

Connectivity Investment & Digital Use Cases



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Purpose

This resource provides an overview for towns in regard to connectivity investment options and the digital use cases that can be enabled through connectivity infrastructure.

Digital use cases have been linked to the Digital Blueprint to provide towns with a sense of the ‘art of the possible’.

This resource can be used by Towns to inform town projects and investment plans.

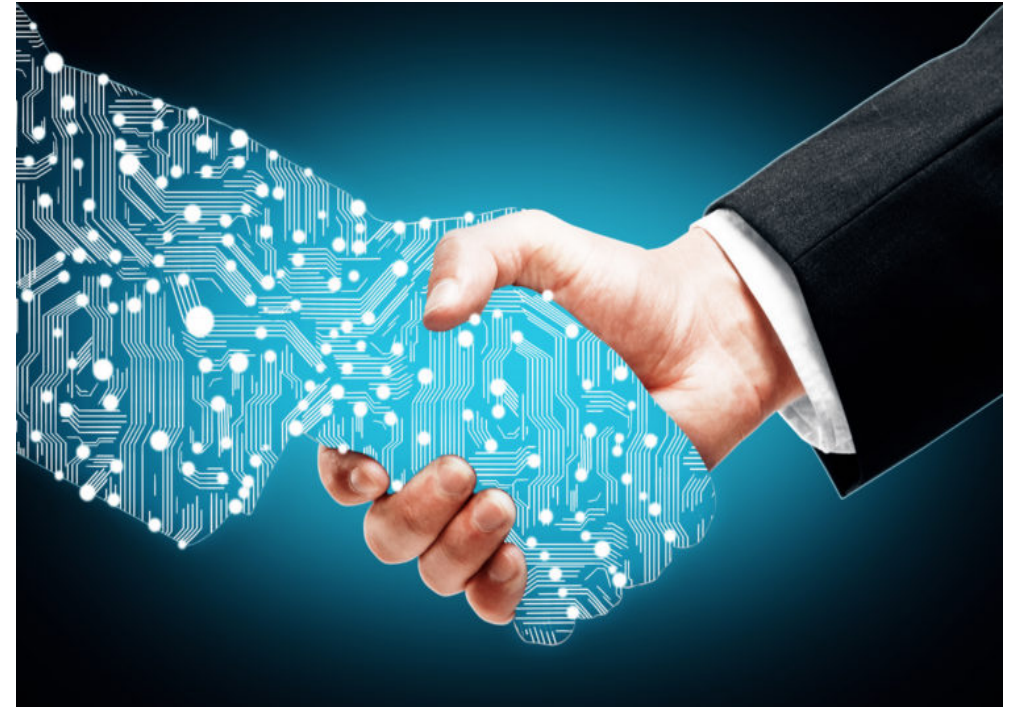
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Connectivity Investments

Connectivity Investment

This section outlines different investment models that offer viable options for connectivity projects, ensuring digital infrastructure deployment maximises the chance of the commercial market interest.

Investment models and schemes often aggregate demand in the local areas, either by opening up or allowing easier access to public sector infrastructure, or by providing the long term commercial impetus for investment in digital infrastructure.



Anchor Tenants

Anchor tenancy involves a large tenant/customer being tied into a long term agreement, with guaranteed revenue acting as a commercial incentive for investment in the local area. This is often led by public sector organisations.

Public Sector Anchor Tenant (PSAT) works to provide a core fibre optic network that will be extended out to an agreed area/set of buildings via new Fibre-to-the-Premises (FTTP) connectivity solutions. Councils use the anchor tenancy approach to get investment in building or extending new / existing fibre networks in order to connect public sector sites, as well as to foster future expansion for the needs of local homes and businesses.

An anchor tenant model is great way of aggregating demand and making it more attractive and viable as a proposition for a commercial partner or provider to invest money for deploying digital infrastructure assets.

Example:

West Sussex County Council decided to use the anchor tenancy model to improve access to broadband within their boundaries. The aim of the *West Sussex Gigabit Project* was to provide new end-to-end Gigabit dark fibre networks in nine urban areas within the Council territory through a multi-year lease agreement with a single supplier, in this case Cityfibre. This involves using long-term public sector demand to underpin commercial investment in full fibre, with public sector sites being the first to benefit. The Council combined this the Gigabit voucher scheme from the UK Government for surrounding private businesses.

Anchor tenancy provides a powerful mechanism for local authorities to attract full fibre infrastructure investment. It is also a positive for the provider, who then get an incentive of a long tenancy agreement from the Council for the public buildings, as well as the chance to pursue private tenants in local private houses and businesses. CityFibre and other providers have used this model increasingly over the last few years and are well used to the processes to put this in place. The agreement in place between the Council and the provider in this case is for a 30 year Indefeasible Right of Use (IRU), with the provider agreeing to build fibre networks access to 152 public buildings.

Public Sector Buildings

Providing connectivity to local public sector buildings can deliver the commercial stimulus for investment from a provider due to the potential of surrounding private customer take up

Public Sector Building Upgrades (PSBU) model is based on a core fibre optic network that will be extended out to cover local Government or public buildings, or even certain businesses, via new Fibre-to-the-Premises (FTTP) and Ethernet style connectivity solutions. Further down the road it may also open up an opportunity for the provider to extend their 1Gbps Fibre-to-the-Home (FTTH) broadband service to local residents, having already gained a backbone presence in the area, making it cheaper to extend the 'last mile' fibre connections to private homes/properties.

Example:

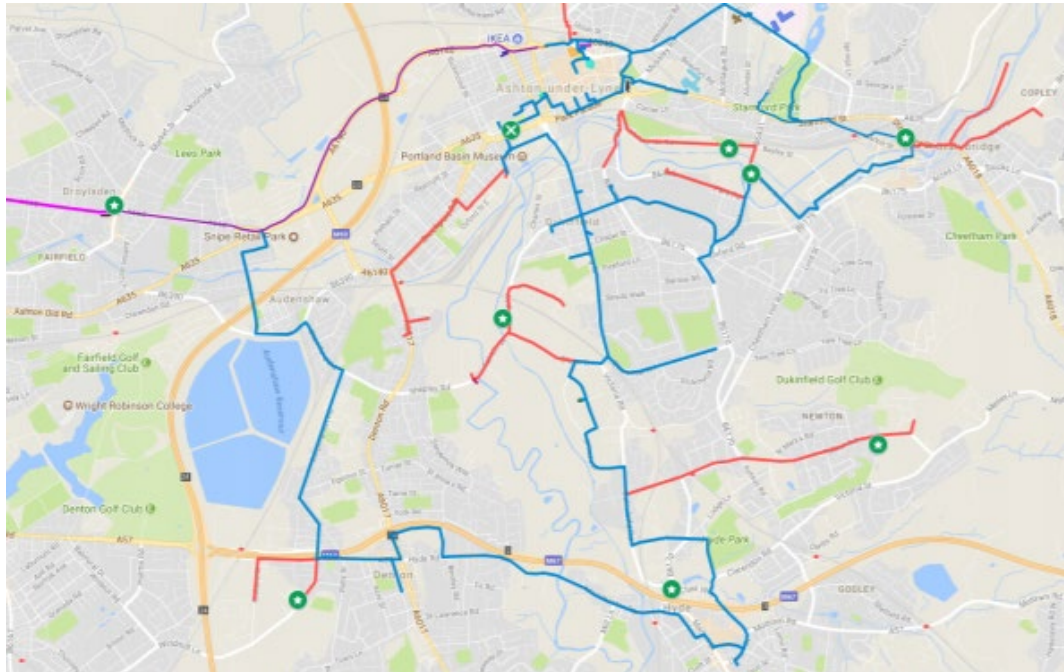
Coventry, Solihull and Warwick combined to use Government funding to use the PSBU connectivity investment model. They combined with Cityfibre, who already owned a large metro fibre optic network in Coventry (140km+), to aggregate demand and open access to allow them to connect their network to local public buildings. The project requirements were to connect public sector buildings to the full fibre network (FTTP) with Gigabit-capable connections. The idea is that by taking full fibre out to public buildings, the provider will then connect homes and businesses along the fibre route and in the vicinity of the newly-connected public buildings.



