Draft Smart Belfast Framework

Foreword

Over the past two years the Council has been talking to residents and partner organisations about a shared vision for our city in 2035. This conversation about the *Belfast Agenda* has generated a wealth of ideas about how together we can build on the city's recent success to achieve transformational change in the lives of our people.

There is definite energy for making the Belfast Agenda a reality and a strong commitment to a vision of a well-connected, vibrant city with a modern, successful economy that benefits everyone. This enthusiasm is of course tempered by an awareness of the substantial economic, social and environmental challenges that lie ahead.

The Belfast Agenda sets out some really ambitious goals: we want to grow our population by 70,000. We want to increase the number of people working in the city by 50,000. And we want to reduce the gap in life expectancy between the poorest and richest parts of the city.

In order to meet such goals we need to start thinking differently. We need to start getting much more innovative in our approaches to problem-solving. In particular, we in the public sector need to think differently about how we design and deliver our programmes, interventions and services. And we need to start borrowing leading-edge ideas from industry and from our university partners.

The Smart Belfast framework is about creating the circumstances in which such cross-sectoral innovation can flourish. It is about building the necessary foundations upon which the city can harness its amazing pool of talent, creativity and technical infrastructure to address urban policy challenges. In creating these conditions Belfast can also present itself as a 'living laboratory' for businesses, start-ups, entrepreneurs and researchers to design, test, and build advanced digital solutions for the twenty-first century city.

Over the past twelve months, supported by the Government's Future Cities Catapult, the Council has been engaging with partners about how we create these foundations. This framework represents the culmination of this process and the beginning of a joint programme of work towards creating a Smart Belfast.

On behalf of Belfast City Council, I would like to acknowledge the contribution of both the Catapult and the many individuals and organisations from across the community, public, academic and private sectors who have contributed to the development of the framework. We look forward to working with our city partner to deliver an exciting programme of work over the coming years.
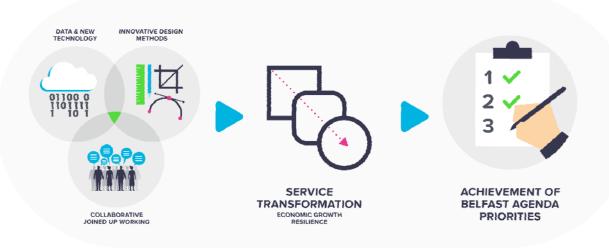
Councillor John Hussey
Chairman of Strategic Planning and Policy Committee, Belfast City Council

Introduction

This framework outlines proposals which seek to foster conditions for greater collaborative innovation between public, commercial, academic and community organisations in Belfast.

Belfast City Council is supporting this work with the understanding that the city needs to encourage greater innovation, particularly in the exploitation of data science and smart technologies, if it is to successfully address significant urban challenges over the coming decades.

In developing our ideas Belfast City Council, in partnership with the Future Cities Catapult, engaged with local stakeholders whilst drawing from the expertise and practice of other places. There was strong agreement, particularly from local businesses, for the need for better collaboration to support innovation.

(By bringing together new technologies, innovative design methods in a collaborative working environment, Belfast can transform services, support economic development and contribute to Belfast Agenda priorities.)

The resulting Smart Belfast framework sets out a number of proposals:

1. **Guiding principles** for a Smart Belfast
2. **Foundations** that the city needs to build in order to deliver innovative programmes
3. **A roadmap** that describes the resources and activities required to strengthen its foundations and criteria for projects to directly address city challenges.

Why do we need a framework?

A Smart Belfast framework is about harnessing innovation, technology and data science to contribute to the success of the Belfast Agenda.

Belfast's community planning partners recently established their long term ambitions for the city. This 'Belfast Agenda 2035' seeks to deliver major economic and social change and achieve long term positive outcomes for citizens. The priorities for the first four years are outlined below.

Belfast Agenda's priorities

Growing the economy
- Create employment and opportunity
- Attract investment into Belfast
- Foster business growth in Belfast
- Strengthen business relationships and make it easy to do business
- Maximise the impact of the city region
- Increase tourism spend
- Reduce economic inequalities

Living here
- Improve neighbourhoods
- Improve the city living experience
- Improve community relations
- Reduce life inequalities
- Enable active, healthy and empowered citizens
- Provide fit-for-purpose city services
- Support and care for people who face multiple challenges
- Support younger and older people

City development
- Promote and position the city to compete
- Develop the city's infrastructure and improve connectivity locally, nationally, and internationally
- Drive the physical and cultural regeneration of the city centre
- Deliver key strategic physical projects and policies
- Attract more tourists
- Protect and enhance our environment and built heritage

Working and learning
- Address educational inequalities and increase skills attainment
- Address barriers to employment at a structural and personal level
- Enhance and increase the skill levels of our residents and attract and retain even more skilled people
- Match people and skills to opportunities across Belfast
- Reduce poverty and economic inactivity

The Agenda identifies substantial programmes of work that partners will need to deliver together in order to achieve success. To deliver these Organisations will need to think differently about how they design and deliver these transformative programmes, interventions and services. In particular, the public sector needs to find better ways to tap into the huge potential of smart technologies, data science and innovative design.

Fortunately, Belfast has significant strengths in these areas and we can draw on innovative practice from the city's digital SMEs, our communities and from within our universities.

By doing so we suggest that not only will Belfast be better equipped to address its challenges, it will also create a richer and more creative environment for our knowledge sector businesses and entrepreneurs.

Getting smarter

Cities around the world are using a range of smart city approaches to improve and create new services through opportunities in data, connectivity and design. For example,

- **Glasgow**[1] has introduced smart street lighting that are not only energy efficient but also monitor noise and air pollution and supports community safety measures.
- **Santander**[2] in Spain is using GPS and apps for crowd-sourcing citizen knowledge to make city waste management more efficient.
- **Barcelona**[3] is using IoT and other technologies to gather visitor information that enables the city to create a sophisticated, responsive tourist offering.
- **New York's** Digital NYC[4] is fostering a range of Smart City opportunities to support hundreds of digital start-ups and local entrepreneurs – while also directly addressing urban challenges.
- **Bristol** city council and its local university, working together, aim to maximise the opportunity presented by its new integrated transport hub by utilizing big data.
- **Westminster**[5] is implementing smart parking to tell drivers where they can find a parking space. Smart parking cuts congestion and improves the experience of coming into the city centre.
- **Transport for London** is driving towards ticketless public transport by integrating and promoting the use of contactless payment cards.
- **Newcastle upon Tyne** is developing an innovation centre focused on data and cloud computing, which also acts as a living lab to test smart energy grids, sustainable urban drainage and building sensors.
- **Dublin city council** is mapping local energy demand and matching it to the best local resources to find the most sustainable solutions for energy consumption. Its Smart Dublin[6] team are also supporting a series of SBRI challenges to encourage local SMEs to develop solutions to the city's problems.
- **Cardiff University** have established *Y-Lab*[7], which is supporting innovation and experimentation in the public sector across Wales.

