The Roadmap to a **Smarter Birmingham**

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Accessing additional information

Throughout this document, we have included hyperlinks to supplementary research and information on smart cities. This online content provides further context behind our rationale and approach for Birmingham.

To help you locate these additional pieces of information, we have inserted mouse icons (🖱) after each hyperlink.

Simply hover your mouse over the hyperlink or mouse icon, hold down CTRL and then click.

Foreword

Our *Roadmap to a Smarter Birmingham* provides the strategic framework to demonstrate leadership and support cooperation with citywide partners that will create a sustainable and better future for our citizens by responding to challenges such as unemployment, skills, health inequalities, effective mobility and carbon reduction targets.

It has been developed by the Birmingham Smart City Commission, a body set up by the city council which includes key players from Birmingham's economic and academic community and third sector leaders. It represents a collective ambition by city stakeholders to deliver real change by developing intelligent and integrated services through the use of digital technologies, data and open collaboration, driven by the citizens and communities that are core to the city's future growth.

By involving many stakeholders across the city, we will build the critical mass required to achieve real and lasting change, providing greater opportunities for economic prosperity and a high quality of life, namely:

- A highly capable workforce attractive to employers, with skilled individuals able to gain employment easily;
- A move towards a low carbon economy through energy and fuel savings, improved air quality and enhanced public transport information, facilities and integrated payment systems;
- Joined up health and care services to support better care coordination, planning and independence;
- Economic value created by businesses and service providers through better use of data & information;
- Attractive residential and commercial properties with future proof digital connectivity;
- Personalised and better targeted public services.

The Roadmap sets out the starting point for bringing together activities and projects which will help change our approach and attitudes to how we deliver services and support the integration of our multiple city systems such as transport, energy, health and housing that will help make the city work better, to deliver social, economic and environmental benefits.

As a city council, we have a major part to play in the smart city agenda. One of our first priorities is to share and publish as much public open data as possible through our open data platform, so that we increase the capacity of businesses and entrepreneurs to develop new applications and services as well as support citizens to develop their digital and data literacy skills to make what we do more, inclusive, accessible and transparent.

Smart city transformation will also be about investing in technologies that will help us all manage what we do better and more effectively – technology enabled not technology driven.

I invite you to be part of our smart city journey. Our Roadmap gives you the means to get involved, while the Birmingham Smart City blog is the place to have your say and share ideas.

Cllr. Lisa Trickett
Cabinet Member
Green, Smart and Sustainable City
Chair Birmingham Smart City Commission

"***The Smart City Roadmap*** *and the work done by those involved is an excellent way of maximising the contribution of all partners in line with public interests. As resources become scarcer, the outdated notion that this equates to less or worse service is rightly challenged by this progressive and exciting work. Having a smart city means the future for all can be assured and Birmingham will retain its hard earned reputation for excellence and value.*"

Garry Forsyth, Assistant Chief Constable, West Midlands Police and Community Safety Partnership

*"**A Smart City is an inclusive city** that values and supports its communities to solve the problems that matter most to them; Birmingham's Smart City Roadmap is about putting its people at the heart of what it does."*

Jas Bains, CEO, Ashram Housing (part of The Accord Group)

"***A 'Smart Birmingham'*** *implies a concentration of dynamic, innovative young businesses providing all sorts of new services and solutions, all made possible by widely available data. Data that gives opportunities to entrepreneurs from all backgrounds – especially our universities, schools and colleges – to start and grow successful companies, create jobs and support the local economy. That's an exciting city for all of us to live and work in.*"

Professor Dame Julia King, Vice Chancellor, Aston University

"***It is a real privilege*** *to be asked to act as a champion for the city's ambitions to become a smarter city, specifically in relation to the mobility of the population. By introducing cutting-edge technology* in intelligently managed traffic signalling to the use of 'smart parking' technology*, the city can be more efficient in the way it delivers services to citizens, visitors and those simply passing through. Birmingham's mobility will determine its future success and is vital to driving long-term investment, employment and wealth, and creating a safer and greener place to live."*

Nick Gregg, Managing Director, Amey

Executive Summary

In early 2013 Birmingham City Council published its Smart City Vision statement. Subsequently the Smart City Roadmap has been developed with a group of citywide stakeholders to support its implementation. The Roadmap lays out the principles the City needs to follow and describes an initial range of activities we plan to undertake over the coming 1 -3 years.

Birmingham is a diverse city with a strongly growing population (over 150,000 additional residents in the next 20 years), which faces a number of challenges. The Roadmap responds in particular to the following challenges:

- Addressing low economic performance, unemployment and skills gap
- Tackling health and wellbeing inequalities
- The need for seamless and effective mobility
- Establishing a low carbon society

Following a review of national and European Smart City research we have identified some of the underlying principles that can help cities adapt to become more flexible and resilient in response to these challenges:

- Use of digital technologies and information to increase capacity of existing infrastructure and services
- A joined up, integrated approach to service delivery across sectors
- Citizen involvement, cooperation and citizen-focused service delivery

These principles have been embedded in all of the roadmap actions. The roadmap is divided in the three main sections of ***Technology & Place, People and Economy*****.**

The **Technology and Place** section covers actions regarding **connectivity, planning for digital infrastructure and open data** and **information marketplaces**. It talks about how we can improve fixed line and wireless connectivity; attract data services into Birmingham; open up more public open data and looks at the city's future needs through embedding digital principles into city planning.

The **People** section covers actions regarding **digital inclusion, skills and employment** and **innovation**. It stresses the need for a digital inclusion strategy, suggests ways to improve digital skills in a neighbourhood and through building smart communities. Activities for skills development consider age groups from pupils to adults and deal with employers, job seekers and entrepreneurs. In addition numerous actions across the three sections directly support innovation by business, e.g., through open data release, change to procurement rules and competitions.

Finally the **Economy** section addresses actions in the fields of health and wellbeing, ICT and energy efficiency and mobility, such as care coordination, building energy management and smart payments for travel.

In conclusion, the Roadmap is an aspirational document and the proposed activities vary from being explorative to actual project delivery. The Smart City Commission and Birmingham City Council will work together closely to engage with many stakeholders across the city to make a smarter Birmingham a reality.

How the future Birmingham will look and feel

Technology & Places

Connectivity

Affordable and reliable digital connectivity is accessible from anywhere in the city. Fast speeds are supporting the growth of new telehealth solutions, virtual learning, mobile entertainment, and our businesses are thriving taking advantage of new online service models to support new applications, services and ways of working.

Planning for Digital Infrastructure

New commercial and residential developments and priority intervention areas are benefiting from the early deployment and investment in the right digital infrastructure, such as fibre optic cabling and smart sensors that make Birmingham an adaptable, resilient city, capable of supporting healthy and prosperous communities.

Information Market Places

Publicly available and accessible 'open' data and information is being used and combined by SMEs, entrepreneurs and city stakeholders to provide new insights and the opportunity to make better decisions, deliver new services and apps creating a valuable city asset for social and economic gain.

People

Digital Inclusion

A digitally capable city, where everyone is enjoying the social, economic and cultural benefits of being online; access to jobs, education, civic participation and health are improving choices and opportunities for a better way of life.

Skills & Employment

Nurturing digital skills and talent spanning education to employment has built cross sector capacity to support innovation and SME growth leading to increased job opportunities and entrepreneurship.

Innovation

People and businesses come together to collaborate and exploit the city's assets, data, technology and networks to design new solutions to our societal and economic challenges and are valued for what they do.

Economy

Health, Wellbeing & Care

New models of people centred digital health and care and use of data in its widest forms is making it easier for individuals to manage their health and wellbeing and bring the people with needs closer to the people that can help to support a better way of life.

ICT & Energy Efficiency

Increased decentralised energy, low carbon energy generation with buildings that use technologies, such as smart grids, use of smart meters and apps are helping control the supply and demand of energy in the home and at work

Mobility

Making our city an easier and more enjoyable place to get around by providing travellers and commercial operators with better journey planning and up to date transport information is helping to ease congestion, reduce air and noise pollution and enhance the travel experience whether by foot, car, train or bus.

Our roadmap for a 'smarter Birmingham'

This roadmap sets out a framework for Birmingham's economic, community and third sector leaders, and Birmingham City Council (BCC), to come together and address the city's challenges of today - with the clear goal of building a more resilient and adaptable city for the future.

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The purpose of a smart city approach is to accelerate and enable the delivery of outcomes across various sectors, through a truly integrated approach. This document is a statement of our aspiration to transform the city. It sets out specific ideas that we wish to explore and actions that we have identified for delivery within a 1-3 year timeframe.

This Roadmap represents the beginning of a journey to become a smarter Birmingham, which will evolve over time to incorporate new opportunities and changing technology and to reflect the challenges and opportunities ahead. The changes we are making today may not have an impact until 5 years down the line (particularly in the case of infrastructure). To measure and demonstrate Birmingham's progress in becoming a smarter city, we will use a number of approaches, such as benchmarking with other cities and project management.

The actions captured in this roadmap are not exhaustive, but serve to highlight some of the key areas we will focus on. They have been identified collaboratively with input from all stakeholders involved in developing this roadmap. These include the Smart City Task and Finish Group, city-wide working groups and networks of communities, entrepreneurs, business and research institutions. As a result, the actions proposed in this roadmap:

- Are backed by a significant number of stakeholders who want to support their delivery
- Offer a city-wide benefit (rather than just within one sector or location)
- Build on existing investment or plans, ensuring they are achievable in the short to medium-term
- Address a need or gap in service provision (where identified).

There are a number of ways how organisations and individuals can get involved:

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The rationale for a smart city approach

"Birmingham, the agile city where enterprise and social collaboration thrive – helping people to live, learn and work better by using leading technology." Birmingham Smart City Vision Statement 2012

To make this vision a reality, we need to look at new ways to deliver services, not only to address today's issues but also respond to emerging challenges and pressures, e.g., resource scarcity, population growth and an ageing population. This is all against a backdrop of having to deal with a slow economy and ongoing austerity measures. Yet cities in particular can be the catalyst for finding innovative ways to respond to the major societal, environmental and health challenges we face today.

There is no one solution for a smart city. We know that the traditional ways of serving urban populations and operating cities are no longer fit for purpose. Cities are already struggling to cope with the sheer number, diversity and expectations of service users, while relying on an ageing infrastructure that was put in place decades ago. The advent of internet connectivity and digital technologies and the relentless pace of their development are changing how societies interact and govern themselves. The consistent and innovative exploitation of such technologies can help us change how cities operate and make them more responsive and adaptable to the pressures they face. This is integral to the smart city approach.

The smart city approach

Over the past five years, organisations such as the European Commission, EUROCITIES (more recently the City Protocol Group), the Department for Business Innovation and Skills (BIS), the British Standards Institute (BSI) and the Technology Strategy Board (TSB) have each published similar conclusions and recommendations. These organisations all:

- Regard cities as a 'system of systems' that need to be addressed holistically
- Advocate the integration of infrastructure and processes as a solution
- Encourage a strong focus on carbon reduction
- Promote the use of digital technologies to increase capacity of existing infrastructure and services
- Believe in citizen involvement and citizen-focused service delivery
- Identify four main focus areas of built environment, energy, mobility and ICT

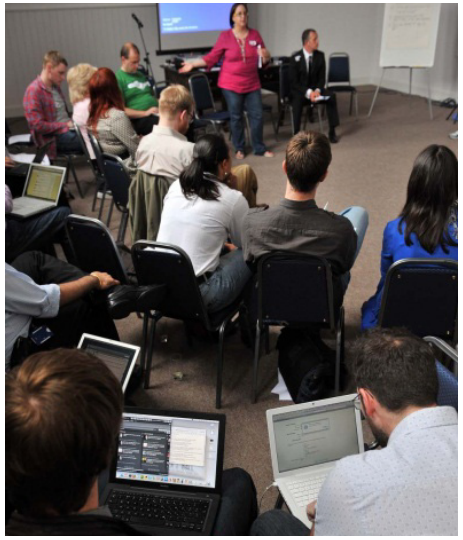
Since 2011 a growing group of city leaders, led by Digital Birmingham and drawn from the public, private, third sectors and academia, has engaged in a debate about how a smart city approach could help Birmingham to tackle its local challenges. In 2012, the Smart City Commission was set up to lay out the vision and key principles for establishing a smarter Birmingham. Subsequently, Birmingham's Smart City Vision document was published in November 2012 to set out the Commission's vision and strategic direction - as summarised on the next page.

What makes a smart city?

Based on emerging research and recommendations, our definition of what constitutes a smart city is best summarised as follows:

"Smart Cities use information and communication technologies and data to be more intelligent and efficient in the use of resources, resulting in cost and energy savings, improved service delivery and quality of life and reduced environmental footprint – all supporting innovation and the low carbon economy".

Dr Boyd Cohen, Urban and Climate Strategist



How do we work?

A smart city is based on the principles of collaboration, openness and engagement. As such, we want to create an environment – or eco-system – that supports all stakeholders, at all levels. By working together for the good of Birmingham, we will share ideas across groups and sectors in order to create greater value for all .

The first tentative steps on the road to a smart city began in 2011 with a workshop involving some of our key stakeholders, which explored what a smart city approach might mean for Birmingham, with input from public and private sector bodies, senior Council officers and elected Members. Since then we have continued to engage a wide range of stakeholders, such as Birmingham's Open Data and developer community, digital and small SMEs, third sector representatives and educational institutions as well as seeking expertise from national and European bodies like the Technology Strategy Board, British Standards Institution and EUROCITIES Knowledge Society Forum.

In 2012, the Smart City Commission was established as a coordinating body and collaboration forum. Its members are Birmingham-based and wider national stakeholders who have an active interest in the roadmap's three themes and in developing the smart city agenda.

The Commission meets quarterly and is chaired by Birmingham City Council's Cabinet Member for Green, Safe and Smart City, Cllr James McKay.

As part of our engagement with others in the city, the Smart City Roadmap will be published on the new *Birmingham Smart City website* , as a blog-style document allowing people to interact, comment and submit ideas.

The role of the Smart City Commission

The role of the Commission is to provide thought leadership, set the standards for a smarter Birmingham and embed the core values of being visionary, open and collaborative, inclusive and people-centric across all city actions. The Commission will:

- Provide thought leadership and set standards for planning and creating the future city
- Engage with other groups and individuals in the city to nurture collaboration and share ideas
- Drive forward the issues identified in this roadmap and address new issues as they emerge
- Be ambassadors for Birmingham's smart city plans and convince others to play their part.

Digital Birmingham's role

Digital Birmingham is the city's lead on the smart city agenda. It is supporting the Smart City Commission and will be instrumental in progressing the roadmap. It is also the Council section responsible for digital developments in the city.