Public Sector Asset Re-use

Re-using existing public sector assets for digital connectivity in local areas, combined with commercially attractive rates, is providing improved access for businesses and residents across the UK via individual projects

Public Sector Asset Re-use (PSAR) as a model is based on using existing infrastructure for a new purpose, sharing digital infrastructure to benefit local businesses, residents, public sector buildings and communities.



Example:

Tameside Metropolitan Borough Council (Greater Manchester) initiated a project to re-use of 50km of existing Council ducting and fibre installed for commercial purposes. The aim of the initiative was to re-use the assets already in the ground to bring fibre within 200 meters of around 38,000 premises.

The *Cooperative Network Infrastructure (CNI)* scheme is currently being harnessed by Virgin Media and other ISPs. It brings together public and private sector organisations to create and share digital infrastructure.

This is a simple way for public and private sector bodies to collaborate for mutual advantage, with no complex shareholder agreements. Public sector bodies retain the assets they own. It is a relatively simple way to share access with the private sector, with consequent benefits for the local economy. There are no complex clawback or revenue share agreements, with a cooperative system in place paying the market fee to public sector asset owners. The Cooperative structure ensures infrastructure is neutral, access is non-discriminatory and non-exclusive. This promotes competition and innovation as well as public sector cooperation. Public sector partners in this project include Tameside Hospital, the Pennine Care NHS Trust and Tameside College.

Using an innovative model, this project has enabled rapid deployment of a new digital infrastructure serving multiple sectors in the local area. This model provides a framework to support both public sector collaboration and engagement with private sector business, including local and SME businesses. The model maximises leverage of publicly held assets and public sector demand, without offering a concession and without the need for complex clawback provisions. The focus on collaboration, guaranteed neutrality and shared ownership helps smaller businesses to access infrastructure that would otherwise be unavailable to them, and so promotes competition and innovation; it similarly helps public sector agencies innovate with service delivery while controlling costs.

Innovation Hub Centres

Innovation and development of next generation communication technologies, models and projects have helped advance the digital infrastructure assets in many areas of the UK

Testbeds and Innovation hubs, often taking advantage of central Government funding at the off-set, have been proven as great methods to encourage wider community inclusion and collaboration of ideas for the future of the local area. The research and development of technology within projects and real life scenarios across public and often private assets is known to encourage a stronger cohesion when moving to the deployment or business as usual phase, alongside the assets already being deployed.



Example:

Bristol is Open (BIO) is a next generation connectivity and innovation testbed. Originally funded from the UK Government Super Connected Cities Programme in 2015, it used the city-wide infrastructure and establish multiple communication/digital technologies and enable smart city research, development and innovation. It is a joint venture between Bristol City Council and the University of Bristol and is a test-bed programme for digital infrastructure innovation.

The programme initially researched projects within 5G, Software Defined Networks (SDN), Internet of Things (IoT), Big Data, Artificial Intelligence (AI), Machine Learning (ML) and High Performance Computing (HPC).

The programme initiated three years of research and development and is now under the sole control of Bristol City Council, with the platform now focussing on using the infrastructure assets and learnings to address the challenges of the city.

The move to this second stage enabled closer collaboration between services across the city and growing alignment between the development of the platform/network and the City's digital agenda. *Individual projects that formed part of BIO are:*

- Big Cloud – IoT, Big Data and Cloud applications
- Replicate – Energy efficiency, mobility, communication technology solutions in cities
- 5G Smart Tourism – Crowd analytics, event control, IoT/LoRaWan sensors

The positives of this approach come from the collaboration, opening up different contacts and engagements across public and private organisations. It also encourages investment into assets for research initially, being used for wider community connectivity needs, often meaning the area is ahead of the curve.

Public WiFi

Free WiFi in public buildings and outdoor spaces in central areas is becoming more prevalent in towns and Council territories. The free service open to all residents and people in the area encourages more uptake in digital connectivity and easier access to services for many.

Public WiFi connectivity investment can provide positives for both sides of an agreement, both the local authority and the service provider. This can form part of a wider initiative or be the sole form of agreement. This involves a service provider connecting their network to public buildings or public areas such as streets (through street furniture) and managing the free WiFi service for the Council.



Example:

Brighton and Hove City Council reached an agreement with BT for them to introduce free WiFi to the public in city centre. The deal means that BT will both build and managed the '*Brighton Hove Free WiFi*' (SSID) network for an initial period of 10 years.

This agreement has positives for both sides as the Council are not spending any public money to increase connectivity to residents in the area, whereas BT is granted access to some of the city's valuable street furniture (e.g. lamp posts) and that can also be used to install new mobile infrastructure (e.g. good for boosting local 4G connectivity, as well as distributing WiFi). This also has positives for the provider over future deployment of 5G infrastructure, with the current assets available and a new agreement for further access a possibility from the current relationship.

The Council originally deployed free WiFi Hotspots from The Cloud (Sky) to its main public libraries, moving to roll-out free "unlimited" WiFi at a range of locations across the city centre with BT. The outdoor network consists of 40 WiFi Hotspots that cover the busiest areas in the city for tourism, shopping and leisure.

This builds on other connectivity initiatives the Council worked on to encourage more people to get online, including free internet in public buildings and computer courses and training sessions in libraries.

Public WiFi (2) – WiFi as a Service

Smart cities and areas that want to move towards becoming more efficient through the use of digital technology and connectivity are increasingly reliant on a fast and secure WiFi network

Free WiFi in urban or central areas is not just a benefit for residents and businesses. This service helps people who live and work in these areas, but it also does much more. Secure, reliable and fast networks are also needed for smart city services connected to the internet, including meters, lights and rubbish bins. Smart cities have been talked about for many years, with the ideal urban centre being managed from a single platform, using the data to manage and run the cities more efficiently. To do more than just provide free internet for people in the area to browse online, you need a network capable of fast speeds with huge capacity, growing all the time. This network also needs to be highly secure, with more windows of opportunity for cyber attacks opening up as more and more day to day items are connected via IoT (Internet of Things).

