



# Bristol: the world's first open city





# Bristol: the world's first open city

*Bristol is the biggest digital hub outside of London, attracting industries in high-tech, clean tech, digital and creative industries. The city is seen as a "testbed" for the Internet of Things and is the world's first open, programmable city region. Its award-winning approach is based on learning from the best examples, sharing own experiences and constantly looking for innovative ways to operate. Besides leadership from the top, the city's digital transformation closely relies on the entrepreneurial attitude and the cooperative efforts of its local champions.*

1

## Problem statement

### Bristol as a digital pioneer

Bristol has long been at the forefront of digital transformation. This position stemmed from the realisation that the services provided by the council to the citizens were based on old-fashioned and suboptimal technologies.

Local stakeholders acknowledged the potential of the use of digital technologies and of the Internet of Things to improve the lives of Bristol residents.

### Rethinking digital infrastructures

This new perspective led the council to rethink the city's digital infrastructures in order to focus on the identification of new and innovative ways to enable citizens to interact with the council and to benefit from public services.

### Putting citizens at the centre of Bristol's digital strategy

Citizens lie at the core of Bristol's approach towards transformation. In order to make the city smarter and more tailored to the needs of the citizens, the city council has recognized the need to encourage Bristolians to make (greater) use of public open data.

Bristolians have therefore developed new products and services, contributing to the creation of a more "liveable" and creative digital city.

The ultimate goal is to tackle pressing urban challenges by adopting an engaging, innovative and playful approach.

### The development of digital infrastructures paving the way for Bristol to become a creative hub

This emphasis on digital transformation is enabled by the presence of successful businesses, state-of-the-art digital infrastructures and support from city leaders. Together, these components allow the Bristol and Bath region to pave the way towards the growth of the UK's creative industries and for the generation of an international example of a creative hub.

In particular, the collaborative approach between universities, chambers of commerce and incubators, as well as strong public-private partnerships, ensure the success of the city as a "testbed" for digital innovation.

*"Bristol has always been a distinctive smart city because we place citizens at the heart of our strategy and take a playful and engaging approach to tackling serious urban challenges." – Stephen Hilton, Director of Bristol City Council's Bristol Futures team<sup>1</sup>*

Consequently, Bristol has attracted major international corporations, and boasts the highest retention rate of university graduates.

### Bristol as a leading UK Smart City

This strategy is paying off and is setting an approach that other cities are keen to learn from. Indeed, the Huawei UK Smart Cities Index places Bristol among the top ten cities in the country.<sup>2</sup>

The index highlights five themes that are common across most of the successful smart city programmes, namely<sup>3</sup>:

- importance of leadership and vision;
- need to focus on local priorities and strengths;
- importance of engagement with local communities;
- building local partnerships; and
- understanding the way in which the data revolution can improve services and boost innovation.



According to these criteria, Bristol is ranked as a leader alongside London, having obtained the second-highest scores in terms of Strategy (81.9) and Strategy execution (78.4).

Indeed, Bristol's smart city strategy provides a framework to connect successful innovations with priority issues for the city and its communities.

Figure 1: Top 5 Smart cities in UK

	City	Category
1	London	Leader
2	Bristol	Leader
3	Birmingham	Contender
4	Glasgow	Contender
5	Manchester	Contender

Source: Huawei UK Smart Cities Index<sup>2</sup>

## 2

## Realised benefits and new opportunities

Monetary and social impact indicators assessing digital strategy's success

Bristol's success can be measured in two ways. Firstly, a monetary perspective can be taken, for instance by analyzing the investments of large multinational companies.

On the other hand, the success can be measured in terms of the social impact of digitalisation, looking at indicators such as the creation of skills, confidence and employment, particularly in more deprived areas.

In the following, both the monetary as well as the social impact perspective will be taken to assess Bristol's success.

### Monetary Perspective: Increasing the value of the digital sector

From a monetary perspective, the digitalisation of the city has resulted in an increase of the digital sector's value and of its importance in the national economy.