Belfast also has strengths in these areas and is beginning to develop and deliver smart city projects, from empowering planners with a single digital view of the city's infrastructure, to deploying IoT sensors.

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[1] http://futurecity.glasgow.gov.uk/dashboards
[2] http://www.smartsantander.eu
[3] http://fortune.com/2015/07/29/barcelona-wired-city
[4] http://www.digital.nyc/
[5] https://www.westminster.gov.uk/parkright
[6] http://smartdublin.ie
[7] http://www.nesta.org.uk/y-lab

A selection of the technology & innovation centres in Belfast

Technical centres of excellence

1   QUB Centre for Statistical Science
2   QUB Centre for Secure Information Technologies
3   QUB Administrative Data Research Centre
4   QUB Sonic Arts Research Centre
5   UU Connected Health Innovation Centre
6   UU Living Labs
7   UU Cognitive Analytics Research Lab

Start-up spaces, labs and incubators

1   Catalyst Inc.
2   Belfast Met's E3
3   Farset Labs
4   E-Spark
5   Startplanet NI
6   PWC / Google Hive Lab
7   FabLab

Co-working hubs

1   Blick Studios
2   Oh Yeah Music Centre
3   Weaver's Court
4   Ormeau Business Park
5   Innovation Factory
6   The Foundry
7   Ormeau Baths Gallery

Public and third sector

1   NICVA Detail Data
2   Digital Catapult
3   Innovation Lab, DofF
4   NISRA

Example tech companies

1   Kainos
2   RepKight
3   Deloitte
4   Intel
5   IBM
6   BT
7   Rapid7

Guiding principles

Evidence suggests that while individual smart city projects can certainly contribute to improving outcomes for residents, their impact can often be piecemeal. If we want to achieve our ambition of harnessing innovation, technology and data science to contribute to the success of the Belfast Agenda, there is broad census that the city must adopt the following principles:

1. **A focus on outcomes for citizens**
   Belfast's smart city projects will not be technology-led. Instead they will demonstrate the ability to make positive contributions to the economic, social and environmental outcomes described in the Belfast Agenda. This outcomes-based approach is also in line with the Northern Ireland Programme for Government.

2. **Demand-led innovation**
   Innovative solutions will be shaped by user-centred design sensitively applied in the context of Belfast's complex social geography.

3. **Partnership and collaboration**
   Projects and framework governance will be based on a collaborative approach with city stakeholders. Projects should work with and support existing communities and infrastructure.

4. **Support for local business and entrepreneurs**
   The framework will help grow the local economy and aim to achieve local multiplier effects. While external investment and expertise is welcome and often necessary, there is an emphasis on strengthening and promoting the local tech scene and stimulating new business growth.

5. **Build-as-you-go data infrastructure**
   Any emerging city data infrastructure will develop incrementally through the delivery of challenge-focused projects.

6. **An open ecosystem**
   Data and infrastructure from different projects will be open and inter-operable to create an open ecosystem that allows innovation from lots of sources.

7. **Digital and data projects**
   Smart city projects will pursue opportunities in digital and data technologies that can improve outcomes for citizens. There is a strong appetite among key partners to unlock innovation through digital and data projects. This will make use of some of Belfast's major growth sectors, such as cyber security, analytics, IoT, and machine learning.

8. **Data security**
   The framework will ensure that data privacy and security is upheld.

Smart Belfast foundations

Belfast has a growing community of innovators, data scientists, technologists and community activists. The city has a strong digital infrastructure that offers first class connectivity for organisations and individuals. To harness this resource in order to better address city challenges, we are proposing that partners should seek to build four Smart Belfast foundations.

1. Shared understanding of city challenges

The Belfast Agenda goes some way towards scoping the broad nature of outcome-focused challenges facing the city. In addition, partners must also have to hand common methods and resources for identifying, understanding and designing solutions for such challenges.

Elements for this foundation:

a) A co-design and testing environment for collaborating with citizens and stakeholders to define challenges and service requirements.

b) Effective methods of communication, networking and understanding between groups to bring out priority challenges and rally stakeholders to collaborate.

c) Generating, gathering and sharing city data to help prioritise challenge areas; understand problems better; shape proposals; and measure impact.

d) Shared processes for defining a challenge and inviting others to develop innovative solutions (eg outcomes-based accountability).

Some of the city resources already available:
- Ulster University's living lab facilities
- PwC and Google's 'Hive Lab' promotes co-design methods for digital product design
- The Department of Finance's Innovation team stimulate service design innovation across NI Government
- The Digital Catapult's design methodologies accelerate service innovation in collaboration with suppliers.
- Living lab methods are being used for healthcare applications, making use of Belfast's advanced healthcare research
- Belfast City Council is working with The Young Foundation to deliver a Social Innovation programme to equip residents with the tools to make changes in their neighbourhood
- OpenData NI, Northern Ireland's open data portal
- Data to inform our understanding of city challenges can be sourced from the Administrative Data Research Centre at QUB, NICVA's Detail Data portal, NISRA's NINIS small area data portal

2. An engaged innovator community

Belfast has world-class expertise in areas that can support our smart city approach. This can be leveraged, supported and developed to embed innovation across the city. We can do this through tools, training, networking, prizes, funding, marketing and much more. In so doing, a Smart Belfast can support investment, skills and jobs creation in growth areas of the economy.

Elements of this foundation:

a) Capacity building programme with communities and public sector staff on creative use of data and technology for problem-solving, including data literacy and visualisation.

b) Promotional activities and channels to raise Belfast's profile as a smart city at home and abroad.

c) Web-based engagement to share practice, challenge calls, support tools, and facilitate networking.

d) Standard working arrangements with partners in the city, eg through common MoUs (Memoranda of Understanding).

e) Participation in national and international networks to acquire knowledge, promote Belfast, and support project work.

f) Connection to informal networks of developers and entrepreneurs.

g) Network of centres for smart city related disciplines and for supporting innovation.

Some of the city resources already available:
- Catalyst Connect events, BelTech annual conference, DigitalDNA, Internet of Things Alliance annual event
- Major tech companies with a presence in Belfast are running digital skills and youth programmes (Barclays, Deloitte, BT, PwC)
- Networks and bodies with policy, business, digital and smart city-related membership include: Catalyst Connect, MATRIX panel, IoT Association, Digital Catapult, Ireland Smart Cities Forum
- Promoting Belfast abroad: SXSW, Barcelona Smart Cities World Congress, 100 Resilient Cities Network, Sister Cities, NIPIM, Invest NI digital trade missions, Catapult events
- Bank of Invention, Farset Labs, Potting Shed, Design FullOn, 2D3D,
- Young Influencers, WEF Global Shapers
- Technical centres of excellence: Centre for Statistical Science, Centre for Secure Information Technologies, Connected Health Innovation Centre, Precision Medicine Catapult, Digital Catapult, Administrative Data Research Centre
- Offices and coworking space to rent, targeted at creative and digital industry: Blick Studios, Weaver's Court, Innovation Factory, Forthriver Business Park, The Foundry

3. Building city data assets

Innovators and researchers in Belfast need quality data and infrastructure in order to develop new ideas, applications and products. Individual projects will generate these assets but we need to ensure that they remain available across the wider innovator community through standards, sharing agreements, platforms and other mechanisms.