WiFi as a Service

WiFi-as-a-Service (WaaS) enables fast, secure access by outsourcing this to an all-inclusive, managed subscription provider. This service covers infrastructure, software, and managed services in an end-to-end solution, including management and maintenance of what can be a very high performing network. WaaS also offers the ability to use free public WiFi as a new revenue stream by enabling reputable brands to advertise their products and services. This is a growing market as cities struggle for ways to reduce the costs of WiFi infrastructure while meeting surging demand for faster and wider access/coverage.

The positives of the WaaS are:

- Stronger connectivity, robust network needed for areas to take advantage of the applications of a smart and widely connected city/area
- Lower costs to the authority as the subscription agreed can combine the installation investment capex and operational expenses of specialist management in one
- Equipment upgrades can be included in the service, keeping technology up to date
- Subscriptions to include high security, management and maintenance by specialists
- Potential route to further revenue. e.g. a basic level of WiFi to everyone, charging fees for a premium level with higher speeds

All-inclusive, subscription-based WaaS solutions remove many challenges of city-wide deployment, reducing costs of deploying/maintaining high performing networks and giving authority leaders access to expertise for designing and deploying wireless networks that will help build more connected areas.

Barrier Busting

Barriers to digital infrastructure deployment have been identified by stakeholders and since 2017 there has been a push from Central UK Government to remove these. This is increasingly becoming an important part of the picture for better connectivity for local Councils and towns, forming part of their digital strategies.

The three main barriers to deployment of digital infrastructure are:

- Access to land and sites for installing equipment
- Cost of deployment
- Access to spectrum for wireless networks



Removing the barriers to quicker, cheaper and more effective digital infrastructure needs to be tackled on all of these three levels to improve connectivity in any area.

The access to land and sites, making this easier for operators to install infrastructure, is the main work of the central **Barrier Busting Taskforce (DCMS)**. Their work and engagement with Councils, towns and cities has caused many of these areas to install their own Barrier Busting specialists, see this as a vital avenue for improving the lives of people in the local area, as well as encouraging private investment.

The Barrier Busting Taskforce aim is to encourage processes, behaviours and a culture that allows cheap, quick and easy deployment of digital infrastructure. They have focussed on both legislative and non-legislative solutions and projects to tackle this, seeing how differential local Councils/towns can be, placing as much emphasis on engagement to change behaviour and culture as they do on changing central Government law.

The group developed best practice guidance and formed the Digital Connectivity Portal to support local areas and operators in facilitating the deployment of digital infrastructure under the following themes:

- **Digital vision and leadership**
- **Access to Public Sector Assets** – Street Furniture
- **Planning Policies and Processes**
- **Street Works** – Dig once policy, Street works toolkit
- **Wayleaves** – Wayleaves toolkit

The next pages look at some of these themes in more detail.

Wayleaves

A Wayleave is a right of way granted by a landowner, which can be in exchange for payment or service, typically for purposes such as installing equipment on property owned by the building/land owner

Internet Service Providers (ISP) may decide that investing money by laying connectivity technology in certain areas will not be worthwhile to them if there is not an immediate uptake of new customers. Wayleaves can encourage service providers to invest in rolling out infrastructure as they then have rights to install on certain properties, offering the potential switch of new customers in those properties, and new opportunities for private customers in the local area.



Example:

As part of the *Better Broadband for Southwark Initiative*, Southwark Council introduced the *Estate Fibre Broadband Programme* in March 2018. This involved the Council signing wayleave agreements with two Internet Service Providers (ISPs), Community Fibre and Hyperoptic. This agreement meant that the two ISPs would then install Gigabit capable fibre to the premises (FTTP), full fibre broadband all the way to the home, to every Council owned home at every estate, covering 53,000 properties. This includes laying the fibre lines in the streets and connecting each estate building and Council home with the 'last mile' fibre connection. The idea behind this scheme was to provide better broadband options for the residents at all of the Council's estates, as well as allowing other potential improvement opportunities to other homes and businesses in the area, with a larger network of fibre closer to other properties in the area.

Giving the two companies this right to build on Council land provides positives for the Council and the ISP. The Council are providing improved digital connectivity options to current and future residents, helping their own and the UK wide digital strategies, as well as future proofing those Council homes and providing better options for future connectivity in the surrounding areas in the future. The ISPs are also receiving the positive of spreading their presence, being able to offer services to all of the houses in each estate, as well as laying more fibre to be able to offer connections to properties and other homes close by, having laid the majority of the fibre and being able to offer more 'last mile' connections at a lower capex cost for them. This particular programme is delivered at no cost to the Council. Fibre installations on all estates are fully-funded and managed by the internet providers.

Street Furniture – Local Authority Assets

Street Furniture has long been seen as a revenue raising method for local Councils and authorities, allowing for improved local connectivity and money that can be put back into the local areas

Many local authorities and public sector bodies have sought to grant concessions and wayleaves to a section of the market, through one or a number of the telecoms operators. This method for renting space on local street furniture has benefits, but has also seen challenges in pricing agreements for many local Councils. For some towns and cities open access is the right approach. For others, the concession model may be more appropriate. It is important that local authorities can collaborate with providers.



Example:

Croydon Freshwave from Croydon Council and Freshwave Group, a neutral network service provider, focusses on improving mobile connectivity within the local area. The programme is the first UK Council offering non-exclusive and open access approach to all telecoms and mobile operators. This pioneering model means all four mobile network operators can easily share the same digital infrastructure, gained through a fair and transparent engagement process.

The deployment of this digital infrastructure improves connectivity and 4G coverage. It will help the future roll-out of 5G and ensure the technology is future-proofed, putting the area on the front-foot of deployment. The first 4G small cell antennae were installed in July 2020 across town centre locations, with further deployment into 2021. The 4G small cells are deployed on Council-owned streetlights in the town centre across a range of high-demand sites. Business owners, residents and visitors are already enjoying the benefits of this increased mobile connectivity.

This model Improves mobile connectivity in the town centre and beyond through digital infrastructure assets. This example shows a fair and transparent engagement process, reducing the barriers for MNOs to access Council-owned street furniture, whilst speeding up the adoption and installation of new mobile technologies. This formed Part of the digital toolkit for Croydon, following the DCMS digital toolkit principles, helping local public sector authorities work closer with mobile and telecoms network operators.

This specific open access example provides seamless connectivity when the environment and needs are always changing demands flexible solutions and innovative approaches.

Street Works

One of the biggest barriers on faster access to full fibre access, opening up opportunities to other digital connectivity solutions, is the speed of deployment and access to be able to lay the fibre cables

Approximately 8% of homes and businesses in the UK currently have access to full fibre broadband. In order to increase this percentage there will need to a huge amount of street and roadworks, in addition to the current planned works for maintenance and repair. Central Government, as well as growing local Government, focus has been placed on making this efficient, opening up access to roads where necessary quickly and looking to combine any planned work with laying fibre at the same time.