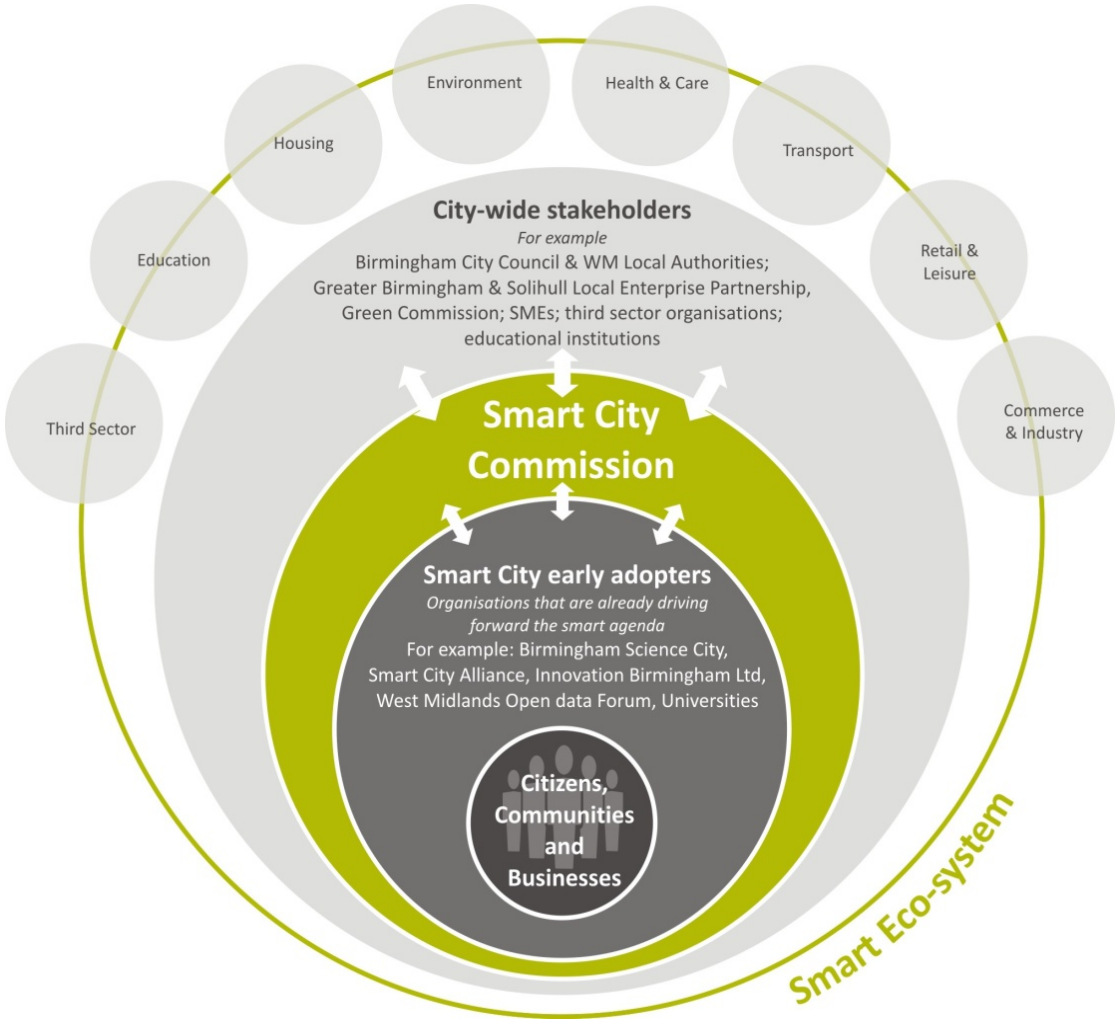
DIGITAL BIRMINGHAM
SMART APPROACH. BRIGHT FUTURE.

Birmingham's Smart City Eco-System

To achieve our Smart City ambitions, we are working in partnership with many other organisations in Birmingham to create a smart city 'eco-system'. Some of these organisations have fully adopted the smart city approach and are already working closely with the Smart City Commission. These include:

Early adopters:

- **Birmingham Smart City Alliance (SCA)**: The SCA's purpose is to bring together partners wanting to develop smart city projects and solutions; drawing its members mainly from the commercial sector.
- **Birmingham Science City (BSC):** Aims to use science and technology to improve prosperity and quality of life in Birmingham and the wider region. It has established three working groups for low carbon, health and digital which are developing and progressing projects, many of which link directly with the smart city agenda.
- **Innovation Birmingham Ltd:** This technology campus provides space, services and entrepreneurial support to technology companies and it plays a vital part in supporting the skills for a smart economy.
- **West Midlands Open Data Forum:** This forum is for data users and people interested in open data from Birmingham and the wider region. Its role is to progress open data applications and standards, engage with data owners and challenge and progress the publication of data. WMODF is working closely with BCC on the development of the Birmingham Open Data portal.



By establishing a collaborative, interconnected smart city eco-system in Birmingham, we will work with all stakeholders to deliver long lasting benefits that future-proof the city against future demands

Routes to funding

A strategy to pay for and deliver smart city activities

Making Birmingham a smart city will require collaboration between all of the city's key stakeholders – whether from the public, private or third sectors, academia, citizens and local communities. These stakeholders will each need to be open to new ideas and play their part with energy and enthusiasm. In contributing investment, it is worth noting that many activities do not require significant cash investment. Instead, they need investment of time, effort and goodwill.

Where actual cash investment is necessary, there are different ways to fund activities:

- Commercial developments, private sector investment and 'crowd funding'
- Aligning BCC-funded capital programmes and developing grant applications to Central Government
- Building consortia and applying for grant funding from the EU or national agencies
- Cooperating with other public or third sector organisations to better target services or share assets
- Collaborating more to ensure assets are produced once and widely reused
- Seeking sponsorship opportunities

We need to be more astute in developing initiatives that have commercial value and the potential to generate income. We will look to create partnerships with the private sector and encourage private sector investment; for example, by using procurement as leverage and holding industry days for market development, and being open to new business models.

It is vital we develop a strategic and well managed approach to securing funding. Based on the roadmap, we will engage early with national and EU funding programmes to influence the topics that are eligible, and to bring together national and EU funding to maximise scope for 'match funding'. A good example of this is Digital Birmingham and Smart City Commission members, who are actively shaping the programme for Structural Infrastructure Funds, i.e. European Regional Development Fund (ERDF) and European Social Fund (ESF), which is being coordinated by the LEP.

We recognise that whilst research funding alone will not pay for widespread adoption of proven smart city initiatives, it can support the search for new ideas and piloting new technologies for potential digital and technological infrastructure development.

For the smart city agenda, grant funding possibilities fall into four key areas:

Government and Research Council funding

- BIS, DCLG and DCMS funding
- ERC Funds.

EU funding

- Horizon 2020
- Competitiveness and SMEs (COSME)
- Connecting Europe
- LIFE (environment and climate change)
- Health for Growth
- Territorial cooperation (INTERREG).

National agencies:

- Technology Strategy Board
- Catapult Centres
- NESTA
- Big Lottery Fund.

Local and regional

- GBSLEP: SIF (ERDF and ESF) and Local Growth Fund.

Profiling and influencing to attract investment

By 2030, it is estimated that there will be a £200bn global market annually in smart city technologies. We want to maximise the region's capacity to exploit that opportunity and ensure Birmingham stays ahead, positioned as an innovator and testbed for attracting investment and designing and trialling of new urban solutions.

An integral part of Birmingham's drive to be a Smarter Birmingham will be promoting and sharing its Smart City thinking and activities in a collaborative way at local, national and international level. In partnership we have a unique opportunity to join efforts, share, learn and benefit from combined achievements.

Already this is happening through our influence and involvement in national groups, for instance, the Technology Strategy Board Future Cities programme, British Standards Institute Smart City Committee and at a European level through EUROCITIES and international exchange programmes.

This roadmap will be the starting point to increase collaboration and conversation around our future needs and challenges and to do this in a proactive and participatory way. The Birmingham Smart City website is the first step in widening that engagement in an open and transparent way providing a virtual space for people to come together, comment and share what they are doing in the context of smart, demonstrate how the city is collectively already pushing the boundaries and enable us to connect better and engage others in what Birmingham is doing to drive forward it's Smart City work.

We will share our activities via the website, social media platforms, events, workshops and public presentations. We have three guiding principles, as set out in our Smart City Communications Strategy:

To inform and enable: The Smart City agenda is complex. We aim to help our stakeholders understand what a Smarter Birmingham is all about, the relevance to them and how they can integrate practices of it within their own environment to support economic and social gain.

To show and share: There are already many smart projects and activities happening across the city. The aim is to demonstrate to the world how active Birmingham is in pushing the boundaries of being smart. This will share good practice, understanding and help join up the 'dots' on the ground to maximise effort and influence.

To collaborate and participate: Inviting, involving, and bringing together people from all backgrounds, sectors and walks of life - academics, designers, artists, innovators, entrepreneurs and community activists - the richness of what we do will be evidenced by the diversity of those that are involved in driving forward Birmingham's Smart City work.

Assessing progress

This Roadmap represents the joint ambitions and collaborative efforts of many stakeholders. It aims to provide a statement of intent rather than provide a tightly managed programme of work delivered by a single entity.

As part of developing this roadmap, we have discussed the measures we could introduce to assess Birmingham's progress as a smart city, the thrust of which is to deliver a sustainable, prosperous and inclusive future for its citizens. This is based on working together to look at how we can make Birmingham a city that is more adaptable, resilient and efficient in managing its resources across all of its communities.

The actions, ranging from research to projects, set a direction of travel and will be managed and evaluated against their own set of indicators, in line with the lead partner's requirements and grant funding criteria. These will be reported to the group that is measuring the outcomes; for example, a skills project might come under the LEP's Employment & Skills Board measurement.

However, the real added value of implementing the Roadmap actions, will be their potential to contribute to the overall goal of supporting Birmingham's transition to a smarter Birmingham and for that reason we are taking a new approach to how we measure success.

Given the infancy of the Smart Cites agenda in the UK, there is still yet no established metric of performance. In the past, Digital Birmingham has benchmarked the city using the Intelligent Community Forum (ICF) global framework. The ICF compares cities across the globe in terms of their use of broadband to achieve economic growth and build an inclusive society. And in 2011, Birmingham achieved the 'Smart21' Intelligent Community award.

Moving on from 'intelligent communities' to 'smart cities' we have identified a new guideline of the British Standards Institution (BSI) as a suitable framework. In 2013, BSI was commissioned by the Department for Business Innovation and Skills to develop a range of standards for smart cities and Digital Birmingham was part of this process. In particular the *Smart city framework – Guide to establishing strategies in smart cities and communities (PAS181)* will be published in spring 2014.

Digital Birmingham has started to engage with other UK cities and the existing BSI Steering Group for smart city standards to develop a benchmarking system for UK smart cities based on PAS181.

Digital Birmingham will be working with the Smart City Commission to prioritise our efforts. Already Open Data and data related activity has been identified as an immediate priority because the release of public open data and the ability to use data underpins many of the actions. This is seconded by a strong focus on digital connectivity as the second enabler.

Our role is to not just encourage and facilitate change but also to recognise and embrace the fluid growth of ideas across the city. By observing and listening to the people in our city we can identify areas of activity where additional support could increase impact.

The success of the smart city strategy will be visible in economic success and an` improved quality of life.

Recognition for Birmingham shows the city is on its way to becoming a smart city

Technology & Places

Connectivity

Affordable and reliable digital connectivity is accessible from anywhere in the city. Fast speeds are supporting the growth of new telehealth solutions, virtual learning, mobile entertainment, and our businesses are thriving taking advantage of new online service models to support new applications, services and ways of working.

Planning for Digital Infrastructure

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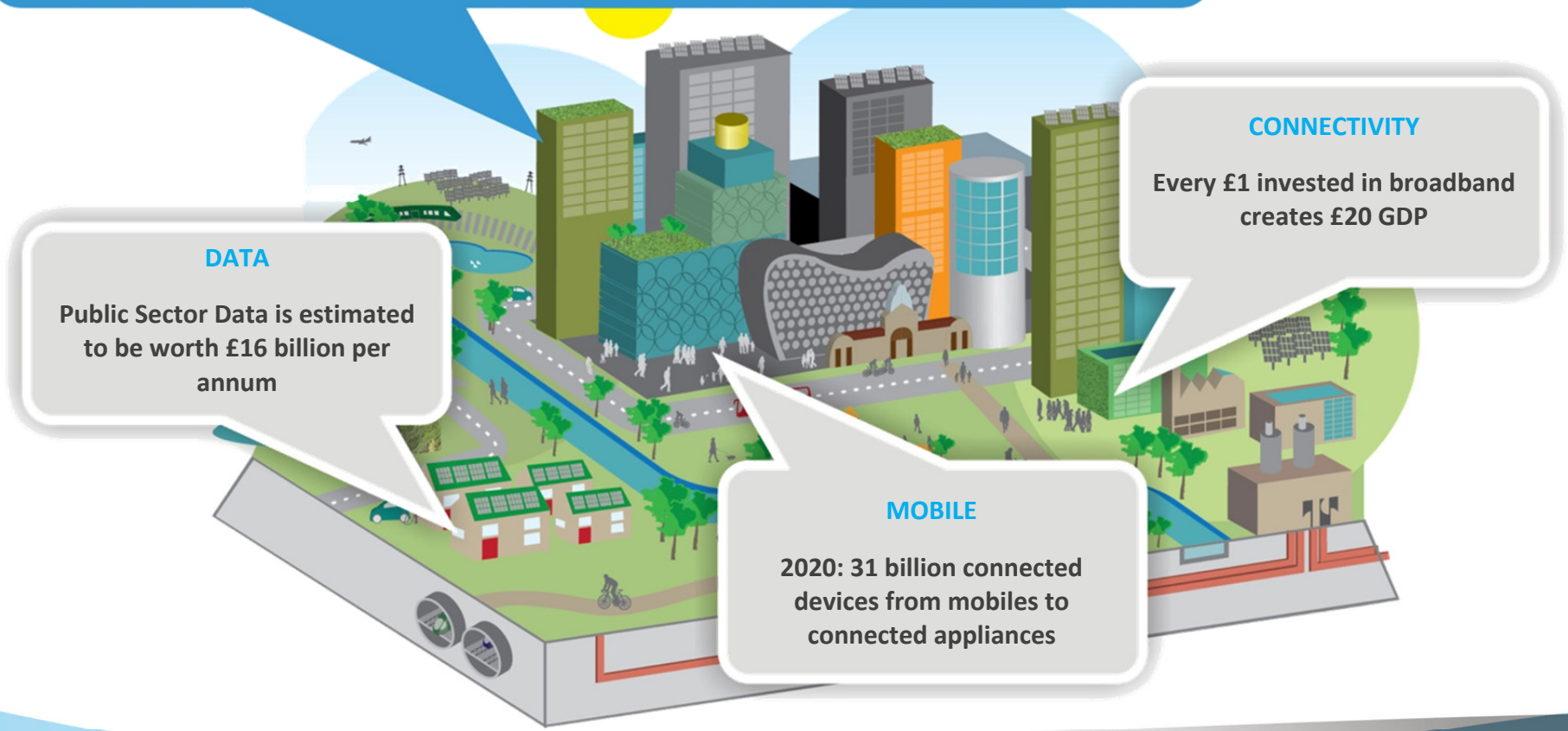
Information Market Places

Publicly available and accessible 'open' data and information is being used and combined by SMEs, entrepreneurs and city stakeholders to provide new insights and the opportunity to make better decisions, deliver new services and apps creating a valuable city asset for social and economic gain.

"The web as I envisage it, we have not seen it yet. The future is still so much bigger than the past"

Sir Tim Berners-Lee, November 2012



A: Connectivity

Digital connectivity is a key building block for any smart city. To maximise benefits for service users and citizens, it is essential we harness digital technologies. Affordable, ubiquitous connectivity can underpin transformational change in public services and will play a major part in closing the 'digital divide'.

The speed of change in the last 20 years has been dramatic and keeping pace with this change remains a critical factor to deal with. Since the 1970s, ICT has transformed the office workplace. We have seen a growth of 480% in ICT-related labour productivity between 1972 and 2012, compared to growth of just 84% for overall labour productivity.

As consumers continue to embrace new technologies at an extraordinary rate, the desire to be connected to high speed services, all of the time, keeps growing. Global mobile data traffic is expected to increase 13-fold between 2012 and 2017. More and more public services are moving online due to the need to deliver efficiency savings and the ability to personalise services through online platforms. The Government's 'Digital by Default' approach clearly endorses this direction of travel.

To ensure citizens benefit from services, such as telehealth, telecare and e-learning, and businesses can take advantage of new business models, such as micro payments or 'cloud solutions', we must work with the technologies market to provide affordable, reliable connectivity that is accessible anywhere in the city.

Digital connectivity in Birmingham

Today our city is well served, with an estimated 85% of premises able to access superfast services. However, this level of access is not available city-wide. In some areas of the city, people are reliant on basic broadband services which are often quite slow. This is something we are determined to change, by working with the telecommunications industry to encourage greater investment in Birmingham.