At the same time, data must be secure and sensitively handled. Belfast must be able to reassure citizens that their data is safe through appropriate governance and oversight.

Elements of this foundation:

a) City team set up to manage the development and delivery of data infrastructure.

b) Data task force that ensures the production, maintenance and provision of data from different stakeholders

c) Data is harmonised through open standards to meet agreed criteria: formats, licences, information policy, etc.

d) Well-maintained web services, collecting users' feedback, updating data catalogues.

e) Well-maintained network of public officials, developers, companies and citizens, that leverages data infrastructure to improve their lives and address city challenges.

Some of the city resources already available:
- Queen's University of Belfast's Centre for Statistical Science
- Ulster University's Cognitive Analytics and Research Lab (CARL)
- MATRIX panel's recommendation for Northern Ireland digital strategy
- Strategic Investment Board initiative to set up a new centre of excellence for data science
- The Northern Ireland Executive is promoting open data through Open Data NI, supported by training and expertise deployed at local level.
- NICVA and ODI Belfast is providing open data from public and voluntary institutions through the DetailData portal.
- NISRA is the region's statistical authority and hosts the Northern Ireland Neighbourhood Information Sevice (NINIS) portal
- Land and Property Service's Spatial NI geo-data portal
- Northern Ireland Government's Open Data strategy which seeks to promote an 'open by default' approach to public sector data
- The Administrative Data Research Centre for Northern Ireland supported by Queen's University, Ulster Universtiy and NISRA.

4. Robust delivery mechanisms

To build partnerships that will last, a Smart Belfast will need processes that will provide governance and accountability mechanisms that are not onerous but which encourage the flexibility and learning environment that innovation demands. Creating these goal-driven mechanisms is critical to collaboration among the large number of diverse stakeholders.
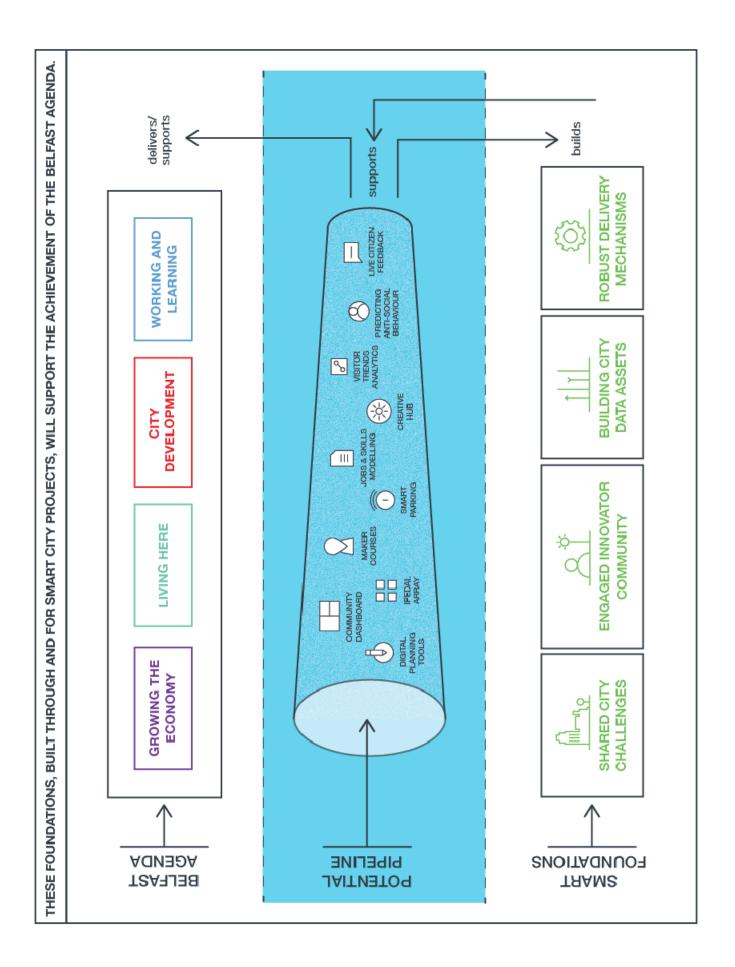
Elements of this foundation:

a) Support from city leaders and key influencers at city and regional level.
b) Strategic and ethical oversight of the programme.
c) An appropriate smart city entity (eg) arm's length company, voluntary association, unofficial group, etc.
d) Provision of sustainable financing that can draw from stable sources.
e) Provision of funding for projects through funding management and business model expertise.
f) Capacity to negotiate complex and innovative contracting and procurement arrangements with partners and with supplying SMEs and other vendors.
g) Project management capacity for gathering, filtering, prioritising and managing proposals through to delivery.
h) Creation, maintenance and evaluation of business case for smart city activities.

> **Some of the city resources already available:**
> - Belfast's community planning partnership and its emerging delivery mechanisms
> - Belfast City Council's Smart Belfast team
> - Well established cross sector city partnerships
> - Forthcoming £2 billion of Innovate UK calls and demonstrators
> - Invest NI's Collaborative Growth programme
> - SBRI programmes across NI Government Departments
> - Horizon 2020 call
> - Rockefeller Foundation's 100 Resilient Cities programme

Developing these foundations will require addressing gaps in Belfast's capabilities. The Council and Catapult have together carried out a capability assessment which forms the basis of a **delivery roadmap**.

THESE FOUNDATIONS, BUILT THROUGH AND FOR SMART CITY PROJECTS, WILL SUPPORT THE ACHIEVEMENT OF THE BELFAST AGENDA.

BELFAST AGENDA

delivers/supports

WORKING AND LEARNING

CITY DEVELOPMENT

LIVING HERE

GROWING THE ECONOMY

POTENTIAL PIPELINE

supports

LIVE CITIZEN FEEDBACK

PREDICTING ANTI-SOCIAL BEHAVIOUR

VISITOR TRENDS ANALYTICS

CREATIVE HUB

JOBS & SKILLS MODELLING

SMART PARKING

MAKER COURSES

IPEDAL ARRAY

COMMUNITY DASHBOARD

DIGITAL PLANNING TOOLS

builds

SMART FOUNDATIONS

ROBUST DELIVERY MECHANISMS

BUILDING CITY DATA ASSETS

ENGAGED INNOVATOR COMMUNITY

SHARED CITY CHALLENGES

Roadmap

There are six interlinked streams to strengthen the Smart Belfast foundations:

1. Building governance structures

A city group to oversee and steer the Smart Belfast work. It will promote the guiding principles, build cross sector commitment and establish ownership for the delivery of the programme.

