

Smart Cities

May 2014

Summary

Now more than ever, UK cities need to provide public services more efficiently while at the same time supporting sustainable and long term economic growth. The latest thinking suggests that the best way to do this is by becoming 'smart'. This generally means using new technologies (mainly information and communication technologies)¹ and data to improve service delivery and address various economic, social and environmental challenges.

For example, smart energy meters can help cities manage energy demand, reduce cost and safeguard the environment while the move towards online health consultations can also reduce cost and improve the quality of services. Smart transport initiatives like London's 'Oyster' card or traffic control centre can also help the city manage traffic flows and reduce congestion, while making real time bus arrival data publically available can allow for the development of new mobile applications that make commuting in the city easier.

Due to the potential benefits of using smart technologies, UK cities are becoming increasingly active on this agenda. London and Birmingham, for example, have already issued their 'smart' plans and other cities are implementing smart-related projects (described in case studies at the end of the paper). Local Enterprise Partnerships (LEPs) are also incorporating smart initiatives in their Strategic Economic Plans and the Government is providing funding for smart projects and establishing forums for collaboration.

Yet despite some pilot projects being implemented, take up of smart technologies amongst cities is slow for two main reasons:

1. There is a lack of consensus on what 'smart' means and how cities should approach this agenda.

Becoming 'smart' means different things to different audiences, and this is causing confusion in the market, meaning that cities have no clear sense of which issues they should focus on and which technologies they should implement.

1. Information communication technologies are communication devices or applications that can retrieve, store or transmit information in digital form. This includes traditional technologies such as television and computers or more recent technologies like the internet, emails and mobile phones among others.

2. The smart technologies market suffers from a number of barriers (financial, technical and institutional) that need to be overcome if the market is to grow and mature.

Smart technologies are part of a new and emerging market where many of the products and services are still in their pre-commercial stage of development. Market weaknesses, ranging from the lack of risk financing to the shortage of capacity and cross-departmental working, are slowing down progress.

Cities wishing to take advantage of smart technologies need to set out their own vision for a 'smart city' based on three basic principles:

- **Integration:** instead of drawing up smart city plans from scratch and in isolation from other initiatives, city authorities benefit most when they integrate smart initiatives within their existing economic development and public service plans and identify how new technologies can help them achieve the goals they already have.
- **Pragmatism:** cities should focus the bulk of investment on smart projects that are practical, achievable and financially viable, while also leaving some room to develop and pursue innovative initiatives.
- **Participation:** smart projects should be undertaken in partnership with businesses, the community and other partners (such as LEPs or neighbouring authorities) to make sure that they respond to local issues and needs.

Also, overcoming the barriers to growth of the smart technologies market requires joint working between national government, cities, businesses, users and other stakeholders. They should work together on sharing capacity, identifying the required standards and regulations and developing new risk-sharing models that will allow new technologies to be adopted at scale.

This Paper

This briefing looks at the smart city agenda in more detail, the reasons behind slow progress and the challenges that need to be overcome. While recognising that many stakeholders are involved in the smart agenda (including community organisations, local businesses, and citizens), this briefing mainly focuses on city authorities due to their role in setting out the long term economic plans for their areas.

Section 1 outlines the confusion over smart city definitions and **Section 2** presents some of the activities that cities are involved in. **Section 3** sets out the main barriers to developing the smart technologies market and **Section 4** describes the UK Government's approach towards supporting its development. Finally **Section 5** sets out some conclusions.

1. What is a Smart City?

A concept lost in translation?

The term ‘smart city’ is poorly defined, which is creating confusion and uncertainty for many UK cities. The variety of views about what a smart city is has resulted in broad definitions with no focus on specific technologies or sectors (see Box 1). What most smart city definitions have in common, however, is that they consider the use of new technologies (usually ICT) and data as the means to solve the city’s economic, social and environmental challenges.