We recognise the important role world-class digital infrastructure plays in today's globalised economy. Birmingham is already working closely with The European Commission, national Government and delivery partners to help develop approaches that bring us closer to meeting our digital aspirations.

Recently, the City Council awarded a contract that will see Birmingham benefiting from the very best mobile broadband experience available anywhere. This innovative and ground-breaking contract, negotiated by Digital Birmingham, lays the foundations for mobile operators to roll-out the latest wireless technologies across our city by using street lighting columns. This will provide a safe, effective and cost efficient way for operators to improve coverage and capacity of mobile networks.

In response to feedback from city-based SMEs, Digital Birmingham has been actively developing ways to increase the availability of affordable high speed connectivity. Supported by the Urban Broadband Fund (UBF) and ERDF, Birmingham will provide support to businesses in covering the costs for connecting to high speed broadband services (often a barrier for SMEs). The voucher scheme will launch in 2014 and will support many of our high growth industries. A parallel business assist programme will

raise awareness of the benefits of connectivity and internet use in increasing the bottom line.

Priority intervention areas for connectivity in Birmingham

As part of Birmingham's connectivity strategy, Digital Birmingham is focusing on two key areas: availability of Connectivity Services and planning for the future of connectivity infrastructure. (Our approach to Digital Infrastructure is covered more fully in the next section.) Several projects and approaches are being developed to support connectivity; these are based on two overarching themes:

Connectivity services

We are addressing fixed line connectivity by improving availability and affordability of fibre products, and using innovative approaches to tackle 'digital exclusion' (see Action A1). We are encouraging innovation in wireless products for businesses and citizens; improving the mobile broadband experience across Birmingham and accelerating the roll-out of new technologies – to position Birmingham as the easiest place for operators to deploy the latest technology (see Action A2).

Connectivity infrastructure

Birmingham's connectivity infrastructure will grow and improve as we make it easier for new market entrants and smaller companies to deliver new and affordable services. We will minimise the disruption of civil works by promoting 'Open Access' infrastructure. Digital Birmingham is working with developers to address planning principles and connectivity for new developments (see Action B1), while we are aiming to provide more data services by promoting Birmingham as a hub for data centres and internet exchange (see Action A3).

By tackling connectivity in such a holistic way, Birmingham will reap many benefits:

- Greater access to affordable high speed connectivity will make it easier for SMEs to compete in the global marketplace, while higher speed and capacity will help unlock innovation – leading to new applications, products and services being 'born' here in the city
- An increased ability to work more reliably in an agile manner will put customers at the heart of services, and deliver tangible green benefits in parallel
- Greater availability of Open Access infrastructure will lead to new entrants coming to Birmingham, resulting in increased competition, greater choice and innovation, and more affordable services

Case study: Droplet Pay

One example of a successful connectivity-oriented business in Birmingham is Droplet, which launched in 2012. Droplet is a smart phone application that allows users to load money directly from their bank account to their phone.

They can then pay in less than 5 seconds using their Droplet account, e.g., at coffee shops; saving the customer and shop time at the point of sale and offering them a social networking opportunity at the same time.

Transactions are highly secure and the platform provides merchants with a promotional channel direct to its customers.

There are no transaction fees for either the merchant or end user and Droplet provides the perfect opportunity to move towards an ideal cashless business environment.

After just one year since launch, Droplet is already available in Birmingham and London, with thousands of users and a rapidly-growing community of more than 300 shops and services taking part – including Chiltern Railways' on-train catering service.

Based at Innovation Birmingham, business models such as Droplet depend on reliable connectivity – at all times.

Action Plan – Connectivity

Action A1: Fixed Line Connectivity	Join us	
	Stakeholders identified	Potential stakeholders
There is an urgent and sustained need to stimulate private investment in FTTP and other high speed connectivity technologies for Birmingham. We will take steps to nurture working relationships with new and smaller operators to help them better understand the opportunities available by investing in the city. We will facilitate the sharing of infrastructure by introducing businesses as part of our eco-system approach, to drive collaborative working and joint investment. Where public funding is available, we will use it to develop initiatives that stimulate demand for high speed services, resulting in greater availability of such services and widespread growth in the availability of open access infrastructure.	• Telecommunications suppliers • BCC Planning and Regeneration department • Digital Birmingham	• New entrants and or smaller telecommunications suppliers • Birmingham landlords and developers

What makes this approach smart?	• Open access infrastructure supports market competition and shared infrastructure brings carbon and economic benefits
Short-term actions	• Continue to engage with private investors to encourage and sustain new investment in high speed connectivity services • Continue to foster internal BCC relationships to educate staff and stakeholders on the benefits and leverage of high speed connectivity in public service delivery • Design and deliver a voucher scheme to help businesses with the costs associated with connectivity to a high speed service
Future actions	In development

Action A2: Wireless Connectivity	Join us	
	Stakeholders identified	Potential stakeholders
The rapid proliferation of mobile devices means consumers increasingly expect to be able to connect to a reliable, high speed wireless service wherever they are. Birmingham will continue its drive for ubiquitous high speed wireless coverage by focusing on several areas. These include: continued negotiations with potential providers to improve the availability of free public Wi-Fi across the city; encouraging mobile network operators to expand and improve their mobile networks in Birmingham by making it increasingly easier and cheaper to do so; and working with landlords and developers to consider wireless connectivity for their developments in a holistic manner, to ensure superb coverage both inside and outside of properties.	• Telecommunications suppliers • Mobile network operators • BCC Planning and Regeneration department • Digital Birmingham	• Birmingham landlords and developers

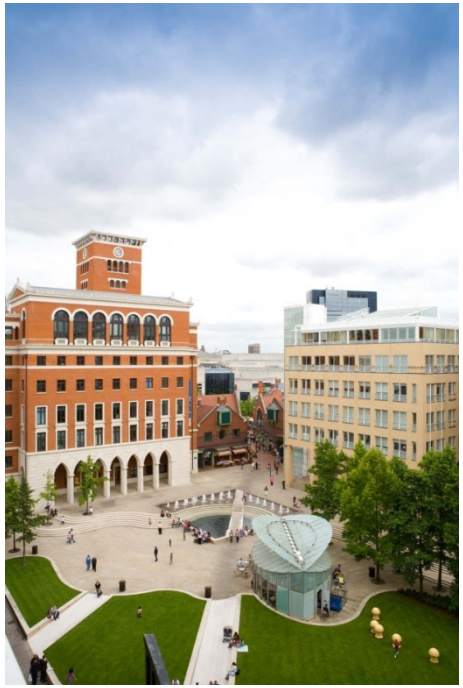
What makes this approach smart?	• Affordable Wi-Fi connections are key to digital inclusion and working with developers is about future proofing the city
Short-term actions	• Create a free public Wi-Fi network across Birmingham city centre • Expand the availability of free public Wi-Fi to as many public buildings as possible • Enable mobile network operators to use street infrastructure to expand and build capacity in mobile networks
Future actions	• Ensure all new developments consider digital connectivity as part of their planning proposals

Action A3: Data Services	Join us	
	Stakeholders identified	**Potential stakeholders**
As connectivity improves, businesses will become more aware of the services that can be delivered through it. Helping people to better understand what services like cloud computing, managed services, voice over IP telephony and data storage are, and the benefits they can deliver for their business, is essential. We will work to educate businesses on the benefits of data services and encourage their uptake. We will encourage providers of data centre services to locate within the WM region and secure the creation of an internet exchange in Birmingham.	• Data centre organisations • The London Internet Exchange • Data service providers	• Big data users • Businesses that require excellent connectivity

What makes this approach smart?	• Businesses understanding how to use connectivity and data services will increase economic output, can support carbon reduction and can support new business models
Short-term actions	• Work with data centre organisations, the London Internet Exchange (LINX) and local developers to develop attractive proposals to encourage their location in Birmingham • Develop a programme of business support activities to educate businesses on the benefits of data services
Future actions	• In development

B: Planning for Digital Infrastructure

To provide reliable and fast digital connectivity anywhere across the city, we need to put the right infrastructure in place. Digital infrastructure covers a diverse range of elements, such as civil engineering works to put fibre optic cabling into the ground, or the installation of new phone masts and Wi-Fi broadcast units. Whatever the specific nature, it is vital Birmingham works to make the deployment of this infrastructure as simple as possible. For the City Council, this means planning, regulating, working with commercial investors and potentially investing in and providing this infrastructure.



Technology developments and access to digital services are critical to Birmingham's economic, environmental and social development. Today, private investment models by telecommunications providers for digital infrastructure tend to focus on the most lucrative and commercially viable areas of a city. While this approach can provide for the majority, it leaves behind pockets of poorly served areas that gradually become less attractive for investment. If left unaddressed, these areas can quickly fall into a state of decline. Birmingham is actively developing plans to encourage longer term investment in digital infrastructure, and is pursuing a number of different approaches (as detailed in the preceding 'Connectivity' section).

Digital infrastructure in Birmingham

Proposals for new commercial and residential developments should include the appropriate infrastructure to deliver the desired mix of technologies – wired and wireless – to provide high speed, ubiquitous internet access. Such proposals should consider:

- The need for inclusive approaches to create open and competitive services that are accessible by all
- Efficiency measures to ensure infrastructure is installed alongside and concurrent with utility connections, with suppliers and providers incentivised to create open infrastructures and share assets, e.g., chambers, ducting and data networks
- The need to cater for future flexibility to reflect increasing demand in providing connectivity and data traffic for a range of purposes, and the installation of future proof connectivity as an important property asset

We have therefore developed two guidelines for planning officers and developers: the Planning Policy for Digital Communications (TP45) which forms part of the **Birmingham Plan 2031** and **Blueprint for a Smart City** – 10 best practice recommendations for city planners and developers, which have been published online on the **Birmingham Smart City website**.

Priority intervention areas for digital infrastructure in Birmingham

As the city's re-development continues to flourish, it makes sense to adopt a coordinated approach with BCC's planning team to encourage developers and landlords to think about future connectivity requirements, in a holistic manner.

Based on the Blueprint recommendations and TP45 documentation, we will continue to explore how these recommendations can be implemented in the Council's own work (see Action B1). One consideration is to introduce mandatory obligations for

developers which will require them to consider and include appropriate digital infrastructure proposals. Further work with commercial developers and Council planning officers is required to fully understand the potential impact in this area (see Action B2).

Developers will need to ensure a full mix of connectivity technologies and services can be delivered, in order to provide high speed internet access - available anytime, anywhere. These mandatory obligations will need to assess requirements for external and internal infrastructure for both fixed line and wireless services.

Open-access conditions where multiple suppliers can share infrastructure will play an increasing role in the future. This approach will reduce the total overall cost of infrastructure (where up to 80% of the deployment cost can be in civil engineering) and minimise future disruption to highways and other public spaces. Shared assets could include ducting, chambers, service pipes and any other infrastructure necessary to route fibre and cable networks to premises. BCC will aim to build in such requirements to any developments it is involved with, encouraging private developers to do likewise.

While the planning management process will be a key mechanism for advancing Birmingham's Smart City agenda, the City Council will also need to work closely with other key partners. These include Local Enterprise Partnerships, universities and advisory groups. In this way, we will develop compelling Smart City propositions that contribute to Birmingham's economic growth and prosperity, and help developers recognise the importance of connectivity assets.

Benefits

If we can start to plan and manage our digital infrastructure in this way, Birmingham will start to see benefits in a number of areas, for example:

- Significant reductions in traffic disruption due to less civil engineering on highways
- Properties that are future-proofed for connectivity are more attractive for inward investment
- Greater availability of Open Access infrastructure will lead to new entrants coming to Birmingham, resulting in increased competition, greater choice and innovation, and more affordable services
- Greater provision of data services will support local businesses in achieving global growth

Case study: Boosting connectivity in Birmingham's Jewellery Quarter

At the heart of Birmingham lies the historic Jewellery Quarter, home to more than 200 listed buildings and a proud heritage of industrial innovation and craftsmanship.

The Jewellery Quarter is currently being considered for World Heritage Site status and BCC wants to add to the distinctive identity and character of the area by building a new public space at its centre. The Golden Square will be an attractive and inclusive centrepiece; providing space for public events and temporary exhibitions and a place to relax.

To ensure this tranquil oasis remains undisturbed for many years to come, the Council is taking a forward thinking step by installing telecommunications ducting and providing open access availability.

This will allow telecommunications companies to provide services to iconic buildings in the area, such as Big Peg, by encouraging properties to share infrastructure and prevent unnecessary disruption, e.g., digging up the new square and unsightly scars being left on the landscape.

Action Plan – Planning for Digital Infrastructure

Action B1: Implementing the Digital Blueprint	Join us	
	Stakeholders identified	Potential stakeholders
The Digital Blueprint contains 10 far reaching recommendations for improving current and future digital infrastructure. To apply these practical processes, procedures need to be agreed for the council and developers to: • Provide expert guidance to planners/developers • Supervise installation and location of ducting • Resolve funding and ownership of ducting and state aid implications	• BCC Planning and Regeneration department • Digital Birmingham	• Commercial developers • Housing Associations • Universities

What makes this approach smart?	• Joined up early planning enables better integration and use of infrastructure
Short-term actions	• Seek guidance from the European Commission • Review good practice elsewhere, e.g., Bristol and Rediffusion, Manchester and Oxford Street development (INCA) • Resolve city procedures for gathering planning and location information in a standard format
Future actions	• Consider procurement of an 'open access ducting' partner to manage and enable utilisation of ducting • Assess planned developments to identify target areas for implementation, e.g., Icknield Port Loop and link to Action B2

Action B2: Regulating infrastructure planning	Join us	
	Stakeholders identified	Potential stakeholders
The Birmingham Development Plan (BDP) will be finalised in 2014 and continued engagement is required to embed the Digital Communications Planning Policy (TP45). To move from optional planning guidance to mandatory requirements, we need to build the understanding of the current planning landscape, building regulations and standards in place, together with BCC's Planning and Regeneration department, developers and industry regulators.	• BCC Planning and Regeneration department • Digital Birmingham	• Commercial developers • Housing associations • Universities • Regulators and standards bodies

What makes this approach smart?	• Cross sector approach to align the systems and processes for planning and development
Short-term actions	• Continue to monitor and progress blueprint principles through the continuing processes of BDP development and ratification of the Digital Communications Planning Policy (TP45) • Create a focus group with planners, developers and industry regulators to understand current guidance and legislation, and develop a 'memorandum of understanding' that will embed the key principles of the Smart City Vision into planning policy and building regulations for all major development/redevelopment schemes in Birmingham. • Work with universities, colleagues in BCC, other local authorities and the wider industry to understand the feasibility and impact of new digital planning regulations • Develop a Birmingham business case evaluating suitable regeneration locations and infrastructure requirements, complemented with detailed information gained from Actions B1 and B2, e.g., based on Longbridge and St Modwen
Future actions	• In development

C: Open Data and Information Market Places

As part of the wider information economy Information Market Places are emerging where data and information is widely available to all, either free of charge or as a trading commodity. Exploitation of these Market Places enables the creation of new services, e.g., big data processing and analysis, visualisation and enrichment of services through new intelligence. Providing local government open data and encouraging others to release open data is one important step to support economic activity.

In line with the Government's open data agenda, more and more local authorities and public sector organisations are making their own data available free of charge, in a reusable format and with a clear licence to allow others to use it for their own purposes (including commercial). Digital Birmingham has already released its civicdashboard.org.uk website in 2010, which provides access to BCC's contact centre data, and gives an early example of analysis and visualisation tools for citizens.

The availability of public sector data has grown hugely over the last five years. The three biggest UK Government data portals – data.gov.uk, the Office for National Statistics (ONS) and the London Datastore now have over 37,500 datasets on offer. Local authorities, such as Nottingham, Glasgow and Redbridge have already created their own open data portals, as have global cities, such as Amsterdam, Berlin, Chicago and Edmonton who are encouraging data use through application developer competitions and events.