Resources needed include:

- ✓ **Smart Belfast Steering Group** – senior representative body governing strategic direction of the programme.
- ✓ **Data Advisory Committee** – providing oversight on data security, privacy issues and exploitation of data.
- ✓ **Specialist data security advice and auditing** – to provide independent security audits.
- ✓ **Specialist procurement and legal advice** - to address complex legal issues and enable innovative public procurement.
- ✓ **Evaluation function** – to monitor the progress, outcomes and impacts of smart city projects.

2. Building the Smart Belfast team

The work of coordinating projects, creating new processes and building governance will fall to a core smart city team. This team needs more resources and expertise, particularly in data, technology and engagement, drawn from across the city.

The team will require access to the following skill sets:

- ✓ **A digital champion** – to drive innovation at senior levels both within the city, nationally and internationally.
- ✓ **Programme and project managers** – to manage the framework, city-wide projects and partners-led project engagements.
- ✓ **Technologists** – specialist expertise in IoT and other technologies; with capacity to engage with technology providers and users to identify opportunities.
- ✓ **Data scientists** – specialist expertise for acquiring and analysing data; engaging with data holders and potential data users to identify opportunities.
- ✓ **A data manager** - to securely manage data from diverse sources and ensure it is readily available for emergent use cases.

3. Building engagement channels

New digital and traditional channels of engagement will coordinate and communicate the smart city work while promoting Belfast as a place to invest.

Resources needed include:

- ✓ **Web presence —** providing routes for suggesting ideas, discovering resources, offering innovations, entering competitions, etc.
- ✓ **Events function and facilities** – management, administration and logistics capabilities for events, including international showcasing events, tech events, workshops, community events, etc.
- ✓ **Social media strategy** – outlining channels and content to be used for inviting participation, publicising projects, connecting with contacts, etc.
- ✓ **Challenge events** – creating and engaging the eco-system to contribute regularly to the smart city framework through outcome focused events looking at specific challenges.
- ✓ **City dashboard** – city data dashboard to publish data on city indicators.

4. Building the innovation network

Partnerships will be formed to deliver projects that address city challenges. These partnerships can be formalised to create delivery groups that can be quickly turned to city challenges as they are identified. These groups and the wider community will be supported by a network of innovation spaces and living labs across the city.

Resources needed include:

- ✓ **Living lab** – Not a physical place but an environment for open innovation where users, designers and developers can collaborate to create and test new solutions. We will form partnerships with and support existing living labs, while expanding the practice in new areas.
- ✓ **Commercialisation function** – expertise and networks to analyse markets, create commercial propositions and attract investment.
- ✓ **Developer events** – creating and engaging groups of developers to regularly contribute to the smart city framework.
- ✓ **Workshops /Maker spaces** – to ensure all people have access to the equipment, environment and networks they need to innovate.
- ✓ **Partnership management function** – to develop and maintain partnerships between stakeholders, including coordination of key partners.
- ✓ **Memoranda of Understanding (MoUs) with key partners** – establishing longer term working relationships between partners, including data sharing and IP arrangements.
- ✓ **Innovation hub network —** maintenance and promotion of

innovation hubs across Belfast that act as sites for urban innovation and attractors for investment.
✓ **Funding management function** – capacity and networks to tap into sources of research funding.

5. Building Internet of Things (IoT) and data infrastructure

Individual projects will generate data assets that can be developed into a shared city platform that can be used by other innovators. This may not be a single platform, but a connected infrastructure that utilises both existing and new infrastructure to enable working across silos.

✓ **Formal and informal processes** – to gather, validate and govern data.
✓ **'Distributed' data platform** – an infrastructure to tie together datasets and data sources across the city, making this data easily available. Note, this can be developed as protocols to link independent datasets generated through projects, and existing data portals such as Open Data NI.
✓ **IoT network deployments** – an infrastructure to host IoT devices and sensors that can be a source of data relevant to city challenges while offering an attractive environment for start-ups and SMEs to experiment and build urban solutions (eg, LoRaWAN network, 2.5G network).

6. Building innovation experience

Challenge calls and competitions supported by an Innovation Fund can energise the local innovator community to solve city challenges and make use of the latest in citizen-centred design methods.

✓ **Innovation fund** – to fund design and innovation; to attract third party investment; to kick-start challenges.
✓ **Insights and design function -** research and design expertise that can provide insights on what new innovations will be impactful.

These capabilities are developed and deployed in the course of delivering a pipeline of city challenge-orientated projects (rather than implemented as stand-alone initiatives).

Get involved

Belfast City Council has taken steps to support the initial implementation of the framework. However, we realise that our key role is in convening city partners, encouraging collaborative working, and setting the public policy challenge in which the framework needs to operate in order to have an impact.

For the framework to be a success, we need the active support, involvement and contributions of many partners particularly the digital sector, our universities and local communities.

We want to know how we can strengthen the ideas expressed in this document and how we might work together to deliver the framework.

We want to know what technologies, services, expertise, projects and ideas you have that could contribute to the Belfast Agenda and the foundations of a Smart Belfast.

We want to know if there are projects or challenges that you want us to get involved in or that you want to work towards in partnership with us.

Contact us

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Smart City Team
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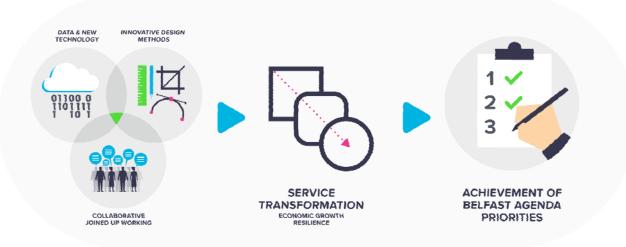Donegall Square
Belfast BT1 5GS
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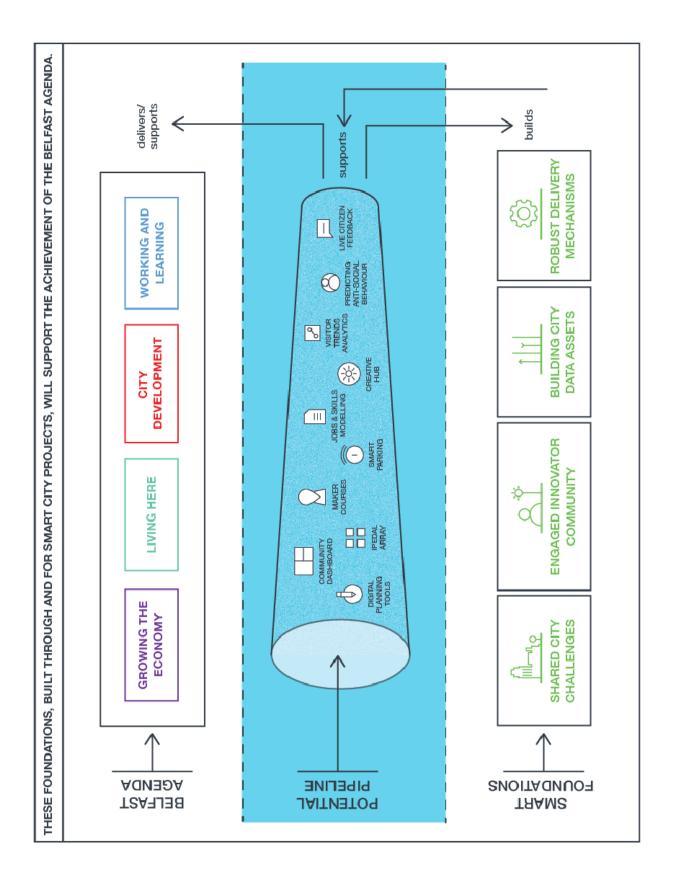# A pipeline of potential Smart Belfast projects 2017 to 2021