According to a recent study by McKinsey, Bristol's ICT cluster is 'the most significant and fastest growing outside of London'. Indeed, the Bristol City region ICT sector is worth £1 billion to the Gross Value Added (GVA) of the UK<sup>4</sup>.

Moreover, 91.3% of Bristol adults used the Internet over the past 3 months according to the Office of National Statistics. This figure is significantly higher than the UK average of 86%.

#### Knowle West Media Centre, 2014-2015<sup>5</sup>



- Work placements to **23** young people
- Internships/apprenticeships to **14** young people
- **5** additional full time jobs created
- **8** new businesses set up and developed

### Social impact dimension: boosting skills and jobs

Bristol prides itself on the social dimension of its digital transformation. It relies largely on the use of creativity, media and digital technologies to inspire people, particularly the younger generations.

At the same time, this approach solves societal issues in the most deprived neighbourhoods.

#### Knowle West Media Centre ensures an inclusive digitalization process

In this respect, the work of organisations such as the Knowle West Media Centre (KWMC) has been extremely beneficial in reaching out and engaging with the most vulnerable communities. In doing so, the city ensured that everyone can benefit from the digitalisation process<sup>5</sup>.

Indeed, the KWMC is positively contributing to achieving social, environmental and economic regeneration by involving the community in media activity, education and action.

KWMC achieves this by providing training courses to develop skills in digital manufacturing equipment and technologies.

Council process times has dramatically reduced from **10 days** to less than **1 day**

Figure 2: Knowle West Media Centre



Source: Knowle West Media Centre



### Bristol's incubators are fostering social entrepreneurship

Social entrepreneurship is also an important element in the activities of Bristol's many incubators. One example is the Bristol SETsquared Centre.

Indeed, the incubator seeks to bring about economic development and social benefits to the community.

For instance, the SETsquared helped to develop Oracles's small local office into a major centre for client support, creating new jobs, attracting more investments and contributing to the social dimension of digitalisation.

### Redesigning and digitising public services tailored to changing needs

The Bristol City Council Digital Platform project was conceived as part of a wider transformation programme within the Bristol City Council in order to improve the way services are delivered.

This process took into account a landscape of budget cuts and the increasing and changing demand for user-friendly services<sup>6</sup>. Thus, over the past few years, the council has been redesigning and implementing numerous new digital services for its citizens.

For instance, in 2015, 11 new services were delivered, including taxi licensing, parking permits, pest control and concessionary travel. These new services have been built to use digital technologies and data from end-to-end. Thus, all procedures related to the various council applications which were previously done manually could now be digitised.

For instance, a regular traditional council application process used to take about 10 days, whereas now the digitally redesigned application process can be done in 1 day only. The digital transformation of these public services therefore brought about efficiency gains which contributed to the creation of more "user-friendly" public services.

### Open data is benefitting citizens on various dimensions

Being a leading 'open' and 'programmable' city allows Bristol to create new ways in which open data is used for the benefit of society.

### Bristol works extensively to revolutionise health monitoring

Open data and smart sensors can be a powerful tool to tackle healthcare issues and monitor well-being in a non-invasive and stress-free way.

In this context, new research projects have been launched in Bristol to generate knowledge and data that will change clinical practice by focusing on real-world technologies.

Bristol's enabling and creative environment has the potential to embed healthcare technologies into people's everyday life, allowing their development through early and sustained user involvement. A case in point for such opportunity is the SPHERE project (see Key Initiatives).



### Bristol created necessary conditions to become a "green leader"

New technologies, innovation, open data and partnerships between local champions will provide the opportunity to make Bristol a leading "green" and smart energy city in the near future. Indeed, through the Bristol is Open initiative, it will be possible to reduce carbon emissions by 40% by 2020 and create 95,000 new jobs<sup>7</sup>.

Particularly high growth sectors such as the creative industries and green technologies are affected by the vision of having Bristol recognised among the top 20 European cities by 2020.

### Centrally coordinating supply of heat and power across the city

Moreover, by 2020, Bristol will have a public-interest organisation which coordinates the smart use, distribution and supply of heat and power across the city for the benefit of its people and businesses<sup>8</sup>.

