of future demand, and estimated sales or rental values
- Connecting with relevant stakeholders (land/property owners)
- Producing 3D Building Information Modelling to support planning and cost estimation

Companies involved in data aggregation collect and collate a wide range of data that includes:

- Topographic landscape data
- Land ownership, planned developments, target land use, schemes in progress and wider real estate data
- Postal addresses
- Environmental and constraints data

A smaller proportion of companies actively draw on a wider set of data on populations and how people interact with local environments (education, transport, social and search data, credit card transactions, shared economy data) to identify patterns with capital values and growth sets.

# UK residential planning systems.

As well as being a source of many of the most granular geospatial datasets, Local Authorities are also vast consumers. Location data is critical for producing Local Plans, which detail the volume and type of housing needed in each locality, informing land promotion and allocation and associated planning decisions. Population data (behavioural trends and population projections) and wider social, economic and environmental data underpin each Local Plan. They also require the proactive engagement of landowners, agents, developers and – in some cases – utilities companies, in identifying suitable sites for housing.

The planning systems (involving the management and regulation of development) of Scotland, Wales and Northern Ireland are largely similar to England, despite a separate legal basis. Decisions are taken at a local level by Local Planning Authorities based on national planning policy guidance set out by Ministry of Housing, Communities and Local Government (MHCLG) in England and the Scottish and Welsh Governments. In Northern Ireland, this is produced by the Department for Infrastructure in collaboration with the 11 Local Authorities.

In England, there is a tiered plan-led system which includes a National Planning Policy Framework used to guide the production of Local Development Plans. These are typically 15-20 year forward plans for how local land is to be used. A similar approach is taken within Wales, guided by the Planning Policy Wales national framework.

Local Authorities in England and Wales are supported by the Local Government Association and Welsh Local Government Association, which work with 335 of the 339 Local Authorities in England and the 22 Welsh unitary authorities. The LGA helps represent the views of their membership to government and supports sector-led improvement tailored to specific service areas including housing. Over the past year, this has included 24 housing-related projects across 90 Local Authorities in England.

In Northern Ireland the Department for Infrastructure holds responsibility for regional planning policy. Since 2015 there has been relatively greater devolvement of responsibility to Local Authorities for determining the type and scale of development required.

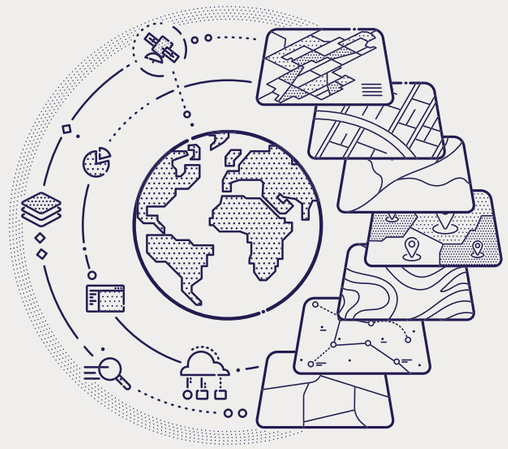




In Scotland, the Planning (Scotland) Act 2019 was recently passed which has introduced locality plans, which are similar to local development plans, though with more explicit focus on accounting for community outcomes (such as health and the environment) in decision making. Like England and Wales, Scotland has a National Planning Framework, a revised version of which is currently in the process of being consulted on. In Scotland the housing figures come from regionally produced projections rather than a national projection (as is used in England for example).

The Improvement Service in Scotland is a partnership between the Convention of Scottish Local Authorities and the Society of Local Authority Chief Executives. They play a similar role to the Local Government Associations of England and Wales, with a core remit to improve the efficiency, quality and accountability of local public services. The Improvement Service established the Spatial Information Service (now the Data and Intelligence Team) in 2015 following the creation and commercialisation of the Scottish national address register (The One Scotland Gazetteer). This team now performs a key service for Scottish Local Authorities via the Spatial Hub, a web service which is the centralised source of standardised Scottish local government spatial data. This enables all Local Authorities to meet their legal EU INSPIRE obligations.

The Data and Intelligence Team at the Improvement Service consists of eight data analysts who work across the 32 Local Authorities in Scotland. The team receives datasets that are processed via CKAN and Python to a cloud server before being standardised via FME and published on GeoServer.



There are now 40 national datasets published including local development plans, planning application data, housing land supply and others. The Spatial Hub also hosts the SGN gas network data. The service currently enables all Scottish public bodies free access to this data under PSGA through either a download or an API.

# Geospatial data use within Local Authorities.

To understand how geospatial data was being used within Local Authorities across England, Wales and Northern Ireland, we undertook 126 telephone interviews with the Head of Planning, a representative from the Local Authority GIS team or equivalent member of staff. All Local Authorities in England, Wales and Northern Ireland were contacted using a census-type approach in which we sought to engage staff from as many Local Authorities as possible - with no restrictions or quotas placed on the type or location of Local Authorities.

The survey findings are included as an Annex to this report. In summary, the key findings included:

- Geospatial data is used primarily to help with the development of local plans and for the review of planning applications. This also means that geospatial tools are often used by non-data specialists.
- The majority of Local Authorities do not place daily limits on searches made by stakeholders, though one-third of Local Authorities charge for data searches to either help to cover costs or to generate profit.
- Data is published by Local Authorities in several different formats including PDF, shapefiles and Excel. Over half of Local Authorities have added data to the data.gov portal and of these, over half shared between 1-25 datasets.
- The mean number of geospatial practitioners in any given Local Authority is 35, though this ranges from areas that have no geospatial specialists to those that have several hundred staff working directly with geospatial data.
- Two-in-five Local Authorities have a dedicated GI/GIS team in which geospatial practitioners 'sit'; a similar proportion of Local Authorities spread geospatial practitioners across multiple teams.
- To make sure geospatial data is embedded across the Local Authority, 78% of Local Authorities who have a data strategy also link this to other corporate strategies.
- 40% of Local Authorities have knowledge/forums, the majority of which include representation of geospatial data professional development.
- In relation to training and development, 29% of Local Authorities utilise services from industry or professional bodies. Those authorities with an annual spend over £500k use services from industry and professional bodies more than any other.
- Recruitment and/or retention of staff with geospatial skills was an issue for two-in-five Local Authorities, predominantly due to salary and a lack of local talent pool.
- A lack of geospatial skills and resource is the number one barrier for Local Authorities to leverage geospatial data.





As the team charged with collating and standardising Local Authority geospatial data in Scotland, the Data and Intelligence Team was well placed to help understand the situation in Scottish Local Authorities:

- There will be 6-8 staff with geospatial skills in a typical Local Authority, often spread across several different departments. The bigger the authority, either by land mass or population, the larger the team
- Many Local Authorities have disbanded GIS specialists and the work has been taken on by general planners and researchers
- Geospatial data is used primarily as part of the Local Development Plan
- Around half of Local Authorities produce online Local Development Plans, and most of them will use ArcGIS Online or something similar; 10-15 Local Authorities will also share their data via web services or APIs

Key data sources relevant for Scottish Local Authorities, and planning and housing more generally in Scotland include:

- Scottish Spatial Data Infrastructure has c.1,000 spatial data sets and forms the metadata catalogue for Scotland. This includes Local Authority data that is drawn from the Spatial Hub (and published on data.gov.uk)
- Scotland's Environment Web, which has distillation of around 50 layers (drawn from Scottish Environment Protection Agency, SEPA), Scottish Natural Heritage, and Forestry Scotland data); often used by planners
- Historic Environment Scotland
- Scottish Enterprise provides a regional economic spatial data resource

The data collated and then provided by Local Authorities in Scotland – as across the UK more broadly - is seen as "fit for purpose" at a localised level. However, a lack of clear quality standards and consistency in the format in which data is provided creates challenges at more of a macro level (without a significant amount of manual cleaning).

To help address these challenges and capitalise on the opportunities presented by geospatial data, the Scottish Government is investing in the digital transformation of the planning system in Scotland. As part of this Digital Planning reform, they have commissioned three distinct digital 'pathfinder reports' on: planning data, the technology landscape and PlanTech. These will be published alongside a Digital Planning Strategy for Scotland.

## Planning applications.

Planning applications submitted to Local Planning Authorities will typically be supported by a set of reports drafted by a consultant project team. This often involves architects, planning and development consultancies, who project manage the process and ensure policy compliance, as well as architects, engineers and other specialists.

Planning consultants and architects will collect and use data that helps to:

> Prepare feasibility studies before developers acquire the land
> Understand the local area and the likely considerations for a successful planning permission (e.g. future traffic demand)
> Maintain an up-to-date record of planning regulations in the local areas
> Model pre-application CAD drawings
> Predict the value of a home before planning application and construction phases of work

While bespoke surveys will almost always have been conducted, architects and planners also draw on a wide range of existing geospatial data, typically through third party services or software, rather than manipulating raw geospatial data directly in GIS software. Relevant data included:

> Land ownership and property addresses
> Topographic landscapes
> Constraints data
> Previous planning application searches
> Gas and electric supply data

Once suitable plots are identified, a range of different companies offer tailored services and solutions to facilitate the planning and design of housing developments and to inform the cost estimation of any construction work that might take place. These services are typically used before planning applications are submitted and can include data visualisation solutions such as Building Information Modelling (BIM) and interactive visualisations of both above and below-ground assets to help with cost estimation and planning. Much of the data here is provided by developers and managed using CAD software and/or game engines.

In planning applications, data will often be positioned to show the scheme in the best possible light or, where that is not possible, mitigation will be proposed. For larger developments, developers may use engagement platforms like Commonplace to engage with residents to pre-emptively address any potential objections that may be raised, while for planning authorities it can be used as part of the public consultation process prescribed in article 15 of the Development Management Procedure Order.

Applications are generally submitted via the Planning Portal in England and Wales or ePlanning.scot in Scotland, but a substantial minority (c. 10%) are still submitted direct to local planning authorities in hard or soft copies. All applications in Northern Ireland go directly to the local council in Northern Ireland. Local planning authorities will then consult with statutory consultees – as primarily set out in Schedule 4 of the Development Management Procedure Order 2015 (and devolved equivalents) - before reaching a decision on relevant planning and listed building consent.





## Construction of new developments.

Once planning permission has been granted, housing developers will commence construction. At this stage there is more limited engagement between developers and the core forms of publicly available geospatial data, as the groundwork has largely been laid at the planning stage.

Developers, architects, engineers and construction companies working on behalf of developers will typically make use of a limited set of geospatial data to account for constraints throughout the construction process (such as property access and location of utility assets). This can include:

> Topographic landscapes
> Asset location records, jobs and emerging infrastructure
> Reviewing data on the location of utilities such as pipes and cabling, and transport infrastructure
> Visual representation of sites (e.g. via LIDAR) to represent planned developments on a CAD or GIS system
> Ecological and utility asset constraints

Larger construction companies tended to have a cloud-based common data environment tailored for the construction industry and enabling the management of a variety of data including CAD architect and engineering plans, BIM models as well as geospatial data.

Outside of the largest construction companies, it is relatively rare that companies involved specifically in the construction phase would utilise GIS software. Similarly, data is rarely standardised or FAIR, and there is a lack of geospatial capability outside of specialist consultants and larger construction companies.

Local Authorities will allocate house numbers and road names to new developments and property conversions. The Data Co-operation Agreement (DCA) is the legal agreement and framework that underpins the creation and maintenance of National Street Gazetteer (NSG) and National Address Gazetteer (NAG) Databases managed by GeoPlace (a joint venture between the Local Government Association and Ordnance Survey). It provides the framework that lets the whole public sector have access to authoritative address and street spatial information in England and Wales. It also recognises the role of Local Authorities in the creation and source of this spatial information.

This NSG dataset can be seen to be foundational for the management of utility assets, and as a basis for Local Authority network management duties. Similar services are provided in Scotland by the Improvement Service and in Northern Ireland by Ordnance Survey NI.

The UK's utilities sector plays a critical enabling role in facilitating efficient planning of housing and in establishing new residential connections and managing utility infrastructure. Utilities providers include:

> Distribution Network Operators (DNOs) and Gas Distribution Networks (GDNs) responsible for regional energy distribution and connections

> Independent Gas Transporters (IGTs) and Independent Network Operators (IDNOs) responsible for more localised energy networks and connections

> Water and Sewerage companies responsible for regional services

> Telecommunications companies responsible for telecom and broadband services

> Independent Utility Infrastructure Providers operating multi-utility networks

Asset data is integral to the construction, deployment and maintenance of utility assets. Therefore, most employees will have access to some form of geospatial data to enable them to conduct their work. Within a typical utilities provider there will be two teams who will make most use of geospatial data.

The Connections Team are responsible for establishing new connections for residential properties in response to plans from developers, Local Authorities or other utility providers. They will collate data on the location and performance of their own assets (pipes, cabling circuit routes, substations, ducts, cabinets and exchanges etc.) and how these interface with the needs of new and existing developments by modelling pre-planning inquiries and planning applications to assess risk and cost. They also ensure any changes to the operational network are reflected on a central asset register.

A Strategic Planning Team (or equivalent) are involved in examining usage, forecasting future demand and scenario modelling to direct investment in the network to meet predicted demand. As a regulated industry, utilities companies are required to demonstrate that the investments being made in the system are reflective of need based on up-to-date and relevant data on current and forecasted use.

Both teams will proactively engage with Local Authorities to help manage supply and demand.





Key geospatial data varies between organisations based on their remit and size, but typically include:

> Topographic landscape

> Land ownership and property addresses

> Utility asset location records

> Water drainage, flood zones, areas of outstanding natural beauty, earth resistivity, roads and foot traffic

> Current use and predicted demand

> Planned developments and target land use

Given the nature of the infrastructure under management, utilities companies typically have a significant dedicated resource to manage the collection and analysis of geospatial data. This is particularly the case for DNOs, GDNs, water and sewerage companies, and telecommunications companies where there is responsibility for networks of above and below ground assets.

Data on owned assets is typically maintained within enterprise asset management systems, which can include SCADA network management systems, relational database management systems that also serve as connectivity models, and a GIS to capture, collect and present data on linear network assets. While data standards are still not completely aligned within or between sectors, much of the geospatial data collected by utility companies is FAIR in respect of its intended use and many companies employ geospatial specialists and programme developers with the right skills to manipulate data.

Third parties will variously have access to an internal viewer or a third-party service. Developers can also request and pay for plans detailing energy and water assets to inform planning and construction.

There are a wide range of geospatial data-related initiatives taking place within the utilities sector, many of which relate to the development of centralised asset registers across different utility providers. These are detailed in the sector summaries included as an Annex to this report.

## Housing marketing and sales.

The second phase of the planning and housing journey is the marketing of properties for sale. Housing developers again play a central role in this process, helping to facilitate access to relevant geospatial data for use by conveyancers and real estate agents for new build properties. For existing properties, this data is typically sourced and presented by sales and letting agents. This includes data on property values and information on the surrounding area (e.g. school locations/ performance, transport hubs, crime rates etc.).

Given the value that can be added at this stage, the commercial gains that can be made, and the range of geospatial data available there are a wide range of businesses that support the sales and marketing of properties. The British Property Federation and Future Cities Catapult report that more than 50% of PropTech companies focus solely on property sales.

In Proptech 3.0: the future of real estate, the Said Business School identifies the opportunities and efficiency gains that could be made in taking all real estate and transaction processes online. Real estate FinTech ranges from equity raising platforms to debt and mortgage platforms companies that look to facilitate the marketing and sales of both new build and existing properties, with prominent examples including search aggregators like Rightmove and Zoopla, sales agents like PurpleBricks, and businesses that make the transaction process more efficient such as Coadjute.

These platforms are underpinned by sophisticated data aggregation capabilities, with newer technologies including artificial intelligence, machine learning and blockchain likely to have an increasing role in the future.

At this end of the housing journey, customers for data aggregation vary from estate agents and conveyancers through to individual home buyers and renters. Many of the services offered again involve the collation, cleaning, standardisation and presentation of property supply and demand related data. This helps:

- Developers and investors to understand the optimum pricing of their properties (for rental/sale)
- Estate agents and prospective buyers to understand market trends, including previous prices that have been used to market homes and sales prices
- Prospective buyers to assess risk and to value properties
- Prospective buyers and renters to identify and compare different locations for moving home



Planning and Housing Landscape Review 2021

## Residential conveyancing.

Once contract negotiations commence, conveyancers require all data sets that relate to a property for the sale or purchase. These may be simple searches in terms of the property history all the way through to flood risk searches and other searches that the client has asked for that might not be required at the start of sale/purchase.

According to the Conveyancing Association, there are 163 different data sets required to sell or buy a property in England and Wales that are reviewed as part of residential transactions. HM Land Registry holds the key information on property ownership, which is integral to the conveyancing process. Aside from this, conveyancers may draw on information from Ordnance Survey and Local Authorities to clarify potential risks or errors that may impact transactions.

Data is often provided and managed in an ‘analogue’ format, which means that property searches undertaken by solicitors can take up to six weeks in areas that operate more manual card-based systems (such as Southampton). In other areas, such as Portsmouth or Wakefield, the process can be completed in less than one hour. Data is typically not managed according to FAIR principles and there is a distinct lack of capacity and skills within the conveyancing profession for managing geospatial data.

Much of the data required for conveyancing is open-source, so many of the PropTech companies involved in supporting land identification also provide information required for due diligence in conveyancing (i.e. in helping buyers to identify risks and liabilities). HM Land Registry is working in partnership with Local Authorities to standardise and migrate local land charges register information to one accessible place as a national digital service.

In recent years there has been increasing support for the use of online property log books, which provide homeowners and prospective buyers with detailed information about a property’s history (including developments, planning information and building control information). This information is made available through a secure web service. In the future, this could form a standardised repository of property information required for completing a transaction and provide efficiencies in the conveyancing process.

