NLGN
NEW LOCAL GOVERNMENT NETWORK

TOMORROW'S PLACES

HOW COUNCILS CAN HARNESS SMART CAPABILITIES

DR ABIGAIL GILBERT

New Local Government Network (NLGN) is an independent think tank that seeks to transform public services, revitalise local political leadership and empower local communities. NLGN is publishing this report as part of its programme of research and innovative policy projects, which we hope will be of use to policy makers and practitioners. The views expressed are however those of the authors and not necessarily those of NLGN.

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Dr Abigail Gilbert
NLGN

FOREWORDS

LORD KERSLAKE

Crossbench Peer

The most important thing that I want to get across to you in this foreword is that this report is not just for the 'techies'. What it says about the future of places and the power of technology to transform them matters to everyone who plays a leadership role in a local authority. It should also matter a great deal to their local partners.

In a time of quite considerable challenge and change, there is both a need and an appetite for more social interaction between residents, visitors, businesses and government. To deliver this, better cross-sector working is essential to ensure all voices are heard and the ability to contribute is available to all.

However, as this report demonstrates, this requires new ways of working and deep cultural change. If the greatest potential of smart capabilities is to decentralise, intelligence about what is happening must be kept open. Data and commissioning processes must allow for a more collaborative, inclusive and creative approach. For councils to achieve this, leaders, policy makers and central government must collaborate to resolve existing challenges and confusion around data sharing. The result: a creative and supportive environment for continued innovation.

The latest developments in technology have brought about new possibilities for the way places are designed, governed and brought to life by their residents. They have also stimulated a change in people's expectations. There is a growing sense of entitlement to participate, shape and co-create their physical environment and the related public services they receive. In other words, citizens are at the centre of this change.

Councils are gatekeepers to data, platforms for representation, and the purveyors of public service contract opportunities. They hold great potential

and responsibility to develop systems which enable people to become more connected, and live healthy, happy and independent lives, in environmentally sustainable places.

This report sets out a very powerful argument about the role that technology-led infrastructure, data analytics and networks could play to deliver these changes in the future. Through a series of excellent examples, it demonstrates how these ‘smart capabilities’ can be harnessed by councils and their partners across the local public, private and third sector to lay the foundations for communities which are more autonomous. But they cannot achieve this alone. To continue to innovate and improve the quality of service delivery, they must work closely with experts in the private and voluntary sector.

CLLR THEO BLACKWELL

Cabinet member for Finance Technology & Growth, LB Camden

Setting our first Camden budget in 2010, technology featured little. Seven years later practically every aspect of Camden's work is technology-related, testament to the growing importance and recognition of digital solutions.

Today some 85% of council savings in Camden are technology-related. Successful public service digital transformation will make services more effective and preventative. To do this requires redesign on every level — workforce, customer service, how we use data and improving governance and leadership. This will make our public services faster at doing things, more adaptable, able to share more information and do so securely. So this is as much a cultural and leadership challenge as it is a technological one.

Providing a proper vision for digital is fundamental for the delivery of public services. The bigger picture is that local councils provide 80% of all local public services — including supporting those with the greatest needs in society. Demand for many of the services is rising fast at a time of continued central government cuts.

Local government spending is in excess of £20bn annually and the move to integrate health and social care brings future spending into scope. Localisation of business rates by 2020 mean that councils will have a closer relationship with businesses and their investment needs — bringing a new set of digital economy challenges and opportunities which we should use to our benefit.

This report shows that local digital innovation is happening across the country and makes practical recommendations on what central government can do to make sharing and collaboration the standard rather than the exception. It is part of a wider discussion of how digital and devolution go hand in hand.

EXECUTIVE SUMMARY

"We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don't let yourself be lulled into inaction." **Bill Gates.**

Technology is always evolving. However over the last decade our ability to harness the data it can generate and the connections it can bring has undergone a step-change. Using the capabilities of smart technology, data analytics, and the networks built around them in the future, systems which have previously worked in silos can be integrated and people who have been isolated can become visible and easier to reach. Most significantly, in the future the wisdom and creativity of people will be harnessed to create residents who are more independent, decision making which is more decentralised, and services which are more agile and responsive to people's needs.

Over the coming decade, councils are aware that they need to begin to work more openly and collaboratively with residents and the wider public sector, and develop new, sophisticated relationships with the private sector to manage demand. This involves being able to predict and prevent needs, and tackle them early on. To do this, councils need to put in place the hard and soft infrastructure which allows people to live happier, healthier and more independent lives. Smart infrastructure – such as sensors in buildings or mobile phones connected to the internet – and the data and social networks that are built on this, can help to make this shift. These support more integrated service delivery strategies, while also making them more responsive to and empowering of their users.

However, many councils have been reluctant to make changes to their places in ways which allow them and their residents to take advantage of these new capabilities. There are several reasons for this. Over the past decade, the market in 'smart' products has often delivered what has been seen as 'additional' rather than core place-related functions, seeming superfluous to municipal strategies at a time of financial constraint. Further, the time and expertise is not always present within councils to make the most of these new capabilities. Annual budget cycles and departmental

silos can make long-term investments difficult across multiple areas of responsibility. Lastly, there is public concern about the way data is collected and used in tomorrow's places.

It is imperative that these challenges are overcome and that collaborative technologies are harnessed to enable cities to make better use of resources, including the wisdom of the people within them. Following cuts to revenue support grant, financial reforms to business rates, and growing demographic pressures,[1] authorities will find new ways of working.

With this challenge in mind, NLGN started a research project to understand how to overcome existing barriers, so that decisions made today do not prohibit a more integrated, open tomorrow. By carrying out a desk study of existing practices, two half day workshop sessions with senior officials from local government, and interviews with five expert practitioners, this report identifies how smart capabilities can be delivered in the following stages.

A VISION FOR TOMORROW'S PLACES: The first challenge in delivering tomorrow's places is conceiving what change could mean. We demonstrate how technologies such as Blockchain allow for completely decentralised database management. This could transform energy markets, with people trading renewables with each other in real time. Platforms such as mobile phones will allow for the power of crowds to be harnessed, diminishing old hierarchal forms of decision making. Crowdfunding models could allow for decentralised decision making about new urban art investments. Apps will also allow for more distributed coordination of public transport – with bus routes crowdsourced to respond to the needs of individuals as they emerge in real time. Similarly, mobile phones will contain an increased number of sensors, allowing for a vast amount of diagnostic healthcare to be conducted by individuals at home. Ultimately the resources of a place will be used more efficiently to meet the needs of individuals and connect people who have been isolated.

ENABLING TOMORROW'S PLACES: To deliver this vision, councils do not have to deliver everything directly. Part of their role will be to harness their position as enablers to ensure that all local stakeholders can take part in place-making and delivering the local vision of tomorrow's places. As enablers it is clear that councils will change their relationship with

1 LGA (2016) Adult social care funding: 2016 state of the nation report. LGA.

communities, businesses, local social entrepreneurs, and other parts of the public sector, by being more open and collaborative. They may do this by engaging in concession contracts to deliver the infrastructure that smart capabilities are built upon, or by being more open with their data, and hosting hackathons to engage the public in strategy change. They could also increase their use of platforms which allow people to be in the driving seat of urban change.

DELIVERING TOMORROW'S PLACES: Beyond enabling others to deliver smarter places, councils can also directly shape outcomes through their role as delivery bodies, procurers, and commissioners. Plans for the local retention of business rates create an imperative for councils to create local business growth, and the emphasis on place within the industrial strategy creates an opportunity for councils to create better conditions for growth in the technology sector. With this in mind, councils can change procurement strategies to allow for more creative and flexible solutions. This demands that approaches are developed for more place-led outcomes-based commissioning, the use of innovation partnerships to utilise the skill in partner organisations, and greater collaboration between authorities to deliver solutions which work more effectively at scale.

RECOMMENDATIONS: As the owners of assets, gatekeepers to data, makers of connections, and architects of public service delivery, councils should be in the driving seat of change. To do this however, they need to rethink their role as facilitators and enablers, in ways which make them more open to new ideas, more empowering of their residents, and more active in market-shaping. This can allow them to deliver differently with less, while simultaneously increasing public trust and engagement. To achieve this we make the following recommendations.

LOCAL GOVERNMENT

Harness physical and regulatory assets to deliver improved connectivity and incentivise behaviour change: Councils can deliver some of the infrastructure needed to increase the uptake of smart capabilities by developing new and sophisticated relationships with providers. This relies on an interventionist approach, to incentivise changes in public behaviour and to mobilise existing assets.

Collaborate to create an inventory of place-based intelligence: For the full potential of data and data integration to be realised, a full inventory of what is already available across the public, private and third sectors should be identified. By working across council silos and with partners in the third and private sectors, a database of organisations, and the types of information they hold could be developed.

Work towards more openness in data collection, data analysis and place-based decision-making: To encourage greater participation in processes of place governance, councils should build platforms which allow people to take part in decision-making about investment, to generate data and to increase awareness about activities happening locally.

Support wide reaching participation in the use of smart capabilities: While a 'channel shift' to digital mediums for relational services presents immediate challenges surrounding exclusion, many of the opportunities presented by smart capabilities for place-based change are new and original offers to the public. Nevertheless, to ensure everyone can take advantage of these benefits, councils should work with other partners to minimise digital exclusion.

Establish a clear set of policy principles and practical guidance for the development of smarter places: Councils need to simplify council language and processes about place-shaping, in areas such as environmental management, transport, waste and planning; and safeguard openness in new hardware and software by developing clear policy principles on data management and privacy, interoperability and partnership working.

Develop relationships with partners to deliver creative and better solutions which deliver strong public benefit: Adopting more creative models of procurement can allow councils to better understand what the market has to offer. Partnerships with universities can help to optimise data and develop more intelligent solutions. Joint-ventures with experienced companies can be used to work through incremental changes progressively.

Share evidence of best practice and of failures or mistakes: Monitoring and evaluation of the benefits of smart capabilities should be shared

within knowledge exchange networks. Councils should also be prepared to share stories about successes and mistakes with their peers, to prevent reinvention of the wheel or repeated mistakes.

CENTRAL GOVERNMENT

Our research suggests that there are some steps which could be taken by central government to reduce barriers to systematic change.