The city will have the capabilities and systems to access, manage and interpret local energy supply and demand data. This will enable coordinated city and neighbourhood-scale interventions to balance heat and power demand and supply across the city in real time; to curb energy waste and reduce peak demand; to reduce network losses and to manage system constraints effectively.

## 3

## Drivers and obstacles

## A

### Drivers

#### "Smart City" status reached thanks to strong framework conditions

Achieving the status of a leading smart city has been made possible by a series of drivers, which have provided the appropriate conditions and prerequisites for the development of the digital strategy of the city of Bristol.

#### Support from the Bristol City Council for high-speed broadband access

The creation of a smart city of the future relies on access to extra fast broadband. Thus, in order to turn the city into a high-tech "testbed" for innovation, a 30 Gigabit per second fiber broadband network has been installed in the city. It serves as the basis for a wide range of digitalization projects.

### Bristol City Council created 3 improvements to high-speed internet

The Bristol City Council (BCC) has acted in three ways to improve access to high-speed internet.

#### 1. Broadband Voucher Scheme covers cost of connecting to high-speed internet

The BCC has intervened directly by putting in place a series of measures such as the Broadband Voucher Scheme<sup>9</sup>.

This scheme granted 1,685 Bristolian Small and Medium-sized Enterprises (SMEs) a Government-funded voucher to cover the cost of connecting to high-speed broadband. The scheme, which was open until October 2015, provided support to the businesses for a total value of £2,597,006.

#### 2. Fostering supply and competition in broadband access

Secondly, the BCC made a series of tactical interventions to increase the supply of and competition in broadband access. For instance, in late 2015, BCC agreed a concession to a consortium of two alternative network Internet Service Providers (ISPs) in a 20 year deal<sup>10</sup>.

The consortium (BNET Ultra Ltd) will manage and maintain The Bristol Network duct network and could bring back into use the 60km of "unused duct".

The consortium, thus, utilises spare capacity in the network to offer new super and ultra-fast broadband services to Bristol's businesses and, at the same time, will generate a multi-million revenue stream to help the BCC deliver better council services.

#### 3. Supporting investment in R&D

Thirdly, Bristol City Council is also supporting investment in Research and Development to stimulate the High Tech sector. For instance, the BCC has made a £7million "Gigabit Bristol" investment in fibre and wireless mesh networks to support High Tech research and development at the city scale.

This programme has the goal to accelerate Bristol's position in relation to the Internet of Things, Big Data Analytics and High Technologies.

#### European Commission as the provider of financial support

Bristol's digitalisation and smart city strategy also entails an important degree of involvement from the side of the European Commission.

Indeed, the Commission's financial support plays a key role in this respect. EU-funded programmes, after all, are an important pillar of the city's innovation agenda.

#### REPLICATE: an EU programme integrating Smart Energy and Smart Transport innovation

A prime example of the EU contribution to Bristol's innovation agenda is REPLICATE which stands for "Renaissance in Places with Innovative Citizenship And Technology"<sup>11</sup>.

It is a European 5-year research and development Smart City 'Lighthouse' project that aims to deploy integrated energy, mobility and ICT solutions in city districts.

The project was launched in February 2016. The city of Bristol, as part of a consortium with San Sebastián (Spain) and Florence (Italy), has been awarded €25 million to create integrated smart city solutions to tackle urban problems.

In particular, the programme covers the Ashley, Easton and Lawrence Hill Neighbourhood Partnership area, chosen as the target district to explore the impact of integrating Smart Energy and Smart Transport inventions.



### Key stakeholders

The key component that makes Bristol a leading example of a smart city is the collaborative approach between a variety of stakeholders.

In fact, this collaboration is composed of stakeholders from both the public and private spheres, including universities, chambers of commerce and incubators, as well as strong public-private partnerships.

Some of the main actors that are actively involved in the digital scene of the city are listed in the table below.