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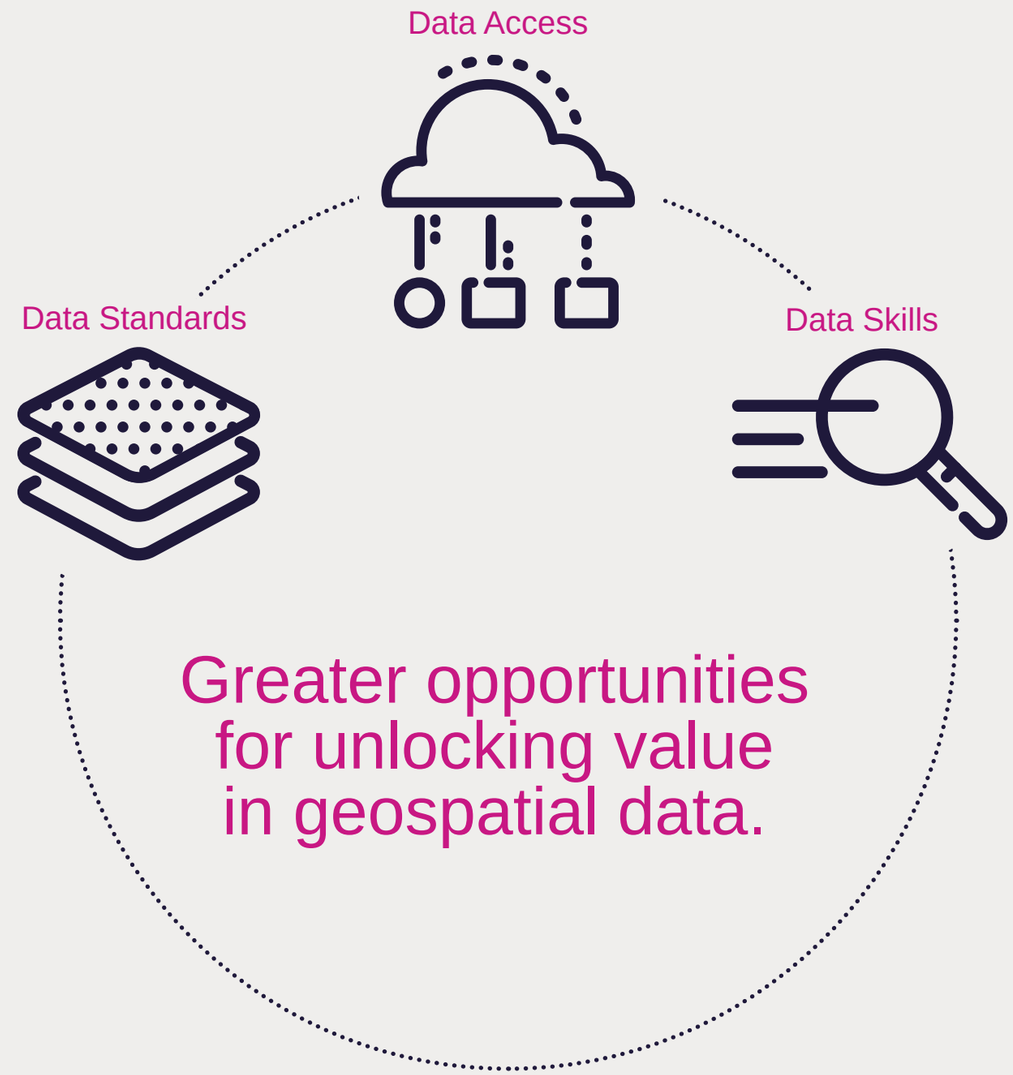
# Section 3.
## Creating planning and housing value through geospatial data.

“In general, what you need to do is to make quite a lot of data that exists better known about, more accessible, in a better condition, in a standardised format, available to people.”

(Strategic Stakeholder)



# Getting the data fundamentals right.

The UK's National Data Strategy aims to boost the better use of data across businesses, government, civil society and individuals. It also summarises the challenges that exist in unlocking the true value of data, geospatial or otherwise.

The National Data Strategy highlights three core areas that are critical for the effective and efficient use of data:

1. The data foundations – the extent to which the data collected is 'fit for purpose' and recorded in standardised formats.
2. The data skills – the 'basic, technical, governance and other skills needed by practitioners to maximise the usefulness of data'.
3. The data availability – an environment that 'facilitates appropriate data access, mobility and re-use'.

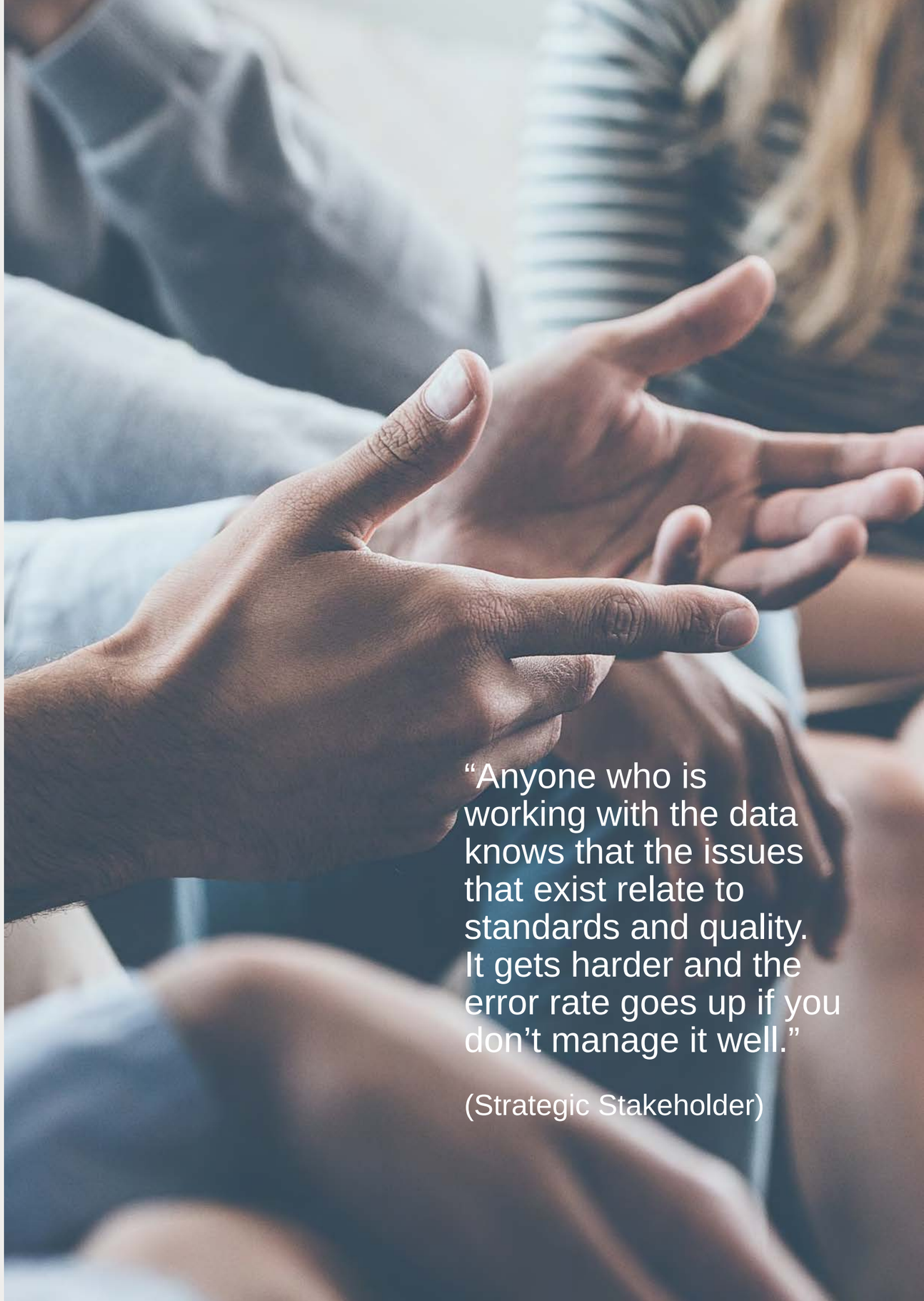
While the National Data Strategy was written in respect of 'data' more generically, these areas – and the commercial, political, cultural and technological factors impacting these – align with those that apply to geospatial data, and with Mission 2 and Mission 3 of the UK Geospatial Strategy:

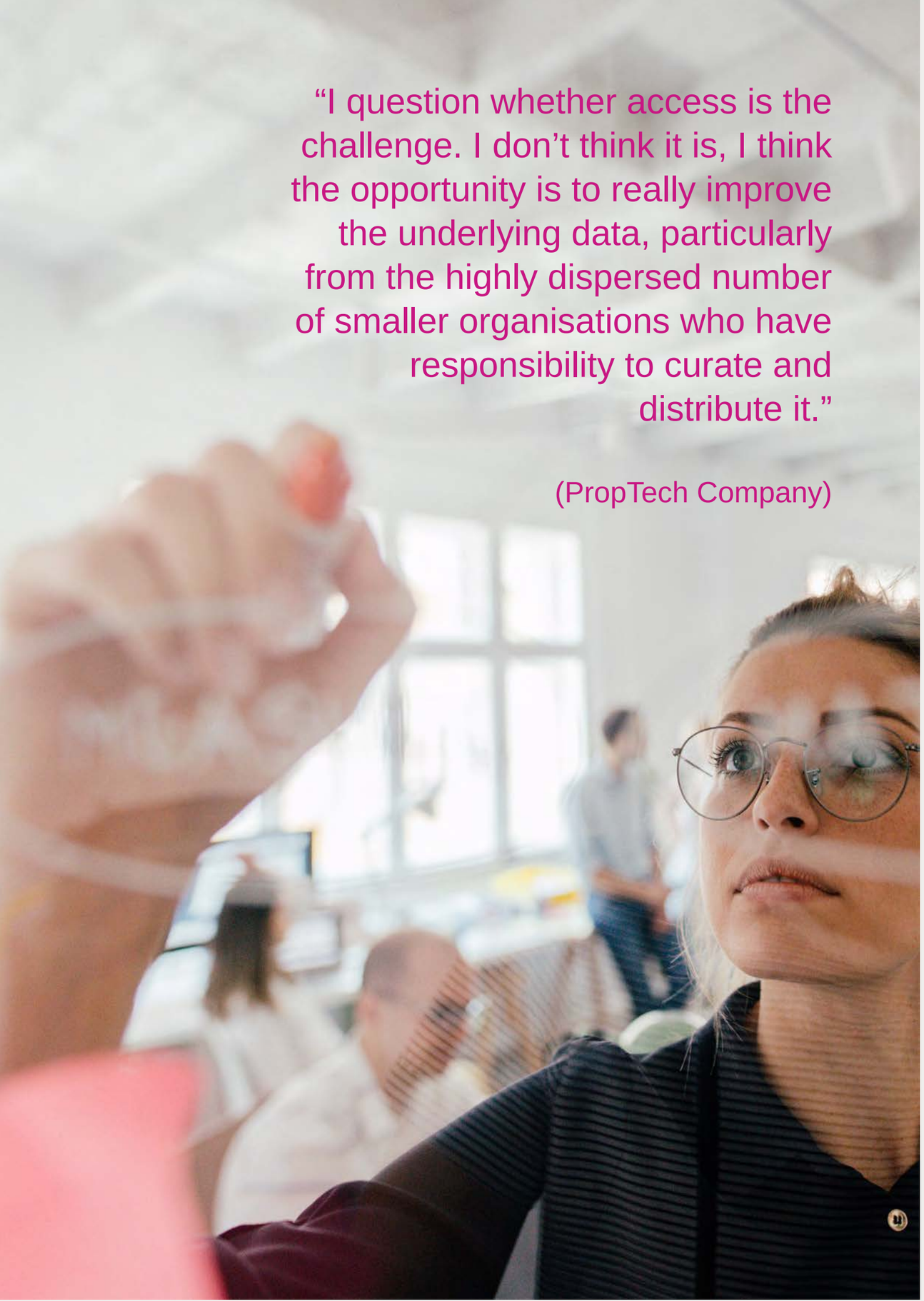
To improve access to better location data through activity that ensures it is findable, accessible, interoperable, reusable (FAIR) and of high quality.

To enhance the capabilities and skills of people to better leverage geospatial data, and increase awareness of the opportunities that geospatial data presents

The findings from this extensive benchmarking exercise are that the challenges and opportunities for organisations to better leverage geospatial data are aligned with these two strategic missions. Within this section, we therefore detail the range of challenges and opportunities in accordance with the issues of access (incorporating standards and the FAIR principles), capability and skills.







“I question whether access is the challenge. I don’t think it is, I think the opportunity is to really improve the underlying data, particularly from the highly dispersed number of smaller organisations who have responsibility to curate and distribute it.”

(PropTech Company)

## Data standards.

One of the main challenges that applies across all sectors and stages of the planning and housing journey relates to data standards; specifically, the standardisation of the type of geospatial information that is collected and the format in which this geospatial data is then stored and shared.

Standards as relating to planning: Local Plans are a key source of geospatial data for everyone from developers and planning consultancies through to construction and utility companies. However, there is no agreed base level of operable planning information that both members of the public and the planning community can access to make decisions. As much of the local government finance legislation is from the 1980s and 1990s when the technological context was very different, planning authorities provide statutory information to various organisations in geospatially incompatible and non-machine-readable formats.

While there is some consistency in planning language - from the National Planning and Policy Framework – there is limited prescription in how local planning authorities collect and report data (and what geospatial data points should be captured) despite INSPIRE. Each Local Authority creates their own policies and priorities for housing and planning on the basis of a Local Plan which draw on different evidence and then employ different decision-making processes in granting permissions to developers. This leads to patchy and inconsistent data, in turn resulting in different tools and processes being employed to manage and report on data.

A lack of agreed standards led many stakeholders to report that, with over 300 different planning authorities, there was huge variation in the information that is collected, represented and provided to third-parties. Some may provide a geo-package or shapefile detailing Adopted and Emerging Development Allocations, with relevant metadata on when a site will come forward. Others provide an Excel sheet or PDF link to a report which might contain a postcode somewhere near a site. Either way, there is often no standardisation of addressing or alignment of data with a consistent UPRN.

“There is a lack of consistency across every single planning authority.

(Strategic Stakeholder)

The single biggest issue reported by all organisations utilising geospatial data for planning and housing was that the local-level building blocks of geospatial data produced by Local Authorities were difficult to access in a standardised, machine-readable format. This results in organisations either (i) employing staff to review and ‘translate’ documents by interpreting the figures, graphs and charts, plotting GIS polygons manually and deciphering the metadata, leading to errors, or (ii) procuring solutions from PropTech companies that specialise in aggregating and standardising Local Authority data.

Standards as relating to development:
As part of the pre-planning application process and in applying for planning permission, construction and engineering design drawings are provided by developers (and other utility providers) as a CAD image file, alongside a wide variety of different types and forms of location plans. This presents challenges for those receiving that information – which can include utilities services and PropTechs – to manage that data and align it with their own GIS packages. In short, it requires a substantial amount of “manual handling”, which can lead to misalignment through human error, undermining the quality and reliability of the data.

For larger residential developments, it is typically the case that developers will provide construction companies with data on a site. However, the liability for ensuring the surveys are correct rests with the construction company. Due to a lack of agreed standards across the sector, it is often the case that construction companies will repeat this work, in some cases undertaking up to 15 surveys.

“The PropTech job should be to translate information for the end user, not to create standards. That should be sorted before it even gets to a company like ourselves.”

(PropTech Company)

“Data from utility companies is appropriate for finding it but not appropriate for planning.”

(Large Construction Company)

Standards as relating to utilities: There is recognition of the value in having a shared system across all utility companies for representing overground and underground assets (including Utilities by Others), and for having common standards for geospatial data. This includes standardising how data is defined (i.e. metadata standards) and how this is shaped or modelled across the various organisations working in the same sector.

Users such as developers could draw a polygon around a proposed site and see everything relating to utilities. This will help to provide a consistent experience for the end user, enable collaboration on construction works to minimise disruption to customers, and save a huge amount of manpower that is currently invested in sifting through, organising and interpreting the same data from different sources.

Within sectors borne out of competition and regulated to encourage competition (such as energy) there is potentially a need for much more explicit regulation on data standards to prevent different companies doing their own thing.

Amongst organisations used to handling geospatial data, there was agreement that - assuming it contains the correct identifier/s - the exact (geospatial) form of data was less of an issue than it has been historically, although consistency in how the same types of data are provided would be beneficial.

Most important in unlocking value is ensuring standardisation in the metadata (specifically spatial references, identifiers and dates) and schema (the metadata catalogues). As an example, even where there are commons standards (such as the Common Information Model developed by the electricity industry) there is variation in how it is employed (e.g. in how assets like pipes and cables are represented in design drawings). This lack of consistency requires manual labour and/or the development of algorithms and parsers to enable the data to be analysed consistently across cases.

“The sector is intelligence-poor and data-poor because there are too many commercials behind the operations.”

(Telecommunications Company)





“Data from utility companies is appropriate for finding it but not appropriate for planning.”

(Large Construction Company)

Another initiative in recent years has been the move toward clearer standards on the specifications for hardware, software or the geospatial data collected and reported, helping to pave the way for improving access to geospatial data. The main international standards body leading work on open standards in the geospatial sector is the Open Geospatial Consortium (OGC), supported by other organisations such as International Organization for Standardization and the Worldwide Web Consortium (W3C).

A more recent trend has been the development of geospatial open standards outside of these formal bodies through crowdsourcing and collaborations between organisations. This has led to open standards such as GeoJSON, STAC and the Mapbox Vector Tiles specification.

A joint OGC and W3C working group was established in 2017 to support best practices for geospatial data on the web (architecturally neutral, distributed, and open) in order to reduce the risk of interoperability issues caused by standards that are not aligned.

## Findable and accessible data.

Historically, licence cost, restrictive terms and inconsistent definitions have been viewed as major barriers to enabling access and sharing of geospatial datasets supplied by national organisations such as Ordnance Survey (OS) and British Geological Survey (BGS) licenced for restricted use. Participants in this research recognised that access to spatial data could be restricted for various commercial, legal, and security reasons. However, there was also a prevailing view – rightly or wrongly - that by widening access to spatial data, the return on investment gained through the innovation and application of data would more than cover the costs of producing and maintaining that data.

However, there has been a clear move toward making core geospatial data more findable and accessible – a key example being the Public Sector Geospatial Agreement (PSGA) and recent open access to UPRN identifiers. This improvement in address matching is seen as having the potential to generate significant efficiency benefits.

Companies, particularly those in the PropTech sector, would like to see more data being made more widely available at greater speed, in a more granular form (postcode or asset level), and with greater clarity around licencing restrictions. Examples of the more common data discussed by participants in this research included:

- Land co-ordinates and public land ownership
- Building and planning data (including HM Land Registry NPS, conservation areas, Article 4 directions and outcomes of planning applications)
- Residential lettings data (volume and achieved rents)
- Utilities and amenities data (pipes and substations, lampposts, bins and bus stops)
- Traffic data (highways and public transport)
- Demographics and household income level data

This data is collected and maintained by a variety of organisations and as acknowledged in the recent Geospatial Data Market Study, ‘incentives for data sharing that encourage sharing of commercially collected data will need to be created’ to widen access. High costs are a barrier to access, but there is also a wider issue with some of the data simply being inaccessible due to commercial value, commercial confidentiality or perceived restrictions relating to upstream licensing or GDPR. The Geospatial Strategy details that the Geospatial Commission will actively consider opportunities to enable the sharing of private sector data, balancing assessments of value and public interest with commercial incentives to invest and innovate.





Many companies are looking for national and local geospatial data gatekeepers to put in place systems for organisations (and individuals) to programmatically access data via an API to draw it down automatically. While there is recognition that APIs are useful for companies that have engineers and developers looking to leverage that, for many organisations it is most appropriate to standardise data within a spreadsheet or shape file.

