UKAuthority Inform 2022

Harnessing tech and data for smarter environments

Perspectives from UKAuthority's Smart Places & Communities 2022 conference

Smart Places & Communities 2022

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Contents

1. From ambition to reality

The word 'smart' is now part of the vocabulary for the public sector, related to the use of technology and data to provide a more cohesive infrastructure and delivery of services.

In general, however, it is still an ambition rather than the reality for most: there are excellent examples of progress and good practice, but many local and regional authorities are still finding their way in how best to harness the technology and make use of data.

There are issues to address and learnings to share, as became clear in the recent UKAuthority Smart Places and Communities 2022 conference, which brought together several public sector pathfinders and representatives from the technology industry. It was an enlightening event that outlined the challenges but also showed the case for optimism in approaching the smart agenda and realising smart benefits for the sector and its communities.

2. Questions & foundations

The movement is often associated with the internet of things (IoT), sensors and associated data platforms, but there is a danger of authorities rushing to use these without sufficient thought about the purpose.

Any instance of deploying 'tech for tech's sake' is likely to be an unnecessary expense.

Aruj Haider, chief digital and innovation officer at Westminster City Council, made the point that there are advantages in coming from a non-tech background and asking questions about what a deployment is meant to achieve, focusing and on the opportunities to solve problems.

This comes from spending time in understanding the needs of communities and the local environment, rather than becoming excited about what a technology can do. "It's getting to the bottom of what keeps residents up at night," she said.

She added that experiences with new digital and data systems during the Covid-19 pandemic have created an opportunity for bringing people together in developing new solutions, and that there are three core elements to the foundation.

The first is that smart places need a strong digital infrastructure, which requires authorities working with telecoms providers to fill any gaps in connectivity.

Second is digital inclusion, ensuring that people are not excluded through low incomes or difficulties in using devices and getting online. Westminster created a digital exclusion map with some detailed personas of the types of people affected, found there was not 'one size fits all' solution and began to work with community groups on initiatives such as a digital academy and a digital ambassadors programme.

Third is the operating system, in the sense of having a platform to bring the data from different sources together and test different capabilities.

She also emphasised a focus on desired outcomes, saying that Westminster has highlighted a need for technology and behaviour

change to create a cleaner environment, along with improving experiences for people who live, work in or visit the borough, and encouraging groups to collaborate in innovation.

This begins internally by bringing teams with different responsibilities together to work on solutions.

3. The business case

One of the major issues facing any local authority, especially given the ongoing financial squeeze on local government, is to make the case for the relevant investment.

This came up in many of the conference discussions, with the point that demonstrating a return on investment upfront can be very difficult when moving into innovative uses of technology, and in dealing with the big issues that are relevant to multiple partners across a place. In many instances the financial benefits are not recovered by the organisation making the initial investment, which makes it a tough sell to finance directors.

Among the possibilities are to persuade all the organisations that could benefit to make their contributions to the spend – although this can be difficult when some of the expected benefits are hard to quantify – and, if there is an element of revenue generation, come to an arrangement under which this could be shared among the partners. There is also a possibility of contrasting the expected benefits against the likely long term outcomes of not making the investment, which could shed a more favourable light on the former.

There is also scope for an incremental investment in sensors and applications, experimenting with some to show what can be achieved, then winning support for a further spend if they can show quantified benefits. This can be applied in areas including monitoring the levels of waste in public bins to manage collection routes to be more cost-effective, or the state of street gulleys to keep track of how often they need to be cleaned and maintained. Planning the early deployments with a clear evaluation of their results can provide the data to support a business case.

4. Underpinning technologies

Organisations have to make careful choices about the underlying technologies for smart places, especially the type of networks on which they will run.

Julie McCann, professor of computer systems at Imperial College London, said that the factors to take into account include costs, scale and trust. The former has led to the common use of wireless systems that are not too expensive to deploy, along with a range of sensors collecting different types of data. But the latter brings problems in terms of maintaining the devices, ensuring they can interconnect with each other and have sufficient network capacity. In addition, the wireless networks can become 'noisy' with data and the devices are prone to decalibration or being moved, compromised or degraded.

Trust can rely on the provenance of data used and agile, decentralised systems that do not store quantities of potentially sensitive data. It is also necessary to make systems resilient to change and to be able to find routes around any failures in the networks.