Dig Once

This approach focusses on the most effective way of managing the deployment of fibre lines, using the 'Dig Once' method of planning to install fibre ducts into any project that already plans to dig up the street or road for other means. This method means future projects to lay fibre can be done quickly and with no further disruption to the roads and traffic. This approach has been very successful at specific traffic hotspots. The main benefits of this approach are:

- Less traffic disruptions
- Less time used by local planning and permit teams
- Increased commercial attractiveness for future fibre deployments, as the ducting in already laid



Example:

Westminster City Council have been recognised for their approach to Street Works. The Council worked on improving relationship-building with all parties involved in road works and working closely with any infrastructure deployments planned in the area. The Council worked on this close collaboration early on and carries this on throughout any planned builds. The Council built their approach around four themes:

- Encourage fast builds as soon as possible
- Meeting with all new companies deploying in the area, building relationships
- Proactively identify works where contractors/utilities can at the same time
- Parking costs suspended in areas of utilities undertaking works

Case study: York

City-wide Connectivity

The *City of York Council's (CYC)* initial idea to invest in fibre connections to an estate of schools and Council offices to improve connectivity has provided huge benefits for businesses and homes in the area. The dark fibre network, spanning the city, has been used to serve York's thriving business community.

York is now one of Europe's best digitally-connected cities with full-fibre working to improve day to day services for the local authority, businesses and residents. It is a '*Gigabit City*' project that highlights what full fibre connectivity can achieve for the whole area. CYC wanted a cost effective way of improving connectivity, and therefore services offered to residents, at their public buildings and schools. They decided the best way to do this was through the economy of scale, aggregating the demand and connection potential. The Council secured a multi-million pound private investment deal to install a fibre network that would also provide new opportunities for businesses and residents in the future. The initial advantages were the fastest internet speeds to all schools and free public WiFi throughout the city. Cityfibre (ISP) signed a contract in 2008 to provide a dark fibre network across the city.

Cityfibre then made the network available on wholesale to other ISPs, who were able to offer competitively priced broadband services to businesses in the city. These businesses used the UK Government Gigabit voucher scheme as a further impetus to improve their connectivity. Now the Cityfibre network continues to support hundreds of businesses in the city, allowing innovation for businesses and services dependent on high-speed internet.



In 2014, York was selected as the home for a trial Fibre-to-the-Home (FTTH) deployment by a new joint venture comprising Cityfibre, Sky and TalkTalk. The city was chosen due to the existence of Cityfibre's expansive metro fibre network, meaning the 'last-mile' connections to homes would take much less time and less investment cost. The savings were passed onto customers and residents with trial and test prices for the fastest packages earlier and cheaper than the rest of the UK.

This case study highlights the opportunity that private investment in digital infrastructure can bring to the businesses and residents of the local area. The positives for this example are the Aggregation of demand of opportunity across public buildings and local assets. The private investment in a fibre network provided initial opportunities for businesses, with the infrastructure leading to economies of scale and impetus for further private investment from ISPs, benefiting residents and businesses alike.

Case Study: Cambridgeshire

Local Collaboration

Connecting Cambridgeshire is a programme that aims to deliver better and faster digital connectivity services to local businesses and communities, in order to drive widespread economic growth. The programme involves the delivery of improved fibre broadband, mobile connectivity and public-free WiFi services across the county. It is the result of collaboration between the various local authorities, the Combined Authority and telecommunication providers.

This programme was achieved by a combination of private sector investment and public funding. The local authorities leveraged various public sector assets to improve the commercial viability of the region, and were therefore able to attract investment from telecom providers.

FTTP

Full fibre footprint to underpin the local economy, support public services and prepare for the next generation of mobile services, 5G:

- Initial threefold expansion of full fibre networks coverage
- Fibre upgrades to around 30 public buildings, including schools and libraries
- 40km stretch of fibre ducting – linking fibre in new and existing routes, available to commercial operators to bring Gigabit networks to homes and businesses
- An ambitious new target to achieve over 30% full fibre coverage by 2022

Public Free WiFi

CambWiFi has been provided to around 150 public buildings and open spaces, now extending to market towns and village halls in rural areas. Originally set up through local and central government funding, The University of Cambridge has invested in the network, providing access via The Cloud in open spaces, and extending its existing WiFi to all students in the city.

Barrier Busting

In-house barrier busting group, *Enabling Digital Delivery (EDD)*, among the first areas to set up a dedicated team to proactively remove the barriers to the rapid delivery of a future proof digital connectivity infrastructure. EDD work with UK Government, Local Government teams, network providers and telecoms operators, to manage ‘real time’ issues affecting infrastructure delivery, investigate, progress and resolve issues such as wayleaves, streetworks and permits, infrastructure problems and planning. They collaborate with providers, including CityFibre, Cambridge Fibre Networks, Hyperoptic, Openreach, Virgin Media and other Alternative network providers at every opportunity to understand their plans and drive investment in the region.



This case study highlights the positives of a collaborative region approach tied in with its Digital Strategy:

- *Maximising commercial investment* – Removing barriers in rolling out telecoms infrastructure, encouraging commercial investment.
- *Innovative use of Council assets* – assets to support connectivity, e.g. fibre ducting under bus and cycles available on a commercial basis, connect public buildings first and free public WiFi
- *Leading Council policy* – Fibre ducting to be included in all new transport infrastructure schemes and projects.

Digital Use Cases

Digital Use Cases

This section outlines a series of digital use cases that are enabled by investment in connectivity infrastructure.

While technology is often the answer to many challenges today, it is important to first understand the question and issue that is being resolved. Ensuring that form follows function is vital in deploying the correct fixed digital infrastructure to support desired outcomes. The Digital Blueprint (opposite) provides a framework for the deployment of connectivity infrastructure through to the services and uses that this enables.

The following use case examples present real life application of technology from which to draw best practice. Enabled by investment in physical assets and infrastructure, examples highlight the value that more flexible digital interventions can also create. These demonstrate how digital, as a means to an end, can support strategic outcomes of towns.

The Digital Blueprint

FLEXIBLE >

Enablement

Digital literacy programmes, innovation facilities, data training, coding lessons, etc.

End-User Services

Footfall monitoring, transport schedules, electric charging, movement patterns, air quality insights, social media posts, proactive security management, predictive street maintenance, pop-up shops, contact-less payments etc.

Devices

Smart phone, touch-screen, footfall counter, charging point, camera, card reader, etc.

Data

Data platforms, standards and protocols, digital twins, smart operating system, etc.

Connectivity and Networks

Optical fibre cabling, radio technologies, LAN, WAN, WLAN, etc.

FIXED >

Physical Assets and Infrastructure

Ducting, chambers, ICT rooms, lamps, benches, etc.

The Data Layer

Data is the “most valuable commodity of the digital age”¹.

Data delivers value when it is harnessed to solve challenges. Towns can leverage data-driven decision making to create more efficient outcomes. Local authorities, particularly in cities, are using data to increase accountability, efficiency, and effectiveness. Accessibility to data is important in encouraging and facilitating innovation.

This section presents use cases where Data is harnessed.

DATA

Themes:



Businesses



Placemaking



Health+Wellbeing



Skills



Environment



Community

Indicative Cost: These ratings provide a rough indication of the expected level of expenditure required to implement the use-case from a local authority perspective. Naturally there will be variation in capital and operational costs depending on the scale of implementation, delivery model, etc.

Capital Cost: **H/M/L**

For the purposes of this deck, high capital expenditure is defined as over £100k, while low is defined at under £10k.