At a more localised level, there are large swathes of geospatial data that are not available because Local Authorities (i) are not mandated to provide this data for open access, and (ii) often have insufficient resources to do so. Making Local Authority geospatial data more accessible carries with it a perceived risk of breaching licencing restrictions on sharing or combining datasets, of breaching GDPR and of users finding errors in the data. Local Authorities also generate financial revenue through providing searches related to housing and planning data, and producing associated reports.

In short, there can be little in the way of perceived benefits to sharing geospatial data collected at a local level, particularly where staffing resources are already stretched. This has led to a situation where many companies employ analysts to access data manually (e.g. through using Freedom of Information procedures, or physically visiting council premises) or gather this information through a third-party company. This is a key barrier to unlocking the value of geospatial data at scale.

The final barrier (and opportunity) relating to accessibility is the speed at which data is provided to organisations requesting that data. Some Local Authorities and public sector bodies have systems in place to make this quick and easy, while others were described as “glacial”.

> “The best thing that could happen to data across the board would be to add location for everything.”
>
> (Large Construction Company)

## Interoperable data.

There is recognition across all sectors that generate geospatial data that this information has historically been collected, stored and managed to serve specific, internally-driven functions. As such, there has been very limited need to look at how data and the systems used to collate that data interact with the datasets held and systems used by others (both internally and externally). Interoperability has not been a major consideration. As an example of this, a company may receive data in a geospatial format (e.g. in shapefile or MapInfo tab files), which is not in a format that is immediately reconcilable with other key systems (such as relational database management systems) or aligned with the way companies manage development plans, planning applications or enquiry data on their own GIS.

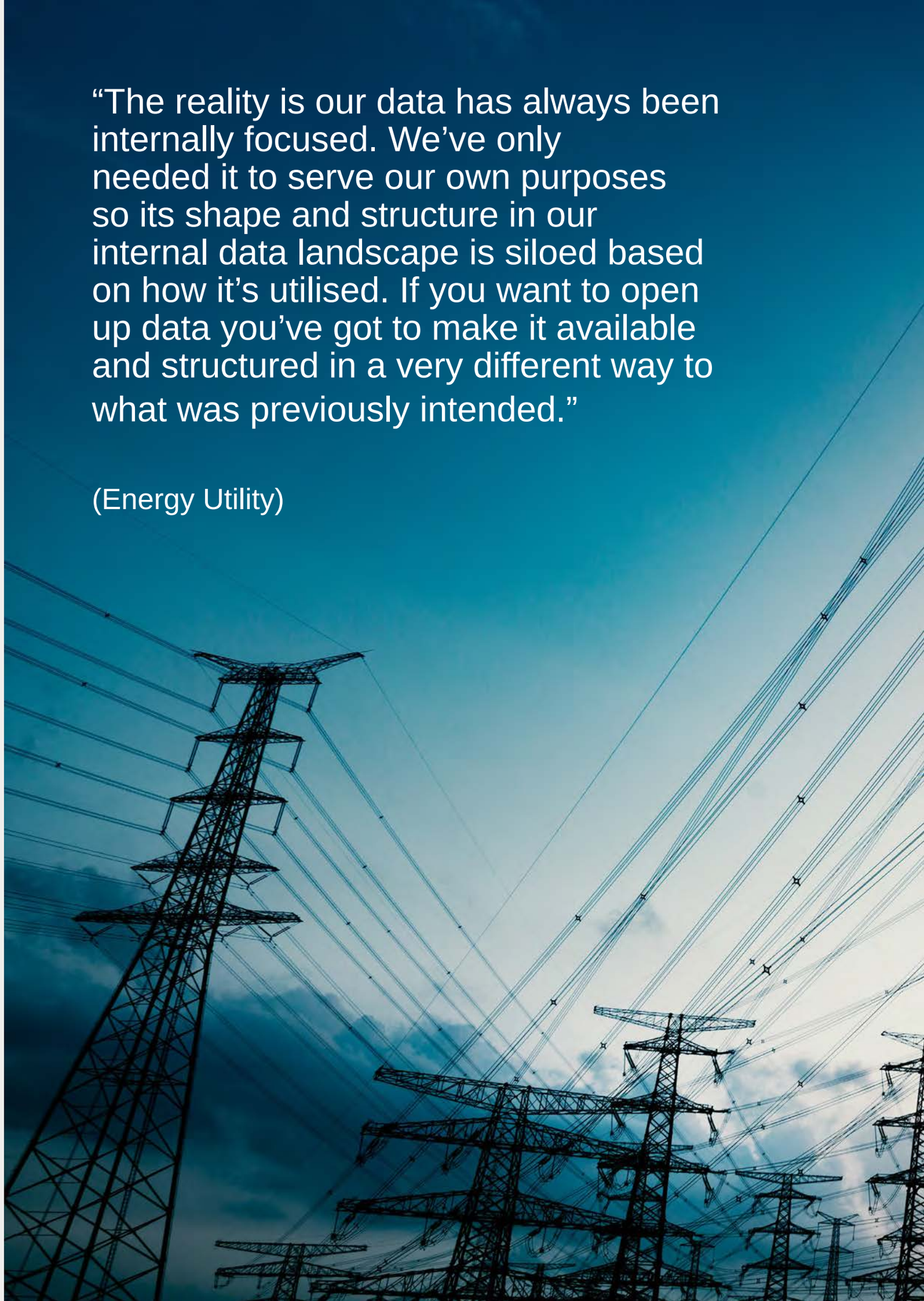
The lack of consistency in standards presents a significant barrier to data interoperability. In 2018 the Open Data Institute ODI reported on the 'competing and overlapping identifiers for addresses, property and land', which adds an additional layer of complexity for analysts looking to interpret and bring together different geospatial datasets'. They go on to call for identifiers and registers to be made as accessible as possible, something that is starting to happen as a result of the PSGA.

Interoperability and leveraging the value of connecting different datasets has also been impacted by the lack of unique identifiers to link with other public datasets. This has led companies, notably in the PropTech space, to invest in building algorithms and "hacks" for address matching, in order to facilitate interoperability. The Data Standards Authority is looking to enhance interoperability of government data by introducing standards across government.



"The reality is our data has always been internally focused. We've only needed it to serve our own purposes so its shape and structure in our internal data landscape is siloed based on how it's utilised. If you want to open up data you've got to make it available and structured in a very different way to what was previously intended."

(Energy Utility)



Other examples of standardisation issues come in the form of the lack of interoperability of prominent UK built environment standards (CityGML, IFC and LandInfra) and a built-in lack of interoperability within much commercial planning software, which is often bundled in with other services including data storage, locking users in to 'little more than glorified document management systems'. This is a particular issue for local planning authorities whose systems for tracking planning applications are often incompatible with GIS software or wider platforms such as the Planning Portal and London Development Database.

As the technology continues to filter down to residential builds there is also an opportunity to incorporate geospatial data into BIM models. This is currently challenging due to the absence of a standard set of processes to help formalise how the data flows between GIS platforms like ESRI and other stages of the construction process and facilities management. There is an opportunity here for companies involved in BIM and GIS to engage with the customer base to understand what a standardised data flow might look like.

Among those familiar with BIM, there was a view that all stages of planning, development and management of buildings will eventually be modelled, enabling a diverse range of data to be connected. This data has the potential to become part of a real-time ecosystem for capturing how people are interacting with the built environment, supporting greater strategic decision making.

In the case of utility companies and their drive for greater transparency and sharing of geospatial data, there is now a clear move toward agreeing common standards for collecting and representing geospatial data to allow for greater interoperability. The advancement of FME technologies should also mean there are less barriers presented by the format in which data is made available in future, subject to the adoption of this software.

Coming back to data standards, interviewees highlighted the progress that has been achieved in other areas such as BIM (IFC Standard) and the Internet of Things (Project Haystack). Greater clarity on standards will ultimately result in improved interoperability.

"In planning systems there is lots of data but location for the geospatial element in missing. There is no interoperability between implicit and explicit data."

(PropTech Company)





## Reusable data.

Related to standards, there is also a key issue with the accuracy – and therefore reusability – of geospatial data, which relates to issues with data capture, transfer and entry on to different GIS and non-GIS platforms.

Different datasets have different issues with quality relating to the definitions and standards imposed at the time the data was collected, and the way in which that data has subsequently been managed and updated. As an example, discrepancies in the data provided by a national body such as the Coal Authority could result from legacy data collection (plotting) issues and where physical inspections in the process of planning investigations identify features that either historically were not recorded or were not recorded accurately. These discrepancies can also be seen in differences between some forms of Coal Authority data (e.g. in relation to outcrops) and data collected by other authorities such as the BGS.

Another example is the quality of the data held by utility companies on their own assets. Inaccurate records have implications for planning, for project costings (and cost overruns), and for construction operations. In the worst case scenario inaccurate data is seen to pose a risk to the health and safety of those operating on sites. Alongside access to local planning data, the accuracy of data from utility companies was the primary issue for housebuilders and construction companies.

Issues with utility data are partly a legacy issue, with many assets having been installed several decades ago when there were different tools available to locate and plot assets. However, it is also a contemporary issue with missing information from as-built and as-laid drawings (particularly feed connections and fibre cables), and field asset data from newer collection methods such as LIDAR not aligning with older raster satellite imaging. There is also not seen to be a cost-effective solution to understand the depth of underground pipes, which changes over time with surface developments.

"Foul and surface water are some of the hardest data to get your hands on. You can find out quite easily there's a pipe in the road or there's a cable in that road. The question is, is that pipe capable of servicing the site? How much would it cost to upgrade it and how much would it cost if we needed to move it?"

(Housing Association)

Utility companies acknowledge that there can be a high degree of missing or inaccurate data on their assets, and construction companies and homebuilders typically find an array of assets un-recorded or mis-recorded in geo-detection surveys. There is a substantial amount of work that would need to be undertaken in order to rectify legacy issues to do with positional accuracy and standardising forms of utilities data. Agreeing a process for survey data to be fed back from construction companies to utilities companies may begin to address legacy issues.

At a local level, geospatial data is collected to underpin the development of local plans. Much of the geospatial data required by the Local Authorities is collected by specialist consultants to maintain the independence of the Local Authority and give greater credibility to any resulting plan. In a similar manner, developers typically employ consultants to gather data in support of planning applications, which planning authorities rely on in making their decisions. The issue in respect of planning applications is one of the objectivity of the data, and therefore the quality and/or validity of data supporting the relevant application.

“We’ve millions of assets which may need to be slightly shifted, which is a very difficult thing to do manually.”

(Energy Utility)

“Every time you open the ground, you are creating data, but after you are done the data is essentially thrown in the bin. As an industry we could contribute to a useful resource.”

(Large Construction Company)

As well as issues relating to issues of accuracy, the quality (and utility) of data is also impacted by how recently it was collated. Planning can be a lengthy and bureaucratic process, requiring significant time and resource investment to generate the evidence base required to pass the various stages of a planning application, which in and of themselves require an up-to-date evidence base.

A recurring challenge for planners and decision makers is the lack of currency in data on housing transactions, due to the 3-4 month lag in which it is available and accurately represented from HM Land Registry. This leads to issues with understanding what is happening in the housing market in real time. With the recent COVID-19 pandemic there is also now a question mark in the housing and planning sector as to whether the models underpinning market data assumptions are currently suitable for planning applications made before the pandemic.





## Data skills: current and future needs.

The exact skills required to leverage geospatial data vary dependent on the organisation collecting and managing the data, and their intended use for this data. However, across all sectors there was a relatively consistent view of the skills required for analysts working with geospatial data. These included a mixture of:

hard, technical ‘spatial’ skills (numeracy, cartography, GIS, Excel, project management, scripting/coding, data science, data engineering)

softer skills (curiosity, problem solving, spatial awareness, communication)

The relative balance of these skills depends on how integral geospatial data is to different functions within an organisation. However, there was a clear trend that skills needs are moving from GIS technicians to data scientists and software engineers who can develop applications to address specific business needs.

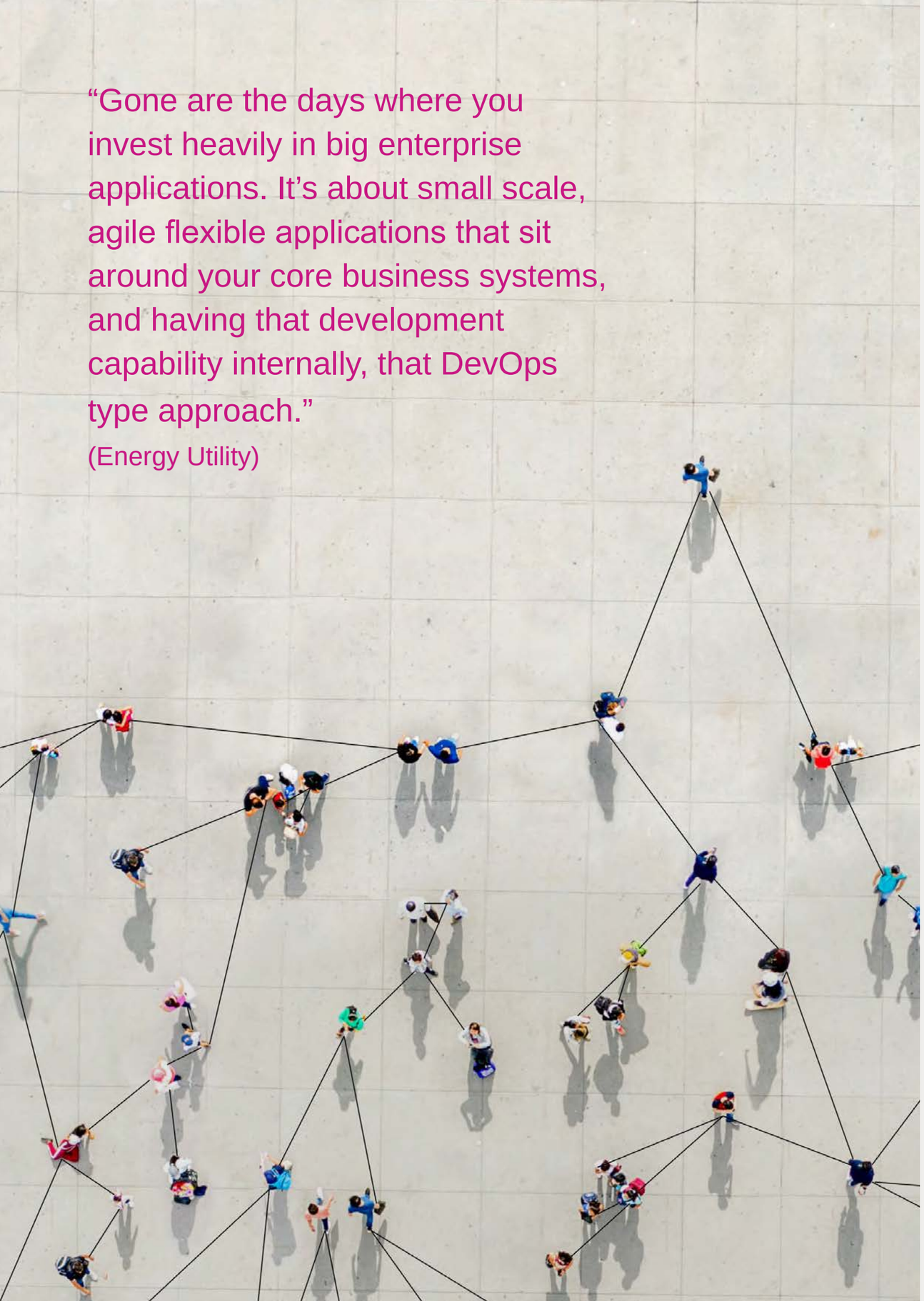
Outside of the PropTech sector it can be difficult to recruit and retain staff with the skills needed to leverage geospatial data. These include both digital skills in the widest possible sense as well as data science, data engineering, geospatial and GIS skills. The initial challenge here is ensuring senior recognition and buy-in to the value of investing in geospatial data collection and management. However, among those that were using geospatial data, there was a view that having these skills as a core part of staff competencies, across the business, was critical to their effective future operations.

“Anybody that is not able to some extent to obtain utilise and apply data and information from various sources in an effective way is going to be limited.”

(Energy Utility)

“Gone are the days where you invest heavily in big enterprise applications. It’s about small scale, agile flexible applications that sit around your core business systems, and having that development capability internally, that DevOps type approach.”

(Energy Utility)



Even with recognition of the value of geospatial data, companies that operate outside of the PropTech ‘banner’ still experience significant challenges relating to cultivating and attracting people with in-demand programming and data science skills.

You can recruit GIS specialists who bring with them critical spatial data analysis skills. However, increasingly businesses need staff that can build software to address specific internal needs and goals, not simply analyse and represent existing geospatial data. These are not skillsets that GIS analysts have received formal training in. There is also very little reported use of external professional development or membership of professional bodies (e.g. AGI*/RGS**) that directly support the acquisition of geospatial skills.

An associated challenge here is that those graduates and professionals who do come with these data science and data engineering-based skills are not necessarily aware of or attracted by roles outside of the technology sector. The immediate thoughts that come to mind are that companies working in housing are industries that “lay pipes in the ground”. There is a need – from university onwards - to raise awareness of the opportunities that exist outside of ‘technology’ businesses and to attract data scientists away from the lure of Google and Amazon. There is also a challenge of retaining skilled staff once they have gained practical work experience.

The opportunity is very evident to companies. With the correct skills in-house, it will be possible for organisations to develop their own applications and services to meet specific use cases.