A Smart Belfast programme has the potential to contribute to a range of outcomes described in the Belfast Agenda by combining technology, data, design and collaboration to accelerate service transformation.

The foundations needed to embed this approach in the city are specified by the Smart Belfast Framework. These foundations will be created through projects that address city challenges while developing long term capabilities for innovation.
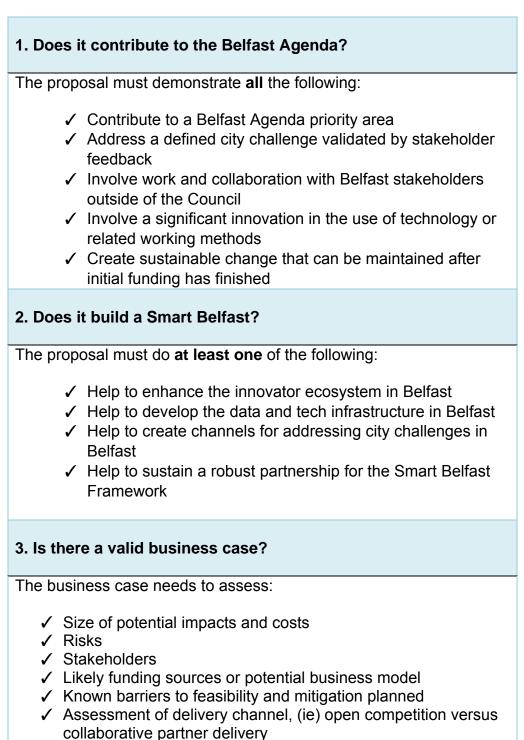
This document outlines the potential pipeline of projects based on ideas raised in our engagement with city stakeholders. These project ideas will require further prioritisation and feasibility study, but they serve to illustrate the opportunity offered by the Smart Belfast Framework for achieving tangible benefits for the city.

While Belfast City Council will play a key role in all of these projects, many of them will be led by or supported by other city partners.

Prioritising the projects

In selecting appropriate projects the Smart Belfast steering group will use evolving criteria that identify those projects which have the most potential to address city challenges whilst at the same time, contributing to the continued development of the foundations of the Smart Belfast Framework.

1. Does it contribute to the Belfast Agenda?

The proposal must demonstrate **all** the following:

- ✓ Contribute to a Belfast Agenda priority area
- ✓ Address a defined city challenge validated by stakeholder feedback
- ✓ Involve work and collaboration with Belfast stakeholders outside of the Council
- ✓ Involve a significant innovation in the use of technology or related working methods
- ✓ Create sustainable change that can be maintained after initial funding has finished

2. Does it build a Smart Belfast?

The proposal must do **at least one** of the following:

- ✓ Help to enhance the innovator ecosystem in Belfast
- ✓ Help to develop the data and tech infrastructure in Belfast
- ✓ Help to create channels for addressing city challenges in Belfast
- ✓ Help to sustain a robust partnership for the Smart Belfast Framework

3. Is there a valid business case?

The business case needs to assess:

- ✓ Size of potential impacts and costs
- ✓ Risks
- ✓ Stakeholders
- ✓ Likely funding sources or potential business model
- ✓ Known barriers to feasibility and mitigation planned
- ✓ Assessment of delivery channel, (ie) open competition versus collaborative partner delivery
- ✓ Offer a future route to market for commercial partners

Potential Smart Belfast projects?

The following project ideas have been developed based on engagement with 'challenge' owners, technologists, and the experience of other cities. At this stage they have not be adopted as definite Smart Belfast projects but serve to illustrate the potential of the approach.

Understanding visitor trends

The Integrated Tourism Strategy identified a lack of robust and accurate data as a weakness affecting tourism planning in Belfast. The strategy calls for the creation of a task force, to include Belfast City Council, for detailed analysis of Belfast's internationally prominent areas.

More generally, data on visitor behaviour is an important first step to understanding how to better plan and manage tourism in the city. This means collecting data, analysing it, and making it useful.

Potential approach?
Data on visitor behaviour can come from a variety of sources, and solutions can tap into a mix of these. For example:

- Mobile network operators hold data on visitor movements within the city, and split this data into demographic groups and country of origin.
- Payment transaction companies hold data on expenditure patterns.
- Transport operators (both public transport and private hire taxi) hold data on passenger flow and dispatch routes.
- Social media provides data on visitor experience and demographics.
- The Belfast Bike scheme creates data on cycling flows. If this can be split between regular users and visitors, this would reveal how visitors are using the bikes and where they are going.

Tracking tourists in Barcelona
The potential for data analytics in tourism has been explored in Barcelona using data from user-generated content (TripAdvisor etc) and from IoT sensors.

In one recent pilot, Wi-Fi and GSMA sensors, together with 3D cameras, were used to gather data on visitors to the Sagrada Familia, the most famous site in the city. Data from these sensors captured the origin and flow of visitors. For example, the data showed that peak hours were between 10am and 12pm. It also showed that the most common nationality of tourist was French, at over 20% of visitors.

Data of this kind is gathered through passive monitoring of mobile phones in the vicinity. Similar datasets are available from mobile network operators.

Solutions would empower the Tourism NI, Visit Belfast, the tourism and hospitality industry, Belfast City Council and other important stakeholders and partners to analyse visitor flows from multiple angles.

Deliverables?

- Source data and develop a tool that allows public and private partners to analyse detailed trends in visitor behaviour.
- Create actionable intelligence based on detailed data on visitor behaviour.

Outcomes?

- Better planning of transport and places
- Local businesses tailor their services and target their offer / marketing
- Improved targeting of segments, based on spend per head

Belfast Agenda measures of impact?

- Visitor numbers
- Visitor satisfaction
- Total spend by external visitors

Public transport challenge

Despite investment in public transport and the success of schemes like Belfast Bikes, more than 44% of Belfast's workforce travels to work by car. Attitudes to travel by public transport or active travel remain a barrier. As major improvements to public transport are completed (Belfast Transport Hub, Rapid Transport System), this barrier will need to be lifted in order to maximise these opportunities.