Operating Cost: **H/M/L**

For the purposes of this deck, high operating expenditure is defined as over £100k per annum, while low is defined at under £10k p.a.

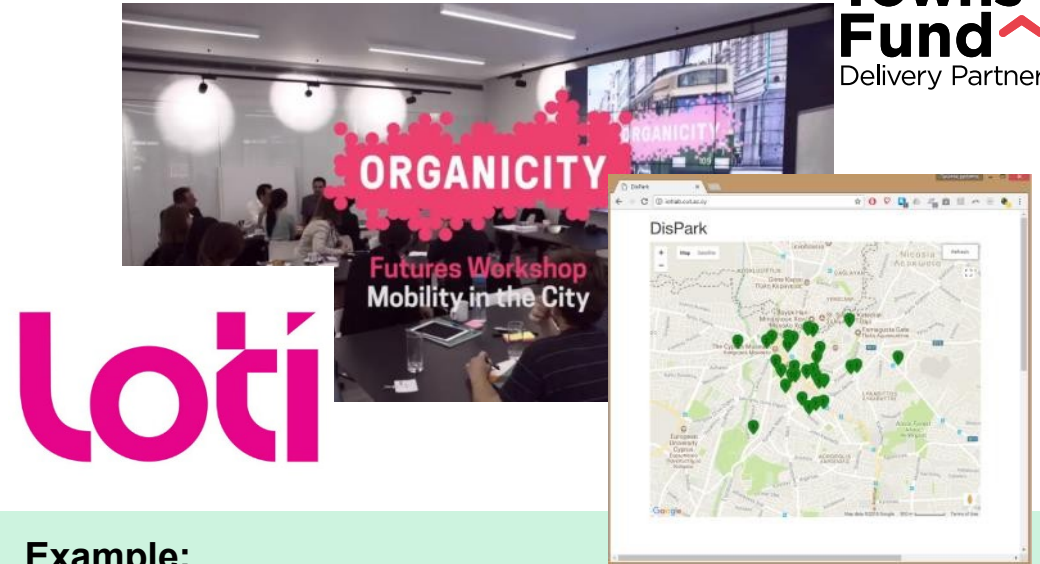
Open Data Platform

It is becoming increasingly common for places to share data they generate to enable data-driven decision making and encourage innovators to create new services.

Open Data Platforms create an online area where data is freely available to all to use and re-publish as they require. Data can be used by individuals, organisations, developers or Councils to develop solutions to local, regional or national problems. Open Data Platforms provide resources for digital innovation to thrive.

Value and Benefits to Towns:

- Optimise operations of towns, while also providing heightened transparency
- Catalyse the local business ecosystem by providing data around which new services can be developed
- Enhance local education curricula by enabling students to analyse real-world data and develop solutions to potential issues
- Attract innovation and investment through the provision of open data



Example:

The European Commission's Organicity project used an 'Experimentation as a Service' approach to involve non-technical city stakeholders in the co-creation of digital solutions to local challenges. After establishing open data portals in 3 cities, the project created a series of easy to use analysis tools and visualisations that citizens could use to 'experiment' and draw insight from city data.

The London Data Store was established to address digital collaboration deficit in London's public services. From this, Hackney has developed a tool to integrate GOV.UK Notify with the Councils Manage Arrears system. This communicates with tenants and leaseholders who have outstanding payments to the Council. Since its beta launch, arrears have dropped 12% and 80% of collections have been automated.



Environmental Monitoring

Environmental monitoring involves collecting and analysing data gathered from air quality, noise, footfall, traffic, and soil sensors to provide new insights and enable data-driven decision making.

Data-driven decisions as a result of environmental may include optimising the diverting traffic away from high-footfall areas, watering of public flower beds, notifications of full refuse bins and ensuring that noise and dust from ongoing construction works does not risk the health of existing residents. Data collected can be made available to the public via an open data platform, enabling local schools and businesses to learn, experiment and create new solutions.

Value and Benefit to Towns:

- Optimises the operations and maintenance, realising efficiencies and reducing costs
- Protects the health of residents by allowing the early detection and fast resolution of harmful environment conditions
- Enhances local education curriculums and stimulates the local business environment
- Subsequent open data can attract investment and stimulate innovation



Example:

The Array of Things (AoT) is an urban sensing project in Chicago. With 500 nodes expected to be installed by the end of 2018, the Array of Things will essentially serve as a 'fitness tracker' for the city, measuring factors that impact liveability such as climate, air quality and noise. The data collected will be made publicly available to allow researchers, policymakers, developers and residents to work together and take specific actions that will make Chicago and other cities healthier, more efficient and more liveable.



The Device Layer

Digital devices, such as smart phones, sensors and wearables, are now a core part of modern life. On average, UK adults have access to 5.1 digital devices each².

Devices are now household staples and can be harnessed to improve social outcomes for the users. In the context of the covid-19 pandemic, social and medical devices are increasing in popularity. Devices can provide a public service. Access to digital libraries or public devices such as totems can enable citizens to access WiFi and information without private device ownership.

This section presents use cases where Devices are harnessed at the individual and town level.

DEVICES

Themes:



Businesses



Placemaking



Health+Wellbeing



Skills



Environment



Community

Indicative Cost: These ratings provide a rough indication of the expected level of expenditure required to implement the use-case from a local authority perspective. Naturally there will be variation in capital and operational costs depending on the scale of implementation, delivery model, etc.

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Wearables and Personal Devices

The use of wearable devices for health, wellbeing, and assisted living purposes enables users and caregivers to track the wearer's vital signs such as heart rate and activity levels.

Connected wearable devices worldwide have more than doubled within three years, rising from 325 million in 2016 to 722 million in 2019. By 2022, the number is forecasted to reach one billion¹. These devices provide healthcare opportunity for proactive care. Activity or medication reminders can be set to support healthy lifestyles. GPS systems allow seniors (or even children) to leave home for a walk or quick trip for groceries without family members feeling worried or concerned.

Value and Value to Towns:

- Allows proactive care to be delivered to individuals rather relying on reactionary care
- Provide users with health conditions more confidence and independence by acting as an 'always there' communication platform for any type of assistance they might need
- Data generated allows health facilities to understand larger population trends amongst the community
- More granular data can be leveraged to provide solutions for issues



Example:

The St Bernard Location Service uses GPS and wearable technology to facilitate the prolonged independent living of people with dementia by providing carers with an alert if the client leaves and agreed 'safe area'.

Hampshire Council deployed approximately 50 Amazon Echo devices. These had specific settings for users in order to provide prompts to cook, drink and take medication for those who need additional support. Carers could use these devices to write online shopping lists to shop for housebound users. They have been used for adjusting thermostats so that bed-bound users can control their environment.



Digital Wayfinding

'Totems' or 'Smart Hubs' are being used to provide an enhanced and interactive wayfinding experience by delivering contextual and personalised information to residents and visitors.

Public digital devices such as wayfinding Totems and Smart hubs can provide public WiFi, free phone calls, internet access, public health equipment, local area information and emergency assistance. Furthermore, these totems can augment existing city systems by hosting CCTV cameras, mobile small cells and air quality sensors. The screens incorporated into totems are typically used for commercial advertising purposes but can also be used to promote new innovations and publicise local events and businesses. The interactive screens can be used for citizen engagement purposes.