Digital Birmingham has been working with Birmingham's open data community to support a number of 'hackathons' and data challenge events such as the Young Rewired State Festival of Code event in August 2013 that used BCC's cycling data. The major Hackference event hosted by Fazeley Studios in the same year attracted over 100 developers. Ahead of releasing more of its data, the City Council published an updated Open Data Policy and Strategy in July 2013.

Open data is often linked to increased transparency and accountability of Local Government activities to taxpayers. Yet it is clear that sharing open data free of charge can also create additional economic and social value. The potential benefits from the use of open data are broad:

- Analysing previously separate datasets together can generate new insights and trends, e.g., between environmental, health and social behaviour data), leading to better targeted services that address user needs and allocation of resources to the areas of most need, e.g., using real-time traffic incident and congestion data to reroute ambulances
- Businesses create new commercial applications and services by aggregating, enriching and analysing data either directly for the end consumer or for other organisations. Open data adds value to proprietary data by giving it new context
- Value is created by the community and SMEs. For example, Transport for London's (TfL's) real-time data has created many applications that TfL did not need to commission and maintain, creating actual savings. Mappa Mercia is creating new services by mapping routes and places of special interest and

improves and corrects available data in the process. Public services get a better view of their own data, which might not be shared between departments – thus generating efficiencies while third sector organisations and suppliers can use service data to bid for BCC commissions and offer personalised services.

A study published by BIS in 2013 on the value created by the release of 10 Ordnance Survey geographic datasets in the wider economy forecasts that it will deliver a net increase in GDP of between £13m and £28.5m by 2016.

According to an estimate by the European Commission, the total direct and indirect economic gains from public sector information (PSI) applications and use across the whole EU27 economy will be in the order of €140 billion annually.

To secure these benefits for Birmingham, a number of measures need to be put in place. We need to release more datasets and create a place where they can be found easily. We need to promote open data to make businesses, the third sector and citizens aware of the opportunities. And we need to ensure businesses and people working in the public and third sectors have the skills to generate value from data. We have therefore identified three areas for action:

Providing open data

Build a Birmingham Open Data portal and start to release BCC data in the first instance, to encourage other organisations to provide data (see Action C1). If this is successful, we will develop the business case and seek funding to create a 'Future City' platform. This will offer a rich service for data aggregation, analysis and processing to be used by the wider business community and other organisations (see Action C2). In support of the Open Data portal, we are changing our procurement policy to ensure the Council retains ownership of data when outsourcing services (see Action F2).

Use specific projects to drive the release of open data and create applications, e.g., transportation data store (see Action I1), energy data (see Action H1) and visualisation of health and social care data (see Action G5).

Creating a vibrant user community

Digital Birmingham will engage with other public sector organisations to promote the release of data and enable links with other data sources, e.g., university projects. Working together with the community to support or organise events, hackathons and application development competitions.

The launch of the WM Open Data Forum will bring together data users from the private and public sector to drive demand for, and use of, data (see Action C3). The growing network of coders and digital makers will engage young people (see Action E1).

Building up data skills

We will grow a network of Open Data surgeries that will help communities to exploit the potential of open data and use visualisation tools to support better decision-making, interventions and planning (see Action E6). We will:

- Provide support for SMEs through the Urban Broadband Fund business support actions (see Action A1)
- Work with building owners and users to improve their use of building energy data (see Action H2)
- Make health and social care data more widely accessible to managers and the public, through collection and visualisation of data and use of online communities to enhance knowledge and promote health and wellbeing (see Action G5).

Case study: Carbon Voyage IT-led recycling scheme

London's Carbon Voyage IT recycling scheme uses an information market place to bundle demand from SMEs for old IT equipment to be collected and recycled. The scheme provides information on journeys planned by empty vans which could divert their route to pick up the equipment and take it to a recycling centre.

The residual value of the recycled equipment pays for the marginal transport cost, with profit returned to the SME or donated to charity. Before, SMEs couldn't afford the cost to recycle. So an intermediary – Carbon Voyage, the market operator – took the risk to start a service to aggregate demand.

Open data enabling this service includes the location, size and IT usage of SMEs in London - helping Carbon Voyage understand the size of the market they're investing in. Non-open data includes the use of technology to request collection of old equipment and data feeds from transport companies indicating the location and routing of their fleets.

Carbon Voyage is assessing if their model can be applied to other market sectors, and whether it could help with local food initiatives alongside partners in Birmingham.

Action Plan – Information Market Places

Action C1: Birmingham City Council Open Data Portal	Join us	
	Stakeholders identified	**Potential stakeholders**
Following the sign off of BCC's Open Data Policy and Strategy, the first step will be to create a simple open data portal initially for BCC data. The main function will be to provide a data catalogue where citizens and developers alike can view and download open data. In a phased approach, the portal can then be developed further in line with user needs and it will be open to host/link to data from other Birmingham organisations.	• BCC / Digital Birmingham • Birmingham City University, Aston University • WM OD Forum	• Data owners in Birmingham and WM • Health care providers • Police • Data users / developers • Other local authorities in WM • Other academic institutions • Community & Voluntary sector • Hyperlocal blogs and citizen activists

What makes this approach smart?	• Making data and information openly available for reuse will create new insights and create economic value. Internally it will progress data sharing and integration efforts.
Short-term actions	• Identify preferred solution and arrange procurement • Develop and implement first version of portal • Identify a list of preferred datasets and negotiate release
Future actions	• Work with Service Birmingham to create a mechanism for automated publication of data from BCC systems • Build up a collection of applications and outputs created with the data • Add more functionality to the portal • Grow the number of datasets published beyond BCC

Action C2: Future City Platform (FCP)	Join us	
	Stakeholders identified	**Potential stakeholders**
To create a data platform that can host, process and trade data, which includes commercial or confidential data and reuse available public open data. The aim of the FCP is to create a vehicle that can stimulate wider economic activity and become a commercial venture. The functionality is much enhanced compared to the BCC Open Data portal. The FCP will engage data owners in Birmingham and the wider region and be linked to a business engagement / support programme. It will learn from the success or failure of existing open data portals and be developed through an iterative approach in consultation with data users and information providers.	• BCC / Digital Birmingham • Birmingham City University, Aston University	• Developers, data analysts • Other academic and research institutions • Commercial data users • Open data communities in other UK, European and International cities

What makes this approach smart?	• Smart cities maximise the use of data for planning and monitoring city operations • Creating the infrastructure that allows all market participants to make use of and commercialise data will add economic value.
Short-term actions	• Create a business case and develop a business model for a self-sustainable service • Develop funding mechanisms and bid(s) for grant funding to pump prime development • Identify relevant data sources including through crowd-sourcing and negotiate release • Exchange experience with other cities
Future actions	• Potentially explore commercial venture

Action C3: Creating a vibrant data user community in Birmingham and the wider GBSLEP area	Join us	
	Stakeholders identified	**Potential stakeholders**
To create economic, environmental, social and democratic benefit from open data and the use of data, it is not enough to simply make data available. Understanding that data analysis can be used to improve business performance, create new services that are based on information, and help people with choices and decisions is still fairly limited to 'data specialists', e.g., data analysts and performance managers. We therefore aim to engage the wider community of potential data users and data owners and link to events, business support and existing networks.	• WM Open Data Forum • BCC / Digital Birmingham • Birmingham Science City	• Innovation Birmingham • Aston University, Birmingham City University • Other WM local authorities • The third sector

What makes this approach smart?	• Engaging a wide range of stakeholders early on and building the skills of the wider community
Short-term actions	• Launch the WM Open Data Forum as the organisation to pull together data users in Birmingham and the wider region • Work with WMODF and investigate the opportunity to support a regional Open Data Institute node • Deliver the Share-PSI 2.0 project, which is building a network of open data experts across Europe, organising events and developing open data standards • Develop interventions to help people gain value from the market place, e.g., training how to use data, how to do analysis and coordinate interaction with Birmingham's business support programmes, for instance, 'train the trainer'
Future actions	• Establishing a growing community of data users that network and interact with open data portals across the region

People

Digital Inclusion

A digitally capable city, where everyone is enjoying the social, economic and cultural benefits of being online; access to jobs, education, civic participation and health are improving choices and opportunities for a better way of life.

Skills & Employment

Nurturing digital skills and talent spanning education to employment has built cross sector capacity to support innovation, SME growth leading to increased job opportunities and entrepreneurship.

Innovation

People and businesses come together to collaborate and exploit the city's assets, data, technology and networks to design new solutions to our societal and economic challenges and are valued for what they do.

"I wish people could have more exposure to fantastic people, such as Warda, a Somalian refugee running a translation business in Birmingham. Technology can break down the barriers. I wish we could break down more social divides using technology"

Baroness of Soho, Martha Lane Fox, former UK government's official digital champion

D: Digital Inclusion

A smart city needs all of its citizens and businesses to have the digital skills and capability to use current and innovative technologies. And all citizens should have the ability to access data and participate in informed decision making for themselves and their communities. The Government's Digital Inclusion team has offered a widely accepted definition of digital inclusion: "The use of technology, either directly or indirectly, to improve the lives and life chances of people and the places in which they live."

Giving citizens and businesses the tools to grow

Birmingham will focus on two specific areas: ensuring every citizen and business has affordable access to broadband connectivity, and has the skills and the confidence to use the internet, data and digital technology to their advantage. As Government and public service providers move more of their services online (see Digital by Default), including 80% of all benefit applications and over 600 Government-citizen transactions to be delivered digitally by 2017 (Government Digital Services Nov 2012), it is essential service users have the skills to interact.

Currently 7.1 million people in the UK have never used the internet and of those, 6.1 million are aged over 55 (ONS Q1 2013). Of those not online, 50% are estimated to live in social housing and a further 16 million people do not have basic online skills. Birmingham, with its high share of deprived neighbourhoods, has a higher than average number of digitally excluded citizens.

At the same time, businesses need to embrace technology in meeting customer demand. The majority of customers are looking for easy to use online applications which offer a multi-channel approach and are available 24/7. With 90% of all jobs requiring ICT skills by 2015 (Go ON UK), employers expect employees to bring basic digital skills to the job as a minimum.

It is vital all sectors take responsibility to help those who do not currently have the skills to get online and to improve digital skills among their residents and business workforce. This will ensure Birmingham has the skills to be competitive in the future. Work to connect citizens and improve their digital skills has been ongoing over the past few years.

A recent initiative is the roll-out of over 4,000 Digital Logbooks to social housing tenants as part of the Department for Work and Pensions Universal Credit Pilot in collaboration with the Birmingham Social Housing Partnership (BSHP) of 46 housing associations. New tenants are given a digital logbook at the beginning of their tenancy. The logbook becomes the primary point of access for benefits for claimants. As such, provision of housing services has changed to accommodate the new interface and work with the tenants to ensure they can manage all aspects of their tenancy and benefits applications online. The logbook is a personalised portal which also helps tenants with budgeting, employment, skills and education.

What will boosting digital inclusion do for Birmingham?

Improving digital inclusion will bring many benefits to individual citizens and the city of Birmingham as a whole:

- Having access to digital technology and the skills to use

it can help people save money, reduce loneliness and social isolation, and enhance people's health and wellbeing. Indeed, 4 out of 5 internet users aged over 55 said having access to computers and the web has improved their lives, while 81% said being online makes them feel part of modern society

- Having a digitally enabled community can help housing providers deliver better and more responsive services, and realise efficiency savings. This includes an estimated £340m in annual savings for landlords in communication costs alone .
- Digital literacy activities can facilitate new relationships and better understanding among housing staff and residents. In the recent Get Digital initiative across 196 sheltered housing schemes, 92% of staff believed social interaction between residents improved as a result of the programme, and 75% said communication improved between staff and residents. 20% of residents now look after themselves better and know more about their health (Get Digital Impact Study 2012)

Our response to the digital inclusion challenge

- The roadmap prioritises one particular action, the creation of a separate Digital Inclusion Strategy for the city (see Action D1). This strategy will bring together a wide range of stakeholders from the public, private and third sectors. It will include digital inclusion measures as part of strategies for economic growth, health and wellbeing, and public service delivery to demonstrate that this issue cannot be tackled in isolation. It will agree a number of measures and actions that will not be described in the current Smart City Roadmap
- To improve digital skills we will increase the current network of Digital Champions (see Action D2), and we will be working with Virgin Media and Birmingham City University to offer TechJams for digital makers (see Action D3)
- BCC needs to better understand how and why citizens use or do not use online services. By working intensively with 50 social housing tenants in a Digital Neighbourhood (see Action D4), we will look at tenants' use of digital technologies and the barriers and enablers to providing services online

Case study: Digital Champions

Two Birmingham women's lives have been transformed through access to the internet. Warda Mohammed from Aston and Heather Hawswood from Erdington were both given internet access through Digital Birmingham projects.

Single mum Warda gained access to the internet via Aston Pride's 'Computers in the Home' project and since then has set up her own business as an interpreter, working online and via the telephone from home - work that fits in with her family commitments and has enabled her, not only to support her family, but train and provide employment to other women in similar circumstances.

22 year old Heather lives in Windsor House, an Erdington tower block that was kitted out with broadband as part of an aerial upgrade and provided with free refurbished ex-council computers. Heather, who had been caring for her teenage sister since the age of 19, had become increasingly housebound and isolated. She used the internet to contact friends through Facebook, search for tips on how to deal with teenagers and found a temporary job through an online advertisement.

Action Plan – Digital Inclusion

Action D1: Digital Inclusion Strategy	Join us	
	Stakeholders identified	Potential stakeholders
In response to Birmingham's high level of social deprivation and the continuing drive to put more public services online, we are creating a Digital Inclusion Strategy for Birmingham. The strategy will focus on affordable access for all citizens, in particular: social housing tenants; basic digital skills development based on citizens' needs and interests; and support for small businesses and entrepreneurs to gain value from digital connectivity and skills.	• Digital Birmingham / BCC	• Digital inclusion organisations, such as Tinder Foundation and Learn Direct • Third sector, such as RnR and RAWM • Housing associations • Broadband and wireless providers
What makes this approach smart?	• A joined up, cross sector approach that aims to integrate efforts and redesign processes for better digital inclusion	
Short Term Actions	• Scoping exercise to develop Digital Inclusion Strategy for consultation with a small number of partners initially, which can be extended to wider Birmingham community	
Future Actions	• Launch Digital Inclusion Strategy in 2014 for consultation • Embed the Digital Inclusion Strategy in the Smart City Roadmap	

Action D2: Digital Champions	Join us	
	Stakeholders Identified	Potential Stakeholders
To create a network of digital champions through GO ON Birmingham, which is linked to a national campaign of people that can help others engage with technology in their community, workplace or home, by creating 2,000 digital champions made up of citizens, employees and businesses across Birmingham.	• Digital Birmingham • Housing Associations • Chamber of Commerce	• Social enterprises • Tinder Foundation • Digital Unite • Telecommunication providers
What makes this approach smart?	• Actively promoting and increasing digital skills will improve social and economic ability of citizens	
Short-term actions	• To launch a booklet (toolkit) and resources that can be used to help others learn digital skills and get online • To enable the digital champions to network so they can act as a conduit for important communications around digital inclusion	
Future actions	• Increase the network, especially with employers to ensure employees have the digital skills to improve their careers and move the business forward • Use the digital champions network to act as test users of the Birmingham Living Lab to trial any new software / technologies that may be developed as part of the Smart City Roadmap	

Action D3: Virgin 10,000 Volunteers Programme	Join us	
	Stakeholders identified	**Potential stakeholders**
Virgin Media will be setting up TechJams with Birmingham City University and BCC. TechJams are free and fun digital making clubs. They are designed to work for absolute beginners and tech-savvy experts. We know that anyone can be a digital maker. Our approach is to learn by doing, by using the thousands of free and easy-to-use tools that are readily available on the internet. This will enable people to learn digital skills but also make useful applications from open data that can help the wider community, as well as develop ideas and innovative projects.	• Virgin • Birmingham City University • Digital Birmingham	• SMEs, students and citizens interested in 'digital making'
What makes this approach smart?	• Cross sector working to maximise impact and increase digital skills required for work and life	
Short-term actions	• Launch TechJams during 2014	
Future actions	• Identify innovative projects and apps which have been made from those taking part in the TechJams, and to promote them for wider consumption • Use skills and apps for wider public and private consumption and to help develop any new software / technologies that may be created as part of the Smart City Roadmap	

Action D4: Digital Neighbourhood	Join us	
	Stakeholders identified	**Potential stakeholders**
We will create a Digital Neighbourhood that will work intensively with approximately 50 BCC housing tenants to engage and connect people to different technologies, to identify their appetite for channel shift and take advantage of the benefits that being online can bring. Its aim is to create a model that can be replicated across the city. Tenants will use a mixture of devices as part of the project. Learning from this project will inform this and other channel shift strategies across BCC.	• Digital Birmingham • BCC Local Services (Housing)	• Tenant associations • Housing associations • Other local authorities • WMODF
What makes this approach smart?	• Gaining better insights to influence service delivery	
Short-term actions	• Identify where the digital neighbourhood will be created and confirm availability of resources	
Future actions	• If successful, work on creating a model that can be replicated across the city and link into other connectivity projects as part of the Smart City Roadmap • Use digital neighbourhoods as living labs to test any new software/technologies that may be developed as part of the Smart City Roadmap	

E: Skills & Employment

Our aim is raise the level of digital skills for citizens of all age groups and businesses and to create an environment that supports creativity, knowledge sharing and experimentation to drive the digital economy with new digital applications, services, civic enterprise, job creation and economic growth.