> Sustrans is conducting a large survey of 14,000 employees in Belfast to understand more about their barriers to switching from car commuting. Sustrans will use this research to work with European partners on programmes and campaigns that improve air quality.

Potential approach?
User research can uncover barriers to using public transport, and their causes. User-centred design can be applied to create solutions that fit with people's needs.

A design challenge could throw up unexpected solutions that we cannot predict. These could be digital (navigation, payment, booking), physical infrastructure, or some other form. They might be relatively simple.

Deliverables?
- New solution designs based on user-centred design process to encourage use of public transport and active travel;
- Prototyping or procurement of new solutions and demonstration of their effectiveness in shifting commuters away from car travel.

Outcomes?
- Solutions that reduce car commuting;
- Less congestion and improved city centre environment.

Belfast Agenda measures of impact?

- Percentage of all journeys which are made by walking, cycling or public transport
- Satisfaction with Belfast as a place to live
- Air quality

City centre parking

The City Centre Regeneration and Investment Strategy highlighted the need for a car parking strategy in Belfast, driven by the need to address constraints that existing parking provision imposes on city centre development, and by the transfer of powers over parking to Belfast City Council. This led to the ongoing development of the Belfast Parking Strategy.

Both the City Centre Regeneration and Investment Strategy, and the Belfast Parking Strategy, recommend more use of technology to tell people about parking availability and to facilitate payment.

Potential approach?
The Belfast Parking Strategy states 'Potential solutions that could be implemented through the introduction of new technology include more efficient enforcement, development of a Belfast parking website and app, improving parking information as you approach the city (city wide Intelligent Transport System, innovative wayfinding and upgrading payment methods).'

Other cities have deployed 'smart parking' initiatives. For example, Westminster and Dublin provide drivers with an app that shows them real time parking availability and allows them to book spots and pay via the app. San Francisco has evaluated a suite of parking interventions that correspond to the recommendations of the Belfast Parking Strategy (see box).

Smart Parking in San Francisco
SFpark was a demonstration project funded through the US Department of Transportation. For the SFpark pilot projects, the SFMTA used several strategies to make it easier to find a space and improve the parking experience, including:
- Making it easier to pay at meters and avoid citations
- Longer time limits
- Improved user interface and product design
- Improved information for drivers, including static directional signs to garages and real-time information about where parking is available on- and off-street
- Demand-responsive pricing (transparent, rules-based, and data-driven)

SFpark piloted and cultivated several emerging technologies, including smart meters, parking sensors, and a sophisticated data management tool.

The evaluation results for SFpark were positive. Pilot areas, compared to control areas, produced the following results:
- Increase in achievement of target occupancy by c.25%
- c.30% decrease in time to search for a spot
- c.25% decrease in miles driven
- c.25% decrease in greenhouse gas emissions from drivers

Deliverables?

- Give visitors more information on parking availability, to cut down on circulating traffic and congestion.
- Make pricing and payment for parking simple and easy.

Outcomes?

- More visitors to the city centre;
- Less congestion and pollution from visitors looking for a parking space;
- Higher enforcement of pricing and parking restrictions;
- Better visitor experience.

Belfast Agenda measures of impact?

- Visitor numbers
- Visitor satisfaction
- Satisfaction with Belfast as a place to live
- Air quality
- Percentage of all journeys which are made by walking, cycling or public transport

Building an integrated employment pathway

Belfast has a complex, underperforming employability pathway with many actors and providers offering a broad range of interventions, programmes and services to those working towards employment.

Evidence suggests this existing arrangement is sub-optimal but the complexity of the environment makes it difficult to identify problems, blockages and inefficiencies. It also presents a confusing landscape for those participating in the pathway.

A key step in identifying barriers, tracking impact and creating joint approaches is understanding employability and the effect of policy from an integrated, holistic perspective.

This means understanding how individuals move from one stage to another (education, training, unemployment etc.). Ideally this would involve revealing a complete picture of the complex factors affecting individuals in every stage.

Potential approach
A data analysis solution is required, capturing data on individuals or cohorts and analysing trends to shed light on employability issues. This does not preclude qualitative insights work.

Employment pathway modelling and analysis is a well-researched topic. This research can be accessed through partnership with Belfast's higher education institutions.

Any solution will require collection of cohort data from educational institutions, employment programmes and other data holders.

Deliverables?
- Map how individuals progress from post +16 formal education through to employment or unemployment.
- Identify factors around individuals and groups that are more likely to suffer unemployment or poor employability.
- Identify lessons and opportunities for developing a fuller mapping of the employability pathway through further work.
- Build towards a shared information management system for tracking performance of individuals, cohorts and employability programmes.

Outcomes?
- Better targeting of initiatives and programmes
- Improved coordination among educational institutions and employability stakeholders
- Data for performance evaluation of programmes

Belfast Agenda measures of impact?

- Proportion of school-leavers entering employment, education or training
- Proportion of care leavers who aged 19 were in education training or employment
- The proportion of working-age population in Belfast who are unemployed
- The employment rate of 16 - 64 year olds by deprivation quintile
- Economic inactivity rate (excluding students)

Understanding the future labour market

In 2015 Ulster University produced the Northern Ireland Skills Barometer. This work involved sector-level supply and demand analysis of skills in Northern Ireland. It revealed areas of significant imbalance, such as an undersupply of STEM skills, and an over-supply of hospitality skills. Such insights allow for more sophisticated planning of education, training and economic development policy.

More is needed to create actionable insights at a local level. Belfast needs a more granular picture of skills demand and supply. This could, for example, show where transport policy needs to change to improve access to skills and jobs. And Belfast needs the most up-to-date view of skills demand possible, to reduce the lag between the emergence of a skills gap and the upskilling required to address it.

Potential approach?
Potential solutions could build on Ulster University's NI Skills Barometer work, but draw on other sources of data to create a richer, more granular, more current picture. Sources of such data could include:
- Planning applications for businesses
- Online vacancy postings
- FDI announcements

Deliverables?

- Create a rich predictive model of skills demand and supply in Belfast.
- Incorporate new data sources to create the most up-to-date, informed view possible.
- Allow scenario modelling so that policies and decisions can be tested.
- Provide geographical granularity.

Outcomes?

- Local labour market conditions are included in planning decisions such as transport, education and zoning.
- Local skills pockets or gaps are forecast and / or identified.

Belfast Agenda measures of impact?

- The proportion of working-age population in Belfast who are unemployed
- The employment rate of 16 - 64 year olds by deprivation quintile
- Economic inactivity rate (excluding students)
- Skills barometer measure - the gap between current and future skill needs

Belfast Health and Leisure Passport

Less than 50% of Belfast's population is physically active. To promote active living and the health benefits it generates, Belfast has a range of programmes and interventions like Jog Belfast, Park Run and Beat the Street. Most significantly, the city is investing in a £105m leisure transformation programme to build six new leisure centres. But the collective impact of these initiatives is unclear.