Figure 1: Public and private actors fuelling Bristol's digital transformation

Public	Private
-Bristol City Council	- NEC
-Bath and North East Somerset Council	- InterDigital
-University of Bristol	- Mellanox Technologies
-University of Brunel	- Polatis
-University of West England	- Laser 2000
-Bath SPA University	- DELL
-Incubators (SETsquared)	
-Engine Shed	
-Knowle West Media Centre	

Source: PwC Analysis

### Key initiatives

#### "Bristol is Open" makes open data available to all interested parties

Announced in 2015, "Bristol Is Open" is Bristol's flagship initiative, aiming to concretise and make open data a reality<sup>12</sup>. It is a joint venture between the University of Bristol and the Bristol City Council. The initiative is funded at local, national and EU levels as well as with academic research funding and by the private sector.

The project delivers R&D to equip the city with the latest small sensors. This includes the smartphones and GPS devices of interested participants, which will supply the three new 30 Gb/second fibre broadband networks with a wide range of information about city life (e.g. air quality, energy and traffic flows).

This will allow to understand how big data can be used to solve issues such as air pollution and traffic congestions. Thus, the initiative will ultimately contribute to the development of new applications leveraging on the "Internet of Things" in the city.

#### Plans to extend the initiative are already underway

Once the new networks are established in the city centre, over the next 3 years they will be extended to the wider city region, i.e. Bath, parts of North Somerset and South Gloucestershire.

These networks are for research and development projects, as opposed to providing free or commercial broadband or wifi. Nevertheless, the public will have the opportunity to join the experimental initiatives, should they wish to do so.

#### Open data will create countless creative and useful opportunities

All the data generated will be anonymised and made public through an 'open data' portal. The creative content flowing through the high-speed network can be used in a variety of playful ways to foster 'digital inclusion', for instance projecting 3D images into the sky or holding a music concert across multiple venues in the city at the same time.

*"The joint venture created between Bristol City Council and the University of Bristol, and the engagement of industry is proving to be a dynamic way to push our 'programmable city' activity forward."* –

Paul Wilson, Managing Director of Bristol Is Open<sup>13</sup>

#### SPHERE<sup>14</sup>

SPHERE (Sensor Platform for HEalthcare in a Residential Environment) is a project involving nearly 100 researchers, designed to employ new technology to address long-term health issues. These include obesity, depression, diabetes, strokes, respiratory conditions, cardiovascular and musculoskeletal disease.

SPHERE has developed a number of different sensors allowing the monitoring of health and well-being at home. This information can then be used to spot issues that might indicate a medical or well-being problem.

To make this happen, clinicians, engineers, designers and social care professionals as well as members of the public are collaborating to develop these sensor technologies. The project was awarded a £12 million grant by the Engineering and Physical Sciences Research Council (EPSRC).



#### Key infrastructures

Bristol boasts a dynamic and vibrant ecosystem of both public and private actors that drive the scene for the digital transformation. In addition to the many public institutions (local councils, universities, research centres, etc.), the city has a thriving start-up community, enabled by its infrastructures that foster knowledge sharing, networking and testing of new ideas.

#### The Bristol SETsquared Centre<sup>15</sup>

The Bristol SETsquared Centre is the Business Accelerator of the University of Bristol, providing a variety of services to early-stage companies and start-ups.

These include coaching, mentoring, workshops, business review panels, access to professional service firms and services, access to SETsquared's global network, investor readiness training, investor showcase events, access to the new Bristol is Open experimental network, and use of the Engine Shed Business Lounge.

Moreover, office space with desk-stations, reception services and meeting rooms can be provided where required.

The Centre holds many regular networking events, such as the SETsquared Garden Party and Innovation Showcase, where investors, corporates, grant-funders and potential non-executive directors get together to see the technology businesses supported by the Centre.

In November 2015, SETsquared won the top accolade of Global Number 1 University Business Incubator, awarded by UBI Global.

The Bristol SETsquared Centre has also won the prestigious Established Business Incubator of the Year 2012 and Best Designed Business Incubator 2013 award from the industry trade body, UKBI.





## B

## Obstacles

Despite the remarkable level of digitalisation achieved by the city and its companies, some challenges still remain. These are related both to the availability of resources and coordination of players, but also to the socio-economic context in the city.