Value and Benefits to Towns:

- Interactive wayfinding is self-service and allows people to find out information of interest about their location
- They can host a variety of sensors
- It offers a more positive visitor experience by reducing frustration so visitors are more likely to return
- The dynamic nature of the interface allows real-time information to be displayed, such as traffic and public transport information



Example:

Intersection's Link totems are now deployed in three cities around the world including New York and London. LinkNYC provides free WiFi, device charging and local wayfinding. Through hosting adverts, the totems are fully funded. In other American cities, the totems have been used in emergencies to share information such as hurricane forecast.

The Future Cities Catapult's 'Tech Totems' incorporate empty space within their totems which can be used by innovators to host sensors and experimentation equipment which generate data for an open data platform.

DEVICES

Stakeholders: Local Authority, Totem Providers, Local Businesses/Citizens,



Capital Cost: H/M/L
Operational Cost: H/M/L

Smart Lighting Devices

Public street lighting is an essential element of urban environment. It affects residents' sense of safety and social inclusion, improves visibility for motorists, and also creates an inviting environment for business and tourism after dark. Integrating with sensor devices can enhance the urban environment.

Energy efficient LED bulbs are now commonplace and streetlights are increasingly being seen as 'smart city platforms' to host/deliver a variety of applications such as: public WiFi, environmental monitoring solutions, charging points for electric vehicles, smart parking (guidance, enforcement and analytics) and geofencing for children and vulnerable adults. Variable light levels and emergency buttons also contribute to ensuring public safety.

Value and Benefits to Towns:

- LED bulbs reduce the cost of lighting by 50-70%
- Provides a multi-functional asset that acts as a platform on which a range of smart city use-cases can be delivered
- Supports parking, traffic management, public safety and environmental monitoring solutions, and supports the night-time economy



Example:

SafeWalks is a mobile application provided to University of Illinois that addresses the daily concern of people who may feel unsafe when walking at night. Utilising smart street lights and integrated pedestrian counting sensors, SafeWalks is able to determine the safest walking path, provide real-time routing advice and ensure the streetlights on populous walkways emit greater brightness on the streets.

BMW's 'Light and Charge' system combines EV charging points into smart lampposts, allowing cities to reduce their energy consumption by using LED lights, while also providing a simple and cost effective way for local authorities to offer electric car charging, without installing the cabling required for separate charging stations.

Glasgow have placed motion sensing street lighting in areas to minimise energy use and also ensure brightness meets street use requirements.



The End-User Service Layer

End-User Services harness physical assets, connectivity, and data to deliver services such as predictive street cleaning, real-time transport schedules, and proactive security management.

Digital can create innovative solutions to citizen challenges. Through utilising rapidly developing technology and increasing data sets, services are becoming finely tuned to citizen need.

This section presents use cases for End-User Services.

END-USER SERVICES

Themes:



Businesses



Placemaking



Health+Wellbeing



Skills



Environment



Community

Indicative Cost: These ratings provide a rough indication of the expected level of expenditure required to implement the use-case from a local authority perspective. Naturally there will be variation in capital and operational costs depending on the scale of implementation, delivery model, etc.

Capital Cost: **H/M/L**

For the purposes of this deck, high capital expenditure is defined as over £100k, while low is defined at under £10k.

Operating Cost: **H/M/L**

For the purposes of this deck, high operating expenditure is defined as over £100k per annum, while low is defined at under £10k p.a.

Mobility-as-a-Service

With greater urbanisation, Mobility as a Service (MaaS) is enabling users to make informed decisions about journeys and seamlessly pay for transport options.

Platforms provide real-time data on the status of local public transport services and provide supporting information about weather and traffic to help inform choices. Users can book desired transport without having to leave the platform. In some cases these may be multi-modal transport bookings. Autonomous Vehicles (AVs) are increasingly being integrated into mobility options to combat last mile challenges. In addition, dynamic ride sharing services have been increasingly used, these match a passenger with a shared mobility option in real time.

Value and Benefits to Towns:

- Citizens can more effectively plan journeys, increasing use of public transport journeys or active transport options
- Identification and booking of multi-modal journeys is easier
- Existing barriers which lead to a preference for private car use are removed
- Sustainable, shared and active transport modes are promoted, thereby reducing congestion, emissions and air pollution, while improving health outcomes
- Synchronised management of traffic is possible



Example:

City Mapper originated as a public transit navigation application, using real-time open source and user-generated data to provide accurate information on transportation options. It has launched the CityMapper pass which aims to simplify ticketing across multiple forms of public and shared transport. Users pay a monthly subscription and receive a card that provides access to multiple mobility options, including public transport, bikes and shared private vehicles.

Crocodile is a smartphone app which allows parents and school to organise walking buses to school. Reward schemes and leader boards are used to encourage participation.

Milton Park has trialled AVs for last mile transport from the local station. The hoped outcome is that up to 50% of private vehicle journeys within the business park will switch to using shared, electric-powered AVs.

END-USER SERVICES

Stakeholders: Local Authority,
Transport Operators, Citizens



Capital Cost: H/M/L
Operational Cost: H/M/L

Smart Delivery Services

E-commerce growth is fuelling an increase in the number of last mile deliveries. Trucks and vans remain the dominant transport mode, however the rising number of deliveries are resulting in increasing levels of congestion, noise and air pollution.

'Green' delivery vehicles such as bicycle or electric vehicle delivery are being used within urban areas to reduce emissions and noise pollution. Delivery drones and robots are enabling companies to provide fast and flexible delivery services, with smaller environmental impacts at potentially lower prices. Consolidation Centres collect and sort parcels for last-mile delivery, reducing the number of delivery vehicles on the road.

Value and Benefits to Towns:

- Reduced emissions, noise pollution and congestion can be achieved
- In urban areas, consolidation centres can be used to reduce the need for delivery vehicles to visit every house
- Drone or robotic delivery can enable 24 hour delivery routes. They can be used to also collect waste or include cameras or sensors to gather data as they move.



Example:

Starship Technologies specialises in delivery robots. The bots can travel up to three miles and are fitted with ultrasonic sensors for detecting obstacles, nine cameras, radar and GPS. Upon arrival, the recipient of the delivery receives a text message containing a link to unlock the robot.

In Milton Keynes, the company has partnered with Co-op and Just Eat to deliver groceries and takeaway meals. The company also launched the world's first commercial roll-out of ground-based autonomous package delivery. Packages are delivered to a Starship managed local facility and residents use an app to request delivery of their packages whenever they choose. Co-op have expanded their delivery area in Milton Keynes recently to meet growing demand for this service.