Box 1: Smart cities definitions

Broad definitions

- The **UK Department for Business, Innovation and Skills (BIS)** considers smart cities a process rather than a static outcome, in which increased citizen engagement, hard infrastructure, social capital and digital technologies make cities more liveable, resilient and better able to respond to challenges.²
- The **British Standards Institute (BSI)** defines the term as “the effective integration of physical, digital and human systems in the built environment to deliver sustainable, prosperous and inclusive future for its citizens”.³

Data-driven definitions

- **IBM** defines a smart city as “one that makes optimal use of all the interconnected information available today to better understand and control its operations and optimize the use of limited resources”.⁴
- **Cisco** defines smart cities as those who adopt “scalable solutions that take advantage of information and communications technology (ICT) to increase efficiencies, reduce costs, and enhance quality of life”.⁵

Citizen-focused definitions

- **UK citizens** tend to consider a smart city as clean, friendly and has good transport connections. Other words they associate with smart cities (although less frequently) include “technology”, “connected”, “internet” and “modern”.⁶
- According to the **Manchester Digital Development agency**, “a ‘smart city’ means ‘smart citizens’ – where citizens have all the information they need to make informed choices about their lifestyle, work and travel options”.⁷

Smart initiatives can be small or large scale and range from bike sharing to integrated operations centres, while the number of stakeholders involved can be so numerous (city councils, technology companies, citizens, universities and charities) that the vision for a smart city changes depending on whom you ask.

As a result, the concept is poorly defined and understood, and is at risk of sitting alongside other well-used but rarely defined notions like ‘liveability’ and ‘sustainability’.⁸

2. BIS (2013), *Smart Cities Background Paper*, London: Department for Business Innovation and Skills

3. BSI (2014), *Smart cities framework – Guide to establishing strategies for smart cities and communities*, PAS 181:2014

4. Cosgrove M & al, (2011), Smart Cities series: introducing the IBM city operations and management solutions. IBM.

5. Falconer G & Mitchell Sh (2012), *Smart City Framework A Systematic Process for Enabling Smart+Connected Communities*

6. Duckenfield T (2014), *What people want from their cities*, Connected Cities 2014, London: Steer Davies Gleave

7. MDDA website <http://www.manchesterdda.com/smartcity/>

8. Campbell M (2014), *Smart Cities? Not for me!*, blog post published on 28 February, 2014 on <http://professormikecampbell.wordpress.com> and Townsend A (2013), *Smart Cities, Big Data, civic hackers and the quest for a new utopia*, W. W Norton & Company: New York

Smart City initiatives can be broadly classified under two main approaches: top down and bottom up.

Top down or technology centric approaches are associated with pre-defined offerings. Cities adopting this approach become smart by integrating data gathered from different kinds of sensors (smart meters and CCTV cameras amongst others) into a single virtual platform in order to manage city operations more efficiently, often working with technology companies to take advantage of already developed products or software. Examples of this include Glasgow's planned Integrated Operation Centre.

New cities such as Songdo in South Korea and Masdar in the United Arab Emirates have been developed using a 'top down' approach; they are being designed from scratch and built using technology-enabled infrastructures.⁹ **However, while interesting, these types of large-scale, top down projects are not relevant or applicable for many old and well-established UK cities as they depend on a blank canvas.** In most cases, wide-scale top down approaches to smart cities stretch far beyond UK cities' financial and technical capabilities and many of these projects do not respond to their needs.

The bottom up approach emphasises the use of new technologies (for example, social media, websites, mobile applications or censoring technologies) and new data (becoming available mainly through open data platforms or sensors) as a means to enable citizens to devise solutions, acquire new skills through online learning and improve their interaction with public authorities. Such initiatives include open data platforms that allow the development of new mobile applications or online crowdfunding platforms to fund innovative projects.¹⁰ By making citizens more engaged in civic life through online platforms, it is also argued that bottom up initiatives can encourage a "more direct form of local democracy" as David Willets, the Minister of State for Universities and Science recently stated.¹¹

Within both approaches there are those that tend to associate smart cities with terms such as healthy, vibrant, pleasant, clean and friendly.¹² Cycling, car-free town centres and improved public transport are examples of this tendency. More literally, others focus on citizens' skills and qualifications-levels to describe how smart a city is.¹³

So far UK cities, along with community organisations and social entrepreneurs, have tended to favour the bottom up technologies approach to smart cities. This is reflected in the rapidly increasing number of such projects being established across the country. These range from open data platforms in cities such as London, Bristol and Leeds (see case studies 1, 2 and 6) to interactive websites in London and online platforms that match skills with business needs, such as Peterborough's Visual Career Pathways project.¹⁴ They also include citizens using sensors such as smart meters to become more aware of their energy consumption and save money (such as in Bristol).