* The Association for Geographic Information (AGI)
**Royal Geographical Society (RGS)

## Data resources: overcoming challenges.

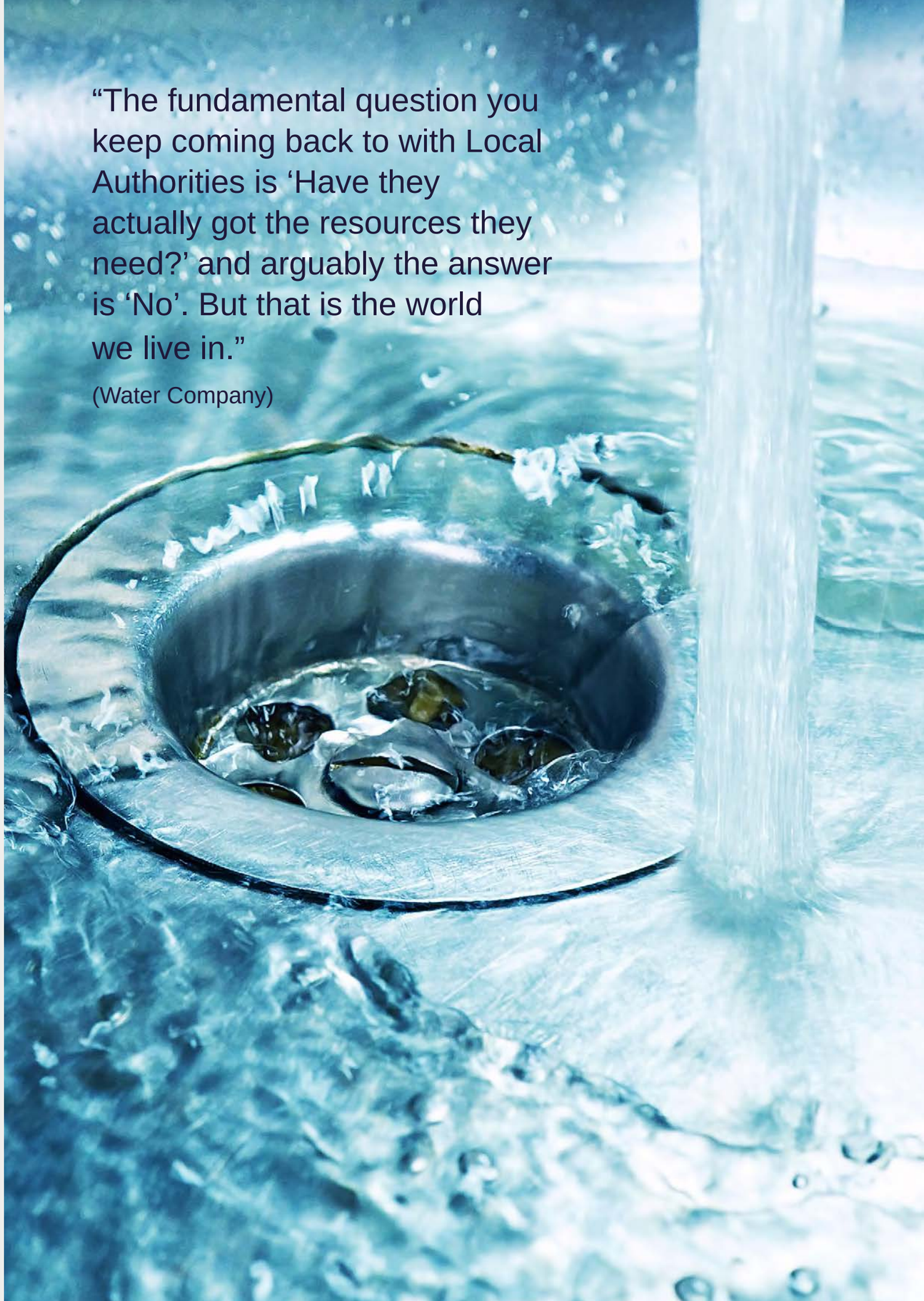
It is commonly accepted that staff planning resource within Local Authorities has been impacted by budget cuts. This means there is a high degree of variation in the planning resources available between Local Authorities, with “wealthier” district councils in the South of England having relatively more resources available than those in the North of England where social care deficits have a proportionally higher impact.

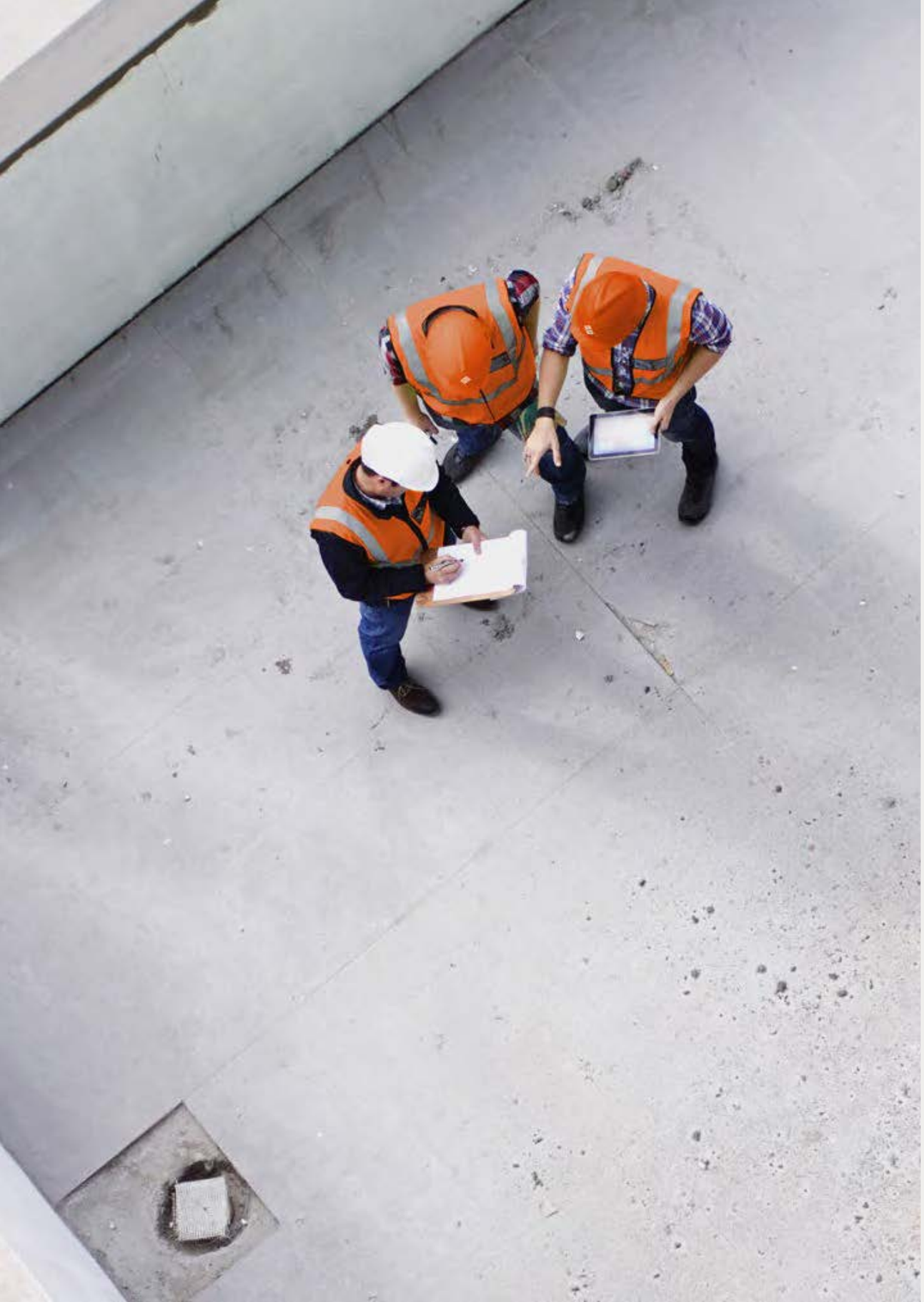
Many Local Authorities were seen to view geospatial data as a cost to be minimised rather than an investment that helps to underpin efficient planning, resulting in a longer term return on investment. This means that not all planning authorities have GIS officers, a geospatial data champion, or have cultivated an environment in which such a champion can be identified and trained to improve the collection and management of geospatial data.

A further compounding issue already referenced is that most planning authorities use commercial end-to-end planning software – e.g. IDOX, Civica, Northgate – which are like closed circuits. They lock users in, limiting interoperability and are not necessarily fit for analytical planning purposes. Even if they were to have access to an appropriate (and open-source) GIS software, this would not provide any immediate cost efficiencies, and would likely incur financial and/or time costs in transitioning to a new platform. This also assumes that the network permissions and hardware capabilities are in place to enable staff to utilise other software.

Hard and soft skills training for planning authority staff would be beneficial to support the introduction of standards and help council staff in both strategic and applied level planning. This includes both training around the technical skills required to manage geospatial data and in how to communicate around the implications of geospatial data.

There is also an opportunity here to create regional and national networks of practitioners involved in the use of geospatial data in housing and planning to shine a spotlight on good practice and to shape the sector. This is particularly important given the speed at which the volume and types of geospatial data available increases, and the high degree of variance in planning resources between different Local Authorities. Currently, there appears to be limited opportunity for professional development and sharing of practice within and between sectors.

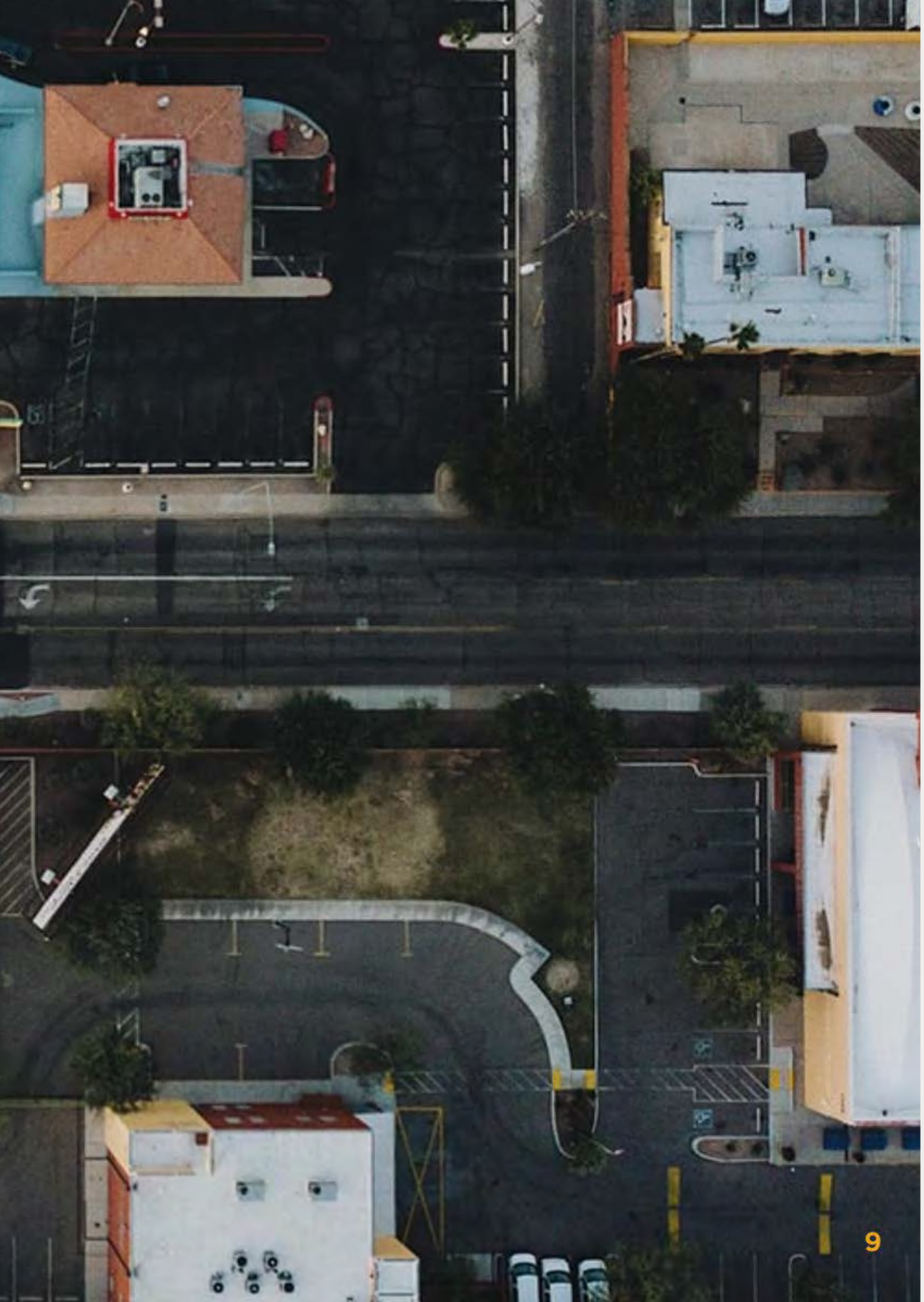




## Data skills and resources: looking forward.

Digital transformation is creating a growing need for both geospatial data and skills in the construction industry itself. The blurring of boundaries between the architecture, engineering and construction sectors and the geospatial industry opens up a range of opportunities for geospatial professionals. The cross-fertilisation of expertise between the private and public sector and between practitioners with local, regional and national remits could help to raise standards (both through skills transfer and a better appreciation of applying location data and the constraints around this).

As we look to the future, where APIs enable large amounts of geospatial data to become accessible and usable with the right kind of digital endpoints, the focus needs to be on helping professionals from a much wider array of professions – notably planning, construction and conveyancing – to understand what can be achieved with geospatial data. This includes helping those who collate and curate geospatial data to understand what can be achieved with small amounts of JavaScript or Python code.





## Unlocking the value of location data.

The value of geospatial data is as much in its application as it is in the data itself. With advances in technology and analytical methods, greater access to geospatial data has the potential to inform more efficient and effective decision-making at an individual, local, regional and national level. The creation of the Geospatial Commission in 2018 is testament to the recognition of the social, environmental and economic value that can be generated through layering and integrating geospatial datasets along with other data sources to maximise opportunities presented by data, particularly in respect of housing and planning decisions and processes.

This Planning and Housing Landscape Review sought to understand the challenges and opportunities in making use of geospatial data within planning and housing. The evidence gathered through this Review is well aligned with key recent strategy publications, including both the UK Geospatial Strategy and the UK Data Strategy. The key barriers for unlocking the value of geospatial data are clear and relate to data standards, data accessibility, data skills and resources.

Without agreement on what constitutes the appropriate data to be collected and made available, specifically at a local planning authority level, the value of geospatial data will continue to be undermined by issues of quality and accessibility.

There is a need to facilitate FAIR geospatial data, in a way that is user-centered and allows for easy manipulation and varied application. Value is dependent upon data being collected according to agreed standards, stored and managed in an appropriate form. This in turn requires planning authorities to have the skills and resources to manage this process and to collect accurate, up-to-date data.

With advances in mapping technologies, machine learning and the introduction of 5G, it will become increasingly feasible for decision makers to have real-time access to detailed geospatial data. Accurate data can inform local needs (including influencing factors like transport and environmental conditions), market capability to deliver against these needs and development work itself. However, the actual value of this data is dependent on both its underlying veracity and the intelligence applied to its interpretation.

# Implications.

1. Standardisation is a critical first step for unlocking the potential of geospatial data.
It is the foundation on which the real value of geospatial data within planning and housing will be achieved: the bringing together of diverse datasets to produce a more holistic, accurate and actionable understanding of how people are interfacing with locations now, and in the future.

All geospatial data should be collected and represented in a way that ensures standardisation in the metadata – which provide descriptive information about the producer, content, date/relevance and quality of the data – and the schema, within (and potentially across) sectors. Properly regulated, this development has the potential to create huge efficiencies in processes as well as increasing the efficacy of the ways in which data is applied.

This is an area that is already being progressed by the Data Standards Authority, working with the cross-government Data Architecture community, which was established in April 2020 to improve data standards across government.

One logical outcome of greater clarity on standards is the generation of (new) geospatial data which would be more accurate in representing aspects of a property, asset or feature. Allied to this, with greater standardisation of data foundations, there would be greater scope to for data to become interoperable between different software applications from GIS and geospatial analytical platforms to relational databases and management systems.

Given the volume of location-based data that is being collected by statutory and/or regulated industries, could there be scope for Government to push through a set of standards in a similar manner as for BIM and Planning more broadly?

The MHCLG brownfield land register is a good example of what could be achieved through the provisioning of data standards or tools that can help local planning authorities map and publish planning data to an agreed target data standard. Similarly, the Data Co-operation Agreement is seen to be a successful example of a shared service agreement that could hold lessons for the sharing of planning data. Is there a role for a body to take more centralised oversight of Local Planning Authorities, setting of expectations and the implementation of standards?





2. Better planning and housing decisions are believed to be made by developing and implementing plans in collaboration.
In actioning a new geospatial strategy, working on the basis of strong data foundations, there is an opportunity to encourage much greater proactive information sharing and engagement among organisations involved in planning and housing locally, regionally and nationally.

It is impossible to plan for the development of residential housing without accounting for a wide array of other public services - transport, health, social care, education - all of which relies on the use and interoperability of data tied to a location. UPRNs have a key role to play here as a linking mechanism between the public and private sector. With greater standardisation of data requirements, Local Planning Authorities will be in a stronger position to draw on public data to inform the creation of more ‘strategic’, and arguably more objective, local plans.

There is obviously a wide array of other datasets that can help to inform this process – notably data from utilities and construction companies – which, if suitable standards and processes were in place for sharing, could help ensure local plans were fit for purpose. As we look forward to the Future Homes Standard 2025, Biodiversity Net Gain initiatives and Net Zero goals it will be increasingly important to ensure a coordinated, macro-level view on residential planning and housing. Geospatial data needs to be recognized as key to this by decision makers at the highest level.

The location of where to build new homes is not just a local issue. The Raynsford Review of Planning highlighted the lack of a national spatial development plan for England. The absence of a holistic view and a consistent approach to national planning has led to a disparate and incoherent approach to planning and housing. With agreement around data standards there is the potential to rectify this.

There are also companies such as the Planning Portal and Landmark who, by virtue of their remit or size, hold vast amounts of data on planning applications and housing transactions. These companies can produce data and insights around the local, regional and national picture, virtually in real-time. There is also scope, with something like the Planning Portal, for data to be automatically fed back from local planning authorities on the outcomes of planning applications. What scope is there to draw on this data to inform strategic decision making and feed into national initiatives such as a National Planning register that could map different data sets according to strategies moving forward?

“In 2012 when regional planning was abolished, we also abolished the national scale strategic datasets that went with it. That was like smashing up your radar in a jumbo jet.“
(Strategic Stakeholder)

3. Before value can be derived from geospatial data, it has to be made more accessible. There are a wide range of barriers to making data available, from GDPR, licencing and commercial sensitivities through to ensuring that data is findable, and from system interoperability to staff capacity. There are also a variety of commercial organisations and voluntary bodies that have evolved to help collate, aggregate, clean and serve geospatial data in such a way that it supports a given use case.

Not all organisations have the awareness, skills or finances to draw on support from companies providing data aggregation-type services. In the case of smaller companies, or conversely those with more sophisticated in-house capabilities, there is a desire for geospatial data to be made more accessible. This may be in the form of an API or web-service where there is a specific application being served, or it may be in the form of a spreadsheet or shape-file for those looking to use the raw data.