Ensuring Birmingham's people, businesses and communities can successfully use technology and have the right skills to succeed in tomorrow's world will be vital to:

- Supporting people in securing work and keeping them in jobs
- Helping businesses achieve global success
- Making sure communities become vibrant, healthy and sustainable places to grow up and grow old

Already the city is leading on innovative initiatives such as the award winning social media surgeries, now delivered across the UK, that help community groups, non-profits and charities to use the power of social media. Birmingham's participation in national hackathons such as Young Rewired State is stimulating young people to create innovative apps/services to exploit the social, educational and economic potential of open data and coding in areas like democracy and way finding.

Birmingham Metropolitan College is developing innovative industry-led gold standard apprenticeship programmes with Birmingham-based firm Mercato, to capture the opportunities of the 'big data' market. This will provide e-learning, rigour, employment and industrial stimuli that give young people the opportunity to be at the forefront of a data revolution, and increase entry points for less qualified school leavers up to post graduate learners; ensuring the big data agenda is open to all. The Employment and Skills Board are using Big Data and web 2.0 technologies to improve skills and opportunity matching through a careers pathway marketplace for students, parents, carers and employers. The online marketplace will be using data and new functionality to enable better skill and opportunity matching. Progress and destination tracking will help Birmingham City Council to meet its duty to at risk individuals, while creating an inclusive service that leaves no-one behind. Birmingham City Council's development of the Birmingham Baccalaureate , working with 10 Birmingham schools, is taking an innovative approach to embedding employability skills within the curriculum

Ensuring the growth of our smart city will be about accelerating access to opportunities, by nurturing skills and talent across our communities and by focusing on creating an environment that supports jobs, enterprise and innovation in a digital age.

Overcoming the hurdles to people gaining skills and employment

Yet we face a number of challenges. The world around us is becoming increasingly complex and we need to ensure our 21st century workforce can adapt to meet the opportunities of rapid technology growth and globalisation. The OECD report on adult skills internationally has highlighted the significant advantage in terms of career opportunities for those with skills in managing complex communications, mathematics and problem-solving using new technologies. IT jobs will grow at twice the UK average up to 2020, accelerated by horizontal digital integration across all sectors. However, employers in Birmingham report a skills deficit across a broad

range of sectors and there is a shortage of job seekers with the critical skills to access the available job market. Analyst firm Gartner predicts that while 4.4 million big data jobs will be created by 2015, only a third of these will be filled. These skill shortages and skills mismatches are stifling economic growth.

The aim of the smart city work is to build on and complement the wider skills programme being led through the LEP, Employment Skills Board and other agencies. This will provide a clearer focus on identified gaps related to skills infrastructure and technology uptake in the context of the digital economy and digital skills, as well as looking at where smart technology solutions can play a part in addressing these challenges.

Overall, we propose seven specific actions in the following three areas:

- Strengthening the digital skills infrastructure from education to employment for a smart, inclusive economy
  - Grow a network of Birmingham coders to exploit the economic, social and educational potential of coding, and maximise opportunities from Birmingham's information marketplace and Open Data portal. Our aim is to ensure we connect many more young people, particularly those from disadvantaged communities, into the world of computing, science and technology – to support jobs, enterprise and innovation (see Action E1)
  - Support delivery of the Midlands i-Tech Hub to take responsibility for the end-to-end chain of learning and employment in supporting a digital economy. This encompasses creation of a digital economy-specific apprenticeship programme using new business models that: support better access to jobs for young people; provide ready access to digital apprentices and enable SMEs to get over the administrative burden of taking on apprentices (see Action E2)
  - Build smart businesses that can increase their digital capacity and global competitiveness in areas, such as open and big data, technology innovation and implementation; establish new business models and increase uptake of ultra-fast digital connectivity – a driver of economic growth (see Action E3)
- Innovating learning in a smart city
  - Create smarter ways to learn by promoting initiatives that use technology to its fullest to improve learning for students and those outside of formal education to improve when and how learning takes place (see Action E4)
  - Offer a Birmingham e-passport for lifelong learning that allows learners to evidence traditional and non-traditional skills throughout their lifetime and share this evidence with employers. (Action E5).
- Supporting innovation in smart communities
  - Building on the award winning Social Media Surgeries the aim is to help communities to exploit the potential of open data and visualisation tools to support better decision making, interventions and planning. In doing this will help to build skills, trust and support greater transparency and engagement (see Action E6).

Case study: Smart communities

Podnosh is a Birmingham SME. Five years ago, its unique vision to nurture smarter communities saw Podnosh set up the award winning social media surgeries. These have helped nearly 600 community and voluntary organisations from 20 Birmingham neighbourhoods make better use of the web, and have grown into a national network. Podnosh is now investing in adding open data to the surgeries to help create a level playing field in the use of data, enabling:

- Neighbourhood Forums to develop their neighbourhood plan – giving them access to the same data and tools to tell the 'data story' of their neighbourhood to BCC.
- Patient groups like HealthWatch to understand how to use health and demographic information to influence policy makers, campaign for changes in services or argue for entirely new ways to help people.
- Charity groups like Age Concern Birmingham to have new ways to find and share information on: the requirements of their beneficiaries (who need their services most); where they are located; and evidence to boost campaign activity and lobbying.

Action Plan – Skills & Employment

Action E1. Support and grow a network of Birmingham young coders and digital makers	Join us Initial Stakeholders
Although digital technologies are rapidly transforming organisations, business practices and societies, skills are developing more slowly. For the digital economy to advance at the speed the UK economy requires, we need our people to have the skills to fuel it. Some of our most digitally literate citizens are our young people and we need to make sure that we harness these skills to ensure their employability and inclusion in society. Building on the success of Young Rewired State we will strengthen and retain a network of self-taught coders/programmers and designers in Birmingham by establishing 'hyperlocal' centres across the city and virtual networks. These centres will provide support, activities and challenges linked to industry, communities and the public sector. The young coders will receive help to develop their ideas into products and apps to stimulate enterprise opportunities. A particular focus will be to look at how we engage with young people from disadvantaged communities.	• BCC • Accord Housing • Arts Council England • BBC • Birmingham City University • Creative Skillset • Digital Birmingham • Lara Ratnaraja • School clusters • Smart City Alliance • STEMNet • WMODF

What makes this approach smart?	• Cross sector collaboration to engage young stakeholders and empower them to transform and create services
Short-term actions	• Establish a pilot hyperlocal centre with the BBC linked to the school/community network • Increase the number of young people and centres in Birmingham participating in the National Festival of Code
Future actions	• Scope a community engagement programme targeted at disadvantaged communities • Grow centres and networks and increase the number of centres across Birmingham and the West Midlands region

Action E2. Support delivery of the Midlands i-Tech Hub	Join us Stakeholders identified	Join us Potential stakeholders
The aim is to create an information economy industrial partnership, which can strengthen skills development so that it is responsive to industry needs. It can build cross sector capacity from education to employment to tackle the digital skills deficit and create the intelligence to anticipate and match skills to future demand. This Hub will create an employer-driven eco-system linked to schools, SMEs, larger organisations and HE/FE. It will focus on creating a pipeline of digital skills and talent from education to employment that: supports ready access to digital apprentices; facilitates SME growth and capacity building across the supply chain; encourages entrepreneurship; and increases job opportunities for young people across the GBSLEP region as part of their skills and growth agenda. The Hub will deliver fit for industry training, establish apprenticeships and various operating models so that every SME benefits and assist SMEs to drive productivity, growth and ambition. Key technology areas will include: data analytics, cyber security, big data, cloud and mobile computing.	• Birmingham Metropolitan College • BCC • UKCES • Employment & Skills Board and GBSLEP • Digital Birmingham • Mercato • MediaSmiths Training • Sector networks, e.g., Digital Media Businesses	• SMEs • Vendors (IBM, CISCO, Microsoft, HP, Adobe) • Vendor certification bodies • Neighbouring LEPs • Aston University

What makes this approach smart?	• A cross sector partnership that aims to integrate processes for training and employment
Short-term actions	• Develop proposal for Midlands i-Tech Hub
Future actions	• Scope and develop digital economy-specific apprenticeship and pre-apprenticeship programmes to make this offer more commercially attractive for SMEs using new business models • Models able to respond to SME sector needs and capacity and training needs in areas of coding, programming and data

Action E3. Growing Smart Businesses	Join us	
	Stakeholders identified	Potential stakeholders
Tools and technologies, such as the cloud, electronic invoicing, mobile working and data storage are rapidly changing both the marketplace and operating environment and can transform businesses to embrace more efficient and effective business processes. For many though, adopting these tools is proving a challenge. While many businesses recognise the benefits of technology, take-up is not as it should be and is inhibiting businesses' capacity to grow. Through a demand stimulation programme, our aim is to: build cross-sector digital capability and capacity for global competitive advantage in areas, such as open data / big data, technology and innovation; explore new business models and revenue streams; and drive uptake of ultrafast digital connectivity - a recognised driver of economic growth. One example to build on is the Goldman Sachs 10,000 Small Businesses scheme that Aston University runs and includes a cohort of digital companies.	• BCC • Chamber of Commerce • Digital Media Cluster • MAS • Birmingham Future / Forward • UKITA • Aston University	• Other business networks • Training providers • Innovators / supply chain leads
What makes this approach smart?	• Embedding digital skills and enabling city transformation through business driven innovation	
Short-term actions	• Scope programme; identify delivery partners	
Future actions	• In development	

Action E4. Innovating Learning in a Smart City	Join us	
	Stakeholders identified	Potential stakeholders
Students live in a world with anytime, anywhere access to information at their fingertips. Harnessing technology that they are at ease with, can change each and every lesson and promote self-learning outside the classroom. The opportunity for learners to 'Bring Your Own Device' (BYOD) can help today's students prepare for the future by building collaboration, creativity, communication and critical thinking. BYOD recognises that students live in a multimedia world where they prioritise visual learning, demand creativity, learn through trial and error, and constantly connect and collaborate using information that is live and linked. Promoting initiatives to ensure no child is disadvantaged (socially or educationally) via access to personal connected devices in and out of the classroom will support new learning models and ubiquitous virtual learning. The aim is to explore and where feasible to move to a BYOD approach.	• Birmingham City Council Education & Skills • Birmingham City Learning Centre • Birmingham e-Learning Foundation • Digital Birmingham • School clusters	• Solution providers • Education partnerships • Aston University
What makes this approach smart?	• Future learning models based on integrated technology and interoperability	
Short-term actions	• Identify models and consensus to ensure every learner has access to a personal connected device inside and outside the classroom	
Future actions	• Pilot a BYOD programme in schools to develop appropriate policies and network controls • Extend and promote to other learning providers	

Action E5 Birmingham e-Passport for lifelong learners	Join us	
	Stakeholders identified	Potential stakeholders
This idea is currently being discussed in the context of the Birmingham Baccalaureate and further work is required to confirm its inclusion as an action. Today learning happens everywhere and the skills learnt outside of the formal curriculum are just as important to employers as qualifications. The e-passport (open source) will provide a virtual space to collect and highlight the achievement of a range of skills that young people develop through real-life learning projects, after-school clubs and outside experiences - all of which are important to employers in today's digital world, but aren't recognised by traditional qualifications.	• BMET • BCC	• Learning providers • Employers • Pupil and student representatives
What makes this approach smart?	• Ability to transfer learning achievements across sectors and systems and ability recognise emerging skills (future - proofing)	
Short-term actions	• Further discussion needed	
Future actions	• In development	

Action E6. Building Smart Communities	Join us
	Stakeholders identified to date
Building on the award winning Social Media Surgeries this project aims to help communities to exploit the potential of open data and visualisation tools to support better decision making, interventions and planning. It aims to act as a catalyst for community and network creation around the support and use of open data for social good and connect open data advocates with the community / third sector. In doing so it aims to support innovation and growth in communities; improve transparency, communication, efficiency and relationships and build skills and trust to co-create ideas for the use of information and new infrastructure. The open data work will be an extension of the social media surgeries in the city - helping us do two things: build on the digital skills being acquired by voluntary organisations in the city and help maintain the surgeries as a wider resource for the city. This project will help to create a level playing field in the use of data for third sector and community groups supporting organisations in how to use, publish and maintain open data and building data literacy. This includes the use of tools that will support visualisations, identify trends and patterns to aid decision making, support commissioning of services etc.	• BCC • Digital Inclusion organisations • Open Data / community activists • Podnosh • Smart City Alliance • Third sector networks
What makes this approach smart?	• Building a digitally inclusive and transparent society, encouraging bottom up engagement
Short-term actions	• Research and training of open data champions through existing social media surgery networks • Organisation, co-ordination and delivery of open data training through social media surgeries • Promotion of surgeries, activities and dissemination of impact evaluation
Future actions	• Develop a sustainable programme of activity across the city

F: Innovation

We want to nurture an eco-system that promotes innovation and generates local regeneration and social and financial value for its participants. To do this, we must develop creative solutions that address the needs of current and emerging markets.

We are already seeing the way in which technology and data is bringing about seismic shifts in how services are delivered in novel and unpredicted ways. On the one hand these are solutions that make use of data and digital technologies to create personalised, location specific services and applications. On the other hand these are about using data and digital technologies to change traditional business models such as developed by Droplet (page 18) and Carbon Voyage (page 25) and help traditional businesses to be more competitive. Creating the enabling culture, environment and tools to support our SMEs, communities and social entrepreneurs to innovate and develop solutions that address the challenges of the future city will be a key priority, e.g., Action G4 regarding health challenges.

As a city we need to get better at encouraging collaboration, openness and innovation on all levels to evolve a new model of how the city works. The current approach of functional silos, e.g., transportation, health) to run the city has reached its limitations. The future city is moving towards customisation and seamless services, which are citizen or business focussed and based on service user needs, e.g., Action I8 – seamless payment for multimodal travel across different operators. To do this the council, public and third sector service providers and other big organisations need to cooperate more; engage with their stakeholders and open themselves up to externally driven innovation in support of citywide change. At the same time they need to enable internally driven innovation based on better use of data and information and service integration.

Externally-driven innovation

This Smart City Roadmap provides an opportunity for Birmingham to set out its commitment to create an innovation-driven economy where entrepreneurs, small businesses, large employers and communities all flourish. One particular focus is the creation of information marketplaces (section C) driven by the release of public sector open data and the creation of a Birmingham Open Data portal (see Action C1). Engaging with data users and building a data user community will become one of the external drivers for business and service innovation (see Action C3).