In recognition of this confusion, the British Standards Institute (BSI) recently released the Smart Cities Framework (commissioned by the Government) which aims to provide cities with some guidance on how to implement smart strategies. Without being sector specific, the framework sets out a wide set of principles and recommendations related to leadership and governance, procurement, and digital inclusion, among others.¹⁵

Whilst this represents a positive step in creating a common framework for all the different players and interests to organise around, it is still too soon to evaluate its effectiveness in providing direction to UK cities on this agenda.

9. Campbell M (2014), *Smart Cities? Not for me!*, blog post published on 28 February, 2014 on <http://professormikecampbell.wordpress.com> and Townsend A (2013), *Smart Cities, Big Data, civic hackers and the quest for a new utopia*, W. W Norton & Company: New York

10. Such as the kickstarter project which raised over £1 billion since 2009 and funded almost 60,000 innovative projects <https://www.kickstarter.com>

11. Willets D (2014), *A driver of innovation and growth*, Surveyor, Transport Network, January 2014 issues pp. 23-24

12. Duckenfield T (2014), *What people want from their cities*, Connected Cities 2014, London: Steer Davies Gleave

13. Campbell M (2014), *Smart Cities? Not for me!*, blog post published on 28 February, 2014 on <http://professormikecampbell.wordpress.com> and Townsend A (2013), *Smart Cities, Big Data, civic hackers*

14. This project is part of Peterborough DNA project. More information can be found on <http://www.peterboroughdna.com/>

15. British Standards Institute (2014), *Smart city framework – Guide to establishing strategies for smart cities and communities*, London: BSI

2. How are cities taking forward the smart cities agenda?

There is no one route to becoming smart, and different cities have adopted different approaches that reflect their particular circumstances. This is dependent on a number of factors, ranging from their financial and managerial capacity, private sector offerings, and what citizens and businesses need.

However those cities that have made most progress have tended to use three general principles to guide their smart city agendas:

- **Integration with economic development and public service delivery plans.** Instead of drawing up a smart cities strategy from scratch, cities have integrated smart initiatives within their existing economic development and public service delivery plans and have identified how new technologies can help them achieve their existing goals. For example, Bristol is becoming smart by focusing on smart technologies that help the city reach its long term carbon reduction goal.¹⁶ Copenhagen and Vienna, considered as the top ranking smart cities in Europe,¹⁷ are also using smart technologies to become greener. For example, Copenhagen is working with Massachusetts Institute of Technology (MIT) to develop a smart bike as part of a broader effort to encourage cycling in the city.¹⁸
- **Pragmatic focus with the bulk of investment going on projects that are practical, achievable and financially viable,** while also leaving some space for innovative experiments and pilots. Some smart initiatives are already showing benefits in a number of sectors. For example:
 - **Transport:** London's intelligent road management system was key to ensuring the smooth flow of traffic during the 2012 Olympic Games.¹⁹
 - **Energy:** the smart meters trial by the Carbon Trust helped 580 SMEs across the UK save over £1,000 each on their energy bills,²⁰ and Milton Keynes council reduced their energy use by 40 per cent by switching to smart street lighting.²¹
 - **Front office services:** the London Borough of Newham achieved £11 million in savings by moving to online service delivery.²²
- **Participation of community representatives, local businesses and residents to ensure projects are relevant to the city's opportunities and challenges.** For example, the Smart London Plan, which was developed by the Smart London Board, and the Birmingham Smart City Roadmap, both involve a wide range of academics, civil servants, private and third sector representatives. Bringing those parties together also represents a starting point towards building the networks needed to take smart initiatives forward.

Approaches which incorporate these three principles and focus on already established goals have enabled cities to overcome the confusion associated with what being a smart city means. It has also enabled cities to strike the right balance between focusing on processes and outcomes and between top down and bottom up approaches, as well as how to use and integrate different technologies and data.

Having a clear vision and building partnerships are important prerequisites that cities need in order to progress their smart ambitions, but they are not sufficient. Many of the smart technologies and data sources – the enablers of smart cities – are relatively new and complex, and for the smart cities market to become successful, it needs the right conditions to grow and mature.

The rest of the paper explores the smart technologies market and the characteristics that govern it, while highlighting the barriers that need to be overcome in order to improve it.