Central government should create a legal framework which supports public contracts to mandate interoperability of hardware for smart places: To ensure that the smart places market develops evenly across the country, central government should create a legal framework that supports all public contracts to mandate open standards in new smart infrastructure. This will create an equal playing field for creators and purchasers of these new technologies.

Central government should promote and support research which will look at challenges surrounding the greater personalisation of data ownership: As connections between devices grow under the 'internet of things', the extent of personal data captured in cloud storage will grow. Central government should promote and support research which looks at the challenges surrounding the greater personalisation of data ownership to identify how this should best be managed, and be used to develop schemes which increase individual control over their data history.

Central government should endeavour to resolve tensions and inconsistencies between the General Data Protection Regulation and Digital Economy Bill: Current conflicts between these two emergent pieces of regulation are creating confusion and uncertainty within the local government community which may stifle progress in data sharing. To overcome this, the government must resolve the conflict between the two items of policy and ensure that there is consistency of language.

This report aims to provide a helpful blueprint for local practitioners to realise a vision of tomorrow's places in practice.

1 A VISION FOR TOMORROW'S PLACES

The future can never be known. But what is certain is that what is imagined today shapes what happens tomorrow. With this in mind, we set about understanding what the potential of networks, data analytics, and smart infrastructure is for tomorrow's places and creating a vision which highlights why they should be used to create transformational change.

Before smart capabilities are deployed, what they are and what they can achieve must be understood. Smart capabilities have developed a reputation as additional, rather than core to local government strategy. To overcome this, an understanding of how they address existing challenges and real social problems is needed.[2]

INTRODUCING SMART CAPABILITIES: SMART INFRASTRUCTURE, NETWORKS, AND DATA ANALYTICS

To better understand their potential to solve 'actually existing' social problems, it is important to first understand what smart capabilities are, and can do.

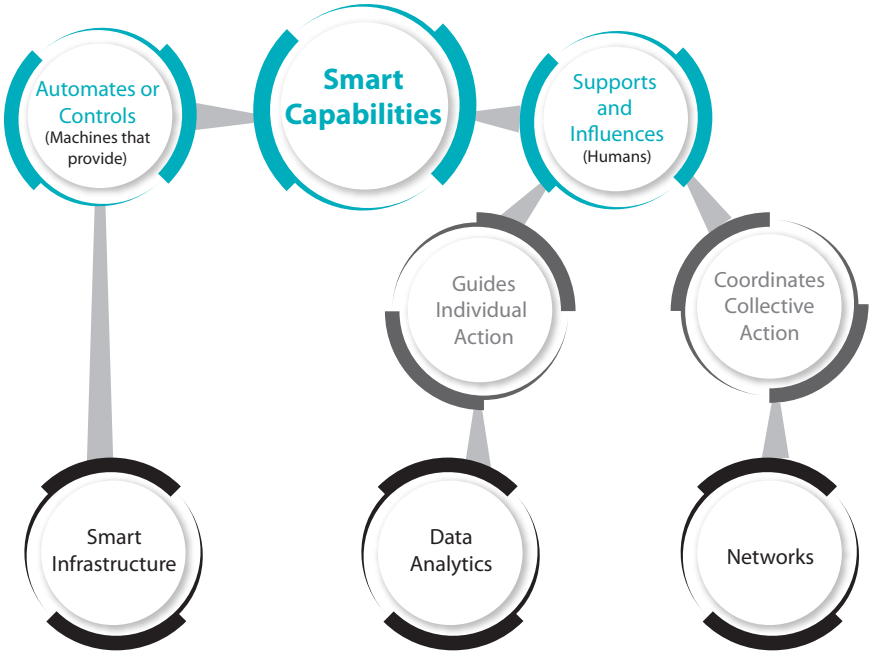
- **SMART INFRASTRUCTURE:** infrastructure which delivers improved flows of things, energy, or information which is often directly connected to the internet. This can be automated or controlled hardware and software. For instance, drones, autonomous vehicles and sensors. Smart infrastructure has the potential to dramatically improve the efficiency of existing operations.
- **DATA ANALYTICS:** data integration, analysis or visualisation provides information to alter processes and make human action more targeted. This involves digital hardware and software interacting with, informing and influencing humans. Harnessing the potential of data analytics lies in using software to interrogate existing data, collected by people. However, in the future it will increasingly include the analysis of data

2 This section draws on the findings of a desk study of international practice, and the first of two workshop sessions with local practitioners. A full appendix of the methodology can be found in Appendix 3.

generated as part of the 'Social Internet of Things' (with input from smart infrastructure, such as sensors, and network technology, such as crowdsourcing platforms). Data analytics have the potential to make service delivery far more effective and targeted.

- **NETWORKS:** networks connect and coordinate people. They are formed through the interaction of smart infrastructure, data and people, to coordinate the interactions between people. These networks may focus on the exchange of material goods, information, or even energy. Networks have the potential to reshape relationships between people and places, people and their communities, and different public services.

FIGURE 1 SMART CAPABILITIES TYPOLOGY [3]



Throughout this report, we refer to the combination of these three forces as smart capabilities.

3 Image adapted from original at http://www.smartgreenmap.com/axes.html#smartaxis

PLACES OF TOMORROW

THE 2030 POTENTIAL: A VISION

Our vision for tomorrow's places demonstrates the potential of smart infrastructure, data analytics, and networks to deliver more creative and collaborative approaches to governance, and places which allow people to be more autonomous. This highlights that much of what can be achieved by smart technologies sits outside of conventional service delivery silos, with demand management impacts in other areas.

For this vision to become a reality however, and for the risks of these technologies to be effectively mitigated, a number of broader political and economic conditions must be met. The challenge for councils is to work with people in their own place to create a vision for tomorrow which recognises these opportunities as core to their strategy, and choose routes to delivering it thereafter.

TRANSPORT

In tomorrow's places, all transport is carbon neutral. Electric cars are supported by a network of charging points in all towns and cities. Public bus routes become crowdsourced, allowing people to register where they need transport and allowing algorithms to allocate routes – improving the efficiency and agility of flows through the city. Zero carbon transport improves public health as air quality-related illnesses decrease. Fleets of public, autonomous vehicles transport people across cities, reducing incidents of drink-driving and traffic accidents. A network of mega-levitation railways travelling up to 360km per hour reduce journey times by half, making a journey between Manchester and Edinburgh less than an hour.

ENERGY

Energy markets have shifted from centralised to decentralised modes of production and consumption, as local energy from waste plants, combined heat and power, district heating and cooling, geothermal, biomass and solar

energy offer sustainable, cheap and efficient supplies. As a result, winter fuel poverty is a thing of the past. In line with a more regional localisation of energy supply, food markets have also shifted to be increasingly local and sustainable. As a result of changes to car parks, demand for car parks plummets, allowing for new multi-storey urban farms. Street parking spaces are transformed into sustainable urban drainage greenways, to simultaneously adapt and prevent climate change.

CONNECTIVITY

The energy revolution helps to fuel high speed internet access across all villages, towns and cities, with network infrastructure moving beyond WiFi to Li-Fi, which uses common household LED (light emitting diodes) lightbulbs to enable data transfer, boasting speeds of up to 224 gigabits per second. This, along with a suite of sensors which monitor air quality, are deployed in streetlamps.

ECONOMIES

As a result of improved connectivity – both physical and digital – economies across the country are revitalised. Rural economies flourish with a suite of creative and maker industries, supported by a growth of peer to peer markets, facilitated by Blockchain technology - allowing for a decentralised, distributed ledger of activities and exchanges and a growth of peer to peer energy markets.

In cities, the impacts of automation and smart infrastructure are mitigated by huge all-age education programmes allowing people to take up new and different careers, and shift towards shorter working weeks as a result of productivity gains. As people move towards a 3-4 day working week they can allocate more time to personal development and creative thinking, fitness and wellbeing, and community activities. In turn, many stress-related illnesses decrease.

PUBLIC HEALTH

An ageing population is able to access health care services from home in all areas of the country, as widespread access to telecommunications and mobile phone internet enables people to be more in control of their own care. This makes providers more aware of who to contact, with effective data sharing and sensors revealing 'invisible' needs to effectively predict and prevent problems. Preventative medicine soars, as sensors installed in people's smartphones allow them to detect the signs of illness before they present in full and diagnose conditions at home. Responding to advances in the field of epigenetics[4] and drawing on the rich data collected about each individual's life medicine will become more personalised. Drones will deliver medicines to people at the touch of a button.

Public spaces enable people to better log and monitor their own physical activity, with parks and public bicycles offering users the chance to upload their activitiy to an individual user profile which monitors their wellbeing and fitness. Linked to the proliferation of smart health technology is a shift towards personal health records (PHR). Every citizen has a single record of health-related information that conforms to nationally-recognized open standards and can be drawn from multiple sources while being managed, shared and controlled by the individual. Data accrued from public, private and individual sources are used to develop more targeted public health interventions, reducing the burden on the NHS.

COMMUNITIES

Platforms built on networked devices create new digital cultures, which give people more control over the places they live. Crowdsourcing platforms allow information, assets, skills, and time to be shared, changing perceptions of ownership. Crowdfunding platforms democratise the way social value is captured by corporate social responsibility, with regeneration projects proposed and preferred schemes selected by a public vote.

4 Epigenetics is the study of changes in organisms caused by modification of gene expression rather than alteration of the genetic code itself.