Already the city is seeding knowledge accelerator centres through facilities such as the Innovation Birmingham Campus and the Hub Launchpad, run by the Accord Group that are providing world class support measures at the pre and start up stage that will scale up the numbers of disruptive entrepreneurs, digital makers, innovations and open ventures emerging from Birmingham in support of our smart city aspirations. The Innovation Birmingham Campus has become one of the founding members of the National Virtual Incubator, which connects tech clusters across the UK to widen the space for collaboration.

The role of the smart city is to look at how we connect some of these spaces with each other and to partners globally, for example, supporting the community based Women's Enterprise Hubs that are being developed in Digbeth and Sparkhill. It is also to encourage the

existing organisations that run the city, e.g., the council, police, education to engage with external innovators.

For example, the ERDF funded Innovation Engine project is bringing together organisations that need to address health and low carbon challenges with SMEs and universities that can drive the development of innovative solutions. The Birmingham Science City digital and innovative healthcare working groups facilitate idea generation to stimulate collaborative working across public, private and research organisations. As part of the smart city approach we will encourage even closer exchange of public sector service providers with innovators to accelerate change, such as the multi-disciplinary innovation teams Birmingham Health 2.0 and West Midlands AHSN.

Internally-driven innovation

Public service organisations have the opportunity to influence and support this eco-system through their procurement policy and processes. Organisations, such as BCC or the NHS are big spenders, turning over billion pound budgets. Indeed, BCC also needs to look at the effect of procurement internally to benefit from market innovation and support efficiencies.

By welcoming external innovation we can inform and spark internal innovation and service transformation. In addition we need to focus on how technology and data can be used to better inform the decision-making process, and how generated data can be used to more actively engage with local businesses.

In addressing these issues, we must look at how we can use our buying power to support innovation, benefit from early market engagement and open up the market for SMEs (see Action F1) and explore how we can embed the use of technology and data within procurement and commissioning processes (see Action F2).

The benefits of innovation

Encouraging external innovation and putting in place the mechanisms for internal innovation will generate key benefits:

- Better access for SMEs to the public sector market, e.g., reduced tender times and requirements
- Improved value for money on public sector procurement and service innovation
- More targeted, better focused local service delivery through insights from open data
- Job and business creation with the development of innovative products and services
- Emergence of new business models, e.g., consumer led digital health solutions or services based on demand aggregation (see Droplet Pay case study on p18 and Carbon Voyage case study on p26)

Case study: New Street Gateway

During the refurbishment of New Street Station, Network Rail developed new touch screen wall displays for rail travellers. It is the first time this touchscreen technology has been introduced into a managed station providing up to date timetable information.

The interactive screens can be linked with third party servers to provide up to date tram information when the metro goes live. It will then provide multi-modal transport information as well as city maps and assisting wayfinding out of the station.

Their successful introduction has launched an initiative investigating the use of the new touch screens at the major national stations that Network Rail operates.

Action Plan – Innovation

Action F1: Supporting innovation, SMEs and development of new markets through public procurement	Join us	
	Stakeholders identified	Potential stakeholders
BCC Procurement Services is reviewing the council's procurement and tendering processes with the aim to make tendering easier for suppliers, to nurture innovation in the market place and ensure procurement of services is linked to supporting local regeneration. Procurement of complex services will use an outcome-based approach that favours generation of social value, local requirements and innovation. Adopting 'small lot provision' of contracts will support SMEs. Early supplier engagement (soft market testing) will aid emerging markets and allow BCC to benefit from market-led innovation.	• BCC Procurement Services	• Feedback from SMEs when processes start to change

What makes this approach smart?	• Procurement and supplier management to support market-led innovation
Short-term actions	• Continue development and enhancement of Find it in Birmingham web tendering facility, including stakeholder engagement events and advice to suppliers • Increase roll-out of e-tendering functionality (In-Tend) currently in use across BCC and maximise use of the e-payment system via BACS transfers for all BCC procurement opportunities - affording quicker, easier payments • Develop procurement strategies which include outcome-based approaches for complex services and market testing • Reduced requirement for Pre-Qualification Questionnaires (PQQ) on tenders below EU threshold
Future actions	• Establish early supplier engagement and regular market testing for new products and services • Contract lot allocation to be expanded as per Government policy, small lots provision to allow for bidding by SME

Action F2: Embedding smart city principles in procurement	Join us	
	Stakeholders identified	Potential stakeholders
Digital Birmingham will work with BCC's Procurement Services to embed smart city principles in procurement/commissioning; particularly where it has an infrastructure, technology or data element. This includes guidance and training to departmental buyers on data ownership and open data requests, compliance with interoperability standards and focusing on service integration at the design stage for specifications. Existing assets (infrastructure, data) should be exploited and re-used where possible. This will support service transformation through service integration and external innovation.	• BCC Procurement Services • BCC service areas and budget holders • Legal services • Procurement training providers • Compliance managers	• Other councils and public sector organisations may also be interested in sharing learning in this area

What makes this approach smart?	• Stakeholder led service transformation and transforming the city's operating model
Short-term actions	• Roll-out commissioning toolkit for all internal staff and develop and enhance in-house procurement training • Develop contract management toolkit for wider use within and external to BCC • Include BCC ownership of data into contract templates
Future actions	• Restructure commissioning function into thematic areas of excellence, which focus on key Council outcomes and must contribute to the outcomes • Develop central PQQ database and availability of grant management and spend data

Economy

Health & Wellbeing

New models of people centred digital health and care and use of data in its widest forms is making it easier for individuals to manage their health and wellbeing and bring the people with needs closer to the people that can help to support a better way of life.

ICT & Energy Efficiency

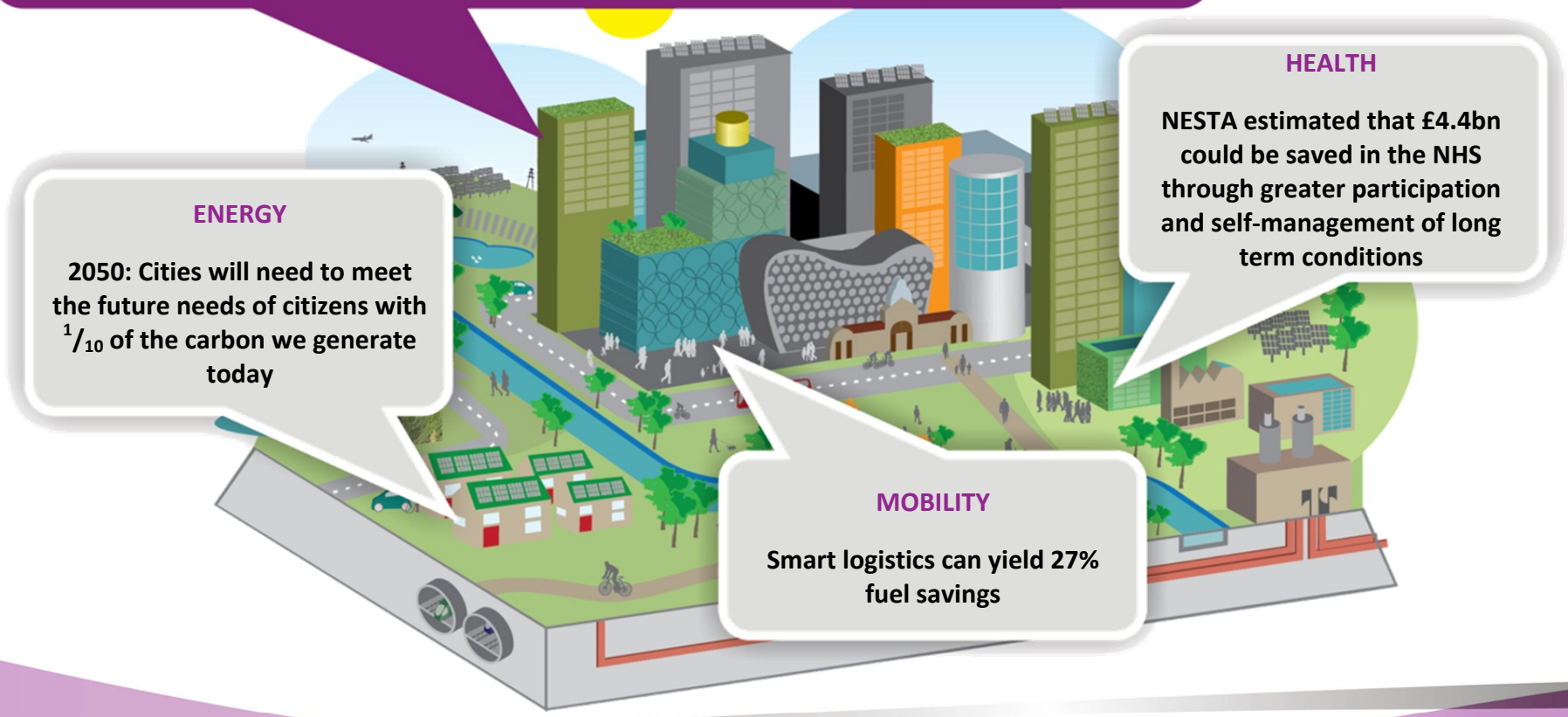
Increased decentralised energy, low carbon energy generation with buildings that use technologies, such as smart grids, use of smart meters and apps are helping control the supply and demand of energy in the home and at work

Mobility

Our city is an easier and more enjoyable place to get around providing travellers and commercial operators with better journey planning and up to date transport information that has helped to ease congestion, reduce air and noise pollution and enhance the travel experience whether by foot, car, train or bus.

"Smart cities will be places that foster creativity, where citizens are generators of ideas, services and solutions, rather than subservient and passive recipients of them. I believe that citizens will shape the cities of the future for themselves, creating "spontaneous order from below".

Usman Haque, CEO**, Connected Environments**



G: Health, Wellbeing and Care

Our approach is to look at ways in which we leverage the value of technology, data and innovation to create new business models and embed solutions in the delivery of health, wellbeing and care support. This will make it easier for individuals and carers to manage their health and care, addressing health inequalities and supporting healthy ageing and independence.

The potential for innovation in health and care is wide open. There is already a focus on personalisation, early prevention, personal budgets and self-management, which is revolutionising models of care. Digital technologies and the internet offers opportunities to significantly reduce the bureaucracy of existing systems and processes, by bringing the people with needs closer to the people who can shape their outcomes.

There is also the opportunity to align technology with new models of care to transform how health and social care is managed and coordinated by the consumer. This will provide greater choice, better opportunities and quality of life via care services that are more efficient, transparent and centred on the users themselves. Our ability to exploit the use of open and proprietary data to improve the quality of health care and make delivery more efficient is gaining critical mass. Patients and service users want to play a much more active role in their care and treatment. The value and future scope for self-management (both of care and navigation of care services) is being increasingly recognised by health and social care services.

Promoting user-led services and pioneering approaches in health and care

We are already seeing a shift to self-management and new approaches. The University Hospital Birmingham NHS Foundation Trust has established a successful e-patient platform myHealth@QEHB, which had 2,400 users registered in its first year. This platform enables individuals to be more involved in their own care, and allows them to view and update their own medical records, such as medication, test results and discharge letters – with future scope to use it to monitor their symptoms, vital signs and treatment compliance. Heartlands Foundation Trust is exploiting the opportunities of virtual communications to enable residents from a care home to have the convenience of online consultations to support remote healthcare provision. BCC's telecare and telehealth programme is accelerating large scale adoption of assistive living technologies to support independence. Midland Heart is piloting Tyze Personal Networks – a social venture that offers secure online networks built around an individual in need of care. It empowers individuals to connect with the care professionals and the supporting family members, allows them to connect with each thus supporting better care coordination. The My Care in Birmingham portal is improving access to information and practical help to support long term independence. The Health and Social Care West Midlands Support site incorporates data, maps and professional tools to support an integrated approach in health and social care.

New partnerships and collaborations are emerging in the region. These include the Healthy Villages Initiative led by Birmingham Community Health

DISCOVER
SKILLS FOR CARERS

NHS Trust; the West Midlands Academic Health Science Network, Health 2.0 Birmingham, the Creative Digital Health Solutions programme and the planned Healthy Ageing KIC. These are bringing together industry, innovators, entrepreneurs, service users, communities, investors and health care providers to seed new ideas, drive innovation and change the way healthcare is delivered.

The drive towards better integration of services around the individual is one of the most pressing issues in health and social care today. Further, a move to an asset-based model of care working in collaboration with patients, families, carers and community organisations to improve outcomes is also gaining momentum.

A core requirement of Birmingham as a smart city, in common with other cities, will be its ability to respond to the challenges presented by rapid growth in the number of people living longer. This will require increasing long-term support for health and social care provision as life expectancy continues to grow. There are wider public health challenges in areas, such as obesity, drug abuse and mental health, and we will need to address these against the ongoing backdrop of fiscal pressures.

We are proposing five specific actions in the following two areas:

- Making it easier for individuals to manage their health and care
  - Accelerate the integration and adoption of consumer digital health and social care applications and technologies such as the e-Redbook (a digital version of the paper-based Red Book that is given to all new parents to record their child's health), and the development of new business models and approaches, such as the Virtual Care Concept to support remote, video-based consultations with specialists and other care providers (see Action G1)
  - Enable individuals and professional and non-professional carers to self-support, coordinate and coproduce care. Part of this is by improving access to information and practical help, particularly via the internet and social media solutions (see Action G2)
  - Increase digital skills of carers/care home staff to help them provide better care for older people and continue to build on the DISCOVER project (see Action G3)
- Driving innovation in health and social care
  - Develop a challenge-based social innovation programme using the ERDF-backed Creative Digital Health Solutions initiative led by Heartlands Foundation Trust and social venture Hub Launchpad, managed through Accord, to co-design solutions to address public health challenges (see Action G4)
  - Provide greater visibility, use of data and information in its widest forms, e.g., social data, medical outcomes, public health, patient experience and hospital admissions data for both health, social care, and other relevant professionals and the public. The aim is to enhance their knowledge and information, and encourage greater patient and public participation in health and social care issues, self-management of health and care, and stimulating behavioural change (see Action G5).

Case study: A network model of care

A circle of support requires open channels of communication to help everyone involved co-ordinate care and support. This was the case for Tracy, a Midland Heart customer living in domiciliary care.

Tracy has some support needs that require involvement from family, support workers and health professionals. At her home she is supported to maintain her tenancy and build up life skills to maximise her independence.

With such an extensive range of support and constantly changing daily activities it is sometimes difficult to keep members of her network engaged with what she is doing. The introduction of an online network (Tyze Personal Networks) to pull everyone together seemed an ideal solution. Tyze messaging had an immediate impact enabling Tracy and her support workers to keep her family up to date with what was happening in her life.

Tyze was introduced to Tracy's dialectical behaviour therapy team. Her psychologist, Aubrey, has uploaded information and videos onto the network, from their weekly sessions that Tracy can access at home.