16. Bristol City Council (n.d), *Bristol Case Study*, document supplied by Bristol City Council

17. According to Boyd Cohen's 'smart cities wheel' ranking which uses 28 indicators for smart city benchmarking. More information at <http://www.boydcohen.com/>

18. The smart bike is called the Copenhagen wheel and includes a hybrid motor and other features which makes cycling easier.

19. More information can be found on TFL website <http://www.tfl.gov.uk>

20. Opus Energy website, *Smart meters trial finding*, <http://www.opusenergy.com/smart-meters/smart-meter-trial-findings/>

21. See footnotes 9 and 52

22. Willets D (2014), *A driver of innovation and growth*, Surveyor, Transport Network, January 2014 issues pp. 23-24

3. What is the state of the smart technologies market?

New technologies can help cities address their challenges and become smart. The UK's Department of Business Innovation and Skills (BIS) has grouped smart solutions into five different categories – water, energy, transport, waste and assisted living solutions. Some examples of these include:

- **Smart energy management technologies** which consist of smart meters, smart appliances and other technologies that provide data and information used to improve the management of energy. Energy consumption data can help utility companies forecast energy loads and improve services and can help households to manage energy usage and save money.
- **Assisted living technologies** consist of software and appliances that help elderly people live independently and improve their standard of living. For example, Telecare solutions consist of using monitors and sensors that enable patients to receive medical care at home. Research suggests that the use of such technology across the NHS can result in £1 billion of annual saving.²³

The smart technologies market can extend beyond these five categories depending the definition used to describe a smart city. For example, software used to create open data platforms or provide online learning services to citizens can also be considered as part of the market. Some research institutions (see Box 2) also consider new building technologies and security solutions as part of the mix.

However, despite ambitious projections about the take up of smart technologies (see Box 2), progress in the UK has been slow. Most of the initiatives (as the case studies show) are small scale, funded by third party 'special' grants, and have no defined plans or business models to scale them up.

A review by the European Parliament of 240 EU28 cities implementing or proposing smart cities initiatives found that more than half of UK cities are implementing such initiatives.²⁴ However, the UK lags behind other countries; in Italy, Austria, Denmark and Finland more than 75 per cent of cities are involved in this agenda. Moreover, the report added that the number of mature and successful projects in the EU is low and it had to rank 'successful' initiatives based on vision and goals rather than outcomes.

Box 2: Value of the smart cities market

The UK **Department for Business, Innovation and Skills (BIS)** evaluated the global market for smart solutions across five sectors –water, energy, transport, waste and assisted living –and estimated its value to reach \$400 billion by 2020 of which 10 per cent can be reaped by the UK.²⁵

The U.S Market research firm **Markets and Markets** adopted a more general definition – which includes smart building and urban and cyber security among other technologies – and estimated the market at \$1 trillion by 2016.²⁶

The global business consulting firm **Frost & Sullivan** valued the market at \$1.5 trillion by 2020. The firm also adopted a wide definition that encompasses seven sectors including security, infrastructure and healthcare among others.²⁷

23. Examples are drawn from BIS (2013), *The Smart City Market: Opportunities for the UK*, London: Department for Business Innovation and Skills

24. European Parliament, Directorate General for internal policies (2014), *Mapping Smart Cities in the EU*, Brussels: European Parliament

25. European Parliament, Directorate General for internal policies (2014), *Mapping Smart Cities in the EU*, Brussels: European Parliament

26. WhatsNews (2014), *Smart Cities Market poised \$1 Trillion by 2016*, Online article published on 13 February 2013.

27. Frost & Sullivan (2013), *Global Smart City Market*, Presentation by Frost and Sullivan posted on www.slideshare.net

What are the barriers to progress?

Most smart initiatives involve the use of new and disruptive technologies that allow things to be done that weren't possible before.²⁸ As a result, smart technologies require the creation of new markets with new ways of working and new financial and governance models.²⁹ These markets also need the right conditions to emerge: a new innovation and entrepreneurial ecosystem where stakeholders interact effectively and where new business models and ways of working can be created so that new technologies can be adapted. Without this ecosystem, the smart technologies industry is unlikely to grow and mature.

In particular there appear to be seven barriers that need to be overcome if the market is to mature and grow.