APPLYING SMART INNOVATION

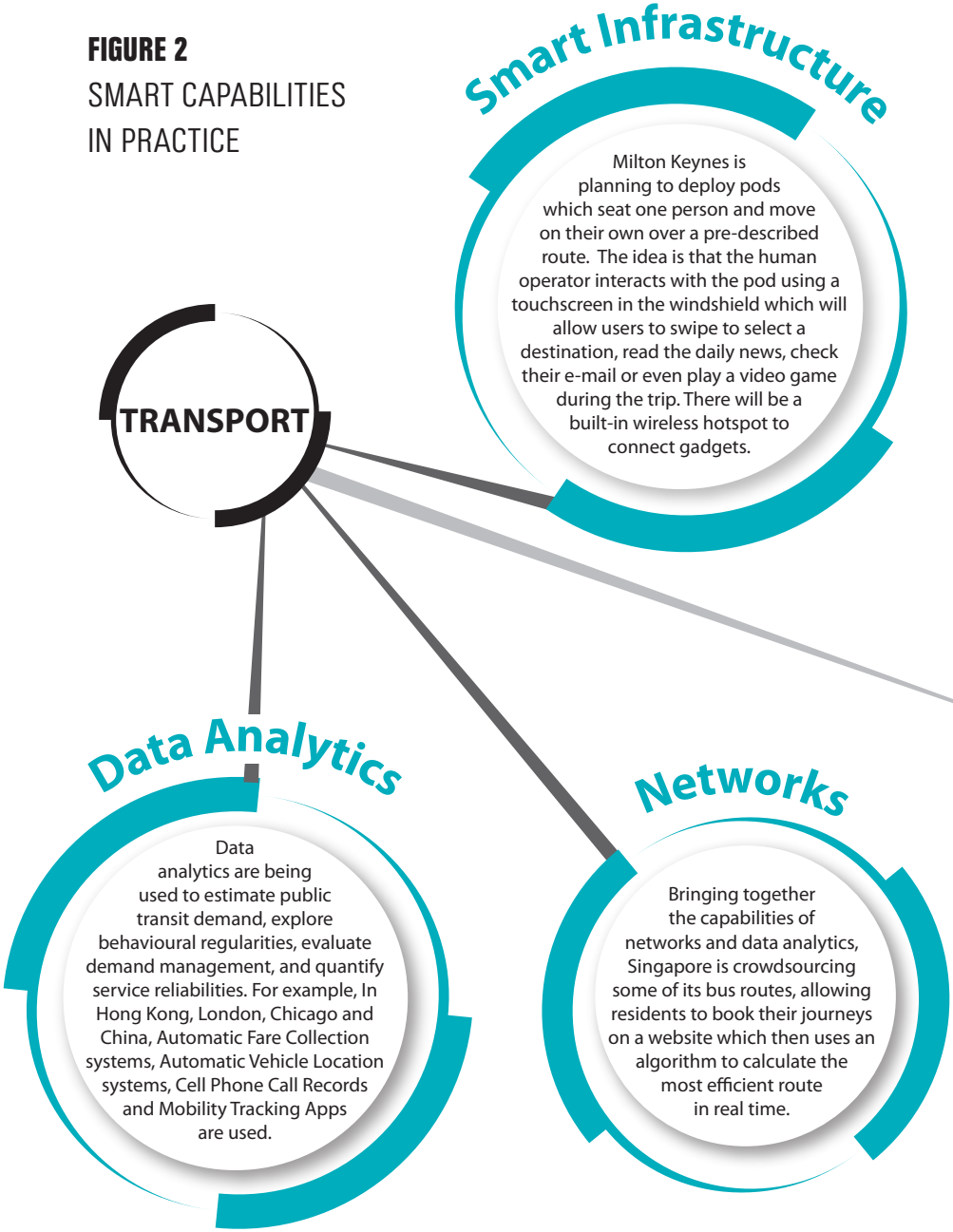
For a long time, smart capabilities were geared towards delivering additionality, rather than transforming core functionality. This led to a reputation that they are not suited to solving real social problems.[5] This could mean that technology is side-lined or seen as extra, rather than core to municipal strategy. However, in the last few years as social innovation has engaged with technological innovation, a number of pioneering examples have emerged which demonstrate the relevance of smart capabilities to local government. To demonstrate this, we asked senior local government professionals what the big challenges would be for their places in the lead up to 2030. Their priorities were:

- **Infrastructure and Economies:** housing affordability, transport efficiency, energy affordability, waste management and environmental quality.
- **People and Communities:** an ageing population, adult social care, creating 'smart' residents, integration and community wellbeing.
- **Governance and Government:** community cohesion, citizen engagement, and their ability to 'see invisible needs'.

The following graphic demonstrates how these challenges could be lessened by the adoption of smart capabilities, drawing on international practice.

5 Saunders, T. Baeck, P. (2015) Rethinking Smart Cities From the Ground Up. NESTA.

FIGURE 2
SMART CAPABILITIES
IN PRACTICE



Data Analytics

Bringing together smart infrastructure and data analytics, sensors have been used to regulate the heating, ventilation and air conditioning systems of buildings across the world for some years, cutting building energy consumption by 20-30 per cent. However, recent advances in sensor technology have made it far more affordable, by becoming wireless, saving on wiring-in fitting costs. These smart sensors work in both new and retrofitted buildings.

ENERGY

Networks

White Gum Valley housing project in Fremantle, Western Australia has implemented the first peer-to-peer energy trading network. The system uses Blockchain technology to allow residents to trade electricity amongst themselves, making them off-grid and self-sufficient.

Smart Infrastructure

The world's biggest offshore windfarm is off the Yorkshire coastline, and is now planned to be expanded to an area five times the size of Hull. This expansion would see 300 turbines span more than 480 sq km in the North Sea. The project is expected to deliver 1,800MW of low-CO2 electricity to 1.8 million UK homes.

Networks

Crowdfunding platform, Spacehive, raised funds to support a community land trust application for St Ann's, a former hospital site in North London. There are now a number of crowdfunded housing schemes across the world, and a range of companies who facilitate peer-to-peer lending for property.

HOUSING

Data Analytics

River Clyde Housing, a housing association in Scotland, is developing a "smart neighbourhood" to field test around 330 Internet of Things devices in Greenock and Broomhill. These will provide data about humidity and temperature, allowing the association to predict maintenance needs and health and safety issues and retain a good level of quality in its stock.

Smart Infrastructure

To improve waste management, the City of Edinburgh has deployed sensor technology in its residents' bins. These send signals when bins are full, and allow for efficient collection. Elsewhere in the UK these sensors could be used to alert local GPs of inactivity of elderly people, triggering a phone call if they don't put the bins out for more than a fortnight.

ENVIRONMENT PLANNING

Data Analytics

Street lamps in Chicago have been fitted with bundles of sensors, packed with tools to collect data about environmental conditions. Chicago's 'Array of Things', made up of smart infrastructure, will collect city data on a micro and macro level. This information will be shared with residents, allowing them to create new tools and policy strategies using the data.

Networks

To save on the costs of inspection and regulation, environmental data can be crowdsourced. Cit'eazen, created by ENGIE is an app designed to increase transparency and public dialogue between local government and residents. This is used across France to allow residents to easily report urban problems to the relevant department, accurately geo-located and in real time. It also allows residents to contribute urban design ideas and receive alerts from council departments.


Networks
Patchwork is an app which allows care workers from different parts of the public sector to coordinate their work around given individuals. This can be used to update others about client progress, see which other agencies are working with a client and how to contact them, and alert others when they have a concern about a client.
Smart Infrastructure
A number of sensors can be deployed in people's homes to increase their independence and safety. For instance, to detect falls, incontinence, epilepsy, carbon monoxide, gas, temperature. This has been used to assist adult health and social care users in Wiltshire where 95% of users surveyed felt the new approach increased their feelings of independence.
SOCIAL CARE
Data Analytics
In partnership with the Troubled Families team, Newcastle's Children's Social Care department have used data and analytics to make it easier and less time consuming for social workers to manage their caseloads and identify the factors which are predictive of poor and costly outcomes.


Smart Infrastructure
Surrey and Borders NHS Trust is undertaking a trial to allow clinicians to remotely monitor the health and wellbeing of people with dementia through the use of sensors in objects like fridges, kettles and beds. These will detect and assess behaviour patterns, such as if someone might be at risk of dehydration or are unusually active at night. The aim is to allow earlier intervention, reduce unnecessary hospital admissions, relieve pressure on carers, and prolong independence.
AGEING POPULATION
Networks
GoodGym is a community of runners that combine getting fit with doing good. Convened through an app, the community stop off on our runs to do manual labour for community organisations and also to visit isolated older people. The app has place-based groups, and works with local authorities to register people to this part of the scheme.
Data Analytics
A local authority in England has been able to prepare better for frosty weather by blending service data about road gritting, with services data for 'meals on wheels'. This ensures that homes receiving meals on wheels services are supported, to help the elderly and make sure services are connected.

Networks

Mental health is strongly affected by isolation. For this reason all apps which build social networks can be an indirect preventative. For instance, Casserole Club connects people within a neighbourhood looking to share meals, with a focus on the excluded. Gig buddies connects people with learning disabilities with those who share music tastes.

Data Analytics

Mexico's Ministry of Social Development (Secretaría de Desarrollo Social – SEDESOL) combines household, beneficiary, and geographic data to provide targeted services to the people that need them the most. The purpose of this data blending is specifically to improve the living conditions of poor populations in Mexico.

COMMUNITY WELLBEING

Smart Infrastructure

By 2050 nearly 80 per cent of the world's population will be in urban areas. To help ensure ongoing access to greenspace and its associated community wellbeing benefits, vertical farms and vertical forests are being developed. Vertical farms have been implemented in Singapore and Wigan and the first vertical forest is in Porta Nuova district of Milan, Italy.

From these examples, it is clear that smart capabilities have the potential to create services which are more personalised, targeted and efficient, allowing councils to see 'invisible' service users or needs and manage demand up front. Further, they hold the potential to decentralise control and power – making services more personalised and peer-to-peer. The challenge then is how to achieve economies of scale and scope, which support the delivery of personalised, targeted local services.

Together these investments can clearly improve the quality of public services. This is important, because recent research by Deloitte and Reform[6] has shown that while the public are happy overall with the quality of public services, the top three answers given for where public services could be improved were 'better public transport', 'better healthcare' and 'more investment'. Further, there is evidence that they would pay more in tax to get it - with 60 per cent of respondents saying they believe public services should be extended, even if that means higher taxes.

While local government revenue budgets have been in decline, many councils have scope to invest capital finance. This may mean that councils invest in ways which help to support the sustainability and resilience of communities and public services.[7]

6 Deloitte and Reform (2016) The State of the State 16-17. Available at: https://www2.deloitte.com/uk/en/pages/public-sector/articles/state-of-the-state.html#

7 NLGN (2016) Securing a Resilient Future for Social Value Available at: http://www.nlgn.org.uk/public/wp-content/uploads/Securing-a-Resilient-Future_FINAL.pdf

2 ENABLING TOMORROW'S PLACES

Having seen the potential of smart infrastructure, data analytics and networks to create places which are more environmentally sustainable, responsive to change, and empowering of their users, this section will outline how councils can deliver change in practice.