The Belfast Agenda calls for an integrated city programme across activity, physical health, mental health and social isolation. Such a programme will need a data-based understanding of the active and inactive population in Belfast, in order to allocate resources and design interventions based on the reality on the ground.

Potential approach?
Many of the active living programmes in Belfast collect data on their participants, often with advanced methods (e.g. RFID tags, IoT key fobs, smart cards). That data, combined with other sources, could be analysed to measure the impact of these initiatives and shed light on the active population in Belfast.

Just as importantly, such analysis could shed light on the inactive population as well. For example, it might show that a demographic is underserved by current programmes and would benefit from a further intervention, such as targeted marketing.

Deliverables?

- Track activity participation over time;
- Improves performance management within and across programmes;
- Enables new and better services through our leisure centres;
- Keep users anonymous and maintain data privacy.

Outcomes?

- Activity programmes are improved and better targeted, leading to larger, more inclusive improvements in activity rates;
- Improved activity rates lead to improved health outcomes and reduced health costs
- Greater usage of the Council's leisure estate

Belfast Agenda measures of impact?

- Proportion of adults participating in moderate exercise at least five days per week
- Proportion of the population participating in culture, arts and sport
- Gap in healthy life expectancy

A Circular Economy Grand Challenge

The management of the city's waste, both domestic and commercial, remains a substantial cost to both the rate-payer and to business.

The 'circular economy' requires a transformation in the way that waste is conceptualised with many cities now recognising that city waste is actually a substantial economic resource for jobs, new businesses and products. Invest NI's recent mega-trends report notes that the circular economy sector is likely to be key growth sector for Belfast in the coming decade.

To capitalise on these trends as a source of jobs and economic growth, the city can rally the creative efforts of industry and academia around a 'Grand Challenge', which would create a value proposition that makes a significant impact in the transition towards the circular economy, while being underpinned by a sustainable business model.

Potential approach?
The 'innovation competition' or 'grand challenge' model is proposed as a means of generating disruptive, unexpected, innovative new services and products. Any potential solution must simultaneously demonstrate:

- A significant increase in resource efficiency for the city;
- Value generated for users and producers, that both would invest in;
- Potential for scale.

Solutions here could include digital solutions to make waste management easier for businesses, design solutions to improve packaging or consumption behaviour, planning tools to improve construction efficiency, social enablers to allow sharing economy, engineering solutions to reduce resource use in infrastructure … the scope for ideas is wide.

Deliverables?
- An innovation competition could galvanise innovators to devise new services that users would be willing to pay for, while significantly improving the resource efficiency of the city.
- Successful designs and prototypes from such an innovation competition could attract further funding and investment, leading to commercialisation and widespread adoption.

Outcomes?

- Stimulation of circular economy cluster
- Creation of world-class innovation and commercial opportunity
- Improved resource efficiency and transition to circular economy

Belfast Agenda measures of impact?

- The number of new business start-ups
- Skills barometer measure
- between current and future skill needs
- Percentage of household waste that is recycled or composted

Predicting antisocial behaviour

Antisocial behaviour damages neighbourhoods and drains resources. If officers, wardens and other resources could be better targeted at trouble-spots and high risk areas, this could help to improve community safety. Such targeting would ideally be both responsive and predictive so that officers could be efficiently deployed and could respond in real-time.

Potential approach?
The use of unconventional data sources is an area of potential innovation.

- Social media data has been shown to predict crime in research by Cardiff University.[8]

- Belfast City Council currently collects detailed data for waste management on, for example, the damage and replacement rate of household wheelie bins.

- Many police forces, particularly in the US, are experimenting with Big Data analytics for predicting crime and antisocial behaviour hotspots.

Analysis of such data, coupled with demographic and socioeconomic data, could yield a rich picture to inform anti-social behaviour policy and operations.

> **PredPol**
> a predictive policing software package, has been deployed by Kent Police since early 2013. Twice a day it automatically analyses real-time recorded crime location data about burglary, street violence, theft from vehicles and anti-social behaviour, supplemented with historic location data from the past five years. PredPol produces a map of 500 square foot 'hot-spots' where there is a higher probability of crime taking place relative to other local areas over the next 12 hours. Officers use these maps to incorporate hot-spots into their daily patrols. Kent Police force is positive about its use and reports that since its implementation there have been small drops in crimes of this type and anti-social behaviour.

Deliverables?
- Improve targeting of resources to tackle antisocial behaviour

Outcomes?
- Reduction in anti-social behaviour
- More efficient enforcement operations

Belfast Agenda measures of impact?

- Number of anti-social behaviour incidents
- Proportion of people who feel safe

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[8] Matthew L. Williams, Pete Burnap, and Luke Sloan, 'Crime Sensing with Big Data: The Affordances and Limitations of using Open Source Communications to Estimate Crime Patterns', British Journal of Criminology (March 31, 2016)

Leveraging the public estate

The sheer size of the public estate in Belfast's city centre means that it plays a large role in the carbon footprint of the city as well as the lived experience of residents and visitors. Therefore the Belfast Agenda's priorities for City Development and Living Here can be addressed through making improvements to the way that the public estate is managed.

Potential approach?
By connecting building information modelling (BIM), GIS and digital management interfaces, we can create a more joined up, simplified estate management system. This can also be coupled with more data on usage from IoT sensors and other sources, to find further efficiencies and create possibilities for improving service provision.

There are several sites in the public estate that could be used to develop and demonstrate advanced estate/facilities management and BIM. These include:

- Six new leisure centres in development through the Belfast Leisure Programme
- A co-working Innovation Factory
- The Waterfront Hall, a conference and venue
- The Girdwood community hub
- The Council's own new office block, 9 Adelaide St

Building Information Modelling (BIM) creates a digital representation of a building, which can act as a shared, reliable information source for all those involved in designing, constructing, maintaining and operating the building.

The UK Government BIM level 2 mandate means that all government building projects are required to use 3D BIM with digital project and asset information, documentation and data.

Attention in Government has now moved towards achieving BIM level 3, which extends the BIM approach to the operation of buildings over their lifetimes. In theory, owners and operators will be able to better manage assets and services as they track their real-time efficiency, maximising utilisation and minimising energy use.

Deliverables?
- Modernise and integrate estate management and open access to social enterprises;
- Use BIM to improve the construction process and enable integrated planning;
- Gather data on usage of public services and facilities, particularly leisure facilities to improve operational efficiency and create new services for users / residents.

Outcomes?

- Reduced energy costs and carbon footprint
- Reduced estate management costs
- More access to and competition for estate management services
- Reduced construction costs
- New and optimised services from data provision

Belfast Agenda measures of impact?

- Renewable energy as a percentage of all energy consumed

The Belfast Innovation Hub Network

Belfast is home to a large number of locations that could be considered, or could become, centres of innovation. By establishing a network to support and promote these centres, they could become the basis of a city-wide offer to investors and innovators. This could in turn support economic development through clustering benefits.