Action Plan – Health, Wellbeing & Care

Action G1: Delivering new models of citizen centric digital health and care	Join us Stakeholders identified to date
The aim is to explore the potential of customer focused digital technologies and new business models to support delivery of health and care services in new ways. Particularly to address issues of integration, interoperability and adoption of digital services across informal and formal processes. It will develop a range of project areas that include: • Cooperation with Birmingham SMs such as Digital Life Sciences and Maverick TV with the aim of developing a Digital Health initiative for Birmingham • Building on existing initiatives in Birmingham, e.g., developing an integrated health folder for the Digital Log Book rolled out during the Universal Credit Pilot; creation an "e-Redbook" - a digital version of the parent-held child health record that covers the 0-5 period • Support channel shift for GPs to enable them to offer remote consultations via video and help surgeries make better use of e-communications for appointment bookings/cancellation, test results, etc.	• BCC • Clinical Commissioning Groups • Heart of England NHS Foundation Trust • Birmingham SMEs • Health Care providers • Housing groups • Science City – Innovative Healthcare Working Group • Birmingham City University

What makes this approach smart?	• Working towards stakeholder-led service transformation and integration of services and systems
Short-term actions	• Work with Birmingham health and social care providers to develop a strategy for digital health and care focused on use of 'consumer' technologies and online services to transform health and care
Future actions	• New business model and intervention to demonstrate delivery

Action G2: Improve care co-ordination and planning between family, community and professional care givers	Join us Stakeholders Identified	Join us Potential Stakeholders
The task of being an effective carer is highly demanding and complex. It requires significant knowledge of the patient and the network of provision around them. However, coordinating care between these disparate groups is very challenging. This lack of coordination creates sub-optimal care for the patient, increases costs in the system, and creates unnecessary stress for family and community carers. The opportunity is to enable individuals and professional and non-professionals carers to self-support, co-ordinate and co-produce care. Part of this is by improving access to information and practical help, particularly via the internet and social media solutions. This will be partly focused on making existing resources across the range of public provision, including the NHS and the publicly funded community sector, work in a more integrated way. This integration is in alignment with the broader public policy agenda around social care reform. The other aspect is encouraging take-up of online tools that enable sharing of information and care responsibilities between professional and non-professional carers.	• BCC • Carillion • Midland Heart • Care organisations and providers	• Community Navigators • Community Trusts • Birmingham SMEs

What makes this approach smart?	• Working towards stakeholder-led service transformation and integration of services and systems
Short-term actions	• User and market needs analysis study to identify potential project
Future actions	• Develop business case for identified interventions / prototypes

Action G3: Services to improve digital skills of carers, cared for and older people to improve health & wellbeing	Join us	
	Stakeholders Identified	Potential Stakeholders
An ageing population and decreasing levels of social care services provided by the state mean that most people will need to take on a caring role during their lives. This can and often has a direct impact on the physical and mental health of carers. Digital skills are invaluable to find information and support, address loneliness and isolation but also to use digital technologies to improve care and independent living of the elderly. Improving the digital skills of carers and care workers will have multiple benefits for the carer and the cared for.	• Birmingham City Council - BCDA and Carers Centre • Birmingham City University • Digital Birmingham	• HealthWatch • Community Trusts • Care Homes • Third Sector, e.g., Carer's UK • Training Providers

What makes this approach smart?	• Exploiting digital technologies for quality of life
Short-term actions	• Build on the Impact Evaluation of the EU DISCOVER Digital Skills for Carers Project (www.discover4carers.eu) to mainstream elearning for carers • Develop business case for potential commercial service • Link to e-passport in skills section re e-portfolios created for carers to record skills • Work with training providers re use of training/learning resources contextualised for caring • Develop models around the use of award winning Social Media Surgeries - http://socialmediasurgery.com/ • Scope Skills for Care proposal around young employed
Future actions	• Embed digital skills within existing training providers material; Accreditation / certification of digital skills training material; scope delivery of commercial service • Deliver digital skills for carers service

Action G4: Challenge based social innovation programme for public health challenges	Join us
	Stakeholders Identified to date
Obesity costs Birmingham £2.6bn each year including costs to the NHS, social care and wider economy. 40% of 10-11 year olds in Birmingham are overweight or obese. By focussing a series of public health challenges on childhood obesity we are addressing preventative action and developing the concept, which can be transferred to other areas of health challenges. The programme will work with the ERDF Creative Digital Solutions, Innovation Engine and Hub Launchpad and engage with citizens, community leaders and healthcare professionals and technology lead developers to identify solutions. This has the potential to use everyday technology to trigger behavioural change and enable better lifestyle choices. Addressing the 'digital natives' generation provides an opportunity to utilise consumer technology and data to help tackle a significant public health challenge.	• Accord Housing • Public Health - Birmingham City Council • Birmingham Community Healthcare NHS Trust • Birmingham Science City • Digital Birmingham • Heart of England NHS Foundation Trust • Innovation Birmingham Ltd

What makes this approach smart?	• Exploiting digital technologies for quality of life, using data to create new insights and solutions
Short-term actions	• Define process to manage public health challenges through involvement of communities
Future actions	• Identify challenges with communities and public health leads through workshops; identify data sets; look at crowd sourced community funding schemes

Action G5: Visualisation of health and social care data to enhance knowledge and information and promote health & wellbeing	Join us	
	Stakeholders identified	**Potential stakeholders**
There is an opportunity to provide greater visibility and use of data and information in its widest forms, e.g., social data, medical outcomes data, public health data, patient experience data, hospital admissions data to enhance knowledge and information and promote health & wellbeing to citizens as well as wider stakeholders. Making high level data available to the public also encourages greater patient and public participation in health and social care issues, self-management of health and care and stimulating behaviour change. The latter is regarded as essential to the long-term sustainability of public health and social care provision. Digital platforms for capturing patient data and experience, and enabling peer-to-peer and professional sharing can be readily developed and used to share knowledge and understanding on issues like the management of long-term conditions.	• Birmingham City Council • Birmingham Community Healthcare NHS Trust • Boilerhouse • Heart of England NHS Foundation Trust • University Hospitals Birmingham • Birmingham City University, Aston University • Healthwatch • Links to Healthy Villages initiative	• Health organisations • Digital solution providers • Developers and data analysts, health informatics experts • Patient / health communities

What makes this approach smart?	• Integration sources of data and information across multiple organisations
Short-term actions	• ESRC bid on predictive preventative healthcare • Scope project activity and partners • Workshop with data owners
Future actions	• In development

H: ICT & Energy Efficiency

Addressing the sustainable use of natural resources and using ICT to reduce CO_2 emissions and monitor consumption is one of the key priorities of a smart city. In cooperation with the Green Commission, and in line with its Carbon Roadmap 2013, the Smart City Roadmap is prioritising actions that support the objectives of:

- ***Reducing our CO_2 emission levels and increasing local low carbon energy generation***
- ***Creating a low carbon green economy and a place where businesses want to invest and are encouraged to do so***

In this context, one of the UK's biggest drivers is the Climate Change Act 2008, which seeks an 80% CO_2 emissions reduction by 2050 (against 1990 levels). This is reflected in BCC's policy to become a leading green city and achieve a 60% reduction of the city's total CO_2 emissions by 2027. Birmingham's CO_2 emissions are dominated by the industry and commercial sector (41.6%), making it important to address. This is followed by the domestic sector at 36.9%, while transport only accounts for 21.5%. In terms of fuel sources, Birmingham's emissions are dominated by natural gas (for heating), electricity and petroleum (for transport) which together account for over 90% of the city's emissions.

To achieve these objectives we need to look at how we can reduce energy consumption and move towards the use of renewables or carbon neutral energy sources. Exploiting digital technologies will be at the core of helping us develop strategies to do so, for example, by using sensors and monitoring stations to generate data, and analyse emission data to understand consumption patterns, forecast peaks and move to alternative behaviours, e.g., through switch-off or avoiding peak times. Increasing the use of renewables is still limited by the fact that many sources, such as wind or solar power produce intermittent energy, which cannot be exchanged or stored easily. Again, the use of ICT to create an intelligent grid (smart grid) to understand what energy is being produced, how much is being consumed and where and how much can be stored etc. can help us move towards local energy production.

Driving more efficient and environmentally-friendly behaviours in citizens

A key requirement is to change citizens and businesses habits and to better use the data available to inform all interested parties of the relative costs of energy consumption. This will reduce both CO_2 emissions and subsequently costs to individuals and businesses. For instance, public, commercial and industrial buildings are big energy consumers through heating, ventilation and air conditioning (HVAC), lighting and the operations undertaken in the buildings. They are usually professionally managed and some already make use of various forms of Building Information Management (BIM) and Energy Management Systems to monitor and control building use.

Two current projects demonstrate how this might work. Digital Birmingham is managing the European Smart Spaces project for BCC. The project is creating a public energy dashboard for visitors and building users of the Council House and Margaret Street extension. In parallel, it is training building managers and energy managers to improve monitoring and control of the Council's buildings through use of a building Energy Management System.

smartspaces

Birmingham City University provides a comparison service for energy consumption of public buildings through the European EPIC project.

If used correctly, these systems can achieve significant CO_2 reduction and cost savings. According to the Carbon Trust, premises with well-controlled systems can reduce fuel consumption by 15-30%. However, it is estimated that up to 90% of building control systems are inadequate in some way – costing industry and commerce over £500 million per year in additional energy costs. Energy reduction needs to be tackled on several levels:

- At individual level – residents heating and lighting their homes
- At building level – public, commercial and industrial buildings and spaces
- At city level – planning and management of spaces, utilities and energy distribution

Our smart city actions therefore focus on three areas:

- Generating and interpreting data and information related to energy consumption and promoting the release of open data
  - We will encourage the release of open data for energy and develop new data analysis and visualisation tools that are publicly available (see Action H1). We will improve the thermal performance of homes under the Birmingham Energy Savers scheme. Data gathered in these homes will be linked to data about residents' health, to gain a better understanding of the most effective interventions (see Action H5)
- Using ICT to improve energy efficiency of buildings
  - We will work with building managers to improve the use of building energy information (see Action H2) and explore how energy could be managed across a whole estate (see Action H3). Working with schools, we will provide a range of energy efficiency measures and link to children's education (see Action H4)
- Exploring and creating intelligent energy infrastructure to support district energy and local energy generation
  - Improving our understanding of the implementation and benefits of intelligent energy infrastructure will support the roll-out of district energy schemes and local energy generation (see Action H6).

By progressing these actions, we expect to deliver the following benefits:

- Less energy wasted through better management, resulting in cost savings and CO_2 reductions for public buildings
- Better information and awareness about energy use, supporting behaviour change and increased innovation through release of open data
- Social benefits and better quality of life for social housing tenants and economic benefits for businesses, where energy savings and going green improve the bottom line
- Contributing to long-term plans for district/neighbourhood energy schemes

Case study: Aspern waterside village in Vienna

The Aspern Smart City Research company has been established in October 2013. It will develop a multi-functional urban district of around 240 hectares in the north east of Vienna until 2030.

The plans include the concept for a longterm integrated energy-optimized district by connecting residential and non-residential buildings to a low voltage distribution network.

Building control systems will manage the energy exchange between buildings and allow building operators to participate in the energy market.

ICT solutions will be used to discover system and infrastructure faults, alert managers to inefficient consumption patterns and identify savings opportunities. Decentralised renewable power generation and energy storage solutions will play a central part.

Action Plan – ICT & Energy Efficiency

Action H1: Energy data (open data) and visualisation	Join us	
	Stakeholders identified	Potential stakeholders
To source and release data about energy consumption as public open data where possible on Birmingham's open data portal. Starting with BCC's own data the next step will be to influence external data owners to release their data. Secondly to help individuals and organisations better understand their own energy usage, particularly how and when energy is used and comparison with that of similar households or buildings through energy dashboards and visualisation, with appropriate protection of individuals' privacy. With this understanding we can identify solutions, generate new solutions and provide advice for change.	• BCC Digital Birmingham and Climate Change and Sustainability Team • Birmingham City University	• Aston University and University of Birmingham • Birmingham Metropolitan College and University College Birmingham • Energy providers

What makes this approach smart?	• Releasing open data and joining it up with data from other sectors to create new solutions
Short-term actions	• Publish BCC data as public open data • Work with the Climate KIC-Transition project led by to create new building information for selected buildings in Eastside • Work with the Smart City Alliance and the Smarter Greener Eastside initiative to gain greater access to energy usage data in Eastside and make this available as open data • Clarify the scope of the Birmingham Energy Savers Resource Centre and what data will be published regarding progress of domestic retrofit, and connect ensure it is made available as open data
Future actions	• Develop a citywide data / systems architecture for resource data (gas, electricity, heat, fuel, water, waste) • Engage with and encourage citywide public and private organisations to release energy data, review feasibility of gaining access to commercial data

Action H2: Building Management	Join us	
	Stakeholders Identified	Potential Stakeholders
The correct use of Building Energy Management Systems (BMS/BEMS) for building automation and control can achieve significant carbon and cash savings. Therefore we aim to increase and improve the understanding and use of information gained from such systems for building professionals and building users from the public and private sectors, starting with BCC owned buildings and initially engaging the wider public and university sector to share experience and maximise impact. Activities will consider awareness campaigns, training and presentation of BEMS data to actors.	• BCC • BCU • other Eastside building owners with education premises	

What makes this approach smart?	• Making best use of data and information for carbon saving and cross sector stakeholder engagement
Short-term actions	• To deliver the www.smartspaces.eu project and build an energy dashboard for visitors and users of public buildings • Explore within BCC how we can reach the over 1000 operational buildings in our portfolio, the investment estate of rented out buildings and maintained schools buildings • To engage with universities and colleges in Eastside to develop a shared building energy management approach (demonstrator project).
Future actions	• To work with exemplar owners of public buildings to make better use of existing BEMS. • Work through BCC's portfolio to reach several hundred buildings. Explore cooperation with other stakeholders to run an information campaign. • Explore how to reach commercial building owners (developers, landlords, major tenants) to improve use of BEMS. • Create easy to use comparison tool for buildings energy consumption based on solution in the www.epic.eu project.

Action H3: Estate Management Demonstrator	Join us	
	Stakeholders identified	Potential stakeholders
Managing energy across several buildings has the potential to balance supply and demand more efficiently and avoid distribution loss due to close proximity. We will carry out a feasibility study to assess the potential carbon reduction and cost savings that could be made by implementing local import, export and short-term storage of low-carbon and renewable energy at a district or estate level. This requires the ability to measure, monitor and manage energy and heat consumption across several buildings and connection to the energy generation and storage systems in place.	• BCC • BCU Building & Estate owners	• Network Utilities • Utility suppliers • Universities with central campus buildings • BEMS and ICT providers
What makes this approach smart?	• System integration across a geographic area and extensive use of data for decision making	
Short-term actions	• Create a dedicated project proposal for developing and testing estate management solutions, e.g., Technology Strategy Board SBRI calls, Horizon 2020). • Explore measuring of electricity consumption and load balancing across entire estates through a monitoring and control platform with link to energy performance contracts for cost reduction.	
Future actions	• Link to district energy developments and feedback research and project results	

Action H4: School premises – energy efficiency	Join us
	Stakeholders identified to date:
Birmingham's schools are still responsible for a significant proportion of the Council's carbon emissions. Electricity consumption is a particular issue as more ICT equipment is being provided into schools. The 348 schools buildings managed by BCC were responsible for 46% of the council's carbon emissions in 2011-12. The aim is therefore to stimulate the take-up of energy saving measures by schools through sharing energy and carbon performance management information and to integrate understanding of energy use and efficiency into the Science and ICT curriculum for the benefit of pupils. Through the Birmingham Energy Savers (BES) contract, Carillion has facilitated the opportunity to invest approximately £1m in energy efficiency measures in Birmingham's schools estate in 2013/14. It is intended to be a pilot programme, with further phases being planned for future years.	• Carillion / BCC • BCC Education & Skills Infrastructure • Head Teachers, Bursar/School Business Managers, School Governors, • Acivico
What makes this approach smart?	• Extensive stakeholder collaboration and use of data and ICT to reduce carbon
Short-term actions	• Delivery of pilot programme with up to 8 schools in 2013 and 2014
Future actions	• Extension of successful pilot to schools city wide

Action H5: Wellbeing and alleviating fuel poverty	Join us	
	Stakeholders Identified	Potential Stakeholders
Birmingham has a high proportion of households which are just above or in fuel poverty (defined as more than 10% of household income going towards energy bills). These households suffer lower wellbeing outcomes as a result of cold and damp conditions in their homes. In response BES will retrofit energy efficiency measures that have been shown to alleviate the financial pressure on households by improving the thermal performance of homes. The proposal is for a demonstrator project which enables improvements in wellbeing outcomes to be correlated with improvements in the thermal performance of homes and additional telecare facilities. The purpose is to generate and evaluate data from the heating and health systems to better understand and later roll out the most effective interventions.	• BCC with Carillion Energy Services • BCC Housing • Housing Associations	• Residents Associations • Birmingham University • Aston University - Bioenergy Research Group