Our research identified that there are a number of barriers which may be preventing local government from delivering tomorrow's places. The central concern of the sector is identifying what councils of tomorrow should do and 'be for' by 2030. Should they focus efforts only on the most marginalised, in a time of limited resources, or should they engage with other actors to become the coordinators of more general system change?

This section will assess how councils can in fact deliver on both of these objectives simultaneously through enabling and providing smart capabilities, without having to allocate large amounts of investment (human or financial) up front.

Our research found that councils may enable smarter places by using:

- Incentives and assets to deliver smart infrastructure;
- Innovation partnerships and networks to deliver data analytics and;
- Platforms to deliver the full potential of networks.

SMART INFRASTRUCTURE

Councils have always sought to harness the potential of new technology to the advantage of their communities. From the first streetlamps in the late 1800s, through to CCTV networks of the late 1960s, smart infrastructure has continued to evolve in line with the wants and needs of residents. Now, four major infrastructure networks require attention in order for tomorrow's places to be realised. These are:

- **Internet:** universal broadband and fast data transfer over mobile telephone networks to underpin the next industrial and social revolution.
- **Energy:** shift towards renewables and decentralised energy networks to reduce fuel poverty and tackle climate change.
- **Transport:** increased speed, flow and connectivity to redress imbalanced regional economies and revitalise economies.
- **Built Environment:** ensuring it allows for efficient and sustainable resource use, and helps to create healthy safe and independent residents.

While addressing climate change can be perceived as more challenging in light of a global economic downturn, the potential of decentralised energy networks and low-carbon transport to usher in whole-scale economic transformations cannot be underestimated.

One workshop participant suggested that local government's perception that it prevents problems, rather than creates solutions has been a key barrier to change. Local government may need to alter their self-perception to enable change. While many local authorities see themselves as place-shapers who curate, facilitate and conduct change, some have focused more on their risk management responsibilities, in line with their growth principally out of the protection of public health. In future, these councils may need to embrace a 'more carrot and less stick' approach to incentivising change both in public behaviour and markets.

INCENTIVISING TRANSPORT CONNECTIVITY

Some local authorities have taken a proactive approach to incentivise a change. For instance, in London around 90 per cent of all car trips are less than 10km, meaning that almost all average day-to-day travelling can be easily accomplished with electric vehicles (EVs). The city already offers 1,400 charging points, with a target of reaching 6,000 by 2018. Some London boroughs also offer free or reduced-charge parking for EVs. Such local changes compliment national policies, such as the Plug-in Car Grant (up to £5,000) and a Plug-in Van Grant (up to £8,000) and absence

of vehicle tax for EVs. This is particularly important in the capital due to air pollution; however, it is questionable whether privately-owned electric cars offer the most efficient transport alternative, with good quality public transport still a necessary priority.

Innovation in industry can also be drawn upon by local authorities to create evidence bases for changes in transport delivery. For instance, Telefonica's Smart Steps analyses mobile data to estimate retail footfall, but has since been applied to support public decision-making about transport infrastructure. Newark and Sherwood District Council commissioned an analysis of traffic around the A46 / A1 interchange using this technology to build the case for a major transport infrastructure project.

INCENTIVISING TOWN CENTRE CONNECTIVITY

Often, the hard and soft infrastructure required to deliver these kinds of incentives requires creative partnerships with the private sector. This can involve a better use of local authority owned assets. Many councils own assets which can be used to secure smart outcomes. All aspects of urban infrastructure, from lampposts, to park benches can be used to improve connectivity. For instance, mobile phone reception can be enhanced by adding transmitters to park benches. Improvements in connectivity are essential to underpin public service and local economic transformations.

New York City has found a way to make the most of its network of over 7,500 pay phones by replacing them with new structures called Links. Each Link provides superfast, free public WiFi, phone calls, device charging and a tablet for access to city services, maps and directions. The project, 'LinkNYC' is delivered through a consortium of leading experts in technology, media, connectivity and user experience and is free to the public, as it is funded through advertising. It also generates annual revenues to New York City. Camden has now adopted this model, called Camden LinkUK.

Similar approaches have been taken across the UK. Newark and Sherwood District Council used a concession contract model to deliver free WiFi at no cost to the taxpayer. This approach works by attracting market investment to build wireless networks through the rental of street furniture assets,

which can be platforms for sensors that enhance connectivity. A wireless infrastructure provider will often design, build, operate and maintain a network because it generates a commercial return to that provider, enabling viability. Some councils have also negotiated as a condition of these contracts that WiFi is extended into community centres and sheltered housing schemes, reducing the potential for digital exclusion in economically marginalised groups. Watford, Newcastle, Edinburgh, Brighton and Hove, Birmingham, Cambridge, Nottingham and many others have taken this approach.

NEWARK AND SHERWOOD DISTRICT COUNCIL PUBLIC WIFI

In 2014 Newark and Sherwood District Council sought options to secure free public WiFi under a concession model, attracting market investment to build a wireless network in the town at no cost, and with the possibility of a small level of income. In collaboration with O2's R&D function, Newark and Sherwood District Council installed WiFi across their town centre in ways which were sensitive to the design requirements of conservation areas, such as the castle and market square. The cost of the equipment, its installation and ongoing maintenance costs are covered by O2. However, the Council coordinate and commission any maintenance and repair through their own contractor on behalf of O2. Through this, the Council are able to generate an ongoing income stream from O2.

INCENTIVISING OUT-OF-TOWN CONNECTIVITY

However, securing these outcomes is not always as easy in smaller towns and villages. One of the most significant costs in delivering high speed internet networks is ducting. Ducting is the physical infrastructure that carries the cables associated with digital technologies. To deliver ducting to every home, roads must be dug up and laid down right again straight afterwards. This costs on average £100 per meter depending on the location and how many ducts laid in the trench (this excludes the cost of the actual technology). In rural areas with low demand, this makes the argument for investment unviable in many instances.

To overcome these challenges, WiFi can be delivered from tall buildings in rural areas. Universal mobile connectivity is also important to deliver high quality public service transformation in rural areas, which can be more expensive to deliver due to transport challenges. High quality WiFi can be delivered without cables to a village if heavy duty transmitters are placed at the top of tall buildings. For instance, WiSpire uses the spires of parish churches across the Diocese of Norfolk as a platform to deliver high speed reliable wireless broadband internet to rural towns and communities. This has given schools, business and residential customers access to internet of up to 30Mbps within a 16km radius of the transmitters. It has also effectively commercialised the churches' assets, providing an income. When creating new public networks, local government should still consider data anonymity, data security and storage, advertising controls and network registration as part of the concession agreement. This is necessary to limit their liability.

Councils can also optimise their asset base to change local energy networks. For instance, Bristol[8] and Nottingham[9] have both established their own renewable energy companies, seeking to tackle fuel poverty by offering more attractive tariffs and supporting the businesses through making the most of their landholdings.

ENABLING TECHNOLOGY-LED INFRASTRUCTURE: SUMMARY

CHALLENGE	POTENTIAL SOLUTION
Local government self-perception that it deals with problems, rather than creates solutions.	Seek opportunities to harness assets (physical and regulatory) to platform increased connectivity and incentivise change.

8 See more at: https://bristol-energy.co.uk/
9 See more at: https://robinhoodenergy.co.uk/

DATA ANALYTICS

The fuel of smarter places is data, of which councils already possess great quantities. Data analytics can involve:

- **DATA BLENDING:** for the purpose of prediction, for instance, identifying the factors which most predict a child becoming NEET (not in education, employment or training) can enable earlier intervention, or intersecting data on meals on wheels and ice gritting trucks to ensure the most vulnerable can still be reached;
- **DATA ANALYSIS:** to identify relationships between causal factors in original ways;
- **DATA VISUALISATION:** for instance, dashboards which give policy makers multiple insights at one time, or websites which communicate with the public.

Good data analytics can empower staff, making their efforts more targeted. Further, it can be used to improve transparency, increasing public trust in government. As demonstrated in Chapter 2, data blending can be a hugely influential way to make services more targeted. This may harness data within councils, or from other partners. Technology can help to bring together data about the places in increasingly sophisticated ways. For instance, the French local authority of Courbevoie collaborated with ENGIE[10] and SUEZ Environnement to design Cit'EaseTM, an interactive control panel that centralizes every type of urban data, from energy to water, waste, mobility, noise, security and the living environment. This offers councillors, technical managers and local stakeholders an overview of every aspect of every urban issue to enable more effective management of the city.

However, integrating data about service users as opposed to place-based variables can be more complex, as authorities continually struggle to balance respecting the sensitivity of personal data while also using it to work more collaboratively.

10 This is part of ENGIE's Cities of Tomorrow Programme, which aims to accelerate the development of integrated infrastructure, efficient services and smart digital solutions by developing innovative, cross-cutting solutions.

CHALLENGES OF DATA SHARING

Our workshops participants highlighted that there are currently restrictions on data sharing between council departments,[11] which can create hesitation within councils to work beyond silos and make more targeted interventions. Further, recent research has found that there is a tension between the requirements of the new EU General Data Protection Regulation (GDPR) and the Digital Economy (DE) Bill which could increase confusion and further undermine efforts towards data sharing. The GDPR, due to come into force next year, places an emphasis on giving people control over their personal data; while the DE Bill, currently going through Parliament, has attracted complaints that it is too relaxed around data sharing, particularly when used to improve public services and combat fraud. In a survey conducted by Civica, two-thirds of local government respondents anticipated that these laws conflict with each other,[12] with a quarter saying it could be serious. One major problem may be that the two sets of regulations use different terminology, increasing confusion.

It is also clear from our research that there is a great amount of data potential held by external organisations. The third sector and the private sector can be a great source of information to create more targeted services. In future, places may seek to better identify and collate this information to create the social networks needed to begin discussions about where data collaborations could be useful.