- 1. Constrained demand from cities for smart initiatives.** Recent cuts to budgets are forcing most cities to concentrate on providing statutory services rather than 'thinking outside the box' and testing high-risk smart initiatives, even if these might actually save money.³⁰
- 2. Business models for rolling out smart technologies are still underdeveloped.** Even if money was available for investment, most of the smart technologies are still in their pre-commercial stage of development and the risk-sharing mechanisms and business models needed to take them forward are yet to be tested and developed. These mechanisms need to be available before smart technologies can be publicly procured, mainly because they represent a higher-risk investment for the cash-strapped public sector. The lack of business models also restricts the availability of private sector financing, since the uncertain financial returns and long payback periods of many smart initiatives makes capital markets and traditional commercial financing rather inaccessible.³¹
- 3. Cities lack technology-related skills and capacity.** Cities need to understand which technologies are available and how they might benefit their places in order to be effective co-designers, commissioners and clients of smart city projects. This requires specific ICT and technology-related skills and expertise which are often scarce within cities.³²
- 4. Cities find it difficult to work across departments and boundaries.** Many of the smart cities initiatives include integrating different policies and information systems such as linking cycling with carbon reduction or integrating data relating to unemployed individuals from different departments onto a single platform. This requires breaking down silos and joint working between departments and across boundaries. At present, budgets and strategies are seldom coordinated across departments and data is rarely shared. For example, funding for roads, rail, and sustainable transport is set separately.
- 5. Cities have limited influence over some basic services.** Utilities such as gas, electricity, water as well as bus services, are privatised which makes it challenging for cities to implement city-wide smart strategies that need the commitment of private utility companies.³³ In Greater Manchester for example, the combined authority would have to get the consent of 66 bus operators to introduce an integrated ticketing system.
- 6. Concerns about data privacy, security and value.**³⁴ Data needed for initiatives such as open data platforms and the integration of health services is not always accessible. This is mainly due to privacy and security issues or other difficulties such as the lack of technical knowledge to generate or manipulate data. For example, the launch of care.data, a database which integrates data gathered from GPs with hospital medical files was postponed due to concerns over data privacy and possible breaches.³⁵ Moreover, the techniques

28. Technology Strategy Board (n.d), *Emerging Technologies and Industries, Strategy 2011-2013*, London, UK

29. Sissons A & Thompson S (2012), *Market making, a modern approach to industrial policy*, London: Big Innovation Centre

30. The UK Government is trying to improve access to broadband by investing £150 million in the Urban Broadband Fund for example but progress on this agenda remains slow

31. Hirst P & al.(2012), *Jessica for Smart and Sustainable Cities*, Horizontal study. Report published by the European Investment Bank.

32. Centre for Cities interviews

33. In other European cities such as Barcelona and Amsterdam, local utilities are nationalised which makes it easier for cities to integrate these sectors in their long term smart plans.

34. See Williams M (2013), *Open data or closed doors*, London: Centre for Cities for more detailed information on Open Data and Big Data.

35. Brimelow A. and Triggle N (2014), *Critics of giant NHS database 'are scaremongering'*, BBC News Health, article published on 21 February 2014.

to analyse data, communicate it and use it are yet to be fully developed and its monetary value is yet to be understood.³⁶ As a result, councils, businesses and other involved parties do not fully understand the value and benefits that data can generate, which makes the business case for releasing it hard to establish.³⁷

7. Increasing citizen take up and participation is difficult. Currently, cities and the private sector are finding it difficult to increase citizen participation in the smart agenda beyond the committed few. This is due to some people having limited access to broadband or not having the skills and confidence to use the internet – especially in low income communities and among older people.³⁸ With e-services and online consultations becoming more popular, this creates the risk of social and political exclusion among these groups. Moreover, people might not have enough information on how the technology (such as smart meters) can be used³⁹ or see it as irrelevant to their daily lives.⁴⁰ Issues around what kind of data citizens value, whether they understand the privacy and security implications of sharing their data and how smart technologies can benefit them are yet to be fully explored and understood.⁴¹