"We need to look at these systems in terms of the devices themselves and as a collective network and how they behave, and write systems that are resilient and agile," McCann said.

There is also scope to work out how they can draw on local Wi-Fi or power themselves up from the environment through means such as solar panels or vibration based power harvesting; and there are efforts exploring how changes in the way devices are programmed can affect their battery life.

McCann also highlighted the 'cyber-physical interaction' in developing smart places, with the example of using data from sensors in water systems while also drawing on the vibrations to power the sensors, which in turn could influence the flows. This should be taken into account in any modelling on computer twins to work out how a smart system should operate.

An alternative perspective came from Phil Beecher, president of CEO of the Wi-SUN Alliance, on how organisations can harness wireless mesh networks based on the relevant specifications. "For sensors it helps them to run on low power with a reasonable range and the ability for good connectivity," he said. "And there is a scope for mesh networks to evolve as the needs of a city expand."

The FAN solution architecture proposed by the organisation involves border routers, router nodes and leaf nodes for each field area, which are joined with others through a wide area network backhaul. Beecher said the benefits include the deployment of a scalable, self-healing mesh, reliability and resilience, a basis for interoperability devices, and an ecosystem that helps organisations avoid vendor lock-in. It can be used to support smart places applications such as street lighting, energy management, traffic control and environmental monitoring.

5. Diversity of data

There is a major issue in the wide range of data to be collected and processed in the creation and operation of smart places.

It raises questions about finding and integrating this data effectively, and one of the conference discussions brought out a handful of key points.

Liz St Louis, assistant director of smart cities at Sunderland City Council, said its choice of data is determined by the problem it is trying to solve, understanding what end users need to consume and why, and the best way to present it to them.

While authorities will have easy access to some sources, it may be more difficult for others, either when obtaining it from third parties with an interest in keeping it to themselves, or in pulling in trying to understand the behaviour of the public. The latter raises the question of crowdsourcing data. St Louis said some people are keen to provide if they can see a public value, but there is a mixed picture, and it needs an appeal to what motivates people, and giving them access to it in a way they can use it easily.

The volume and diversity of data can also provide a challenge. But Dr Johanne Parker, information and intelligence manager, Stockton-on-Tees Borough Council, said that low code analytics software had made it easier to take data from a range of sources – including social media – and feed it into relevant systems without the need for highly skilled specialists.

The discussion conveyed that, while the challenges remain, significant progress is being made in the management of data.

6. Initiatives and achievements

A number of presentations highlighted the progress and thinking around smart place deployments, predominantly at local level in the UK.

South London

Andrew Parsons, IoT programme manager of the South London Partnership, and David Grasty, corporate head of digital strategy and portfolio, Kingston upon Thames Council outlined the partnership's work with Microsoft and Hitachi Solutions creating a platform for IoT data based on the Azure cloud. Deployments began earlier this year, with API integrations with air quality sensors and open data from the Met Office. These have been followed by the creation of the first data visualisations on the platform and the integration of further APIs, taking it to the stage where the trial went into full operation in July – set to run until March 2023.

This has already produced some valuable data visualisations on the relationship between traffic and air quality and the behaviour of cyclists, helping the councils to identify the sources of problems, ease concerns about others that could arise and see where there are opportunities for improvement.

Sunderland

Liz St Louis described Sunderland's smart city programme. It is based on a model that involves ubiquitous connectivity, a sensor network, an operations centre and data analysis and visualisation. Developments have included the delivery of an ultra-fast free Wi-Fi service, city-wide investment in fibre infrastructure, the 5G Create network enabling an automated logistics pilot, and funding for further 5G networks. This has all underpinned projects with assistive technologies, smart video sensor devices, smart building solutions and e-mobility.

The council is following this up with the procurement of a Wi-Fi messaging platform to connect to the Sunderland Citywide App and to sensor networks to provide information to the public, and St Louis highlighted the importance of digital inclusion in making all this count for the whole population.

Newcastle

Newcastle City Council has placed a strong emphasis on data gathering, working with Inakalum on geospatial data and drawing the resource of the Urban Observatory, run by Newcastle University to provide what is described as the largest set of publicly available real time urban data in the UK.

The council's head of ICT and digital transformation, Jenny Nelson, said that it has three main objectives: to improve the experiences of citizens; improve the efficiency of services; and collect and share data to support inward investment, provide a strong infrastructure for smart places and make Newcastle a testbed for solutions.