CONCERNS ABOUT OPEN DATA

The time, skills, and resources councils have to do data analytics has reduced with budget cuts. While there are a number of exciting data projects happening in councils across the country,[13] our research suggests

11 DWP (2014) Guidance for local authorities on the use of social security data. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307156/data-sharing-guide-april-14.pdf

12 UKAuthority (2017) New Data Legislation & the Public Sector. Civica. Available at: http://www.ukauthority.com/NewsImages/2017/New_Data_Legislation_and_the_Public_Sector.pdf

13 Research shows that councils are making better use of data than ever before, but still face time and skill constraints. Symonds, T. (2016) Datavores of Local Government. Nesta. Available at: http://www.nesta.org.uk/publications/datavores-local-government

that to overcome resource constraints and to become more collaborative, local government may become more open and share data with communities, other public sector partners, and the private sector allowing for the collective creation of solutions. The discussions held at our workshop events suggested that there are several forces holding local government back from publishing their existing data. These include:

- a fear that new problems will be identified without the resources to respond; and
- existing data not being in a condition to share, and the lack of time and resources to clean it.

As one workshop participant argued,

> *'dirty data is dirty on paper or digital – one way or another, we have to clean it up.'*

Camden has embraced this and invested the necessary resources to publish the most datasets of any London Borough, with information about planning, parking, health, environment, and the Council's processes and operations available on the website.[14]

TOWARDS OPEN APPROACHES

More and better data does not have to be a problem for the council alone, if this data is shared and solutions sought collectively. Camden have hosted a hackathon to bring in the expertise of members of the community, and businesses to better understand social problems and identify solutions. Westminster has also hosted a 'hack homelessness' day, targeted at preventing digital exclusion.

14 See https://opendata.camden.gov.uk/

CAMDEN COUNCIL AND BIG INNOVATION CENTRE HACKATHON[15]

In 2013, innovation specialists, Camden Council leaders, data engineers, programmers and data analysts came together at Google London Campus to consider future demands and challenges in health, social housing, and the use of street presence teams. Data made available on the day came from the Council, and publicly available data at the council level (such as census data). This public-private, cross-industry hackathon demonstrated that bringing people together with different skills and insights is an effective way to unlock the potential of largely unexplored datasets. The event delivered Camden Council workable tools to build on such as:

- *a tool to simulate and better target social housing repairs;*
- *a tool to demonstrate the performance of the street cleaning teams;*
- *an application for the street presence teams that allows them to identify venue licencing infringements; and*
- *analysis and identification of key health issues that Camden Council's health services will need to be prepared for in the next 10-15 years.*

Camden Council's staff members were able to identify which data quality issues (e.g. connectors, missing data, data formats) caused the greatest difficulties to the exploitation of the data; and receive practical suggestions on realistic ways to fix the data quality issues (e.g. consistency of the format, geographical consistency and the type of connectors needed to link datasets).

In places which are pushing the development of smart capabilities, councils have partnered with universities to create Open Data Institutes. For instance, 'Bristol is Open' is a joint venture between the University of Bristol and Bristol City Council. This data institute oversees all projects within their

15 Sousa, S. (2013) Lessons learnt from a public–private big data hackathon. Big Innovation Centre.

'Programmable City' which hopes to share the information gleaned from sensors to respond in real-time to everyday events including congestion, waste management, entertainment, e-democracy, energy supply and more.[16] All of the hardware and software abides by OpenFlow standards – meaning that the information generated by the new technology remains accessible to all. Milton Keynes also has a data hub, supporting the collection, integration and use of large amounts of data from many diverse resources relevant to city systems.[17]

Using this data, local businesses can develop technology which can tackle problems. For instance, FixMyStreet[18] used local government boundary data to create a reporting tool for potholes and abandoned cars. However, publishing data is only useful if people have the skills to use it and create new smart products. Therefore, education is an important soft-incentive to bring about cultural change. With this in mind, Manchester City Council and the London Borough of Camden offer coding education for students and adults.[19]

This demonstrates how working with local businesses and wider communities can open up the policy making process, while also leveraging the assets of other partners to ensure data is made the most of. This approach can also help to tackle public perceptions that the data revolution means more surveillance. The best way to address this perceived power imbalance is to become more transparent internally, and abide by open data standards.

For instance, Amsterdam, Manchester, and Barcelona have adopted a 'smart citizen' approach - placing sensors across the urban landscape and sharing datasets with residents, who can then use the data to generate their own analysis, strategies and policy solutions. Sensors monitor carbon monoxide (CO); nitrogen oxide (NO2); temperature; humidity, light and sound. This kind of data can be used to develop mobile phone apps which allow, for instance, pregnant women to avoid areas of high air pollution at different times of the day, allowing residents to respond to changes in the atmosphere in real time.

16 See more at: http://www.bristolisopen.com
17 See more at: http://www.mksmart.org/data/
18 See more at: http://www.FixMyStreet.com
19 Digital Manchester Update (2012) Available at: http://www.manchester.gov.uk/download/downloads/id/21338/digital_manchester_update_2012.pdf

Smart capabilities not only improve people's relationship with the built environment, but can also improve people's understanding of their own health. Manchester's CityVerve project involves a network of sensors in parks and along commuter routes which can encourage people to do more physical activity. In the future, personal devices could be synced with these sensors to record people's physical activity, and even exposure to toxins – such as air pollutants. This could dramatically improve the quality of medical research on diseases such as asthma, and increase individuals own awareness of how their interactions with space affect their wellbeing.

ENABLING DATA ANALYTICS: SUMMARY

CHALLENGE	POTENTIAL SOLUTION
Knowing where to find information which could make services more targeted	Council-led creation of a local network of social data-holders, with an inventory of the kinds of information which each agency keeps
Time and skills in house to carry out data analysis	Publish data and enable events which combine data analysis with collaboration as part of a wider strategy for co-production
Public concern about increased surveillance and use of personal data	Equalise transparency with open data standards and ensure data security in all concession contracts

NETWORKS

The internet and other forms of information communication technology are not intuitively associated with the local, or promoting concepts of localism. It is as easy to connect with a neighbour as someone living on the other side of the planet. However, people are as likely to use these technologies to build local networks as global ones. For local government, the greatest

potential of networked technology is the platforms which can be built upon it, to build social networks and improve the control people have over places, and engagement they have with each other.

Our research suggests that in the future, councils will want to do more to help people to help themselves, and to help each other. Networks are one way to do this. Councils therefore need to establish platforms which allow them to have more transparency with residents, and platforms which enable people to see the 'human side' of smarter places by being better able to communicate with each other.

> *'The best smart capabilities make people feel more empowered, and change people's sense of ownership and belonging'* Workshop Participant

One way to do this is by harnessing platforms. Platforms allow a network of individuals (as with Twitter or Facebook) to exchange information, or networks of organisations and providers (as with Amazon or Ebay) to exchange goods and services, to be better seen by a public audience. Access to these spaces is usually broadly open, with a few rules of play being set by the hosts. Platforms have become popular models in the private sector to capture the wisdom of crowds, and move away from more hierarchical models of decision-making.

DEVELOPING A SENSE OF PLACE AND COMMUNITY OWNERSHIP

Local authorities may use this to make their places more participatory. For instance, crowdsourcing and crowdfunding both rely on platforms which allow information, ideas and resources to be sourced from a network, rather than relying on a hierarchy. With this in mind, some London Boroughs have used Spacehive,[20] a crowdfunding platform, to identify projects for their grant programmes, developing the diversity of the community business market. This allows councils to work with third parties to collate and advertise a range of possible community projects, for these projects to be voted for by the public, and collectively owned at the point of funding.

20 See more at: https://www.spacehive.com/

These network platforms have been used to deliver a range of quirky urban installations, and can even be used to deliver network infrastructure. Following a successful crowdfunding campaign in 2012, the town of Mansfield launched the then biggest free public WiFi access zone in 2013, drawn from 42 hotspots.[21] However, this was funded largely by local businesses. Crowdfunding has also been deployed by communities seeking to break through the inertia of public policy and private monopolies in telecommunications. For instance, F4RN (Fibre for Rural Nottinghamshire, a Community Benefit Society) has connected two villages which were omitted from the county's original Rural Broadband scheme, offering fibre connections with 100mbps synchronous speeds. The fibre takes routes through field margins and gardens to minimise the amount of expensive roadwork.

Future Cities Catapult are currently completing a programme on the 'Future of Planning',[22] which considers how these kinds of technologies can be used to improve transparency and community engagement in processes of urban renewal.

OPTIMISING ASSETS

Some local authorities are also using digital platforms to more directly alter the nature of asset ownership by encouraging people to share 'time, space and stuff'. Comoodle[23] was set up by Kirklees Council to improve the local sharing culture, encouraging people to look out to each other to meet needs, making them more connected to the resources of a place. This allows people to register an interest in giving or receiving time (for instance, plumbing skills), space (for instance, land to grow vegetables on) and things (for instance, vans). In line with the original principles of the sharing economy this all works on a not-for-profit basis. Recent research has shown that while only one in ten adults have participated in the sharing economy over the last year (2016), a quarter who have not done so would like to.[24]

21 See more at: http://www.mansfield.gov.uk/article/5134/Free-Wi-Fi-launched
22 See more at: http://futurecities.catapult.org.uk/project/future-of-planning/
23 See more at: http://www.comoodle.com/
24 Clarke, A. (2016) 'Younger generation adopting sharing economy platforms for social benefit, not just profit' Available at: http://www.charitydigitalnews.co.uk/2016/11/03/younger-generation-adopting-sharing-economy-platforms-for-social-benefit-not-just-profit/

CREATING ALTERNATIVE LOCAL CIRCUITS OF VALUE

Several workshop participants felt that the best way to encourage people to engage with smart capabilities was by starting conversations about things which matter to them. Lewisham did this by creating an app, Love Lewisham, which allows people to report environmental damage to the Council.[25] In Hull, a more ambitious and innovative approach was taken, to begin a new conversation about what people valued, on the back of conversations about council tax.

HULL CITY COUNCIL, HULLCOIN

As a city struggling with a low wage, high welfare economy, many residents in Hull began to suffer from extreme poverty after the 2008 recession. This was exacerbated by welfare reforms. In 2010 two Hull City Council employees set about creating a form of local economic currency, HullCoin to try and tackle the problems this presented.

HullCoin was built using Blockchain technology. Blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. The ledger itself can also be programmed to trigger transactions automatically. This networked technology allows for decentralised database management and is a very safe way to operate a financial system.