### Insufficient capacity impedes extension of digitalisation initiatives

Bristol boasts excellent facilities and infrastructure to drive its digitalisation and that of its businesses. Nevertheless, according to the former mayor George Ferguson, the success of the digitalisation initiatives was underestimated, resulting in the fact that further progress is constrained by the limited resources, capacity and infrastructure.

### A need for further collaboration among local authorities needed

The digital transformation process relies on the development of strong partnerships and effective and smooth communication between all the key stakeholders involved. In this respect, the former mayor of Bristol believes that more and better cohesion is required between the four local authorities in the greater region.

### Enhancing social equality as a means to accelerate the digital transformation process

Bristol is a prosperous city, both nationally and internationally. Nevertheless, important disparities still persist among the population, thus constituting a potential hindrance to the full reach of the digital transformation process.

Indeed, there are significant health and wellbeing inequalities, resulting in a 8.9 year difference in life expectancy between least and most deprived areas. Similarly, there are gaps in educational attainment with only 35% of children achieving GCSEs in some areas<sup>16</sup>.

## 4

## Lessons learnt

The lessons learned from Bristol's case can serve as useful guidelines for the development of a connected pan-European network of cities and the creation of launchpads for digital transformation.

### The importance of collaboration

The successful digital transformation of cities relies on close cooperation between the relevant actors. In this respect, establishing strong public-private partnerships is fundamental.

The practical collaboration between local authorities, universities, large companies and start-ups allows ideas and views from all actors to come together and become concretised into a winning initiative. The Bristol is Open initiative is a case in point for this concept.



### Establishing strong networks is essential

The creation of an enabling and conducive environment for sharing and testing of ideas is the primary requirement for successful collaboration between actors. Indeed, physical cooperation is key in this respect.

Therefore, establishing centres where innovative start-ups, large companies and investors can physically meet and exchange ideas has proved to be essential.

Successful examples include the Engine Shed, Watershed and SETsquared, which provide a nurturing environment for entrepreneurs and ensure that they do not act in isolation.

### Digitalisation has the power to bring about social change

Technology, innovation and digitalisation should be seen as a powerful tool to bring about economic development, to level out disparities and to ensure the participation and involvement of the entire population in the digital transformation process.

Ultimately, digitalisation gives entrepreneurs the opportunity to shape the environment of their city, helping it to overcome inequalities and improving the quality of life of the population.

### Risk taking and financial support are needed to succeed in digitalisation

The attitude of the city and its actors is also a factor that determines the success of digitalisation. The lesson that can be learnt from Bristol's case is the importance of fostering an open and trusting approach, mitigating risk aversion and creating a feeling of trust among investors and companies alike.

Indeed, Bristol boast excellent financial support opportunities, owing to the open support of the Bristol City Council, local investors but also at the European level.

### Connectivity infrastructure bears strategic importance

Naturally, the digital transformation of cities cannot take place without the appropriate enabling infrastructure.

In particular, Bristol's case has highlighted the strategic importance of super high-speed broadband, allowing to achieve exceptional levels of connectivity and generate meaningful volumes of data that can then be used to solve societal challenges.

### Data privacy should be everyone's concern, including citizens





Of course, open data implies some data privacy considerations. Indeed, privacy can lead to heated debate and cities should help shape this debate, rather than leaving it to technology companies.

## 5

## Key Recommendations

Based on the case of Bristol, the importance of the roles of local players has emerged. Thus, several recommendations can be formulated, detailing the actions and responsibilities of each group of stakeholders, so as to ensure that the digitalisation process is successful in the long run.

These recommendations are illustrated in the table, and can serve as best practices for other cities starting down the digital transformation path.