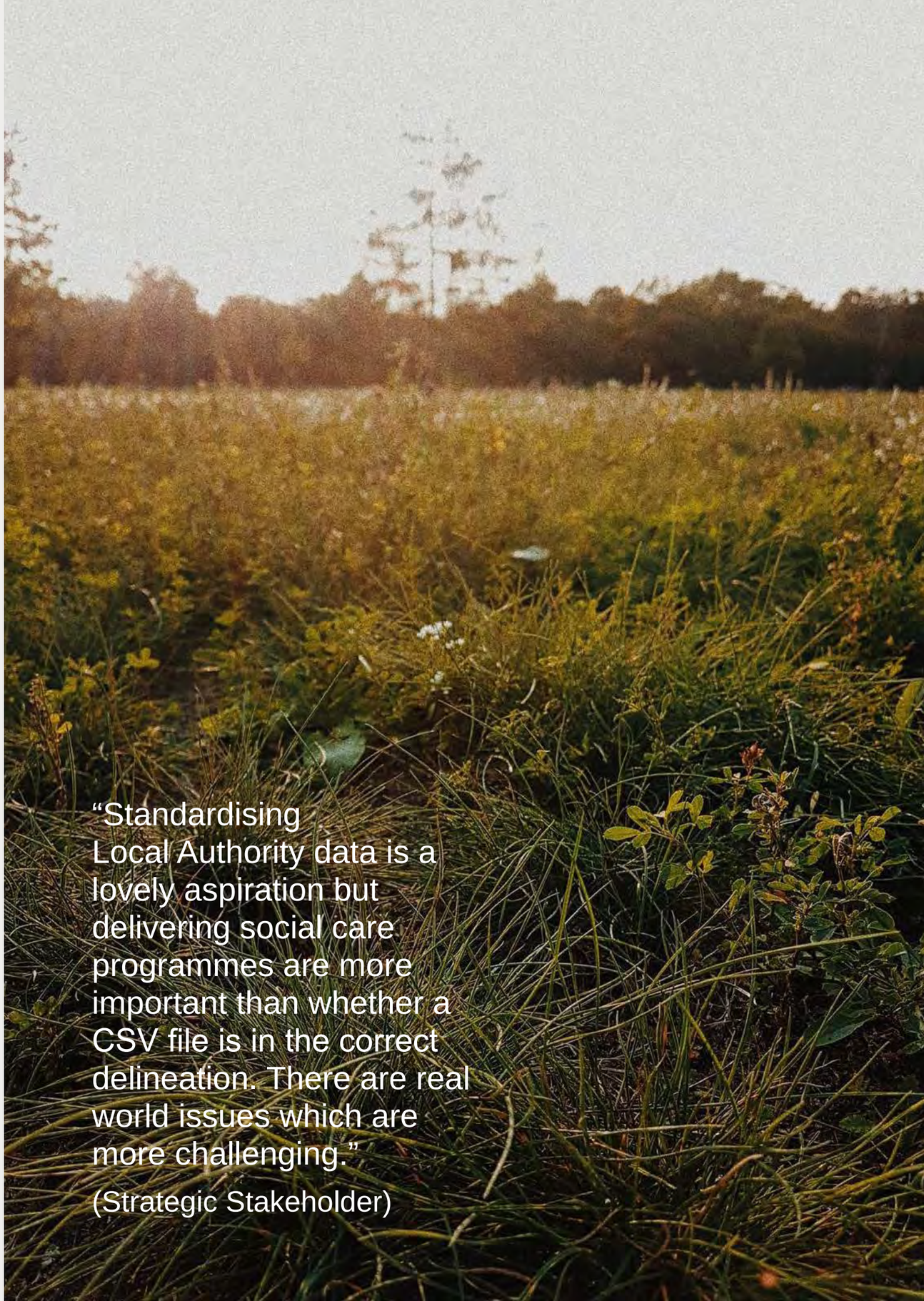
Through the Public Sector Geospatial Agreement (PSGA), the government has increased the range of core geolocation data that public sector organisations can access through Ordnance Survey, now including UPRNs, USRNs (now mandatory open standards for public sector data) and TOIDs. Similarly, the simplified common data catalogue and single data exploration licence launched by the Geospatial Commission have helped to widen access to geospatial data.

Driven by regulators such as Ofgem and facilitated by membership bodies such as the ENA, there has been a move more recently to a ‘presumed open’ standpoint in relation to geospatial data among many of the energy companies. With initiatives such as the National Underground Asset Register there is increasing scope to develop unifying catalogues and platforms for more ‘commercial’ geospatial data which cut across different sectors (while still providing a level of control to protect security of national infrastructure). However, this process will take some time, and there is a large amount of legacy data that will take many years to update.

Some respondents/companies have suggested there could be a role for government going forward to identify additional data sets that could be released and to promote data sharing within the private sector. Key data sets identified as being beneficial to make more accessible, at a granular level, included:

- Land co-ordinates and public land ownership
- Building and planning data
- Residential lettings data
- Utilities and amenities data
- Traffic data
- Demographics and household income level data

Further research would be needed to determine where the relative value (in terms of ROI) is in prioritising access to the above data.



4. Assuming the standards, the strategic imperative and access are in place, the next key issue to address is the skills and resources of staff to manage and utilise geospatial data. This research has found what was commonly assumed to be the case: on the whole, Local Authorities do not have the level of resource needed to harness the value of geospatial data within planning and housing. Over the past decade Local Authorities have had a reduction of nearly £16 billion in core funding from Government while facing growing demand on services through increasing and ageing populations.

An understandable consequence of these demands on Local Authority budgets is that resource and structural decisions have been taken that have impacted the capacity to collect, manage and publicise geospatial data for wider consumption. Creating standards and clear processes, with support mechanisms in place to help local planning officers to adhere to these, will go some way to improving the situation.

Membership bodies such as the GLA in London and the Scottish Improvement Service in Scotland, play an important role in both advocating on behalf of constituent Local Authorities and helping them to meet their obligations in relation to INSPIRE standards. Might there be scope for a membership body (such as the LGA) to help facilitate support networks and professional development for Local Authority staff working with geospatial data?

Outside of Local Authorities there are a wide array of sectors and professions that are utilising geospatial data, though this review has found that resource is often stretched, operating in siloes and using data in relative isolation (both from other sectors, datasets and use cases). Furthermore, outside of the PropTech sector, it is typically the case that the skillsets of current 'geospatial' staff do not extend to data science and programming. While vast amounts of data are collected – of varying quality – this data is often not being intelligently applied.

Looking to the future it will be important for data science students and professionals to have an awareness of the opportunities within the planning and housing sectors. Conversely, training is needed for GIS professionals to help ensure that they are aware of the art of the possible in combining and modifying geospatial data and applying this to specific use cases.

Future priorities.

This planning and housing landscape review was commissioned to provide a comprehensive baseline assessment of how geospatial data was being used and managed by organisations working across the residential development process.





While it was not within the remit of this research to make specific recommendations for the Geospatial Commission or other public bodies, there were some clear implications of this research for the sector. We suggest that there are a number of priorities, aligned with these implications, that would help to truly unlock the value of geospatial data.

1. There needs to be recognition that geospatial planning and housing data is one (important) form of data but that it needs to be linked with spatial data from across related domains (e.g. transport, health, education etc.) for it to be applied intelligently. No one organisation can provide a solution to the challenges that exist in respect of data foundations, access and skills. This requires much greater collaboration and consultation within and between public and private sector organisations working toward shared goals of more effective planning, housing and construction. This is starting to happen at a regional level but would benefit from more of a national conversation and subsequent direction. A starting point for this would be the principle of improving access and agreement on meta-data standards, specifically spatial references, identifiers and dates.

2. Local planning authorities are a key source and user of geospatial data, yet many will continue to struggle in standardising the collation and publication of data due to competing demands on their resource. A priority should be agreeing core data requirements and then supporting the development of a minimum degree of GIS-related competencies in relevant local planning authority staff. Allied to this would be the establishment of some shared for a for Local Authority staff to build networks of geospatial practice and professional development.

3. The next generation of geospatial planning and housing practitioners are in fact data practitioners. Alongside standardizing the skills of local planning authority staff, there is a need to ensure that data engineers and software developers (including graduates) are aware of the opportunities that exist in the planning and housing sector. 'Geospatial data' operating in a technical, sector-specific silo is overly limiting.

4. Geospatial data doesn't just have the potential to unlock value; it is already unlocking both short and long-term value for many organisations across the UK. However, it is still little understood or prioritised for investment. There is a need to showcase the art of the possible (e.g. case studies with associated ROI measures) and make advocates of key decision makers across the public and private sectors.

**Annex 1.**
National, Local and
Sector-specific Initiatives.

# National geospatial data initiatives.

There has been a wide range of work undertaken by the Geospatial Commission, the Geo6 and wider public (and private) sector partners to promote access and standardisation of geospatial data. Relevant recent national initiatives have included:

The Data Discoverability project (through which a simplified common data catalogue was published on data.gov.uk providing core information – using INSPIRE themes – on the geospatial datasets that each of the Geo6 partners hold and manage).

The single data exploration licence so anyone can access data held by the BGS, Coal Authority, HM Land Registry, OS and the UK Hydrographic Office, for research, development and innovation purposes.

Linked identifiers best practice guidance to support the integration potential of different datasets.

Enhancement of the core dataset list through each Geo6 organisation adding further detail, filling gaps, updating information and correcting errors.

The release of the Unique Property Reference Number (UPRN) and Unique Street Reference Number (USRN) under Open Government licence. This is a foundational identifier that has the potential to be the standard that will align Local Authority data with wider datasets and PropTech solutions, supporting greater interoperability of different geospatial datasets. Geoplace details how the UPRN is becoming embedded in other datasets (ONS, Land Registry, DfE, DWP, GLA and LGA)

HM Land Registry's 'Use land and property' data service, which provides data on registered leases and restrictive covenants across England and Wales, though is still limited through licensing restrictions on use in order to mitigate against potential misuse.

HM Land Registry's is working in partnership with Local Authorities to standardise and migrate local land charges register information to one accessible place as a national digital service.

BGS led on the Brownfield Risk Calculator initiative, jointly commissioned by Greater Manchester planning authorities, to collect and plot constraint data on a shared system to inform the identification and promotion of brownfield land for development. Alongside this MHCLG has led on a national dataset on brownfield sites (including an accompanying guidance on standards for publishing brownfield land register data).

Ordnance Survey established the now Geovation incubator in 2009 which continues to fund PropTech and GeoTech startups in the UK, helping to develop a bedrock of geospatial data-led tech solutions. In 2017, HM Land Registry joined the initiative as a strategic partner, and both organisations continue to fund PropTech and GeoTech startups in the UK, helping develop a bedrock of geospatial data-led tech solutions. At a more regional level, the Mayor of London's Civic Innovation challenge in 2018 helped fund a 3D model of London to help ' democratise planning and tackle the housing crisis facing Londoners'.

Overall, there was a huge amount of optimism around the widespread use of BIM and digital twins. The National Digital Twin programme, run by the Centre for Digital Built Britain (a partnership between the University of Cambridge and Department for Business, Energy and Industrial Strategy), has worked to develop an information management framework to standardize digital twins. There are synergies here with what could be achieved in respect of planning data.

The Ministry for Housing, Communities and Local Government (MHCLG), often through the work of the Digital Land Policy Team, has been supporting digital innovation in transitioning the statutory planning system onto a digital platform both at a local and national level. This has included a Planning Delivery Fund (2017-19); a Local Digital Fund (2018-20) that includes planning exemplars; and the publishing of viability assessments.

The Future Cities Catapult developed a Housing and Innovation Map that considers concepts that they believe are challenges facing the housing industry in connecting homes to location data. The work has brought together stakeholders to form partnerships for the 'greater good' by combining skillsets and resources together to tackle a barrier.

The Coal Authority run annual outreach activities where they meet planning authorities in the defined UK coalfield to reinforce understanding of the statutory processes and best practices in consulting with the Coal Authority around planning applications that need to account for legacy coal mining risks.





The BGS has provided knowledge exchange placements for planning practitioners from four Local Authorities from across England, Wales and Scotland to receive training on GIS and online mapping

The Digital EIA project, funded by Innovate UK, looked at ways of digitising the Environmental Impact Assessment (EIA) process by creating a Digital EIA Framework, making it less time consuming while at the same time agreeing data sets to be captured once an EIA is complete

In 2019 GeoPlace introduced the FindMyStreet service to open access to information about the road network in England and Wales to support local highway authorities in meeting their Highways Act Section 36 (6) obligation in providing a list of publicly maintainable streets to public. In addition, they also provide the FindMyAddress service to enable personal searches for the official address, UPRN and location of every property in England, Scotland and Wales.

The Data Pathfinder, led by the Improvement Service in Scotland, is working to identify the required data standards and governance to support the delivery of the Digital Planning Transformation Programme, which aims to create a wholly digital planning system in Scotland.

To improve the partnership opportunities between different telecommunication companies and to help generate a data and information rich sector, DCMS established a Telecommunications Data Taskforce chaired by Lord Ian Livingston that also includes current and former CEO's of Vodafone and Openreach. The Data Taskforce Strategy sets out key areas for boosting competition and innovation in the UK market by building an open, sustainable and diverse telecoms supply chain. One key area includes data sharing among telecommunication companies in the sector.

The Geospatial Research team at Knight Frank has recently worked with MHCLG to identify publicly-owned car parks across the UK that could be readily converted to high-density housing near key transit hubs such as train stations.

LocalGov digital network for digital practitioners publicises ‘Pipeline’: a list of 356 projects ranging from Concept to Completion including those involving use of geospatial data (e.g. Building a ‘Living in Hackney’ web map prototype).

Regional planning, through regional governance bodies such as the GLA and the combined authorities, has helped to provide a more holistic perspective on planning and housing across multiple Local Authorities. The is a key source of all new developments in London. The London Datastore is a free and open data-sharing portal where anyone can access over 700 datasets relating to the capital, including specific geospatial data relating to housing and planning.

The GLA’s Infrastructure Mapping Application for London enables exploration of current/future development and infrastructure projects to support collaboration. It uses data from utility companies, Local Authorities, developers and the GLA

Lambeth, Southwark, Lewisham and Camden Councils are working with the Open Systems lab, using the Local Digital Fund, to develop an open service pattern for digital planning submissions.

Southwark and Camden Council is working with the GLA, the Future Cities Catapult and Unboxed, again using the Local Digital Fund, to create open, user-centred back-office planning software.

Waltham Forest, as part of the GovTech Catalyst challenge, investigated how technology could be used to monitor developments of all sizes and types, building an accurate picture of development status from permission to completion and occupation, improving intelligence available to planners.

The Surrey GIS Forum developed the Digital Services Planning Hub in response to the large volume of website hits relating to planning across each of its 12 councils. The Hub has combined data feeds from each Surrey council and provided access to planning applications harvested from authorities in Surrey via a consistent API. The Hub has also provided details of the API and a simple means of embedding a map within any web page for replication in other regions

Milton Keynes Council worked with the Satellite Applications Catapult to develop an Urban Planning Service that used satellite imagery to generate a real time picture of developments, including the longer-term impact of these (e.g. on traffic, the local environment etc.).

North Ayrshire Council established a GIS and Analytics team in 2017 to enable action toward meeting the goals of the Local Authority digital strategy. This was referenced as an excellent example of transformational change

Glasgow City Council has worked closely with the Urban Big Data Centre at Glasgow University on various spatial initiatives. The Urban Big Data Centre is also currently developing a Spatial Urban Data System, comprising social, economic, natural, built-environment and physical infrastructure aspects of UK 14 cities, including Glasgow.





## Utility initiatives.

The Geospatial Commission is working to create a National Underground Asset Register and in 2019-20 launched two pilots, one in the North East of England and the other in London. The national register will include assets across the gas, water, electricity, telecommunication and transport sectors and Local Authorities and will be used to plan and carry out excavations.

The National Improvement Service in Scotland already collates local plans from all of the Local Authorities in Scotland and overlays them with network information from the DNO and GDNs.

The National Grid published their Future Energy Scenarios (FES) to stimulate debate and decisions on the future energy system and Net Zero.

Energy Networks Association's (ENA) Data Working Group is working to create an open access central energy utility dataset, with a prototype network map in Scotland already developed.

Innovate UK, BEIS and Ofgem launched the Modernising Energy Data Access (MEDA) competition in 2019 as part of the Industrial Strategy Challenge Fund (ISCF) 'Prospering from the Energy Revolution' (PFER) programme. Those through to the second (pilot phase) round of the MEDA competition include the Icebreaker One 'Open Energy' project and the Siemens 'Your Online Data Architecture' platform, each proposing technology-driven solutions to improve the accessibility and quality of data in the energy sector for businesses and consumers. A final winner will be announced at the end of 2020.

United Utilities Safe Dig is a web service that depicts the clean and wastewater assets of this North West England water company on a map. It is accessible for those excavating a site or with a Section 50 notice for street works, as an alternative to a plan purchased from the Property Searches team.

A similar third-party service is Linesearch BeforeUdig, which allows individuals to specify works to be undertaken and in return receive any available utility maps and a list of utility asset owners who have assets in the search area which may be affected by the works.

Planning and Housing Landscape Review 2021

# Annex 2.
## Survey of English, Welsh and NI authorities.

# Local Authority achieved sample.

| Criteria | | Total number of interviews |
|---|---|---|
| Region | Eastern | 22 |
| | East Midlands | 19 |
| | London | 4 |
| | North East | 3 |
| | Northern Ireland | 4 |
| | North West | 16 |
| | South East | 23 |
| | South West | 9 |
| | Wales | 10 |
| | West Midlands | 12 |
| | Yorkshire and Humber | 4 |
| Annual Spend | £20m - £100m | 61 |
| | £100m - £500m | 36 |
| | £500m+ | 29 |
| Size of population | Up to 100,000 | 41 |
| | 100,001-120,000 | 24 |
| | 120,001-180,000 | 37 |
| | 180,001+ | 24 |





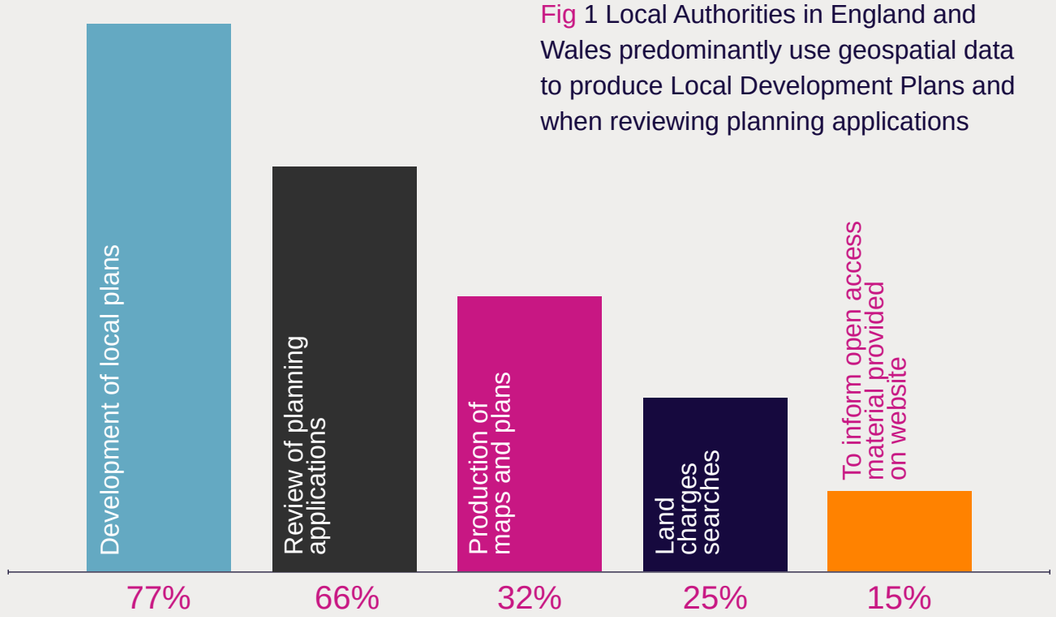



Fig 1 Local Authorities in England and Wales predominantly use geospatial data to produce Local Development Plans and when reviewing planning applications

Q: What are the primary areas where geospatial data/services are used in your planning and housing work? Base: 126

Local Authorities noted the importance of geospatial data in their current community response to Covid-19, where it was being utilised to help identify housing needs, social distancing measures and areas where public transport could be used most safely.