HullCoin enables people to earn credit in return for carrying out voluntary work. The HullCoins can then be spent with merchants who have signed up to the scheme or even used to help pay council tax or rent. In this way, it seeks to create a virtuous cycle of social and economic vitality.

IMPROVING DIGITAL LITERACY

A concern about smarter places raised in the workshops was digital exclusion. This is particularly relevant to 'channel shift' in relational public services – involving a change in service delivery from transactions being

25 See more at: http://www.lovelewisham.org/Home/About

carried out face-to-face, to online.[26] However, as outlined by the examples set out above much of the potential of smarter places is in delivering new outcomes, which may as a bi-product reduce need, rather than change the way existing need is met. Nevertheless, for all citizens in a place to benefit from these gains, councils should work to improve digital literacy. To resource this, Lancashire County Council have successfully delivered Go On Lancashire – an initiative which seeks to deliver their Digital Skills Charter, which seeks to improve basic digital skills through:

- committing to improving digital services for all citizens;
- helping public sector colleagues and the community to achieve the basic digital skills they need;
- making a commitment to the public, to inspire and motivate others to sign up and play their part.

Funding for this has been sourced from the public health budget, NHS England, district council funding, grant funding and the collaborative resources of the department for work and pensions, housing associations, Citizen's Advice Bureau, and local police service. This demonstrates that creative financing and collaboration are important to securing change

ENABLING NETWORKS: SUMMARY

CHALLENGE	POTENTIAL SOLUTION
Limited resources to create platform technology	Partnerships with the community business sector and charitable funders
Ensuring everyone can participate in the benefits of smarter place governance	Beyond publishing open data, councils should work with other local partners to improve digital literacy

26 Beresford, M. (2014) Smart People Smart Places: Realising Digital Local Government. NLGN. Available at: http://www.nlgn.org.uk/public/wp-content/uploads/Smart-People-Smart-Places.pdf

3 DELIVERING TOMORROW'S PLACES

Beyond enabling others to act, councils have a role in shaping markets and outcomes through procuring smart capabilities. What makes tomorrow's places so exciting is that what the combination of technology, data, and networks can achieve is unknown until collaborative and creative discussions are held. Unfortunately, this is also what makes tomorrow's places difficult to write a procurement specification for.

Our research found that local government see the delivery of tomorrow's places as part of a wider strategy to develop their commercial skills, and reform their relationship with markets. Most significantly, all parties involved in the delivery of tomorrow's places need to put 'skin equity' in the game. This section considers how councils can more effectively procure and provide smart capabilities, by looking at the role of:

- Outcomes-based commissioning
- Innovation Partnerships
- Innovation at Scale

OUTCOMES-BASED COMMISSIONING

> *'The question is, do we have to tender it – and if we do, what do we even want from it?'* (Interviewee)

In order to achieve the integration benefits of smart capabilities, and allow the development of local talent in the delivery of smart social innovation, procurement strategies should be underpinned by commissioning cycles which are outcomes-based. To ensure that markets are given space to come up with the most innovative solutions, it is important that strategies move from prescriptions which are silo-based to holistic.

> *"We need to move from 'we want a road' to 'we want residents of all abilities to be able to travel from A-B, with positive impacts for health and wellbeing'* (Workshop Participant)

At the moment, local authorities are hesitant to engage in outcomes-based commissioning, despite recognising that over-specification limits creativity. Our workshop participants suggested that this is because of bad previous experiences with companies, whereby providers have charged for un-specified developments later down the line. As the nature of many smart capabilities means that their full trajectory is unknown, this creates problems. Further, some reported that providers are cautious to engage in outcomes-based contracts, due to the uncertainty. This in turn limits the agility of technological projects and programmes.

With this in mind, the culture of collaboration in public-private innovation needs to change in order for socio-technical innovation to progress.

> "Everyone – public and private – in the smarter places space needs to put more skin in the game to get this off the ground. We need a complete culture change by the private sector – and in local government, so that the risks are seen as collective" (Workshop Participant)

Our research suggests that part of this culture change may be brought about by a simplification of council language, mandating interoperability standards and the personalisation of data ownership.

SIMPLIFIED COUNCIL LANGUAGE

A simplification of council language in commissioning and procurement will enable greater innovation in smart places markets. This is supported by the former Head of GDS, Mike Bracken, who argues[27] that if government does not become simpler, suppliers will be rent-seeking; services will remain in silos; technology prices will continue to rise in time of freefall; and change will take far longer. Making languages and processes simpler may also help increase the accessibility of contracts to businesses who could provide the smart capabilities of tomorrow's places.

27 Bracken, M (2014) 'On Policy and Delivery'. Available at: http://mikebracken.com/blog/on-policy-and-delivery/

INTEROPERABILITY STANDARDS

Interoperability means a product or system is designed to work with other products or systems, present or future, in either implementation or access, without restrictions. This makes it possible for all components of the 'internet of things' to communicate with and connect to each other – and most importantly, for independent innovators to be able to create solutions which are competitive. This is particularly important for electric car charging points, which can leave drivers stranded if they do not have universal sockets.

Westminster City Council have insisted that their Smart Parking Sensors are interoperable. This means that eventually, an app for parking across the whole of London could be developed. But more importantly, it means that technology that generates data in different service delivery silos can be brought into single data processing applications.

WESTMINSTER SMART PARKING APP

Drivers in the City of Westminster circle for an average of 12 minutes to park, contributing to congestion and pollution. A Smart Parking installation connects sensors in the parking spaces to a central data platform, allowing drivers to see the availability of a space using an app. The technology consists of SmartEye battery-powered wireless infrared sensors in each parking bay which communicate with nearby wireless receivers (installed on powered street furniture e.g. streetlamps).

The Council has insisted on open APIs (Application Programming Interfaces) which mean that the technology is interoperable. This means independent innovators will be able to develop their own smartphone apps that use the Westminster data and in time, for an app to be developed covering the whole of London.

Councils have been hesitant to adopt 'open standards'[28] mandating interoperability because of concerns about data privacy. However, this can be remedied by the personalisation of data ownership.

DATA CONTROL AND PERSONALISATION OF DATA OWNERSHIP

Councils face huge challenges in getting service providers to share the data generated from smart service programmes, and to make this information open to the public. Further, they are often unaware of what data different agencies hold which could be useful. This misses the opportunity to maximise the potential benefits of the smart places agenda – open data would allow better public scrutiny of contracts, and more evidence-based future commissioning. Further it would increase public confidence in smart capabilities.

In future councils will focus on giving individuals control over their own data. This has already been trialled in the area of personal health records (PHR) - an individual's electronic record of health-related information that conforms to national standards and can be drawn from multiple sources while being managed, shared and controlled by the individual. Estonia has taken this to the next level, giving all residents a digital citizenship profile.[29] This gives citizens control over their data, not only being able to see all of the records the state keeps about them, but also which government agencies have looked at their profile and giving them the option to share any of their data with third parties.

This could also extend into areas like private purchasing – making individuals more aware of their dietary habits by letting them review their consumer profile in the same way private companies can do. HM Government investigated developing a scheme like this in 2011, called MiData. Such moves would allow people to feel in control of the data that is collected about them. Data personalisation makes it possible for individuals to decide whether to share, or sell, their data to commercial providers. With effective measures in place for data personalisation it is easier for authorities to mandate open standards in new contracts.

28 The Local Government Digital Service Standard advocates for open standards in all new smart infrastructure.

29 See more at: https://e-estonia.com/e-residents/about/

OUTCOMES-BASED COMMISSIONING: SUMMARY

CHALLENGE	POTENTIAL SOLUTION
Silo-based decision making	Adopt outcomes-based commissioning
Ongoing innovation and development of the market	Mandate interoperability in contracts
Complexity of government processes	Simplify processes and language
Data ownership concerns	Support shift towards personalised data ownership

INNOVATION PARTNERSHIPS

Our research indicates that beyond commissioning approaches, specific procurement models can create a stumbling block preventing the delivery of smart capabilities for tomorrow's places. For more creative approaches which harness the full potential of collaboration between different parties, newer models of partnership should be adopted. To realise the potential of smarter places, councils should embrace newer models of procurement to allow them to change the character of their relationship with delivery partners, moving from a role as repeat purchasers of services, to vendors of opportunity and co-producers of change. They can do this by:

- Engaging in innovation partnerships
- Harnessing expertise through incremental partnerships

Under conventional – and most widely used models of procurement – 'open' and 'restricted' procedures (see Appendix 2) the authority has to know what it is asking for before it goes to market. While these approaches have become less preferred across the majority of Europe,[30] they remain the most commonly

30 European Commission, (2014) Public Procurement as a Driver of Innovation in SMEs and Public Services. European Union.

used approaches in the UK[31] often coupled with Framework Agreements. This can prevent innovation and the ability to think creatively about solutions, by preferring established ways of working, while also limiting some parts of the market from accessing contracts.[32]

With this in mind, procurement models which allow providers of all sizes to share their own knowledge and expertise with local authorities, to fully understand their needs are required. Organisations which work internationally and have extensive experience are able to bring a wealth of experience to the table, helping to predict and prevent problems when new technology is being applied in different contexts.

The Public Contracts Regulations 2015 introduced the 'competitive dialogue' and 'negotiated' approaches (see overview in Appendix 2) to allow for innovation partnerships. These should be used where there is a need for the development of an innovative product or service or innovative works and the subsequent purchase of the resulting supplies, services or works cannot be met by solutions already available on the market. Under these arrangements, a local authority can select partners on a competitive basis and have them develop an innovative solution, tailored to their requirements.

These partnerships can be set up with one partner or with several partners conducting separate research and development activities. The partner(s) then develop the new solution, as required, in collaboration with the local authority. During several stages of research and development the number of partners may gradually reduce. This means companies have to put 'skin in the game' and risk investing in developing ideas with a council, without the guarantee that they will win a contract. As business rates become localised the incentives for local firms to do this will potentially improve, as the delivery of better services creates a virtuous cycle of happier, healthier and more productive residents.

Innovation Partnerships can also be used to develop strategies for procurement, rather than procure directly. This is particularly important to

31 HE, C. (2015) Current status of public procurement in the UK. Proceedings of the Loughborough School of Business and Economics (SBE).
32 BIS (2013) The Smart City Market: Opportunities for the UK.

harness the knowledge of universities. For instance, the Royal Borough of Greenwich have partnered with the University of Surrey's 5G Innovation Centre to identify standards for the development of smart places applications.