Category	Role of the stakeholder
<b>Local government</b> 	<ul style="list-style-type: none"> <li>- Drive political leadership and vision as to where to drive the city</li> <li>- Bring about more cohesion between different public authorities towards a common objective</li> <li>- Set targets to measure success (e.g. on the basis of jobs created)</li> <li>- Stimulate innovation (e.g. through fiscal measures, tax reductions, etc).</li> </ul>
<b>Businesses and Incubators</b> 	<ul style="list-style-type: none"> <li>- Share experience and act as advisors to budding start-ups</li> <li>- Keep providing inspiration, support, stimulation</li> </ul>
<b>Universities</b> 	<ul style="list-style-type: none"> <li>- Be open and ready to form joint ventures (e.g. SETsquared)</li> <li>- Provide digital entrepreneurial skills and curricula</li> </ul>
<b>Chamber of Commerce</b> 	<ul style="list-style-type: none"> <li>- Get involved in the support of peer to peer learning and in the education of traditional businesses</li> </ul>

## References

<sup>1</sup> University of Bristol, "Bristol named as leading UK Smart City", 2016, available at: <http://www.bristol.ac.uk/news/2016/may/bristol-smart-city.html>

<sup>2</sup> Huawei, "UK Smart Cities Index – Assessment of Strategy and Execution of the UK's Leading Smart Cities", 2016, available at: [https://www.huawei.eu/sites/default/files/Huawei\\_UK\\_Smart\\_Cities\\_Report.pdf](https://www.huawei.eu/sites/default/files/Huawei_UK_Smart_Cities_Report.pdf)

<sup>3</sup> Steven McGinty, "Bristol is Open: Case Study of an Innovative Smart City, 2016, available at: <https://blog.idoxgroup.com/2016/09/07/bristol-is-open-case-study-of-an-innovative-smart-city/>

<sup>4</sup> Jamie Middleton, "Bristol and Bath labelled the fastest growing hi-tech region outside London", 2014, available at: <http://techspark.co/bristol-and-bath-labelled-the-fastest-growing-hi-tech-region-outside-london/>

<sup>5</sup> Knowle West Media Centre, <https://issuu.com/knowlewestmedia>

<sup>6</sup> Digirati, "Enabling Channel Shift for Local Government, available at: <http://digirati.com/case-studies/bristol-city-council-digital-platform/>

<sup>7</sup> Steven McGinty, "Bristol is Open: Case Study of an Innovative Smart City, 2016, available at: <https://blog.idoxgroup.com/2016/09/07/bristol-is-open-case-study-of-an-innovative-smart-city/>

<sup>8</sup> Centre for Sustainable Energy, "Bristol Smart Energy City Collaboration"; 2015, available at: <https://www.cse.org.uk/projects/view/1296>

<sup>9</sup> Broadband Delivery UK, <http://www.connectionvouchers.co.uk/city/bristol/>

<sup>10</sup> Mark Jackson, "Bristol City Commercialises Ultrafast BNET Fibre Optic Network", 2015, available at: <http://www.ispreview.co.uk/index.php/2015/10/bristol-city-commercialises-its-ultrafast-bnet-fibre-optic-network.html>

<sup>11</sup> EC, "REPLICATE – Renaissance of Places with Innovative Citizenship and Technology", available at: <https://ec.europa.eu/inea/en/horizon-2020/projects/replicate>

<sup>12</sup> Bristol is Open, <http://www.bristolisopen.com/>

<sup>13</sup> Bristol is Open, "Bristol Is Open wins Smart City Innovator Award, 2016, available at: <http://www.bristolisopen.com/bristol-is-open-wins-smart-city-innovator-award/>

<sup>14</sup> SPHERE - a Sensor Platform for Healthcare in a Residential Environment, <http://www.irc-sphere.ac.uk/about>

<sup>15</sup> SETsquared in Bristol, <http://www.setsquared.co.uk/start-support/innovation-centres/setquared-bristol>

<sup>16</sup> BBC, "Bristol mayor tackles life expectancy 'gap'", 2013, available at: <http://www.bbc.com/news/uk-england-bristol-23497196>

This report was prepared with the support of PwC, CARSA, IDATE and ESN as part of the Digital Entrepreneurship Monitor project for the European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs.

Editors: Laurent Probst, Bertrand Pedersen, Olivia-Kelly Lonkeu & Federica Amato, PwC

© - 2016 – European Union. All rights reserved. Certain parts are licensed under conditions to the EU.

This publication is funded under the COSME programme of the European Union.