What makes this approach smart?	• Service and data integration across energy, health and housing sectors
Short-term actions	• Reducing the demand for thermal energy through improved insulation and reduced infiltration through the building envelope, and more efficient domestic hot water systems • Cost-efficient supply of thermal energy by switching energy source (from electricity), greater conversion efficiency and/or alternative energy sources, such as on-site renewables • Generating and monitoring data for households, impact evaluation
Future actions	• Review data and recommend most effective solutions • Prepare wider roll-out

Action H6: Understand the benefits and implementation of intelligent energy infrastructure	Join us	
	Stakeholders identified	Potential stakeholders
Birmingham through its Green Commission has plans to expand district energy, create a council energy strategy and look at local energy generation. In the future, local energy generation will require the integration of ICT with energy infrastructure (i.e. intelligent energy infrastructure) to monitor and manage energy production, distribution, storage and consumption, e.g., Action G3 Estate Management). It also requires a greater understanding of national smart grid developments. We need to better understand the technical feasibility and the policy and legislative environment to make this happen. The action therefore is twofold, covering research and knowledge exchange and development of technical demonstrator projects.	• BCC • Universities: BCU, Aston, Birmingham	• Energy providers • Solution providers • Housing and resident associations

What makes this approach smart?	• Early stakeholder collaboration and reviewing system integration and interoperability needs
Short-term actions	• Understand the role local authorities can play in enabling (similar to broadband market development) and how local energy generation relates to the grid
Future actions	• Research the requirements for a network (connectivity, measuring points / sensors / actuators / links to national grid) that could support local (micro) energy generation, distribution and storage and what is needed to connect a neighbourhood. Link to Green Commission, district energy and CHP expansion. • Gain understanding of the developments of a national smart grid, which is a long-term evolution

I: Mobility

A core requirement for a city to function is the mobility of people, goods and supplies. Easy and affordable connections between all parts of a city are a key factor for the prosperity and wellbeing of inhabitants. The smart city approach can help us achieve this by focusing on seamlessly bringing together city systems, services and infrastructure, and by using information and communication technologies to create better insights for citizens as well as planners. It aims to create an environment where transportation and mobility are centred on individual requirements, and greener, cleaner and more affordable; and where transport infrastructure is exploited to its fullest.

To understand why the smart city needs to prioritise mobility, we only have to look at the current picture. According to the West Midlands Household Travel Survey, Birmingham residents make 2.8 million journeys each week day across all modes of transport and currently 50% of these are by car. This is forecast to increase to 3.3 million by 2031 due to population growth. If we do nothing, the Department for Transport estimates that congestion will worsen by 83% in the West Midlands by 2035.

Tackling the city's mobility issues through a smart city approach

Yet on average, 36% of Birmingham households do not have access to a car, and require other affordable modes of transport to get to work or education. The Birmingham Mobility Action Plan: Green Paper 2013 sets out an aspirational vision for a city that is linked within the region and improves connectivity and safety for local communities, as well as connections to and within the city centre. The smart city approach forms an integral part of the future mobility strategy. It looks at: directing traffic based on real-time information and predictive analysis; giving travellers and freight operators timely information to choose the best time and mode of transport; and seamless integration of transport and payment systems for easier and more convenient journeys. It also aims to generate, use and release, where possible, more transport-related open data for businesses and developers to use and create innovative solutions.

Many initiatives have already taken steps in this direction. The Urban Traffic Control Major Scheme (UTCMS) has invested over £26 million since 2008 in the creation of one joint platform for Birmingham's and the other West Midlands' traffic control systems, including Police, Highways Agency and public transport operators. It has harmonised traffic data and has laid the foundations for truly integrated transport services to be deployed.

The smart city actions will build on this achievement. For example, the recently started OPTICITIES project will create a new algorithm to predict traffic incidents and analyse reaction scenarios based on the Urban Traffic Control data

Mobility focus areas for action

Having considered Birmingham's mobility challenges with key partner organisations, we have identified three themes with eight discrete projects that will support the delivery of the Smart City Vision for Birmingham (in line with the Birmingham Mobility Action Plan). Projects identified are linked to existing plans and investments to ensure they are deliverable.

Creating, using and releasing transportation and mobility data to enable better planning and new applications

- By building on the UTCMS foundations we are looking to create a transport data platform that supports open data and innovation (see Action I1). Additional sensors will support the improvement of the Air Quality Management Area (AQMA) by providing real-time air quality and noise information across the city. The data can be made available to citizens, based on real-time and historic data (see Action I2). By increasing the capabilities of the smart street lighting network, we will decrease energy consumption and enable integration with other city IP-based networks and systems (see Action I6)

Directing traffic and transport

- We will explore how unused freight capacity can be used to reduce delivery traffic (see Action I5). The existing junction management system will be taken to the next level, from reactive to proactive traffic management (see Action I4). And the existing smart parking trial will be rolled out to further locations and data can be made available (see Action I7).

Making it easy for people to get around

- We will explore how the existing on-street way finding system of Totem information kiosks can be exploited to provide additional functionality and data (see Action I3). We will work with Centro to accelerate the provision of the travel smart card and move to the next level of creating a personal travel account for multi-modal payments (see Action I8)

The actions we have identified will benefit people, businesses and the wider economy, particularly through:

- Improved traveller experiences based on better journey planning and seamless payments across different modes of transport
- Improvements in health and quality of life in certain areas of Birmingham, with reduced levels of air and noise pollution
- Enhanced transport information facilities that will simplify citizen and visitor travel experiences across Birmingham
- Reduced levels of congestion within areas of Birmingham
- Increased innovation through release of real-time open data

Case study: Smart payments - the way of the future

The Birmingham Mobility Action Plan already outlines the vision for a fully integrated public transport network, where a 'whole of journey' pricing and payment mechanism based on travel zones will be available.

At its best such a system will allow travellers to use any mode of transport (train, bus, bicycle or car hire) and will include contactless payment technology linked to a personal travel account and through debit or credit cards or mobile phone applications. Traditional payment, such as smart card and season passes will still be on offer.

Transport for London's extension of the Oyster card demonstrates the ease of moving from tube to bus. Since end of 2012 travellers can use the contactless payment card linked to MasterCard, Visa and American Express instead of an Oyster card to pay for bus fares and get the cheaper Oyster tariff.

Action Plan – Mobility

Action I1: Birmingham Transportation Data Platform and Innovation Competition	Join us	
	Stakeholders identified	Potential stakeholders
To create a distributed mobility data platform of real time and historic data that will allow open access to data while protecting access to operationally sensitive data. The platform will support new services to be developed for internal and external use to better co-ordinate plans and activities, such as emergency response and route planning . To promote the use of the platform and data to stimulate innovation by local SMEs, potentially in the form of facilitating a competitive approach and supporting business collaboration.	• BCC • National Express • Highways Agency • Centro • Amey • UTMC development group	• Data users and developers • WM local authorities • Police, Fire and Emergency services • SAP

What makes this approach smart?	• Data and system integration and use of data for better city operations and externally driven innovation
Short-term actions	• Scoping exercise with partners to identify demand and funding streams • Data Audit • Build Data architecture • Platform Test
Future actions	• Platform operational; establish innovation programme

Action I2: Air quality and noise improvement	Join us	
	Stakeholders identified	Potential stakeholders
Support the improvement of the Air Quality Management Area (AQMA) by providing real time air quality (and noise) information across the city. Explore validity of low emission zones with policy makers based on a 12 month pilot. Make information about air and noise pollution available to planners and policy makers linking it to health information. The data could be made available to citizens, based on real-time and historic data, via an app.	• BCC • WM LETCP (West Midlands Low Emissions Towns & Cities Programme) • Amey • Siemens • Centro • National Express	• DEFRA • WM local authorities • Health groups

What makes this approach smart?	• Cross sector collaboration and data use for transport, environment and health
Short Term Actions	• WM LETCP Pilot • Impact assessment and feedback to policy development
Future Actions	• Validate business case for citywide rollout • Determine future solution and incorporate into data platform

Action I3: Exploiting on-street way finding infrastructure	Join us	
	Stakeholders identified	Potential stakeholders
As part of the Big City Plan the Interconnect Project has created a new way finding system for visitors to navigate the city, which includes web information, maps and on-street signage through so called 'totems'. These totems have the capacity to provide additional information and digital services to people in Birmingham, beyond map information, e.g., activity discovery, local news, and sustainable travel information. This could be achieved through introduction of a third-party app. We will explore how interactivity could be used in provision of services and build use of totem communications infrastructure into Birmingham's major incident and emergency planning.	• BCC • Marketing Birmingham • Interconnect Birmingham	• Birmingham Retail • Blue light services • SAP

What makes this approach smart?	• Enhancing existing infrastructure's usefulness through ICTs • Cross sector working between tourism, leisure, transport and health services
Short-term actions	• Scoping exercise with potential partners to identify additional functionality and information to be included
Future actions	• In development

Action I4: Junction Efficiency	Join us	
	Stakeholders identified	Potential stakeholders
Improve traffic flow by optimising key traffic signals in the city. This will be achieved through analysing data related to junction use and vehicle movements. This relies on continued development of the Birmingham Highways Maintenance and Management System (BHMMS). In subsequent phases, integrate information from related sources such as weather, cultural events and social media; make the resulting information available through the Transport Open Data Platform (Action H1) and consider exploiting predictive technology to enable intelligent signalling at junctions and manage demand by informing travellers through mobile devices. Such approaches have been shown to reduce congestion at key locations, and throughout road networks in cities, such as Singapore and Stockholm.	• BCC • Amey • IBM	• Public and private transport operators

What makes this approach smart?	• Exploiting data from many sources and move towards best use of data analysis for city monitoring and operating
Short Term Actions	• Work with the City Council and key stakeholders to identify strategy requirements, develop outcomes and undertake the necessary implementation to support this. • Data audit • Develop event responses • Integrate new data streams, traffic control network
Future Actions	• Develop business case for predictive systems and find finance • Implement predictive, pro-active junction management • Develop consumer information & tools

Action I5: Freight Capacity utilisation	Join us	
	Stakeholders identified	**Potential stakeholders**
Although road freight accounts for just 6% of the West Midlands traffic, delays to its movement account for 30% of the total economic impact (£600m). And in particular Birmingham's retail centres attract a great deal of delivery traffic. Road congestion, particularly on the strategic network, is a major issue for Birmingham's residents and businesses. We therefore aim create new solutions that will improve the use of spare freight capacity through data collection and demand aggregation thus reducing the number of vehicles on the road and that allow freight operators to travel more efficiently through the city.	• BCC	• Retailers • Primary logistics operators • Secondary logistics operators • Road Haulage association • Customers ordering a delivery • SAP
What makes this approach smart?	• Encouraging new solutions based on data aggregation and interpretation • Stakeholder engagement along and across supply chain	
Short-term actions	• Engaging stakeholders to create common understanding • Mapping and analysing city freight vehicle routes • Publish freight route data on Transportation Data Platform (H1) • Innovation competition with journey data	
Future actions	• Create mechanisms for paid use of spare capacity • Review requirement for freight facilities linked to Green Roadmap consolidation centres	

Action I6: Smart Street Lighting	Join us	
	Stakeholders identified	**Potential stakeholders**
Street lighting is a standalone operation that has changed little since electrification. Although sensors and LED bulbs have increased control and decreased energy use in the last decade, the network remains isolated from other city systems. This creates additional management and maintenance costs and limits the use of street lighting as a near-ubiquitous on-street asset. The aim is to further decrease energy use while increasing capability of street lighting by moving to Power- and Light-over-Ethernet for LED street lighting.	• BCC • Amey	• Cisco • Phillips • amBX • PureVLC
What makes this approach smart?	• Integration of physical infrastructure and ICT for enhanced use • integration with other city systems	
Short-term actions	• Policy, legal and regulatory review re governance of street lighting • Trial focussed on major streets, key destinations, iconic buildings • Develop ecosystem of innovators / SMEs to exploit new capabilities	
Future actions	• Rollout and exploitation; integration of street lights with other systems and services • An integrated street lighting system that will enable integration with CCTV, emergency services and other public systems, networks and services. • Enhanced city connectivity by supporting Li-Fi (data delivered by light).	

Action I7: Smart Parking	Join us	
	Stakeholders identified	Potential stakeholders
Make Birmingham an easier place to commute to, visit and travel through by getting people parked accurately and quickly. Expand the existing Smart Parking trial across the city, into a full operational service and develop the culture of compliant parking.	• BCC • Amey	• Car parking operators • Public transport providers
What makes this approach smart?	• Making best use of data to provide accurate real-time information and allow drivers to make better decisions	
Short Term Actions	• Review the Birmingham Mobility Action Plan to ensure planned coverage is aligned with its aims • Develop the business case • Scale up current pilot to cover the whole inner city • Explore additional functionality, e.g., residents permits • Assess impact and feed into policy development	
Future Actions	• Wider rollout and exploitation in areas with high parking demand	

Action I8: Mobility account and smart payments	Join us	
	Stakeholders identified	Potential stakeholders
Deliver a simple, single payment and ticketing experience for travellers to Birmingham and the surround area, covering different operators and modes of transport. Explore the expansion of Centro's existing smart card and move towards a personal mobility account, which no longer requires a physical card.	• Centro • BCC • National Express,	• Arriva • Stagecoach • Travel Midland Metro • Train operators • SAP
What makes this approach smart?	• System integration across several operators	
Short-term actions	• Scoping exercise with potential partners to identify demand	
Future actions	• In development	

Action Plan Reference Table

Glossary of Acronyms and Abbreviations

Term	Explanation
3G/4G	3rd / 4th generation of cellular data technologies
BACS	Banker's Automated Clearing Services
BCC	Birmingham City Council
BCDA	Birmingham Care Development Agency
BEMS	Building Energy Management System
BES	Birmingham Energy Savers
BIM	Building Information Management
BIS	Department for Business, Innovation and Skills
BMET	Birmingham Metropolitan College
BSC	Birmingham Science City
BSHP	Birmingham Social Housing Partnership
BSI	British Standards Institutions
BYOD	Bring your own device
CO2	Carbon Dioxide
DCLG	Department for Communities and Local Government
DCMS	Department for Culture, Media and Sport
DEFRA	Department for Environment, Food and Rural Affairs
EC	European Commission
ERC	European Research Council
ERDF	European Regional Development Fund
ERSC	European
ESF	European Social Fund
EU	European Union
EUROCITIES	Membership organisation of European cities with over 400k population
GBSLEP	Greater Birmingham and Solihull Local Enterprise Partnership
GDP	Gross Domestic Product
HE/FE	Higher and Further Education Institutions
HVAC	Heating, Ventilation and Air Conditioning
ICF	Intelligent Community Forum
ICT	Information and Communication Technologies
INCA	Independent Networks Cooperative Association
IT	Information Technology
JPI	Joint Programming Initiative (European fund)

LEP	Local Enterprise Partnership
NESTA	National Endowment for Science Technology and the Arts
NHS	National Health Service
OECD	Organisation for Economic Cooperation and Development
ONS	Office for National Statistics
PAS	Publicly Available Specification
PQQ	Pre-Qualification Questionnaire
RAWM	Regional Action West Midlands
SBRI	Small Business Research Initiative
SCA	Smart City Alliance Birmingham
SIF	Structural Infrastructure Funds
STEMNET	Science, Technology, Engineering and Mathematics Network
SME	Small and medium sized enterprises
UKCES	UK Commission for Employment & Skills
UKITA	United Kingdom IT Association
UTCMS	Urban Traffic Control Major Scheme
WM LETCP	West Midlands Low Emissions Towns and Cities Programme
WMODF	West Midlands Open Data Forum

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