INNOVATION PARTNERSHIP BETWEEN THE ROYAL BOROUGH OF GREENWICH AND THE UNIVERSITY OF SURREY

The Royal Borough of Greenwich have partnered with the University of Surrey's 5G Innovation Centre. They will share technical and regulatory expertise with the local authority to set out new standards and consider the infrastructural, regulatory and technical requirements of the 'Internet of Things' and data sharing.

Some private companies are also demonstrating a willingness to put 'skin equity' into developing tomorrow's places. For instance, ENGIE has established an Urban Strategy Council to take a multi-disciplinary look at urban issues in order to contribute to the construction of tomorrow's liveable city. Comprised of representatives from a range of multi-national research organisations such as UN-HABITAT, the World Council for Sustainable Development, and World Future Foundation this gives the organisation a wealth of knowledge which they could bring to partnerships with councils to develop collaborative solutions.

INNOVATIVE PROCUREMENT: SUMMARY

CHALLENGE	POTENTIAL SOLUTION
Standard procedures stifle creativity and demand that outcomes are known before ideas have had the chance to develop	Adopt newer models of procurement, including competitive dialogue or negotiated procedures to make the most of innovation partnerships

Lack of knowledge on what the details of procurement should be for new smart capabilities	Partner with universities to develop new, locally-embedded standards and best practice data
Finding necessary data to justify new procurement for tomorrow's places	Draw on innovation in industry to find new ways to monitor and evaluate performance

INNOVATION AT SCALE

To achieve the goals of place-distinctive and a 'home-grown' digital sector, local authorities may work together, using shared and joint procurement. Joint procurement allows councils to pool resources in procurement of smart capabilities. The UK leads Europe in joint procurement practice[33] and by 2010 the country was already saving some £280 million through joint commissioning, through around 325 shared-service agreements.[34] By working together to scale and integrate their services, councils can maintain and even improve outcomes while reducing costs. An estimated 1.8 billion in staff savings could be made by collaborative procurement approaches.[35] Joint procurement can help:

- Scale good local initiatives.
- Attract more bids and greater competition from the market.
- Reduce procurement costs making more innovative models more viable.
- Increase the efficiency of applications for market actors through single portals.

There are a number of different models of joint procurement, suited to different types of smart-innovation and different types of service.

33 European Commission (2008) Joint Procurement Fact Sheet http://ec.europa.eu/environment/gpp/pdf/toolkit/module1_factsheet_joint_procurement.pdf

34 LGA (2010) Place Based Budgets: The Future Governance of Public Services. http://www.local.gov.uk/c/document_library/get_file?uuid=c698bbfb-855c-430b-bbbd-2e727257aea6&groupId=10180

35 Communities and Local Government Committee (2014) Local Government Procurement. HOC, Sixth Report of Session 2013-14. http://www.publications.parliament.uk/pa/cm201314/cmselect/cmcomloc/712/712.pdf

- **ONE-OFF JOINT SERVICE AGREEMENTS:** Retain individual procurement teams, no requirement for structural reform. As this does not require local authorities to share a procurement service, one of the authorities involved will often take 'the lead' and contract on behalf of the involved contracting bodies.
- **SHARED PROCUREMENT PARTNERSHIPS:** Offer efficiency savings, and build trust between local authorities, creating connections which could underpin later, more systemic unification. This does not necessarily mean that the partner councils are unable to do their own independent procurement, as these partnerships may focus on a few key cross-borough services only.
- **COMBINED AUTHORITIES:** Create opportunities for seamless integration of multiple services over a functional economic area. A combined authority can be comprised of any two or more local authorities, which take on functions transferred to them by the Secretary of State.

For instance, large capital investment projects – such as energy generation from waste, a political priority following the introduction of the landfill tax – are well suited to one-off shared service arrangements. Combined authorities in contrast may be the best model to develop integrated transport policies. While austerity tends to result in more centralised procurement practices – a trend seen across the EU since 2008 – here devolution deals have handed down new procurement responsibilities.

SCALING COUNCIL BUSINESS

The findings of our workshop suggest that some local authorities are hesitant to procure for smart capabilities, because they feel this stymies the development of in-house skills. With this in mind, and reflecting the impetus to find more self-sustaining models of public service delivery in the lead up to 2020, some local authorities are creating council-owned companies, (Local Authority Trading Companies) to deliver change, in local markets for smart solutions, or undertaking acquisitions of SMEs (small and medium-sized enterprises), taking advantage of relatively good conditions for capital expenditure. Both Bristol and Norwich have created their own

energy companies. This can allow them to manage demand and make efficiency savings, and allow councils to reinvest profits by selling products or innovations to other councils.

SCALING MARKET INTEREST

Another advantage of joint procurement is that larger contracts can attract more interest from the market, drawing in 'the unusual suspects'. Many smaller districts have joint arrangements for procurement. For instance, Havant Borough Council and East Hampshire District Council have a combined management team, with some cross-borough services, including environment and waste. They found that procurement at this scale can generate more interest from a wider range of market actors, increasing bids sevenfold.[36]

Beyond staff savings within councils, having joint portals makes the procurement process far more efficient. Filling out multiple pre-qualification questionnaires (PQQs) can be resource-intensive particularly for smaller firms.[37] In turn, standardising PQQ demands can help support smaller companies.[38] Transport for Greater Manchester, which combines procurement for transport across the whole authority, now use an E-Tendering system called Pro Contract for all procurement activity.

SCALING DATA

Partnerships can also allow for smarter data analytics, which can result in better commissioning and outcomes for service delivery. For instance, the West London Alliance, a partnership of nine boroughs, was able to pool expenditure and attain data on demand for children's services to create more sophisticated commissioning strategies across the region. Through this, they worked with children's home providers to develop the

36 Havant Borough Council, Cabinet Meeting 10th December 2014. Reletting the corporate services contract. http://havant.moderngov.co.uk/documents/s9533/Corporate%20Services.pdf

37 Federation of Small Business (2012) Local Procurement: Making the most of small businesses.

38 BIS (2013) Smart Cities: Background Paper. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf

marketplace, hosting provider forums which allowed commissioners to present the latest placement trends and for providers to promote their services to Placement Officers from each of the nine local authorities.

DELIVERING AT SCALE

Working with larger companies is often necessary to deliver innovation at scale.[39] Using mechanisms such as 'Incremental Partnerships', local authorities can benefit from the knowledge and expertise of major technology companies, such as IBM or ENGIE, while also supporting programmes which develop local skills in IT.

ENGIE AND CHESHIRE WEST AND CHESTER COUNCIL

ENGIE has worked in partnership with Cheshire West and Chester Council to form a joint venture company to deliver customer and integrated workplace management services across the Council's estate. As part of the initial 10 year partnership, over 300 Council employees have transferred to the new company. ENGIE has committed to investing £3 million in the Council's IT infrastructure to improve and extend online access to council services. This partnership also includes a Community Interest Company (CIC) that will reinvest a percentage of the profits into learning and development in the local community. This will involve an investment in learning and development through at least 65 apprenticeships, 20 graduate placements and 1,000 hours of work experience opportunities for local young people.

39 Building Schools for the Future, An opportunity to personalise learning and fundamentally re-think the business of education, Version 2.0 Final. Prepared by Andy Ellis, Microsoft for Kent County Council.

SCALING INNOVATION: SUMMARY

CHALLENGE	POTENTIAL SOLUTION
Engaging in new more innovative procurement models is costly	Joint procurement using either one-off service agreements, shared procurement partnerships, or combined authority collaborations
Scaling local SMEs and Local Authority Owned Companies to support local economic growth and cross-subsidise service delivery	

CONCLUSION AND RECOMMENDATIONS

This report has demonstrated that despite short-term constraints, councils can significantly improve outcomes for tomorrow's places if they effectively collaborate with others to deliver the full potential of technology-led infrastructure, data analytics, and networks. Places can become more environmentally sustainable, services more integrated, councils more transparent, and people more empowered.

To deliver these changes, councils do not necessarily have to invest large amounts of human or financial resources. But they do have to change the way they work. With this in mind, we make the following recommendations.

LOCAL GOVERNMENT

HARNESS PHYSICAL AND REGULATORY ASSETS TO DELIVER IMPROVED CONNECTIVITY AND INCENTIVISE BEHAVIOUR CHANGE:

To deliver the places of tomorrow, physical networks must be created to simultaneously decentralise, and connect. One way councils can deliver improvements in WiFi and telecommunications connectivity at no cost is by leveraging their existing asset base, and taking advantage of concession contract model approaches. When delivering public WiFi in this way, councils should consider advertising controls, data protection, their liability and issues of public health. In the future, councils will need to adopt a more interventionist approach to incentivise changes in public behaviour and shape local markets in smart solutions to meet needs.

COLLABORATE TO CREATE AN INVENTORY OF PLACE-BASED INTELLIGENCE

For the full potential of data to be harnessed, what is already and becoming available across the public, private and third sector should be identified. Through data warehousing across different departments within the council and identifying partners with useful data in the third and private sector, a database of organisations, and the types of information they hold can be developed. By creating a platform for the various data-enablers in a place, potential partnerships and data collaborations can be identified.

WORK TOWARDS MORE OPENNESS IN DATA COLLECTION, DATA ANALYSIS AND PLACE-BASED DECISION-MAKING

Encourage greater participation in processes of place governance by building platforms which allow people to take part in decision-making, generate data and increase local community engagement. Where investments are made in smart infrastructure which creates data, share this openly to increase opportunities for innovation. Hackathons can be used to identify and explore where new data relationships could beneficial, within the existing legal parameters for sharing.

SUPPORT WIDE REACHING PARTICIPATION IN THE USE OF SMART CAPABILITIES

While channel shift to digital can present challenges surrounding exclusion in the delivery of relational services, many of the opportunities presented by smart capabilities for places are not about channel shift, but the delivery of new opportunities to engage and empower people. Nevertheless, efforts will still need to be taken to encourage and enable everybody to participate and share in the benefits. Councils should identify local needs for digital literacy education and create systems to respond to this. This may be resourced directly by savings made to council budgets as a result of the use of smart capabilities elsewhere, or indirectly, through platforms which enable community self-help or collaboration with the wider public and third sector.