Participants also mentioned the use of geospatial data to inform other activities:

> corporate strategies such as public parking and social housing

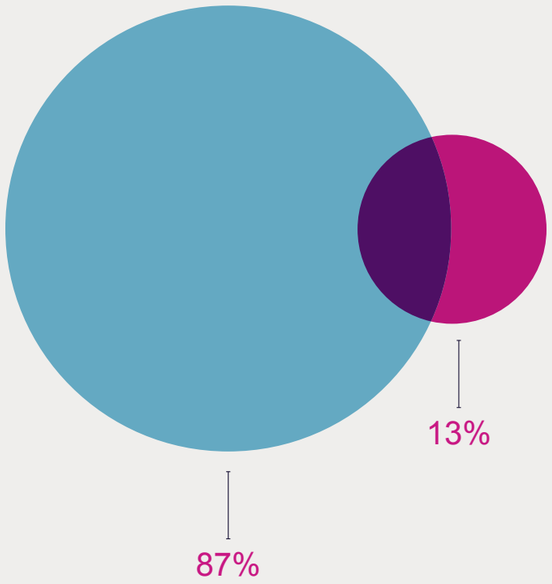
> planning investigations that could include flood risk and heritage area mapping enforcement areas

> asset management of Local Authority owned property

> asset management of right to buy properties, open spaces, property services, land purchases and completed sales

# Providing geospatial data.

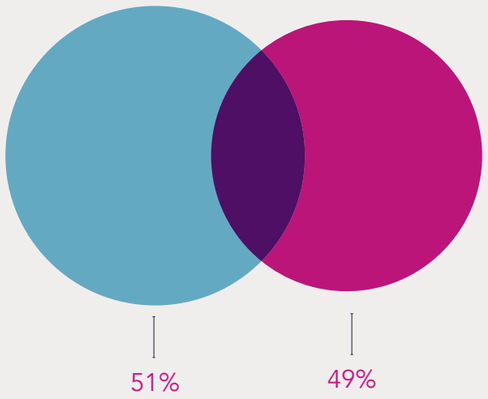
87% of Local Authorities who do not place a daily limit on the number of searches someone can request. Only one Local Authority reported placing daily limits on searches, with the remaining 13% unable to comment on this practice in their authority.




33% of Local Authorities charge for searches either to cover costs (24%) or as a profit-making action (9%). Charging is not related to the size of Local Authority (by population or annual spend).

# Adding geospatial data to Data.gov portal.

49% of Local Authorities report having added geospatial data to the data.gov portal. These include data such as future developments, development limits, and listed buildings. The decision to share data is not influenced by the size of authority or its type of governance. This may be an underestimate as four-in-ten respondents did not know whether data had been uploaded by their authority.

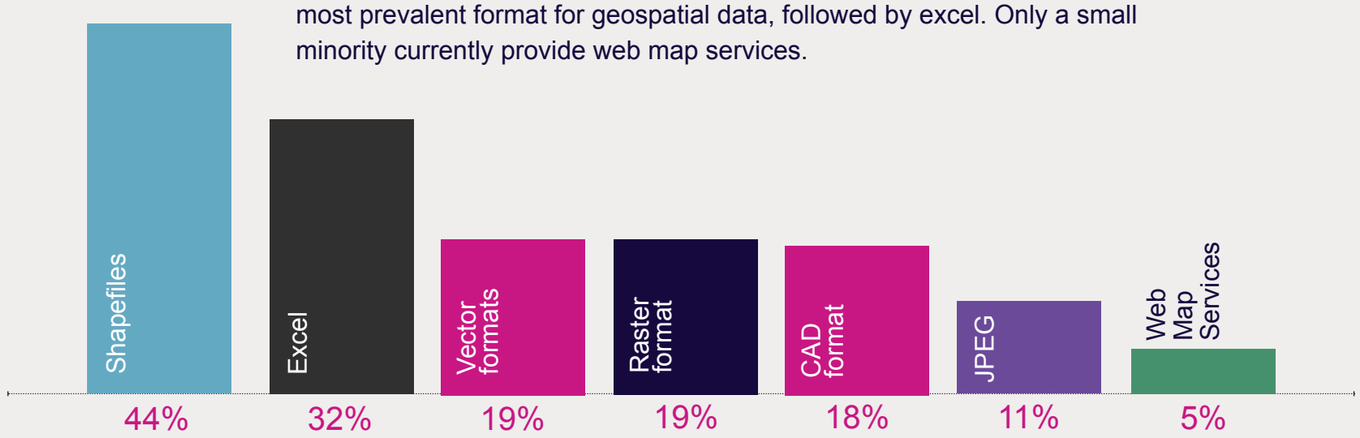







# Providing geospatial data.

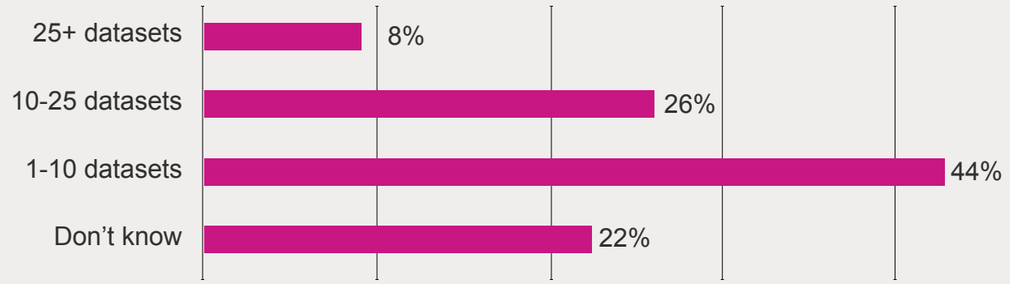
A variety of data formats are used to make geospatial data available to internal and external stakeholders (see Figure 2). PDF, alongside shapefiles, are the most prevalent format for geospatial data, followed by excel. Only a small minority currently provide web map services.




Local Authorities who had not uploaded data to the data.gov portal commented that there were financial implications to collating data in the required format, which presented a barrier to providing data.

> “I attempted this under the system called Inspire. This was a requirement. It was difficult to administer because the platform required a specific format. There was a cost associated with that.”
>
> (Local Authority)

Out of those Local Authorities who had added data to the data.gov portal, the majority had uploaded between 1-25 datasets (see Figure 3). There were no notable differences when compared against the size of authority, if they had a data strategy or the number of GIS staff that were employed.



# Structuring and staffing of GI/ GIS teams.

**30**

The mean number of Local Authority staff working directly with geospatial data to inform housing and planning decisions, though this ranges from zero staff right up to 400 in one authority. As would be expected, the larger the authority the more staff are working with geospatial data.

Half of Local Authorities (48%) report having some form of Geospatial or 'Information' strategy and, of these Local Authorities, the vast majority (78%) link this strategy to wider corporate strategies.

Over nine-in-ten Local Authorities (92%) report that non-specialists access geospatial tools such as web mapping systems.

**75%**

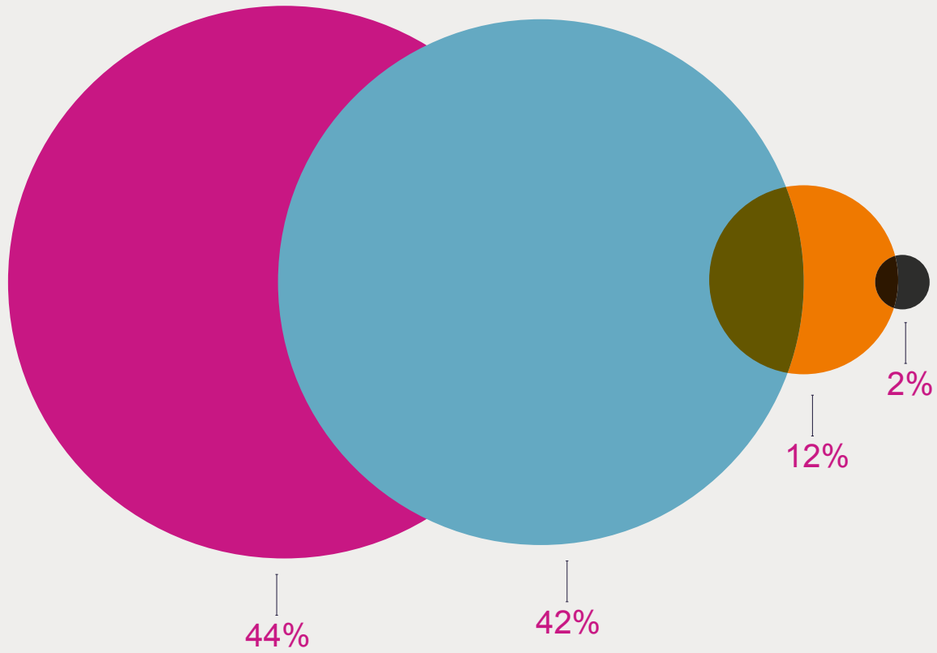
Three-in-four Local Authorities report having a geospatial lead or co-ordinator. This doesn't appear to be influenced by size of authority, number of staff working with geospatial data, or the presence of a geospatial strategy.





Figure 4 (below) illustrates that there was a roughly even split of authorities in which geospatial experts sit within a centralised team (44%) versus those where expertise is spread across different teams. There was no significant difference by size of authority (by spend or population).

Q: Does your Local Authority have a dedicated Geographic Information team or are geospatial experts dispersed across different teams (e.g. IT; Data and Insight etc.)? Base: 126




44%
Geospatial expertise sits within one geospatial team

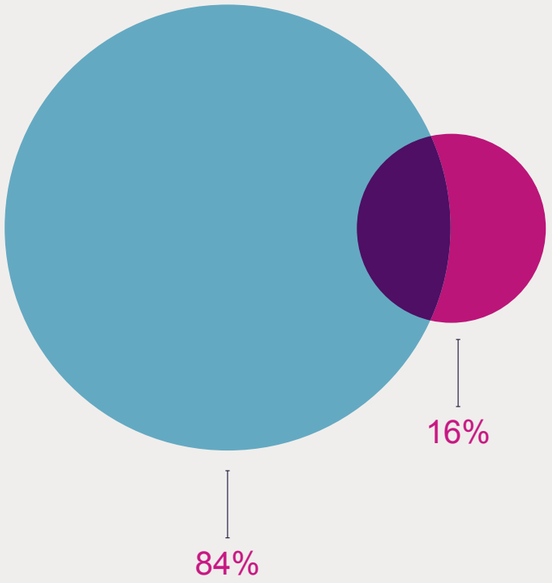
42%
Geospatial expertise is spread across multiple teams

12%
There is no geospatial team at the local authority

2%
Don't know

# Knowledge sharing and training.

40% of Local Authorities report having a knowledge forum/skills sharing function within their Local Authorities. A slightly higher concentration of knowledge sharing forums could be seen in the South of England in comparison to the North; knowledge forums were also seen more in authorities with larger budgets (over £500 million) relative to smaller authorities.




Out of those Local Authorities who do have knowledge forums, 84% include some sort of geospatial data representation.





Overall, 29% of Local Authorities utilise services from an industry or professional bodies to help with the development of staff skills (see Figure 5, right). As might be expected, Local Authorities with over £500 million annual spend are more likely to utilise services from industry bodies.

Q: Does your organisation utilise services from any industry/ professional bodies for the development of skills in staff? Base: 126

29%

Yes, do use support services for skills development

52%

No, do not use support services for skills development

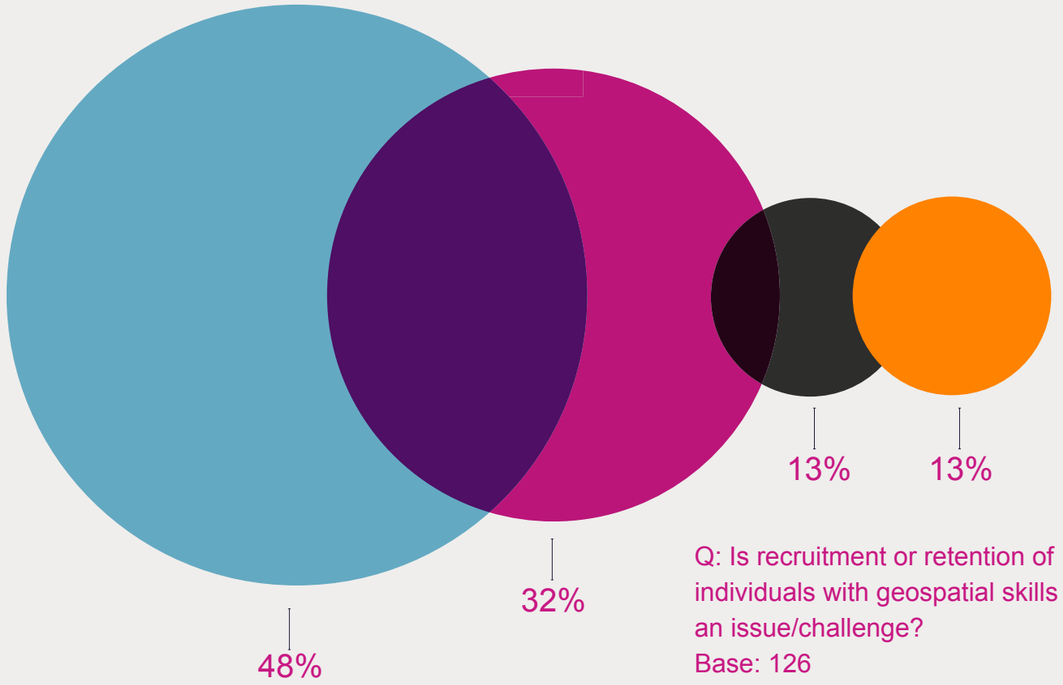
19%

Don’t know

# Skills and resources for the future.

Just under half of Local Authority stakeholders interviewed think recruiting or retaining individuals with geospatial skills is not an issue or challenge while 39% think recruitment and/or retention are an issue (see Figure 6).

Recruitment and retention of geospatial skilled staff was more of an issue for the smaller Local Authorities (both in terms of size and budget), and there was also some geographic variation, with this forming a bigger issue in the Midlands relative to other regions.



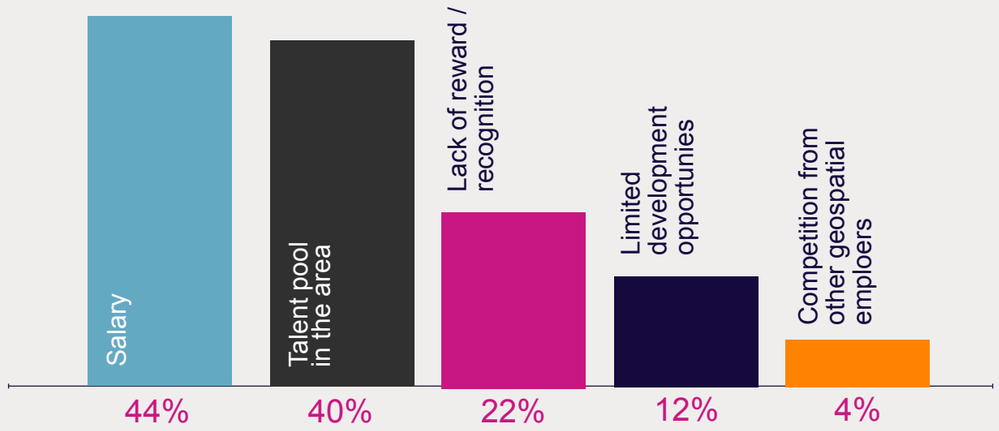

Q: Is recruitment or retention of individuals with geospatial skills an issue/challenge?
Base: 126

| | |
|---|---|
| 48% No | 13% Yes - Recruitment |
| 32% Yes, both recruitment & retention | 13% Unsure |





44% of Local Authorities thought it was difficult to recruit or/and retain geospatial skilled staff due to the salaries on offer. The other key challenge – from a recruitment perspective – was the local talent pool from which Local Authorities could recruit.




Q: Why do you think recruitment or retention of individuals is an issue? Base: 50

# Maximising the value of geospatial data.

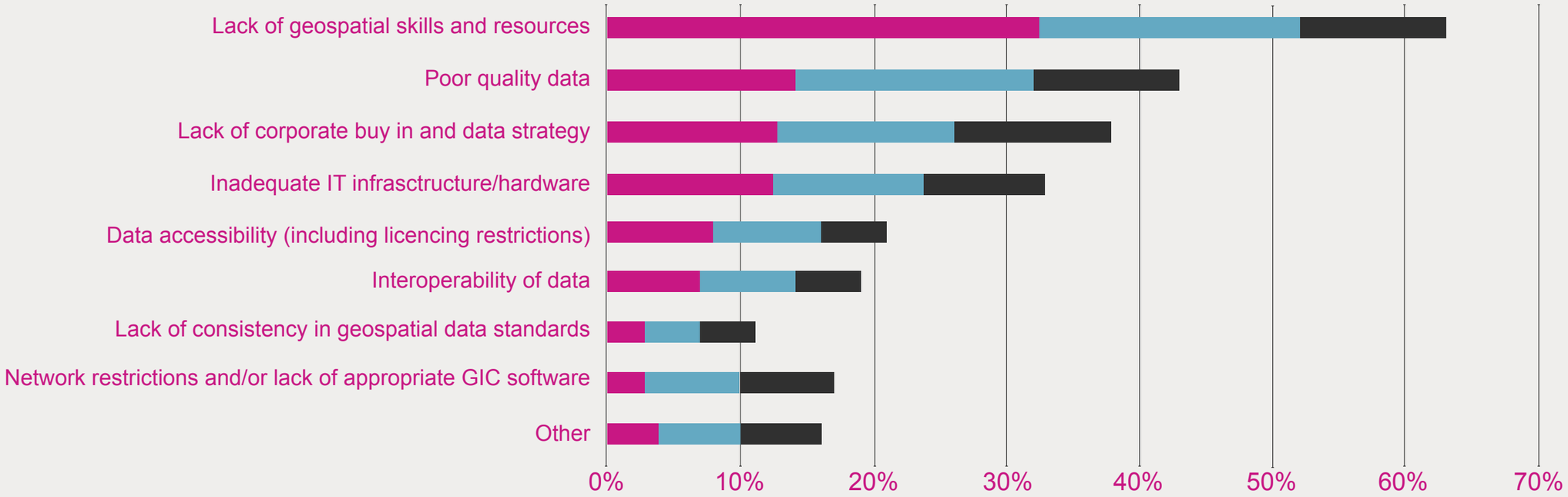
By far the greatest barrier to maximising the value of geospatial data identified by those working in Local Authorities was a lack of geospatial skills and resources. Figure 8 (below) illustrates that this was a key issue for over three-fifths of Local Authorities, followed by poor quality data, lack of corporate buy-in and data strategy, and inadequate IT infrastructure/hardware.