"We know citizens and local community groups are accessing the data to champion causes and push for changes," Nelson said. "It's a fantastic asset for the city."

Inakalum has employed local people to walk the streets of selected parts of the city to collect images of the amenities and assets that they enter into its cloud database through a smartphone app. This approach helps it to access places that other technologies – such as satellite,

drones, drive-by tech and web scraping – cannot reach as the people providing the data can get around barriers and closer up to provide more detail.

The data can then be made available through its smartphone app, which can be used to search for not just public but private sector amenities, with keyword and voice searches and the ability to provide multi-language voice and text support. This has enabled it to build a detailed map of public services, amenities, parking points, places of interest, 5G infrastructure, gullies and trees, and restaurants around the city centre, along with the capacity to create a polygon of a chosen area and export relevant contact details into a CSV file. It can also create heat map visualisations that can be linked with the other data to build an understanding of the city's environmental ecosystem.

Stockton-on-Tees

Stockton-on-Tees Borough Council has used a platform supplied by Alteryx to provide officials with accessible and detailed information on key social issues.

Johanne Parker outlined how it developed a community safety dashboard, bringing together incident records from its anti-social behaviour (ASB) team and Cleveland Fire Brigade. This provides information on the numbers of ASB incidents by category, ward, date and hour of the day, along with filters to types of and specific incidents.

Parker said this has transformed the planning of ASB services and allocation of resources, and subsequently reduced the number of incidents and improved the quality of life for residents.

Devon and Cornwall Police

Security also came under the spotlight, with Robert Goldsmith, geographic information system (GIS) and mapping manager for Devon and Cornwall Police, describing how it had worked the Precisely Mapinfo platform in its planning for the G7 Summit in Carbis Bay last year.

This involved creating a database of points of interest relevant to the event, taking in features such as mobile cell masts, bus stops, footpaths and footbridges, the using aerial imagery combined with other data to build a detailed 3D model of the area, taking in features such as drains, bushes and entry points to buildings to support the planning.

As a further step, it acquired the NavVis VLX indoor 3D scanner, a wearable device that enables a user to walk through a building and create 360 degree visualisations of the rooms that can be integrated with mapping data. In turn, this can be used to create digital twins and securely shared with as many partners as necessary.

Over 22 days the details of two venues – Carbis Bay Hotel and Tregenna Castle – were captured, covering over 140,000 square metres to an accuracy of 5mm, feeding into the digital twin shared with the partners on an AWS server. The event went off without a security hitch and those involved saw the technology as making a big contribution to its success.

Scotland

A Scottish perspective was provided by Dr Colin Birchenall, chief technology officer in the Digital Office for Scottish Local Government. He outlined its collaboration with CENSIS, the national IoT innovation centre, to develop

the local government market and accelerate adoption of the technology.

This involves four steps: to monitor for insights; redesign processes to make them more reactive and better targeted; then automate them; then use artificial intelligence in predictions for prevention and early interventions.

The approach has contributed to a number of examples, including: Renfrewshire Council's proactive maintenance of social housing using sensors for factors such as humidity and energy use; the optimisation of waste collection in a handful of cities; and Highland Council improving water safety with sensors of pipes to detect signs of legionnaires' disease.

7. Clear progress

The overall picture is one of fractured but significant progress. Local authorities are gaining a better understanding of how to use IoT technology, collect the data it provides, and integrate it with that from other sources to improve their control of operations and infrastructure. They are giving meaning to the term 'smart' in more of their activities.

But there is also a sense of a need to accelerate the effort. There is little prospect of the financial squeeze on local authorities easing, which demands that they detect in advance and prevent more of the costly problems with local infrastructure and public health, and this means harnessing the technology and data more widely and effectively. And they have to deal with environmental issues, finding new solutions to improve air quality and reduce energy usage. They are still exploring the issues and discovering what can feasibly work, but again it is the technology and data associated with 'smart' that will be the game changer.

They have to learn from each other, find the right industry partners and take advantage of any national initiatives the improve their chances.

This is one of the main challenges for the UK public sector over the coming years.