36. Batty M.(2013), *Big Data: Big Issues*

37. LGA (2012), *Local Government Transparency survey*, London: LGA

38. Research by Go.On UK states that 1 in 5 adults in the UK don't have basic online skills.

39. A recent study on a Smart Metering project by Bracknell Forest Homes stated that many tenants refused to take part due to limited understanding of the meters' benefits and concerns over privacy.. University of Reading and Bracknell Forest Homes (2011), *Smart Meters Pilot Study: Bracknell*

40. Centre for Cities interview

41. Centre for Cities interview

4. How is the government supporting the smart cities agenda?

The UK Government is using a ‘market making approach’ to try and ensure the right conditions are available to encourage the take up of new technologies. Businesses and cities cannot, on their own, solve the obstacles that hinder the growth of the smart technologies market. This is mainly because this market needs new standards, new infrastructure and regulation, which are beyond the individual scope of businesses and other stakeholders.⁴²

The market making approach adopted by the Government involves intervention in three main ways: by playing the role of **coordinator** and bringing different interests and stakeholders together to establish new platforms for collaboration; by playing the role of **funder**, which consists of funding infrastructure and demonstrator projects; and playing the role of **regulator**, making sure that common standards and regulations are in place.⁴³

Coordination: The Government recently established the Smart Cities Forum which brings together cities, academics, businesses and Whitehall departments to improve cooperation on product development and to build the business models needed for co-investment. The Government also launched the Future Cities Catapult which will help cities identify their challenges and explore how new technologies can be used to tackle them.⁴⁴ The Catapult is also tasked with improving coordination between the private and the public sector, identifying the value and potential use of data, testing pilot projects in collaboration with city authorities and helping build business models to scale them up.

Funding: The Government is committing funding for testing smart projects and the promotion of related initiatives. These include TSB’s Future Cities Demonstrator project which awarded Glasgow £24 million to develop a city management system and £3 million each to London, Bristol and Peterborough to take smart projects forward. BIS also announced in February a £73 million funding for projects to help unlock the value of data.⁴⁵ In addition, Research Councils UK is providing £95 million to support smart projects and the Government recently announced that £45 million will be available to technology companies to develop products. Other related support includes the establishment of the Open Data Institute in 2012 and a number of initiatives on smart energy and smart health that other government departments are undertaking.⁴⁶

Regulation: The BSI is working on a set of papers to help guide UK cities to engage in this agenda. In addition to the Smart Cities Framework already published, it intends to publish a Smart Cities Concept Model which will help cities combine data from different sources, and a Smart Cities – Guide to Development which will look closely at the infrastructure needed for cities to become smart.⁴⁷ BSI is also working with its Chinese counterpart and a number of international bodies to share knowledge and come up with international standards that support the smart agenda.⁴⁸ Other support includes related regulations – such as the Open Data Standards – which the Government is gradually issuing in order to solve individual barriers in the market.

These government-backed initiatives represent good steps towards helping cities benefit from new technologies, but it is too soon to determine their effectiveness. Ultimately their success will rely on how cities, the private sector and other stakeholders support and use them.

42. Sissons A & Thompson S (2012), *Market making, a modern approach to industrial policy*, London: Big Innovation Centre.

43. Sissons A & Thompson S (2012), *Market making, a modern approach to industrial policy*, London: Big Innovation Centre.

44. More information on the Catapult can be found here <https://futurecities.catapult.org.uk/>

45. More information can be found on the BIS website <https://www.gov.uk/government/news/73-million-to-improve-access-to-data-and-drive-innovation>

46. BIS (2013), *Smart Cities background paper*, London: BIS

47. British Standards Institute (2014), *Smart city framework – Guide to establishing strategies for smart cities and communities*, London: BSI

48. BSI Presentation

5. Conclusion

The smart cities concept has gained a lot of attention lately and it will most likely continue to do so in the future. Cities are publishing smart plans, related conferences are trending and more and more books are being written on the subject.

Smart technologies can provide solutions for cities by helping them save money, reduce carbon emissions and manage traffic flows. But the complexity of the agenda is hindering its progress. It involves a large number of stakeholders (local authorities, citizens, technology companies and academics) each having their own vision of what a smart city should be; most of the debate gets bogged down on trying to understand what ‘smart’ means rather than focusing on how it can help cities meet their goals. Moreover, since the market for smart technologies is relatively new, it needs new business models and ways of working which are yet to be developed and implemented.