In contrast, the geospatial skills that are currently key to Local Authorities are data capture (92%), data management (90%) and webmaps (88%). While application development is seen as key in more than half of Local Authorities (57%), programming (34%) and data science (26%) are much less of a priority.



Planning and Housing Landscape Review 2021

Q: What are the top 3 barriers to maximising the value of geospatial data at a Local Authority level? Base: 126



# **Annex 3.**
Sector summaries.

# Planning.

Type of organisations: There are a mixture of independent and agency-led planning consultants, developer services and architecture practices that variously work on local and national projects.

Phase of involvement: Primarily involved in the planning application stage of the housing and planning journey, where developers use architects to produce designs and planning consultants to help identify sites and gain planning permission.

Key links: Local Authorities and local communities. Planning consultants will develop positive relationships with Local Authorities to make sure their clients' plans are strategically aligned to the Local Authority local plans. During the planning application journey, key links may also include residents in the local area whose views can have an influence on the success of proposed applications.

Geospatial data use: Planning consultants and architects will collect and use data that helps them to:

> Prepare feasibility studies before developers acquire the land (including areas of risk)

> Understand the local area and the likely considerations for a successful planning permission

> Maintain an up-to-date record of planning regulations in the local areas model

> Pre-application CAD drawings predict the value of a home before planning application and construction phases of work

Key geospatial data: Planning consultancies typically use a wider variety of data than architects, relating to their broader role in helping to inform and shape planning applications. Key geospatial data include:

> Land ownership

> Topographic information (Ordnance Survey and MasterMaps)

> Constraints data such as listed buildings and flood risk

> Property addresses (Ordnance Survey AddessBase; own data)

> Previous planning application searches

> Gas and electric supply data (utilities)

Managing geospatial data: Architects and planning consultants typically access the required information with the help of third parties rather than accessing raw data. Apart from the regular use of CAD for representing plots and areas for development, planning consultants (and some architects) use some of the following tools for viewing geospatial data:

> Civica 'My Service Planning, Idox, Excel and Google Sheets are all used by planning professionals as CRM and project management systems

> Ordnance Survey is used as the main point of call for levels information, mapping and topographical information

> Promap is used to search for nearby facilities and other housing developments

> Natural England / Magic.gov provides natural environment information cross government departments. They have partners including Historic England, Environment Agency, Forestry Commission

# Construction.

Type of organisations: Housebuilders and construction companies ranging in size from small local sole traders to international multi-use residential housing contractors like Balfour Beatty.

Phase of involvement: Primarily involved in the construction stage of the planning and housing journey, with some smaller involvement in the marketing of homes

Key links: Key links differ depending on the extent to which construction businesses are involved in the planning/ development of residential properties, and in the sales/marketing. Typically, links include housing associations, land agents/ owners, and holders of any data in relation to constraints (utilities companies, highways authorities and the Environment Agency).

Geospatial data use: Housebuilders and construction companies will use geospatial data to inform the construction process, particularly in relation to understanding constraints on a given development (such as property access and location of utility assets). Beyond this, there is limited use of geospatial data, unless they are also a land developer. In this case, data will be used to explore:

> Addressable market sizing the need and demand for different types of property (e.g. bedrooms and garden size)

> Potential residential/community support for a development risks and constraints

> How profitable an area of land could be once developed

In general, large housebuilders will identify potential sites through local plans and overlay this with other raw data to assess viability, also drawing on third party data aggregation and analysis services. However, SME housebuilders who have more limited funds will often find suitable land and development opportunities using local networks and/or services such as LandTech and NimbusMaps.

Key geospatial data: The exact data and sources vary between the type of construction company and the complexity of a specific site in question, but typically they include:

> Planned developments and target land use (Local Authority plans; developer inquiries)

> Property addresses (Ordnance Survey AddressBase)

> Asset location records and jobs (own data)

> Emerging infrastructure plans (own data)

> Topographic landscape (Ordnance Survey; ProMap licenced)

> Land ownership (HM Land Registry licenced)

> Ecological constraints data (Environment Agency)

> Utility and infrastructure assets (Utility companies, Highways England and Local Authorities)

Managing geospatial data: The process for managing geospatial data varies considerably depending on the size of the company and the corresponding size of the residential developments under construction.

Larger construction companies tended to have a cloud-based common data environment – such as Viewpoint – tailored for the construction industry and enabling the management of a variety of data including CAD architect and engineering plans, BIM models as well as geospatial data. Smaller construction companies and housebuilders used systems like Sharepoint or simply shared PDF files via email with partners and sub-contractors.

Outside of the largest construction companies, it is relatively rare that companies involved specifically in the construction phase would utilise GIS software. Instead, they tend to rely on specialist consultants to provide them with relevant information around constraints. Only where companies are also involved in the identification of larger areas of land for development would they be likely to make use of raw geospatial data.

# Energy utilities.

Utility type: Distribution Network Operators (DNOs) and Gas Distribution Networks (GDNs) responsible for regional energy distribution and connections, and Independent Gas Transporters (IGTs) and Independent Network Operators (IDNOs) responsible for more localized energy networks and connections.

Phase of involvement: Primarily involved in the Construction stage of the planning and housing journey, but also have some involvement in land identification, allocation and planning process stages helping developers and Local Authorities understand existing network capacity.

Key links: Developers, Local Authorities and other utility companies (including Independent Connections Providers).

Larger energy utilities will often engage strategically with Local Authorities through various local forums to understand their regional development plans and to talk about their own investment plans. This will then lead to more informed local plans and planning applications.

Geospatial data use: Companies collate data on the location and performance of their own assets (pipes, cabling circuit routes, substations etc.) and how these interface with the needs of new and existing developments. This includes:

> Maintaining an up-to-date record of the operational network on a central asset register

> Modelling pre-planning inquiries and planning applications to assess risk and cost

> Examining usage and forecasting future energy use (e.g. accounting for anticipated demand for electric vehicles and heat pumps) to map predicted demand against supply capacity and to capture the level of uncertainty that's in future electricity pathways to meet net zero

> Examining usage and demand data to inform asset investment plans (in turn linked to price controls and RIIO-2)





Key geospatial data: Exact data and sources vary between organisations based on their remit and size, but typically include:

> Topographic landscape (Ordnance Survey MasterMap; licenced)
> Land ownership (HM Land Registry; licenced)
> Property addresses (Ordnance Survey AddressBase)
> Asset location records and jobs (own data)
> Water drainage, flood zones, areas of outstanding natural beauty, earth resistivity, roads and foot traffic (variously under OGL or APIs from Environment Agency; BGS; MET Office; SEPA; H&S Laboratories; Canals and Rivers Trust; Improvement Service Data Hub)
> Current and predicted energy use (own data; EPC Database; Energy Savings Trust; or via consultants such as Regen)
> Other utility assets (direct from other utility companies; Network Rail; Linesearch BeforeUDig) and meter point reference numbers (e.g. via Exoserve)
> Planned developments and target land use (Local Authority plans and developer inquiries)
> Customer database (Contract types; contact details; addresses) (own data)

Managing geospatial data: Data on assets is maintained within enterprise asset management systems which can include SCADA network management systems, relational database management systems (like SAP SQL Anywhere), which also serve as connectivity models, and a GIS to capture, collect and present data on linear network assets. GIS systems include GE Small World, GE Electric Office and ESRI ArcGIS. Larger DNOs and GDNs tended to have more sophisticated products and larger teams of GIS technicians to update systems with data sent by field operatives.

Larger utility companies also employ geospatial analytical platforms (such as GSA, QGIS or NAVI) for integrating and surfacing various internal and external geospatial data sets to undertake analysis for set use cases. This includes using geo-schematic network modelling link tools (e.g. GNVL Synergy) for network studies.

Typically companies will provide an internal viewer to provide a cut of the asset data for wider internal use, while third parties will variously have access to an internal viewer or a third-party service such as Linesearch BeforeUDig. Developers can also request and pay for a more comprehensive pack of materials to inform planning and construction.

Asset data is typically raster (legacy) and most recently vector data. Some companies are using LIDAR data collected by field operatives and sent in a PDF or sketch for digitizing in database. The electricity sector work with the Common Information Model standard as a common way of representing network assets. Connections data includes co-ordinates and a site address for entry into relevant databases. Wider public geospatial data (accessed under OGC or via APIs) is typically in shapefile format.

# Water utilities.

Utility type: Water and wastewater services responsible for regional water distribution and connections.

Phase of involvement: Primarily involved in the Construction stage of the planning and housing journey, but also have some involvement in land identification, allocation and planning process stages – helping developers and Local Authorities understand existing network capacity and environmental risks.

Key links: Developers, Local Authorities and other utility companies (including Independent Connections Providers).

Larger energy utilities will often engage strategically with Local Authorities through various local forums to understand their regional development plans and to talk about their own investment plans. This will then lead to more informed local plans and planning applications.

Geospatial data use: companies collate data on the location and performance of their own assets (pipes, mains, reservoirs, pumping and wastewater treatment stations) and how these interface with the both new and existing developments and with environmental risk factors.
This includes:

> Maintaining an up-to-date record of the operational network on a central asset register in accordance with the Water Act

> Modelling pre-planning inquiries and planning applications to assess risk and cost – water companies are not a statutory consultee so have to proactively invest in sourcing and reviewing

> Examining usage and forecasting future water use and environmental conditions to map predicted demand against supply capacity and to inform asset investment plans





Key geospatial data: Exact data and sources vary between organisations based on their remit and size, but typically include:

> Topographic landscape (Ordnance Survey MasterMap; licenced)

> Land ownership (HM Land Registry; licenced)

> Property addresses (Ordnance Survey AddressBase)

> Asset location records, jobs and customer calls (own data)

> Environmental data such as surface water and water drainage, flood zones, contaminated land, areas of outstanding natural beauty or special scientific interest (accessed ‘manually’ under OGL from Environment Agency; BGS; MET Office; Coal Authority; Natural Resource Wales)

> Planned developments and target land use (Local Authority plans, planning applications and developer inquiries)

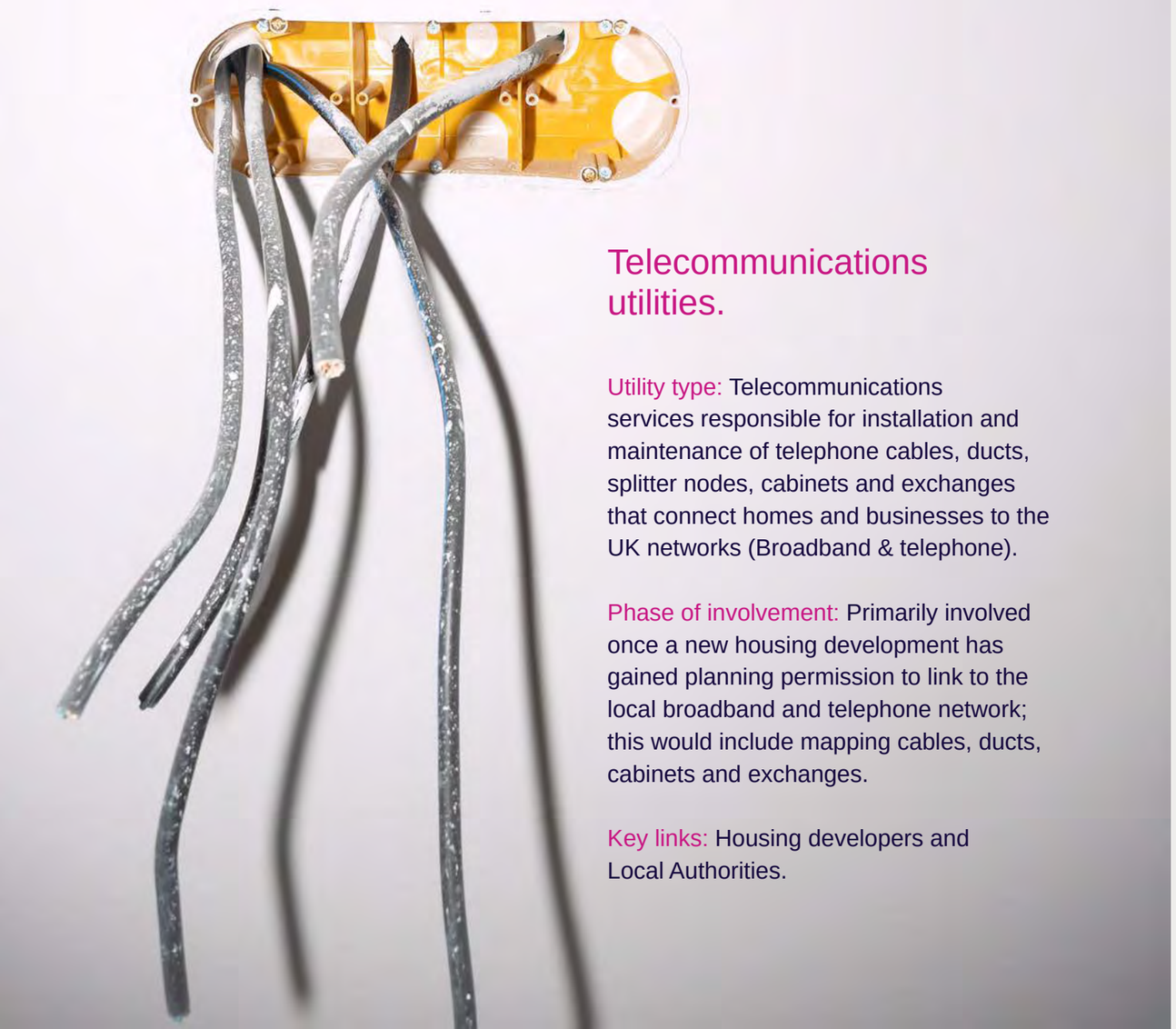
> Customer database (Contract types; contact details; addresses) (own data)

Managing geospatial data: Data on assets is maintained within relational database management systems (like SAP SQL Anywhere) which also serve as connectivity models, and a GIS to capture, collect and present data on network assets.

GIS systems include GE Small World and ESRI ArcGIS. Data is gathered through local development plan consultations, pre-development enquiries or planning applications, and where new water connections, sewerage connections and requisitions are made. This is logged by the GIS team before then being made available to wider staff (e.g. to Planning Teams, Asset Management, Wastewater Operations etc.) through an internal viewer or cloud-based products like ArcGIS Online and tools such as Geocortex Essentials to provide internally-focused web services with greater functionality.

Thousands of planning applications are plotted on GIS annually including a description of the development and the application reference number. Regular queries enable monitoring of works taking place near higher risk assets. Water companies also use data on predicted demand to build hydraulic computer models of the network to assess capacity, drawing on data from GIS. Some companies (e.g. Welsh Water) also have a dedicated department to help innovate and extend use of GIS applications by creating functions, tools or solutions that help leverage geospatial data. Third parties will variously have access to an internal viewer or a third-party service. Developers can also request and pay for plans detailing water assets to inform planning and construction.

Asset data is typically either raster (legacy) or vector data, though can include background image files of developer plans. Some companies are using LIDAR data collected by field operatives and sent in a PDF or sketch for replicating in databases. Connections data includes co-ordinates and a site address which is typically collated in Excel format for entry into relevant databases. Wider public geospatial data (accessed under OGC or via APIs) is typically in shapefile format.



## Telecommunications utilities.

Utility type: Telecommunications services responsible for installation and maintenance of telephone cables, ducts, splitter nodes, cabinets and exchanges that connect homes and businesses to the UK networks (Broadband & telephone).

Phase of involvement: Primarily involved once a new housing development has gained planning permission to link to the local broadband and telephone network; this would include mapping cables, ducts, cabinets and exchanges.

Key links: Housing developers and Local Authorities.

Telecommunication organisations will work closely with developers to understand how many houses are being built to predict demand on the network at given times.

Geospatial data use: Companies collate data on the location and performance of their own assets (cables, ducts, cabinets and exchanges and splitter nodes). By collecting this information, they can:

> Maintain and keep an up-to-date record of the broadband and telephone network.

> Examine usage and forecasting future network capacity against different conditions to predict demand and inform investment decisions. They will also use this information to understand who is likely to switch services.

> Explore the effect of new housing developments on the network and whether this impacts on the number of cabinets and exchanges in the local area.

Key geospatial data: Sources typically include:

> Topographic landscape (Ordnance Survey MasterMap; licenced)

> Property addresses (Ordnance Survey AddressBase)

> Asset location including telephone cables, ducts, cabinets and exchanges (own data)

> Planned developments and target land use (Local Authority plans, planning applications and developer inquiries)

> Customer database (Contract types; contact details; addresses) (own data)

Managing geospatial data: Typically, asset data is kept on proprietary software purpose built for the telecommunications sector.

Eriksson Connect is also used to help design and create new broadband and telephone networks in an area. The software allows engineers to analyse and design pre-build connections and joints in accordance with network regulations. Due to last-minute housing development changes, telecommunication companies typically design pre-build proposals and then finalise plans once construction of homes has begun.

Topographic landscapes, postal addresses and asset locations are mapped using GIS systems such as ArcGIS. Data is gathered through Local Authorities, open sources as well as new housing development teams. Data is then logged by a case worker who manages and maintains a particular area of the network. Some information is cloud-based using AWS and ArcGIS which has enabled greater flexibility amongst teams.

Asset data is usually raster, though background images are used in relation to new build developments that are provided by the architects or housebuilders. Proposed and currently live connections data includes co-ordinates and site addresses that are typically collated in Excel format  and labelled NSI for entry into relevant databases. Across telecommunication companies, they are also looking to access other data and information with the help of APIs and paid data services.

# Conveyancing.

Services: A conveyancer will prepare, clarify and create any statutory legal documents such as the contracts of sale and any memorandum of transfers on behalf of a property buyer. The conveyancing process tends to start as soon as an offer on a house or any other similar transaction is accepted and is completed when the buyer receives the keys.

Geospatial data use: HM Land Registry hold the key information on property ownership which is integral to the conveyancing process. Aside from this, conveyancers may draw on information from Ordnance Survey and Local Authorities to clarify potential risks or errors that may impact transactions.

Conveyancers will either collect data themselves or draw on third-party services (such as InfoTrack) to help with access to datasets such as:

- Land, property and title data (HM Land Registry)
- Environmental risk data such as ground hazards (BGS Geosure; Coal Authority; Law Society; Groundsure; Landmark)
- Property boundaries (HM Land Registry)
- Warranties for boilers, gas certificates, planning permissions and building regulations (solicitors)
- Management information pack containing information on plans for major works, restrictions from freeholder (management agency)

This data is typically then managed within Word, Excel or conveyancing software. There is very limited analysis of geospatial data (and certainly not in a geospatial form). Going forward, advances to technology are helping to speed up the conveyancing process for home buyers/sellers (e.g. DocuSign), and there is much support for Property Log Books as a means for people to manage and access property information.