8. DAY ONE- Wednesday, 22nd June

03:00: Scotland's Connected and Smart Places - Dr Colin Birchenall, CTO, Digital Office for Scottish Local Government (Download slides)

22:19: Connecting a City. Delivering an IOT blueprint across South London - Tim Kidd, Head of UK Public Sector Hitachi Solutions, Andrew Parsons, IoT Programme Manager South London Partnership, David Grasty, Corporate Head of Digital Strategy & Portfolio, Kingston Upon Thames Council and Linda Chandler, Smart City Lead Microsoft

South London Partnership, Kingston and Sutton, Hitachi Solutions and Microsoft to understand how one of the largest IOT pilots in the UK will deliver a multi-purpose platform connecting five London boroughs. The data insights generated will enable real time intelligence and intervention to help residents live healthier lives, generate economic growth, shape polices and reduce council expenditure (Download slides)

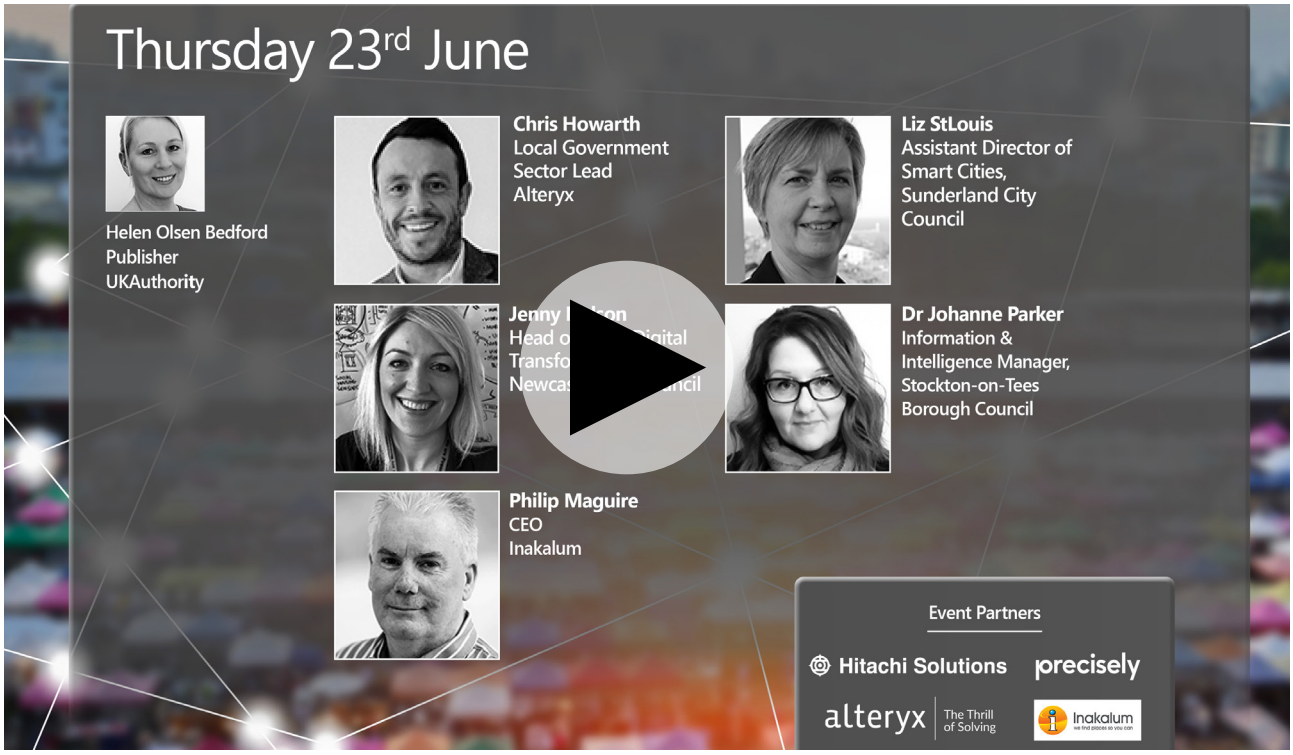
46:00: Keeping communities safe with smart data and technology - Robert Goldsmith, GIS & Mapping Manager, Devon and Cornwall Police and Sumitra Appan, UK Public Sector Lead, Precisely

Rob Goldsmith and Sumitra Appan explore how data and technology enable Devon and Cornwall Police to successfully collaborate with other public sector organisations and provide the best service to their communities. The police force uses comprehensive location intelligence capabilities to plan, monitor, and respond to incidents, events, and ongoing challenges such as pandemic recovery and the reduction of CO2 emissions. In this session you'll hear more about using data and technology to:

- investigate criminal activity and anti social behaviour
- organise responses to accidents disasters and other emergencies
- plan for major events such as G7 summit
- reduce planning and travel costs (Download slides)

1:00:21: Q&A / panel discussion

9. DAY TWO- Thursday, 23rd June



01:49: Harnessing Digital Confidence - Liz St Louis, Assistant Director of Smart Cities, Sunderland City Council

Hear from Sunderland City Council about their public/private sector partnership, scaling the deployment of digital infrastructure and a raft of innovative use cases as they harness the digital confidence gained across communities throughout the pandemic (Download slides)

18:58: Importance of place based data in a smart city - Jenny Nelson, Head of ICT and Digital Transformation, Newcastle City Council and Philip Maguire, Chief Executive Officer, Inakalum

(Download slides)

42:12: Liverpool 5G Create - Smarter Working with Information and Intelligence at Stockton on Tees Borough Council - Dr Johanne Parker,Information & Intelligence Manager, Stockton-on-Tees Borough Council

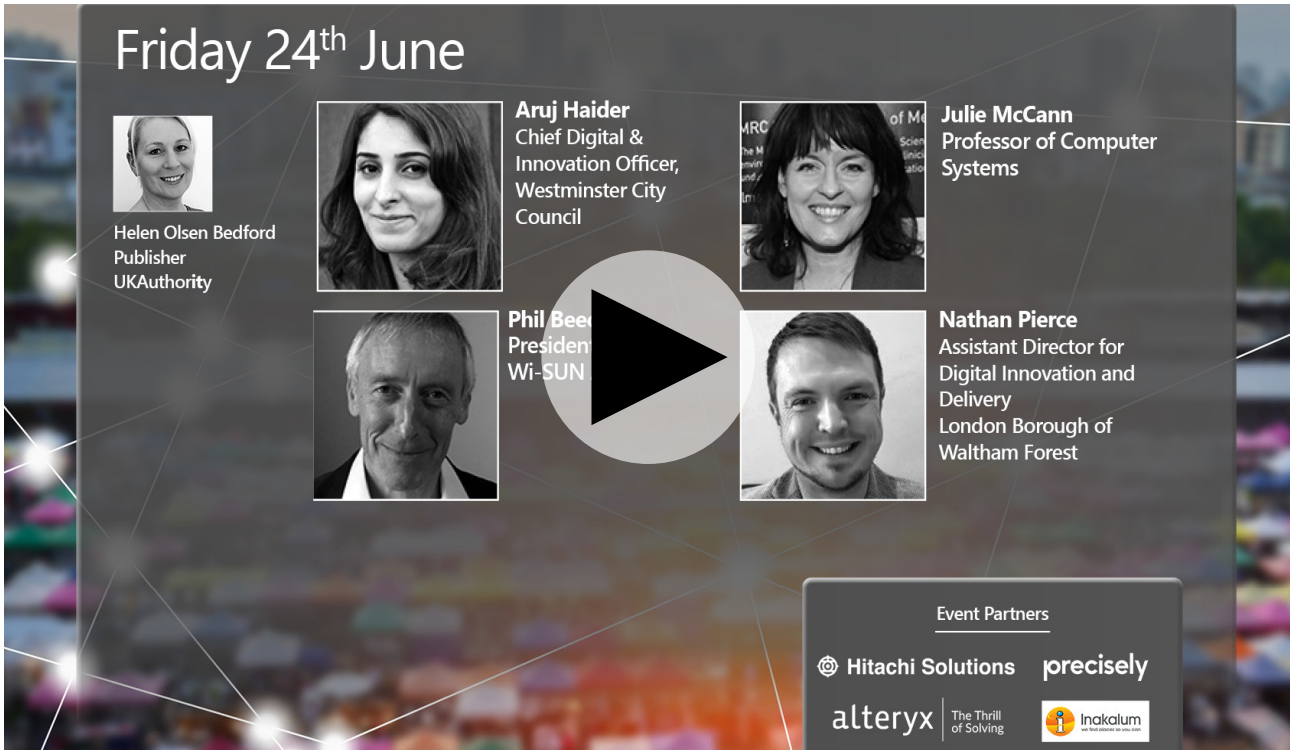
A brief summary of how we have used low code software at Stockton on Tees Borough Council to transform how we work with information and make it available to our end users. Our highly accessible, automated, intelligence reports for a range of frontline service providers are enabling robust, current, evidence to be used on a daily basis to guide, shape and transform professional practice. Together, this is delivering improved outcomes for some of our most vulnerable service users and improving community safety across the borough (Download slides)