Councils could also encourage businesses to include this as an objective of their place-based corporate social responsibility offering.

ESTABLISH A CLEAR SET OF POLICY PRINCIPLES AND PRACTICAL GUIDANCE FOR THE DEVELOPMENT OF SMARTER PLACES

To achieve this councils need to simplify council language and processes about place-shaping, in areas such as environmental management, transport, waste and planning; and safeguard openness in new hardware and software, by developing a clear set of policy principles which give the public and markets guidance on:

- Data management and privacy
- Interoperability
- Possibilities for partnership working

DEVELOP RELATIONSHIPS WITH PARTNERS TO DELIVER CREATIVE AND BETTER SOLUTIONS WHICH DELIVER STRONG PUBLIC BENEFIT

Adopting more creative models of procurement can allow councils to better understand what the market has to offer. Partnerships with universities can help to deliver better data use and intelligence sourcing, and joint ventures with major companies can be used to work through incremental changes.

SHARE EVIDENCE OF BEST PRACTICE AND OF FAILURES OR MISTAKES

For local political appetite for change to grow, the benefits of change must become more recognised and documented. Monitoring and evaluation of the benefits of smart capabilities should be shared within knowledge exchange networks. Councils should also be prepared to share stories about mistakes and project shortcomings with peers, to prevent these from happening elsewhere.

CENTRAL GOVERNMENT

This report has demonstrated that councils can do much in-house to deliver tomorrow's places. However, our research suggests that there are some steps which could be taken by central government to reduce barriers to systematic change. These are shown below.

CENTRAL GOVERNMENT SHOULD CREATE A LEGAL FRAMEWORK WHICH SUPPORTS PUBLIC CONTRACTS TO MANDATE INTEROPERABILITY OF HARDWARE FOR SMART PLACES

While councils in places with more competitive economies can make difficult demands of suppliers in procurement, this power is not held across the country. To ensure that the smart-places market develops evenly across the country, central government should create a legal framework that supports all public contracts to mandate interoperability of new smart capabilities. This will create an equal playing field for creators and purchasers of these new technologies.

CENTRAL GOVERNMENT SHOULD PROMOTE AND SUPPORT RESEARCH WHICH WILL LOOK AT CHALLENGES SURROUNDING THE GREATER PERSONALISATION OF DATA OWNERSHIP

As connections between devices grow under the 'internet of things', the extent of personal data captured in cloud storage will grow. Central government should promote and support research which will look at challenges surrounding the greater personalisation of data ownership to identify how this should best be managed, and be used to develop schemes which increase individual control over their data history.

CENTRAL GOVERNMENT SHOULD ENDEAVOUR TO RESOLVE TENSIONS AND INCONSISTENCIES BETWEEN THE GENERAL DATA PROTECTION REGULATION AND DIGITAL ECONOMY BILL

Current conflicts between these two emergent pieces of regulation are creating confusion and uncertainty within the local government community which may stifle progress in data sharing. To overcome this, government must resolve the conflict between the two items of policy and ensure that there is consistency of language.

APPENDIX 1: CHECKLIST

OBJECTIVE	POTENTIAL ACTION	
Delivering Technology-Led Infrastructure	Seek opportunities to harness assets (physical and regulatory) to platform increased connectivity and incentivise channel shift	✓
	Council-led creation of a local network of social data-holders, with an inventory of the kinds of information which each agency keeps	✓
Optimising data from within and beyond the council walls	Publish data openly and facilitate events which combine data analysis with change-making as part of a wider strategy for co-production of place	✓
	Try to equalise transparency with open data standards and ensure data security in all concession contracts	✓
	Support shift towards personalised data ownership	✓
Empowering people, giving citizens ownership over place and creating virtuous circuits of social value	Use and create platforms which encourage transparency of council processes, and the development of connections within the community	✓
	Partner with the community business sector and charitable funders	✓
More creative solutions to place based problems	Adopt outcomes-based commissioning	✓
	Mandate interoperability in contracts	✓
	Simplify processes and language	✓
	Adopt newer models of procurement, including competitive dialogue or negotiated procedures to make the most of innovation partnerships	✓
Clearer understanding of what is possible to achieve	Partner with universities to develop new, locally-embedded standards and best practice data	✓
	Draw on innovation in industry to find new ways to monitor and evaluate performance	✓
Efficient procurement processes which can scale innovation and deliver innovation incrementally	Joint procurement using either one-off service agreements, shared procurement partnerships, or combined authority collaborations	✓
	Incremental Partnerships can support councils to make the transition to new IT infrastructural arrangements while making significant efficiency savings	✓

APPENDIX 2: MODELS OF PROCUREMENT

PROCEDURE	CHARACTERISTICS	WHEN THE PROCEDURE IS ADOPTED
Open	All qualified applicants must be given the opportunity to bid	Used for lower risk procurement where there is a developed market and a good chance of attracting lots of potential providers.
Restricted	Two stage process with facility to shortlist (PQQ + Tender)	Used where capability of supplier is key determining factor but market is too large to allow short listing. Minimum number of tenders is 5. This allows preferred provider lists to be kept, listing organisations which have passed e.g. legal and financial stability tests.
Negotiated	Two stage process with facility to negotiate at second stage	Specification is not clear or some creative, artistic or expert input is required. Negotiation is with a single or few selected providers. Minimum number of tenders is three. However contract does not have to be advertised in some circumstances (e.g. artistic reasons/protection of exclusive rights, absence of tenders for previous invite, need for extreme speed).
Competitive Dialogue	Two stage process with facility to enter into a dialogue with potential suppliers to consider potential solutions and refine specification before invitation to tender	Complex procurement where suppliers' expertise has a significant impact on the development of the specification. Allows purchasers who do not know in advance what is needed to engage suppliers in discussion about best technical, legal and financial solutions for them, allowing for innovation. Specifications are developed on the basis of the dialogue.
Framework Agreement	Call-off or mini competition amongst preferred suppliers (selected from open/restricted procedure)	Framework agreements are used in the case of repeated purchases to choose suppliers that, when the time comes, will be able to meet the purchaser's needs. Frameworks may be used in conjunction with any procurement procedure.

APPENDIX 3: METHODOLOGY

HORIZON SCAN: we carried out a desk study of current policy in the area of technological development and service infrastructure integration and interviewed key stakeholders to develop a deeper understanding of the current situation for local government and opportunities for the places of tomorrow.

PRACTICE SCAN: we identified existing cutting edge practices, both nationally and internationally in order to produce examples which demonstrate what is possible.

WORKSHOP SESSIONS: we held two workshop sessions with a local government audience and expert representatives from the wider public service sector. The first identified key issues the sector expect to be facing in their areas by 2030, and the concerns which surround the uptake of new technologies which may be used to overcome them. The second used a back-casting exercise to understand the steps needed in order to turn the places of tomorrow into a reality.

APPENDIX 4: GLOSSARY

API: An Application Programming Interface (API) is a language and message format. APIs are sets of protocols which allow different computer programs to speak to each other.
App: An app is a computer programme (application) designed to run on mobile devices such as smartphones and tablet computers and offer a high level of simplicity to users.
Blockchain: an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. The ledger itself can also be programmed to trigger transactions automatically. This networked technology allows for decentralised database management and is a very safe way to operate a financial system.
Channel Shift: involves the redirecting of public services from non-digital, to digital means.
Crowdfunded: the practice of funding a project or venture by raising monetary contributions from a large number of people.
Crowdsourced: obtaining information or input into a particular task or project openly, from a large number of people, typically via the Internet.
Data Analytics: involve integration (bringing together sets of data), analysis (processes which extract meaning from data) or visualisation (presentations of data, for instance on switchboards).
Ducting: the physical infrastructure underground that can carry the cables associated with digital technologies and can sit alongside traditional infrastructures such as telephone and electricity.
Internet of Things: devices communicating with each other in a network.
Interoperability: the ability of computer systems and software to operate in conjunction with other computer systems and software to exchange and make use of information.
Li-Fi: internal which uses common household LED (light emitting diodes) lightbulbs to enable data transfer, with speeds of up to 224 gigabits per second.
Networks: the social connections which develop between people, businesses and service providers on platforms built on smart infrastructure.
Open Data: data that can be freely used, re-used and redistributed by

anyone, subject at most to the requirement to attribute.

Open Source: denoting software for which the original source code is made freely available and may be redistributed and modified.

Platforms: allow a network of individuals (as with Twitter or Facebook) that exchange information, or networks of organisations and providers (as with Amazon or Ebay) that exchange goods and services, to be better seen by a public audience.

Social Internet of Things: people communicating with each other and devices through a technologically-enabled network.

Smart Infrastructure: infrastructure which delivers improved connectivity, which may be energy, transport, or regular infrastructure which has become internet enabled (such as roads with sensors in).

ENGIE

ENGIE is a leading energy and services group employing 20,000 people in the UK. ENGIE acts as a strategic partner to local authorities supporting the development of more sustainable, efficient and vibrant communities through the delivery of integrated services, infrastructure, energy and smart digital solutions.

ENGIE has 15 local authority partnerships and provides services to 14,000 customer sites in the UK. It helps communities optimise their resources, deliver services more efficiently and strengthen the links between citizens and local authorities.

The group has well-established and diverse operations including power generation as one of the UK's largest independent power producers. Globally, ENGIE's businesses are developed around a model based on responsible growth to take on the major challenges of energy's transition to a low-carbon economy, largely based on its expertise in four key sectors: renewable energy, energy efficiency, liquefied natural gas and digital technology. The group employs 154,950 people worldwide and achieved revenues of €69.9 billion in 2015.

For more information, please visit www.engie.co.uk/en/

Technology is always evolving. However over the last decade our ability to harness the data it can generate and the connections it can bring has undergone a step-change. Using the capabilities of smart technology, data analytics, and the networks built around them in the future, systems which have previously worked in silos can be integrated and people who have previously been isolated can become visible and easier to reach.

Most significantly, in the future the wisdom and creativity of people will be harnessed to create residents who are more independent, decision making which is more decentralised, and services which are more agile and responsive to people's needs.

This report examines the ways in which councils can harness these capabilities, and ensure that decisions made today do not prohibit the places of tomorrow from being realised.

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