**In focus.**
Proptech.

## PropTech: data aggregation for development.

Services: A large proportion of PropTech companies work in supporting pre-planning and planning applications, with services utilised by investors and developers, planning consultancies, architects, and in some cases Local Authorities themselves. One key area of work here is in the collation, cleaning, standardisation and presentation of data to enable customers to:

> Identify land and property, both on-market and off-market opportunities, including underdeveloped sites

> Assess the viability of opportunities including potential environmental risks and risks to development posed by utility assets, likely success of planning applications, predictions of future demand, and estimated sales or rental values

> Connect with relevant stakeholders (land/property owners)

Geospatial data use: Companies involved in data aggregation both collect and collate a very wide range of data that could inform decisions. This variously includes:

> Topographic landscape including building curtilage (Ordnance Survey MasterMap, licenced)

> Planned developments target land use and schemes in progress (Local Authority plans; GLA)

> Land ownership (HM Land Registry National Polygon Service, licenced)

> Real estate data (MHCLG; HM Land Registry; Homes England; VOA; purchase from other aggregators such as CoStar and Estates Gazette)

> Postal addresses (Ordnance Survey AddressBase)

> Environmental data such as surface water and water drainage, flood zones, contaminated land, areas of outstanding natural beauty or special scientific interest (Environment Agency; BGS, licenced)

> Education data on school location and performance (Google; Ofsted)

> Transport data (TfL; Ordnance Survey; Local Authorities; GeoPlace NSG; DfT)

> Population data such as crime, unemployment, socio-demographics (ONS)

> Places of interest (Google)

A smaller proportion of companies actively draw on a wider set of data on how people interact with local environments (social media, search data, credit card transactions, shared economy data) to identify patterns with capital values and growth sets.

## PropTech: data visualisation for development.

Services: Once suitable plots are identified, a range of different companies offer tailored services and solutions to facilitate the planning and design of housing developments, and to inform the cost estimation of any construction work that might take place. These services are typically used before planning applications are submitted and





can include data visualisation solutions such as Building Information Modelling (BIM) and interactive visualisations of both above and below-ground assets to help with cost estimation and planning. One extension of this is the production of 3D models of cities which can be used by architects to situate buildings in a wider context.

Geospatial data use: Exact data and sources vary between organisations based on the service offered. Much of the data here is managed using CAD software and game engines.

Companies involved in the more detailed representation of individual developments typically either made use of surveying data (such as LIDAR) or utilised take-offs from 3D models, 2D drawings, parametric assemblies and data already represented on GIS platforms in use. For construction management, models can also include scopes of work, materials, construction costs and associated schedules, all provided by developers and contractors. It is rare that wider geospatial data is used, and where it is used (e.g. utilities data, transport infrastructure), it is provided by the developer.

For companies involved in the representation of larger plots of land and urban developments, the foundation is raw aerial imagery, which is often collected on behalf of Ordnance Survey. This can then be overlaid with wider geospatial data such as:

> Topographic landscape (Google Maps)

> Land ownership (HM Land Registry National Polygon Service, licenced)

> Planned developments (Local Authority plans; GLA)

> Transport data such as tube stations, bus stops, public transport accessibility levels (TfL; Ordnance Survey; Local Authorities; GeoPlace NSG; DfT)

> Environment data such as flood zones, air pollution levels, green belts (Environment Agency)

> Listed buildings (National Heritage)

## PropTech: facilitation of planning processes.

Services: A small number of PropTech companies operate in the development phase, helping to facilitate the planning process itself. In England and Wales, 90% of planning applications are submitted electronically via the Planning Portal (a joint venture between MHCLG and Terraquest Solutions), and a similar proportion are submitted to the Scottish Government's ePlanning portal. These services help ensure that applications are collected and collated in a standardised way on behalf of local planning authorities.

Over recent years, there has also been an expansion in services available to developers and local planning authorities for consulting and engaging with members of the public on proposed developments. For larger developments, developers may use engagement platforms like Commonplace to engage with neighbouring residents and community groups to pre-emptively address any potential issues or objections that may be raised, while for planning

authorities it can be used as part of the public consultation process prescribed in article 15 of the Development Management Procedure Order.

Geospatial data use: The Planning Portal processes several thousand planning applications daily, all of which involve the collation of a set of mandatory information on a property, depending on location and type of development. Data tied to the property can include:

> Access/rights of way and parking
> Waste storage
> Building materials
> Flood risk, foul sewage and SSSI
> Type of proposed housing including use ownership

Public engagement and consultation platforms provide a forum through which people share their opinions about a proposed development. Beyond the use of a topographical map (e.g. Google Maps), there is no other geospatial data that is collated or collected.

## PropTech: data aggregation for sales.

Services: At this end of the housing journey, customers vary from estate agents and conveyancers through to individual home buyers and renters. Many of the services offered again involve the collation, cleaning, standardisation and presentation of data to enable:

> Developers and investors with data to understand the optimum pricing of their properties (for rental/sale) and influencing factors
> Estate agents and prospective buyers to understand market trends including previous prices that have been used to market homes and sales prices
> Conveyancers and prospective buyers to assess risk (e.g. exposure to the risk of damage, disruption and financial loss from ground hazards) and to value properties
> Prospective buyers and renters to identify and compare different locations for moving home, accounting for needs and preferences (e.g. schools, transport links etc.)

Geospatial data use: exact data and sources used vary between companies as relevant to the solution being offered to customers but can include:

> Real estate data (MHCLG; Homes England; VOA; RightMove; Zoopla, under open APIs) and data on properties under management including market value, sales prices, pictures of the property, property size and comments from viewings (clients)
> Land ownership (HM Land Registry)
> Population data (ONS)
> Education data on school location and performance (Google; Ofsted)
> Transport data (TfL; Ordnance Survey; Local Authorities; GeoPlace NSG; DfT)
> Places of interest and local shops (Google)
> Environmental risk data such as ground hazards (BGS Geosure; Coal Authority; Law Society)





## PropTech: support for conveyancing.

Services: In recent years there has also been increasing support for the use of online property log books that provide homeowners and prospective buyers with detailed information about a property's history (including developments, planning information and building control information). This information is available through a secure web service. In the future, this could form a standardised repository of property information required for completing a transaction, and therefore provide efficiencies in the conveyancing process.

The Residential Logbook Association is the MHCLG supported trade association for companies providing digital logbooks for the residential property market.

Geospatial data use: The data collected as part of a property log book is relatively standardized and primarily relates to features of the property and property history provided by developers. These include:

> UPRN
> Tenure
> House type
> Bedrooms, bathroom etc.
> Parking spaces
> Council tax band
> Warranties
> Utility providers and energy information
> Plans/development plans
> Any relevant legal information

## PropTech: property management.

Services: Recent years have seen increased use of digital twin technologies – virtual replicas of as-built structures – particularly in commercial developments.

While there has been more limited use in residential housing, these technologies can be applied to residential developments and used as part of the marketing and sales collateral, and also enable the collation and analysis of data relating to the interaction between buildings, users and the wider environment, helping scenario future outcomes and facilities management.

Geospatial data use: Digital twin models have the potential to incorporate a wide range of geospatial data, but many companies report focusing 'inside of the property line'. The data collected varies depending on the intended use of the solution.

For building management, it includes dynamic information about the property (e.g. temperature, humidity, CO2, VOC and PM2.5 values) derived from internal sensors.

In a minority of cases some digital twins incorporate wider data – provided by clients - on a range of wider geospatial data including:

> Traffic levels and walkability
> Environmental factors (e.g. air pollution)
> Land development areas and building permits
> Broader economic factors (e.g. market values)

**Annex 4**
Research instruments.

# Survey questions.

Approximately how many staff work directly with geospatial data to inform housing and planning decisions at your Local Authority (e.g. in developing local plans, assessing planning applications)?

Does your Local Authority have a geospatial/Geographic Information strategy?
> Yes
> No
> Don't know

[If Yes then] Is there a link between this strategy and other corporate strategies (e.g. Business intelligence Strategy, Data Strategy, Digital Strategy etc.)?
> Yes (Please specify which, if known)
> No
> Don't know

What are the primary areas where geospatial data/services are used in your planning and housing work?
> Development of local plans
> Review of planning applications
> Land charge searches
> Production of maps and plans
> To inform open access material provided on website for residents and businesses
> Other (please specify)

Are geospatial tools (web mapping systems) used by non-Geographic Information specialists in your Local Authority?
> Yes
> No
> Don't know

What are the main non-Local Authority geospatial datasets used in support of planning and housing within your Local Authority?

What are the top 3 barriers to maximising the value of geospatial data at a Local Authority level?
> Lack of geospatial skills and resources within the Local Authority
> Data accessibility (including licencing restrictions)
> Poor quality data
> Lack of consistency in geospatial data standards and definitions
> Interoperability of data (i.e. issues managing and manipulating in GI software due to format of data and missing information)
> Inadequate IT infrastructure/hardware
> Network restrictions and/or lack of appropriate geospatial information software
> Lack of corporate buy-in and strategy for use of geospatial data and information
> Other (please specify)

Has your Local Authority added geospatial data to the data.gov portal?
> Yes
> No
> Unsure

[If no then] Please explain why?
[If yes then] How many datasets have you added?
> 1-10 datasets
> 10-25 datasets
> 25+ datasets





Do you place a daily limit on the number of times people can carry out their own searches of data held by [named Local Authority]
> Yes
> No
> Unsure

[If yes then] Please explain why?

Does the provision of geospatial data (across searches, pre-application & application stages) generate revenue for your Local Authority?

Yes – the authority generates a profit through charges for licensing data and performing searches
> Yes, the authority covers costs through charges for licensing data and performing searches
> No, the authority does not charge for licensing data and performing searches
> Unsure
> Prefer not to say

What software do you predominantly use in your Local Authority to view and/or manage geospatial data?

What formats do you make geospatial data available in?
> PDF
> Excel/CSV
> Vector GIS file formats
> Raster GIS file formats
> CAD file formats
> Other

Is there a knowledge forum/skills sharing function in your Local Authority?
> Yes
> No
> Unsure

If yes, is Geospatial Information/ Geography represented there?
> Yes
> No
> Unsure

Does your organisation utilise services from any industry/professional bodies for the development of skills in staff? For example recognition of professional status (CGeog, RICS, CIWEM, etc.)
> Yes
> No
> Unsure

What, if any, challenges are there in terms of geospatial capability or capacity in your Local Authority?

[If not mentioned] Is recruitment or retention of individuals with geospatial skills an issue/challenge?
> Yes – recruitment
> Yes – retention
> No
> Unsure

[If recruitment or retention is an issue then] Why do you think this is the case?
> Salary, terms and conditions
> Local jobs market
> Competition from other geospatial employees
> Lack of geospatial skills pool in local area
> Limited development/progression opportunities
> Lack of reward and recognition of skills
> Other

[If recruitment or retention is an issue then], What would help recruitment or retention of individuals with specialist geospatial skills within your Local Authority?

What geospatial skills do you believe are key to your organisation? Select all that apply.

> Data capture
> Data management
> Programming
> Data science
> Analysis
> Application development
> Webmaps
> Other? Please specify

Are there any notable geospatial skill gaps in your Local Authority? If so what are these gaps?

What, if any benefits are there to having in-house geospatial capabilities compared to outsourcing or working with shared-services across multiple Local Authorities?

How can best practices in the use of geospatial data for planning and housing be most effectively shared amongst Local Authorities and other organisations?

What are some of the location-data related initiatives you are currently undertaking at [named Local Authority] to inform planning and housing?

What, if any, future location-date related initiatives are on the horizon at [named Local Authority] to inform planning and housing decisions?

Does your Local Authority have a dedicated Geographic Information team or are geospatial experts dispersed across different teams (e.g. IT; Data and Insight etc.)?

> Geospatial expertise sits within one Geospatial Information (GI/GIS) team
> Geospatial expertise is spread across multiple teams
> There is no geospatial team or geospatial expertise in the Local Authority
> Don't know

[If some form of expertise/team then] Please could you explain the rationale for the structure of where geospatial expertise sits, and any challenges/benefits to this.

Is there a Geospatial/GI lead or data coordinator in your Local Authority?

> Yes
> No
> Don't know

If yes, can we have contact details?



Planning and Housing Landscape Review 2021

# Stakeholder interview guide.

1. If we were to simplify the Planning and Housing journey down to four stages: (i) identifying and acquiring land for housing, (ii) gaining planning permission housing, (iii) building homes, and (iv) marketing and selling homes:

A. At what stages does your company typically operate?
B. what other types of organisation (or professions) do you interface with during these stages and what is the nature of the relationship?

2. What geospatial data is used by your company to support the business in planning and housing work being undertaken? Types/forms of spatial data used, who uses this and how is it used

3. What are the key sources and datasets through which this data is currently accessed? Key issues that hinder work and developments that have helped support effective and efficient use of spatial data (including any 'best-in-class' examples) in planning and housing

4. How is geospatial data currently managed (stored, processed and analysed) by your company?

5. What staff skills are needed to most effectively utilise geospatial data for planning and housing? Include capability or capacity challenges, and use of services from any industry/professional bodies

6. Are you aware of any current or forthcoming initiatives that relate to the collection, management or use of geospatial data that you believe could positively influence planning and housing in the UK?

**Annex 5.**
List of participating organisations.

# Participating stakeholders.

1Spatial
Accucities
AgentOS
Baker Estates
Berkeley Group
Bestarea4me
Bovis Homes
Bristol Water
British Geological Surveys
British Property Federation
Built-ID
Cadent Gas
Catesby Estates
Chimni
Christine Williams
Consulting
CityZen
Classic Folios
Coal Authority
Commonplace
Convey Law
Conveyancing Association
Crest Nicholson
Datscha
Digdat
DLA Architecture
Elecosoft
Electricity North West
Energy Assets Pipelines
Limited
ES Pipelines
ESRI
Feilden Clegg Bradley
Studios
GeoPlace
Grainge
Groundsure
GTC Pipelines
Guinness Partnerships
Home Builders Federation
Homes England
Houzen
Hume Planning
HM Land Registry
Hybrid Planning
and Development
Knight Frank
Landmark
LiveWest
McAlpine
McCarthy and Stone
Metrikus
MHCLG
Mott MacDonald
Nimbus Maps
Nomitech
Open Systems Lab
Optimis-Consulting
Orbit
Ordnance Survey
OpenReach
OSP Architecture
Placemaker.io
Planning Portal
PropertyLogBook
Realyze
Richard Slipper
Rob Duncan Planning
Consultancy
Royal Institution of
Chartered Surveyors
Scottish Government
Search Acumen
Seeable
Severn Partnership
SENSAT
SGN
Skanska / Boklok
South East Water
SP Distribution Ltd and SP
Manweb plc
SSE
Stonebond
Teal Legal
Terrafirma
TerraQuest
The Improvement Service
The Partnership
The Planning Portal
TM Group
Town and Country
Planning Association
UK Hydrographic Office
UK Power Networks
United Utilities
Urban & Civic
Urban Intelligence
Valuation Office Agency
Vinci
Vistry Partnership
VU.City
Wales and West Utilities
Welsh Water
Wessex Water
Western Power
Willmot Dixon Holdings
Scottish Hydro Electric
Power Distribution plc
Yovoh
Z Mapping





# Participating Local Authorities.

Allerdale Borough Council
Amber Valley Borough Council
Antrim & Newtownabbey Borough Council
Babergh District Council
Bassetlaw District Council
Bath & North East Somerset Council
Blaenau Gwent County Borough Council
Bolton Metropolitan Borough Council
Borough Council of Kings Lynn
& West Norfolk
Boston Borough Council
Bracknell Forest Council
Brentwood Borough Council
Bristol City Council
Bromsgrove District Council
Broxtowe Borough Council
Bury Metropolitan Borough Council
Cambridgeshire County Council
Castle Point Borough Council
Causeway Coast &
Glens Borough Council
Central Bedfordshire Council
Charnwood Borough Council
Chelmsford City Council
City of London Corporation
Copeland Borough Council
Corby Borough Council
Cyngor Gwynedd
Cyngor Sir Ynys Mon
Daventry District Council
Denbighshire County Council
Derbyshire Dales District Council
Derry City & Strabane District Council
Dover District Council
Durham County Council
East Hampshire District Council
East Lindsey District Council
Eastleigh Borough Council
Elmbridge Borough Council
Exeter City Council
Flintshire County Council
Forest of Dean District Council
Gedling Borough Council
Gloucestershire County Council
Gosport Borough Council
Gravesham Borough Council
Halton Borough Council
Hambleton District Council
Harlow Council
Harrogate Borough Council
Havant Borough Council
Hertfordshire County Council
Hinckley & Bosworth Borough Council
Huntingdonshire District Council
Ipswich Borough Council
Isle of Wight Council
Kingston upon Hull City Council
Knowsley Metropolitan Borough Council
Leicester City Council
Lewes District Council
Lichfield District Council
London Borough of Hackney
London Borough of
Richmond upon Thames
Luton Borough Council
Mid Suffolk District Council
Mid Sussex District Council
Middlesbrough Council
Mole Valley District Council
Monmouthshire County Council
Neath Port Talbot County Borough Council
New Forest District Council
Newark & Sherwood District Council
Newry Mourne & Down District Council
North Devon District Council
North East Derbyshire District Council
North Hertfordshire District Council
North Norfolk District Council
North Somerset Council
North Tyneside Council
North Warwickshire Borough Council
North West Leicestershire District Council
North Yorkshire County Council
Oxford City Council

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# Participating Local Authorities.

Oxfordshire County Council
Pendle Borough Council
Powys County Council
Ribble Valley Borough Council
Rochdale Metropolitan Borough Council
Royal Borough of Kensington & Chelsea
Royal Borough of Windsor & Maidenhead
Rugby Borough Council
Runnymede Borough Council
Rushcliffe Borough Council
Rushmoor Borough Council
Salford City Council
South Cambridgeshire District Council
South Northamptonshire Council
South Staffordshire Council
Southend-on-Sea Borough Council
St Albans City & District Council
St Helens Council
Surrey Heath Borough Council
Swindon Borough Council
Telford & Wrekin Council
Tendring District Council
Test Valley Borough Council
Three Rivers District Council
Thurrock Council
Torbay Council
Torfaen County Borough Council
Tunbridge Wells Borough Council
Uttlesford District Council
Vale of Glamorgan County Borough Council
Vale of White Horse District Council
Warrington Borough Council
Warwick District Council
Warwickshire County Council
Wellingborough Borough Council
West Lancashire Borough Council
Wigan Metropolitan Borough Council
Winchester City Council
Wirral Metropolitan Borough Council
Worcester City Council
Worcestershire County Council
Wychavon District Council
Wyre Council
Wyre Forest District Council