58:26: Using Low-Code Analytics to Tackle Climate Change - Chris Howarth, Local Government Sector Lead, Alteryx

Alteryx's low-code analytics platform is helping to tackle climate change and this brief talk will summarise outcome-based results in: decentralised energy projects; retrofitting; lowering transport carbon emissions; flood prevention; waste management and atmospheric CO2 sampling and forecasting (Download slides)

1:09:32: Q&A / panel discussion

10. DAY THREE- Friday, 24th June



02:02: Aruj Haider, Chief Digital & Innovation Officer, Westminster City Council

27:01: Technologies that underpin Smart Places and their challenges - Julie McCann, Professor of Computer Systems

Julie McCann will discuss some of the IoT and sensor-based systems technologies and how they are used in smart spaces, she will discuss some of their technical challenges, where they can go wrong, and some of the solutions we've been looking at to overcome these problems (Download slides)

49:01: IoT network communications: No one size fits all - Phil Beecher, President & CEO, Wi-SUN Alliance

When it comes to their IoT needs, public sector bodies will need to look at various communications technologies and standards in order to future-proof their network infrastructure. Many public sector IoT initiatives start from a single project, such as smart street lighting with its well defined business case for energy and cost savings and citizen quality of life, but can evolve to other projects and applications, including smart parking, smart signage, and smart sensors for traffic and environmental monitoring. Phil Beecher will address these issues including use cases of how smart initiatives are driving change in the public sector (Download slides)

1:04:06: Q&A / panel discussion

11. Event Partners

Alteryx

Alteryx provides 'Analytics for All'. The Alteryx Analytics Automation Platform delivers no-code & code-friendly, end-to-end automation of analytics, machine learning, and data science processes that accelerate digital transformation.

Find out more about alteryx here | Follow them on twitter

Hitachi Solutions

One of Microsoft's Strategic Gold Partners, Hitachi Solutions has built a strong reputation within Public Sector supporting organisations' delivery of tactical operational projects to large scale transformation programmes and in recognition of this awarded Microsoft's Public Sector Partner of the Year in 2019/2020. Our technical capability and wealth of deep sector knowledge has put us at the front of many ground-breaking projects never mores so than during the pandemic where our solutions are used by over 25 organisations, 5,000 users, supporting 5,000,000 residents and businesses across the UK. Our technical consultancy skills and expertise covers, Low code application development, Robotic Process Automation, Case Management Solutions & CRM, Data & Analytics, Financial management systems & HR, Artificial Intelligence and Internet of Things.

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Precisely

Precisely is the global leader in data integrity, providing accuracy, consistency, and context in data for 12,000 customers in more than 100 countries, including 99 of the Fortune 100. Precisely's data integration, data quality, data governance, location intelligence, and data enrichment products power better business decisions to create better outcomes.

Find out more about Pricisely here | Follow them on twitter | LinkedIn

Inakalum

In just four weeks, Inakalum surveyed Newcastle city centre area and produced 30,000 datapoints - all photographed, geotagged & categorised - including all street assets, public services & amenities, businesses, and places of interest. Our high resolution images will even allow you to read the writing on a manhole! We can export our data so you can use it on your GIS platform, or you can use our user-friendly map-based search engine which allows layering of datasets and viewing of the high-res images of each datapoint.

Find out more about Inakalum here | twitter | info@inakalum.com

12. UKAuthority Events

Support from our event partners enables UKAuthority to produce free events for the public sector to share success stories, best practice and experience

Click here to find out more and register to attend future UKAuthority events

UKAuthority

This briefing note has been researched, written and published by Mark Say & Helen Olsen Bedford, UKAuthority.

UKAuthority champions the use of digital, data and technology (DDaT) by central and local government, police, fire, health and housing, to improve services for the public they serve.

Visit UKAuthority.com to keep up with news and developments in the use of DDaT for the public good. We host regular virtual round tables and events exploring best practice and innovation in the public sector. Visit the UKAuthority 2022 events schedule here