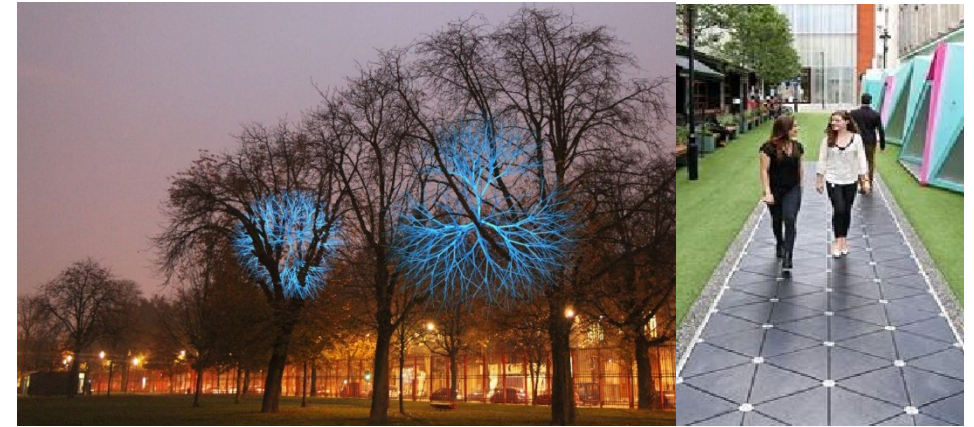
Interactive Environments

A dynamic, interactive environment is comprised of spaces that sense, respond and encourage citizens to actively engage with the environment around them.

By connecting data and experiences that develop through engagement, the urban environment becomes an interactive, adaptive and animate place. Environments might have different functions, such as lighting or communication. These environments harness digital technology to enable them to 'interact' with people.

Value and Benefits to Towns:

- Enhances the brand and identity of the town
- Attracts visitors and generates footfall
- Raises awareness of environmental and sustainability initiatives
- Support the educational programmes of local schools



Example:

Tree Lungs was deployed in Lille, France. The interactive lighting was linked to air quality sensors. The lighting changed according to pollution levels providing residents with a clear understanding of how their air changed.

The Digital Water Pavilion's external facades are embedded with water curtains. The curtains are digitally controlled and have integrated sensors to achieve dynamic openings. Through an interface, users can create interactive sequences by drawing shapes and letters.

Demonstrative technologies like Pavegen's energy-generating pavements, create high engagement with citizens by converting their footsteps into energy, data and rewards.



Flexible Streetscapes and Spaces

Innovative places are increasingly designing streets that can eventually transition to a post-car urban environment, supported by more fluid, safer and shared forms of mobility enabled by new clean technologies. Flexible spaces are developing to facilitate changing user demand.

The use of digital programming in buildings and streets allows them to shift use between uses while minimising the overall urban footprint. This reprogramming is often informed by feedback from community engagement portals and data from smart building or estate operation centres. Flexible Streetscapes could allow the same stretch of road or pavement to be used as a basketball court on the weekends, for example. Flexible booking systems compliment these developments.

Value and Benefit to Towns:

- Reduce the dominance of cars on the streetscape
- Maximise the potential of public space by adapting to citizen's changing needs and desires
- Changing nature of the streetscape creates interest in the area and attracts additional visitors and footfall
- Higher space utilisation rates and revenues for existing spaces and businesses
- Expansion and diversification of user base and increased user satisfaction



Example:

In 2017, the City of New York launched the Driverless Future Challenge which explored how driverless cars and increased car sharing could enable the reclamation of public space. The competition was won by FXFOWLE with their Public Square concept. Public Square is a plug and play system of interlocking unitised squares, with built in infrastructure and a wide variety of arrangements, from seating, to retail pop-ups, play equipment, gardens and greenspace. Appreciating that the transition to driverless vehicles will require gradual change, Public Square can be introduced incrementally, and assembled into endless configurations to suit the needs of different neighbourhoods.

Spacious, established in 2016 in New York, works with establishments (such as high-end restaurants) that do not trade during in the day to open them up as co-working spaces.



Community Engagement and Crowdsourcing

Community Engagement Platforms act as ‘one stop shops’ for community information and interactions. They provide information on services, amenities, activities and events while also providing spaces for members to discuss ideas and issues relating to their community.

Community engagement platforms can provide a channel for engaging with the community, testing ideas and hearing their views. As communities develop and change, engagement platforms become increasingly self-sufficient with community members using them to advertise self-organised activities and to find others with shared interests. The approach represents a new model of community development—allowing citizens to take an active role in the physical improvement of neighbourhoods and the building of long-term community resilience

Value and Benefits to Towns:

- Generating additional funds for local area improvement projects
- A new approach to citizen engagement and involvement
- Improving community cohesion and resilience
- Informing smarter investment decisions
- Development of a culture of co-creation and co-ownership within the community



Example:

A civic crowdfunding movement driven by 10 Hull businesses is aiming to empower local people to make a material difference to the places and spaces around them. Each business has contributed money to a central pot which is then distributed to successful projects.

Better Reykjavik is an online platform where citizens suggest and develop ideas for the city. Citizens add and vote for ideas. In 2017 the City of Reykjavik crowdsourced ideas in response to “what skills do we want our education system to have provided our children by 2030?” A Centre for Innovation in Education has been established as a result.

The Build-ID platform promotes inclusive community engagement in the development process. By leveraging game design, dynamic polling and social incentives, Built-ID connects developers and Councils with a far wider demographic of voices than engage via traditional methods alone.



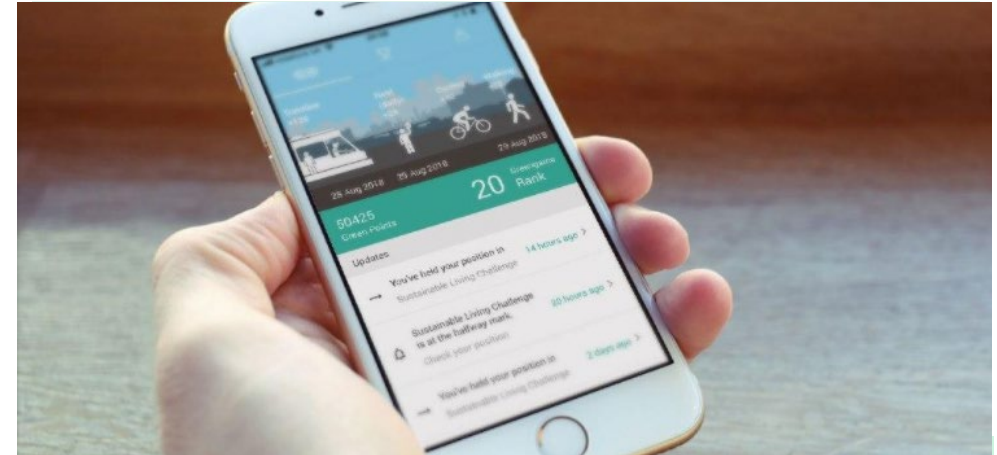
Behavioural Rewards Platform

Behavioural Rewards Platforms incentivise users to contribute to various local agendas such as sustainability, active travel and healthy living.

Platforms engage citizens and support them in changing their lifestyles to achieve the platform's ambitions, and enrol local businesses in order to provide rewards that further incentivise changing user behaviours. For example, users may be encouraged to buy more locally produced food, cycle or walk instead of taking their car and minimise energy use in their homes. Their progress is recorded on a platform and they earn reward points which can be redeemed at participating businesses.

Value and Benefits:

- Acceleration of progress towards sustainability, active travel and energy use targets
- Healthier populations that are more engaged in local and global issues
- Creation of social networks within a community through providing a social platform to share ideas.