At present, this market is getting substantial support from the UK Government. Cities, the private sector and communities are increasingly recognising that they need to work together in order to make the most of the smart agenda.

Cities should find their own definition of what ‘smart’ means, mainly by:

- **Integrating** smarter technologies with their economic development and public services plans and considering how technology or use of data might help them achieve existing objectives more effectively
- **Focusing** on pragmatic approaches
- Adopting a **participatory** approach to setting and delivering strategies and initiatives.

Cities can also start joining up efforts across departments, releasing more of their data, learning from international case studies on what works and what doesn’t, joining new networks, and collaborating with the private sector and other partners to test products and identify new business models to take projects forward.

The private sector should:

- Work in partnership with cities on designing products and services that are financially viable and respond to local needs and challenges
- Publicise international solutions that might be replicated in the UK and partner with cities to test new products
- Work with relevant parties on identifying and building the business models needed to enable to take projects forward.

The Government should continue to make funding available to test new products and initiatives and also make sure that:

- Efforts are coordinated rather than isolated (across the different Catapults for example, where there is currently a risk of unintended duplication)
- Initiatives like the Smart Cities Forum involve representatives and gather insights from all the relevant sectors
- Interventions stay flexible and steer away from focusing on certain sectors/initiatives, recognising that cities have varying needs and challenges.

Case studies

London

The 'Smart London Plan' launched by the GLA in December 2013⁴⁹ aims to use technology to support the capital's economic growth and help solve its challenges. The plan consists of six strands mainly focused on increasing citizens' participation through improving digital inclusion and access to open data, using smart technology to improve the management of the city's infrastructure and enable cross departmental working, and creating new technology jobs through initiatives such as the Smart London Export programme.

The city also won £3 million through TSB's Future Cities Demonstrator Programme which is being used to integrate the city's infrastructure (mainly transport and energy) and create new district heating networks.⁵⁰ Moreover, the capital is already considered a pioneer in the field of smart mobility, mainly through the implementation of congestion charging, 'Oyster' smart ticketing, and the release of real time travel information for buses. To develop this further, with the help of UCL, Transport for London is using the data collected from Oyster cards to understand congestion patterns and plan future investment.⁵¹ Other initiatives include Talk London which is an interactive website aimed to involve citizens in policy debates, and the London Data Store which gives citizens access to data from different public departments.

Some London Boroughs are also saving money by moving to online services and partnering with neighbouring councils on delivering them. For example, the percentage of services that the Borough of Newham offers online moved from nine to 64 between January and December 2012 and it was able to achieve £11 million in savings as a result.⁵² Also, by sharing ICT services with the neighbouring Borough of Havering, Newham will save 25 percent on its ICT overhead costs and both councils will improve public service delivery by sharing skills and knowledge.⁵³

Leeds

As part of its long term growth strategy 'Getting Leeds Working', Leeds is creating an Innovation Health Hub which aims to create an open platform for healthcare data and will also will incorporate a number of digitally driven initiatives such as a clinical training and simulation centre, an innovation lab, health-related mobile applications and a digital teleconferencing centre.⁵⁴ Leeds City Council is making all council data available on its website (such as city centre football data) and the Leeds Data Mill also gathers datasets from different organisations on a single platform. The council is also implementing the EU INSPIRE Directive which aims to share spatial information with other EU governments and to facilitate cross boundary policy making.⁵⁵

Manchester

A recent EU report ranked Manchester as the fifth most successful Smart City amongst 240 EU28 cities.⁵⁶ The city's smart initiatives are implemented by the Manchester Digital Development Agency (MDDA) and are in line with the Manchester Digital Strategy launched in 2008. MDDA focuses on initiatives that are 'people-centred'. These include projects that promote digital inclusion (such as Go ON Manchester and EastServe)⁵⁷, enable the development of applications using open data by running Hackathons and improve citizens' participation in planning the city's future (through the Manchester Living Lab). The city has also implemented several EU-funded projects such as DEHEMS⁵⁸ and is also partnering with a number of EU cities and projects such as the European

49. GLA (2013), *The Smart London Plan*, London: GLA

50. Williams M (2013), *Open data or closed doors*, London: Centre for Cities

51. See footnote 9

52. Willets D (2014), *A driver of innovation and growth*, Surveyor, Transport Network, January 2014 issues pp. 23-24

53. For more information see http://www.majorcities.eu/conferences/2013-ljubljana/conference-presentations/ljubljana2013_tuesday_geoff_connell.pdf

54. Straughan T (2013), *Leeds Innovation Health Hub, Leaders for Leeds update*, PowerPoint presentation accessed online on 20 March 2014. Leeds: Leaders for Leeds and Leeds and Partners.