Example:

GreenGame gives users points from their digital interactions, such as online shopping, travel and shared asset use. Users compete on various challenges in order to win prizes and rewards. The gamification of behaviour change aims to encourage people to be more sustainable and create new habits. Cities, companies and academic institutions can register to compete or create challenges.

The European Commission's Sharing Cities Programme has launched an app in Milan called 'SharingMI'. It rewards users for working towards a more sustainable city in the areas of urban mobility, energy efficiency of buildings and reducing carbon emissions.



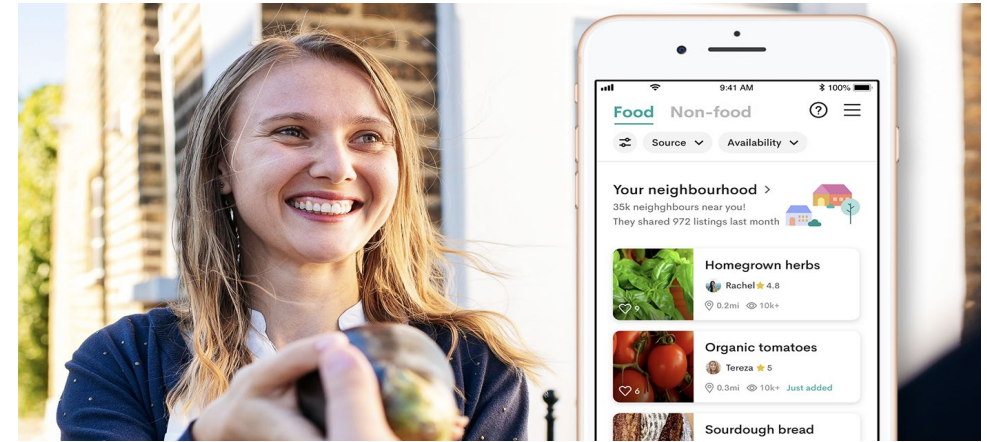
Community Sharing Initiatives

Community Sharing Initiatives provide a platform where people can register and share assets locally.

People can register and share tools, equipment, assets they own and are willing to share with the community, either for free or for a price. Others are able to browse the site and borrow or rent items at a fraction of the price such items would cost if they were new. A newer development is the use of these platforms to reduce food waste. Restaurants, cafes and grocers advertise end of life foods which members of the public can collect for free or for a small price. Time can also be shared. For example, an elderly person that needs to go to the supermarket to do a weekly shop but cannot drive may post a job and a neighbour may volunteer to take them each week.

Value and Benefits to Towns:

- Provides support to all members of the community.
- Builds community cohesion and social resilience.
- Reduction of waste and support of a culture of reuse by creating a sharing economy
- Facilitation of social interactions and generation of community cohesion



Example:

OLIO is a community sharing platform where users can pick up unwanted food items from neighbours and neighbourhood businesses. OLIO allows members to post if they have surplus food stock that will go out of date. Through this site users can both save and earn money whilst also meeting new people. Furthermore, it improves sustainability within a neighbourhood through reducing food waste.

NextDoor is a neighbourhood community app which aims to provide a trusted platform where neighbours can work together to build stronger, safer happier communities. Communities are using NextDoor to find trustworthy babysitters, organise neighbourhood watch groups and arrange local celebrations.

END-USER SERVICES

Stakeholders: Citizens, Social Enterprises, Local Authority



Capital Cost: H/M/L
Operational Cost: H/M/L

The Enablement Layer

Enablement allows people to access digital technologies through programmes such as digital literacy, code training, or access to innovation facilities.

Enablement is foundational in ensuring all stakeholders can engage with digital interventions. Enablement can range from digital leadership through to basic upskilling. Building the capacity of citizens, organisations and the local authority will support towns as digital transformation occurs.

This section presents use cases for Enablement examples.

ENABLEMENT

Themes:



Businesses



Placemaking



Health+Wellbeing



Skills



Environment



Community

Indicative Cost: These ratings provide a rough indication of the expected level of expenditure required to implement the use-case from a local authority perspective. Naturally there will be variation in capital and operational costs depending on the scale of implementation, delivery model, etc.

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Digital Skill and Job Platforms

Digital skills and education programmes supports people of all ages and all backgrounds to improve their ability to interact with information through digital platforms. Linking skills development to job platforms can connect those with skills or a desire to learn certain skills to job opportunities in a local area.

Digital skills are increasingly critical to people as services are migrated to online platforms. People are expected to use online services for their jobs, health, education, finance and news. Digital literacy programs can provide exposure to computers, internet and the benefits that technology can play in communities. These platforms can create a space where opportunities can be shared with the local community. Business owners can post employment, training and apprenticeship opportunities and job seekers can connect with the ones that resonate with them.

Value and Benefits to Towns:

- Reduction in the digital divide
- Enabling enhanced educational programmes for people to learn.
- Supporting business owners with a space where they can post odd jobs that they need done in the day and the jobs can be fulfilled by teenagers or anyone looking to learn new skills, earn money on the side or meet new people.



Example:

Trans e-Scouts facilitates digital inclusion of elderly and youth, improving community life through intergenerational dialogue. TechPathways is a community where educators can connect and improve digital literacy to better support students. Topics covered include misinformation, robotics, and the future workplace. Tech Goes Home (USA) provides local people with 15 hours of digital skills training, a new device (e.g., a Chromebook or iPad), and assistance acquiring low-cost home internet. The programme has served 4,500 Chattanooga residents in four years and is designed to make the Innovation District inclusive of citizens who might otherwise be caught on the wrong side of the digital divide.

ENABLEMENT

Stakeholders: Local Authority, Social Enterprises, Local Businesses, Citizens



Capital Cost: H/M/L
Operational Cost: H/M/L

Community Labs and Maker Spaces

The skills required for the future digital economy are diverse. These range from basic online tasks, to coding, to using state of the art digital fabrication techniques.

Digital enablement can cater for more traditional skills that support every day life and also to those who wish to change skills in order to access more office-based employment. Community Labs and Maker spaces have proven successful in equipping people with digital skills and more practical skills needed for a digital economy. These spaces can provide training and access to machines and equipment such as 3D printers, laser cutters and metal working tools. These are often run by social enterprises and members of the local community.

Value and Benefits to Towns:

- Reduction in the digital divide
- Access to facilities that support varied digital skilling support
- Opportunities to meet and connect with local people and businesses
- Opportunities to be creative and innovative with new digital tools
- Support to people in accessing skills to enhance employability



Example:

A south London maker space provides a social community workshop. Workspaces in areas such as 3D printing, laser cutting, metal working tools, screen printing, electronics and wood work are available. Expert members offer training and mentoring sessions to beginners, creating a self-perpetuating cycle of learning.

Camden Collective (CC) is a charity that manages a co-working space. Motivated by the long term benefit that creative and innovative business can bring to the area, it offers free work space to organisations that will undergo skill-sharing activities between other members of CC and the wider community.

CityLab Melbourne is a living lab where human centred design is created, tested, and developed by the community. The aim is to support and facilitate community working to future-proof the city.



Towns Fund ^

Delivery Partner