55. Leeds City Council website www.leeds.gov.uk

56. European Parliament, Directorate General for internal policies (2014), *Mapping Smart Cities in the EU*, Brussels: European Parliament

57. More information can be found on the projects' website <http://go-on-manchester.com/> and <http://www.eastserve.com/>

58. More information on the Digital Environment Home Energy System can be found here <http://www.dehems.eu/>

Network of Living Labs and the European Connected Smart Cities network.⁵⁹ Another project includes the Greater Manchester Data Synchronisation Project,⁶⁰ through which the 10 councils forming the Greater Manchester Combined Authority are working with the Future Cities Catapult and other partners on a new framework that will coordinate data gathering and sharing across departments and boundaries.

Birmingham

Digital Birmingham (a council-owned partnership organisation) formed a Smart City Commission in July 2012 and launched the Birmingham Smart City Roadmap in March 2014. The roadmap sets out 49 actions grouped under three main themes: Technology and Place (which involves improving broadband connectivity and sharing open data), People (focusing on digital inclusion, improving citizens' ICT skills and implementing new business procurement processes) and economy (mainly around digitalising social care, improving energy efficiency and smart mobility).⁶¹ The roadmap will also build on Digital Birmingham's existing projects, such as investment in ultrafast broadband and a number of initiatives aimed to improve technology skills and encourage the use of data (such as Go on Birmingham and Hello Business).⁶² Through the Urban Traffic Control Major Scheme, £26 million was invested in integrating transport data from different agencies (highways agency, police etc.) into a single platform and the city is also participating in EU funded smart initiatives such as the Smart Spaces project and Discover.⁶³

Milton Keynes

In January 2014, Milton Keynes received a £16 million grant from the Higher Education Funding Council for England (HEFCE) to take forward a Smart City, Big Data (also called MK:Smart) project. Led by the Open University, the project will aim to demonstrate how data gathered from the city's censored infrastructure and other sources (through the new MK Data Hub) can help better manage utilities and decrease the city's carbon footprint.⁶⁴ The city also hosts the £150 million new Transport City Catapult and is trialling a number of smart initiatives such as installing smart street lighting in order to reduce energy use by 40 per cent.⁶⁵

Bristol

Smart City Bristol, launched in 2011, aims to use smart technology to meet its ambition of reducing CO₂ emissions by 45 per cent by 2020. The strategy, led by the council's Smart Cities team, focuses on smart transport, smart energy and smart data and includes pilot projects (such as 3e-Houses and Smart Spaces) which are mostly funded by the EU.⁶⁶ Currently the city is exploring new mechanisms and sources of funding to scale up these projects, mainly through looking at international case studies and learning what models can be imported and used.⁶⁷ In April 2013, the city was also granted £3 million from TSB through the Future Cities Demonstrator Programme to open its City Living Lab which will combine data from different sources and host hack events in order to encourage citizens and businesses to use them. The city council is also implementing a number of challenges and gathering citizens' feedback through initiatives such as the Bristol Open Data energy challenge and 'George's idea lab'.

59. More information can be found on the MDDA website <http://www.manchesterdda.com/smartcity/>

60. More information can be found here <http://futureeverything.org/ongoing-projects/greater-manchester-data-synchronisation-project/>

61. Birmingham Smart City blog <http://birminghamsmartcity.wordpress.com/>

62. More information can be found on Digital Birmingham website <http://www.digitalbirmingham.co.uk/about>

63. More information on both projects can be found here <http://smartspaces.eu/S/home/> and here <http://www.digitalbirmingham.co.uk/projects/digital-skills-for-carers>

64. More information on the project can be found on this website <http://www.mksmart.org/?q=node/1>

65. Echelon (2007), *City Cuts Energy Use, CO2 Emissions with LONWORKS®Technology*,

66. For more details see <http://www.slideshare.net/Bristolcc/bristol-smart-city-report-7579696>

67. Centre for Cities interview

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