Potential approach?

Innovation hubs could receive support services, such as:

- Shared digital services, e.g. an investor portal, collaboration platform;
- Promotion and joint marketing as part of a citywide network;
- Facilitated planning processes.

At the same time, the innovation hubs would be expected to contribute toward the Belfast Agenda. The Smart Belfast Framework can provide the basis for coordinated activities across partners' innovation hubs to target shared city challenges. Hubs will be called on to provide resources such as event space, co-working space, equipment and distribution channels. For example, a hub may provide a project space for entrepreneurs involved in an innovation competition.

Deliverables?

- Leverage the existing innovation hub network to create added value for the city
- Support the existing innovation hub network to support the innovator community in Belfast

Outcomes?

- Belfast's innovation hubs attract investment to the city;
- Innovation hubs contribute to solving city challenges;
- Innovation hubs have access to support services that encourage collaboration and improve their operation.

Belfast Agenda measures of impact?

- Investment into Belfast
- The number of new business start-ups
- City productivity levels
- Skills barometer measure

Other ideas

The versatility of the Smart Belfast approach means that there are many other ideas that could be explored. The project ideas listed below are also based on feedback from the partners and illustrate the potential of the framework to deliver across a broad range of priorities from the Belfast Agenda.

1. Designing out waste

Partner with an FMCG company to create less wasteful product designs that reduce the waste burden on citizens and council services experiment with an extended producer responsibility approach.

2. Neighbourhood Living Labs

Set up neighbourhood living labs in a number of community centres to bring open innovation, co-creation and user-testing to local communities, starting with the four Social Enterprise Hubs at Sandy Row, York Street Castlereagh Street and Springfield Road.

3. Establish a new Creative Hub

Establish an accessible, centrally located creative and maker space, that welcomes academics, businesses and students to create a genuine centre for innovation which complements the existing ecosystem of innovation hubs.

> The report on Creative and Digital Industry Initiatives to the City Growth and Regeneration Committee, dated 9 November 2016, states 'While there is now much more support available than in previous years, the scale of the demand [for co-working space] is still outstripping supply'.

4. Identify vacant properties in city centre

Use analytics to identify vacant properties in support of the city centre regeneration strategy.

5. Belfast Internet of Things network

Seek to deploy an IoT network to facilitate a range of low-cost transport and environmental data collection projects with SMEs and other partners.

6. Connected health and local communities

Pilot social innovation projects that use connected health technologies to connect local communities and address issues identified by communities (such as supported living, prescribing challenges).

7. Casement Park hub

Use new methods such as pedestrian flow modelling to explore opportunities for place-making and transport planning around the new Casement Park hub.

> Bristol City Council is currently modelling the impact of a new £300m transport and innovation hub at Templemeads station. There are opportunities for joint learning from this work – as it involves AI researchers from Queen's University.

8. Living with Water

Deploy sensors as part of the investment in city water infrastructure to aid analysis and future infrastructure planning.

9. Waste management data analytics

Maximise use of data from waste management services to predict parallel social and economic issues.

10.   Smart leisure centres

Integration of IoT sensors and BIM systems open up opportunities for improved energy management and operations, and advanced digital services for residents using the facilities (e.g. personalised leisure centre experience).

Additional funding sources

Local government can be a source of finance for smart city programmes through rates income, service charges and borrowing. However there are numerous other funding sources that could be explored for co-investment in smart city projects.

UK and Regional sources

Invest Northern Ireland
Through the Collaborative Growth Programme, Invest NI has allocated £5.7million funding over the next five years to help stimulate innovation among local businesses. Funding is available to industry-led networks requiring facilitation support to scope innovative collaborative projects.

Invest NI has agreed to fund innovation competitions for the Smart Belfast Framework as part of the Collaborative Growth Programme.

Innovate UK
Innovate UK is the UK's innovation agency. While cities are not typically able to directly apply for Innovate UK funding, they are eligible as partners within projects and can receive funds aligned with their activity projects.

Funding competitions
Innovate UK runs funding competitions, often in partnership with government departments, to encourage research and development in specific challenges and markets. Currently these markets are organised into four sector groups, two of which relate to smart cities: Emerging and Enabling Technologies, and Infrastructure Systems. Additionally, they run an Open Programme, which focuses on developing early innovations in any sector.

Innovate UK's upcoming funding opportunities related to smart cities are shown below:

Investment	Timing	Budget
Infrastructure Systems competition	Next call opens in July 2017 (every 6 months)	<£15,000,000
Emerging and Enabling Technologies competition	Next call opens in December 2017 (every 6 months)	<£15,000,000
Cities Integrated by Design	Q4 2016/17	<£9,000,000 open

Small Business Research Initiative
Innovate UK's Small Business Research Initiative (SBRI) funds innovation competitions to support small companies trying to develop new products

and services to tackle challenges for the public sector. Small businesses are given funding to scope and develop a new product that a public entity then buys.

Belfast City Council's smart city team has already seen success in attracting this funding for the development of a rates maximisation tool. Department for the Economy have indicated confidence that funding will be available in the coming months.

UK Government Departments
The UK Government has multiple departments which are concerned with smart cities interventions: Department for Culture, Media and Sport; Department for International Trade; the Foreign and Commonwealth Office; and Department for Communities and Local Government. However these departments are not currently running any funding competitions for smart city-related projects.

European funding sources

European funding is still open for UK project proposers until the formal exit scheduled in March 2019. The Government has guaranteed funds for projects signed up until the UK departs the EU.[9]

Horizon 2020
Horizon 2020 is the biggest EU Research and Innovation programme with nearly €80 billion of funding available over 7 years (2014-2020). H2020 launches hundreds of calls for proposals simultaneously throughout the year. Calls change from one year to another. The work programmes for 2018-2020 (calls to open starting from September 2017) are not disclosed yet. The definitive version and calendar of the calls should be known during the summer.

Examples of thematic work programmes	Average budget per proposal	Co-funding	What it can fund
Inclusive, innovative and reflective Societies calls	€1-6 million per proposal	100%	Co-creation of public services, promoting social inclusion, social innovation and cultural heritage
ICT calls	€1-15 million per proposal	100%	IoT, digital transformation of health and care, big data, support business innovation ecosystems

[9] https://www.gov.uk/government/news/further-certainty-on-eu-funding-for-hundreds-of-british-projects

Pre-Commercial Procurement calls	€6 million per proposal	100%	Targets consortia of procurers with similar needs that want to procure together the development of innovative ICT based solutions o modernise public services (on any topic)

ELENA
ELENA is intended to support energy efficiency and renewables projects. It covers up to 90% of project setup costs (feasibility studies, market studies, audits, tendering, structuring).

JESSICA
This initiative supports sustainable urban development and regeneration through sophisticated financial instruments. Supported projects fall into the following areas:
- urban infrastructure
- heritage or cultural sites
- brownfield redevelopment
- creation of commercial floor space for SMEs, IT and R&D
- university buildings
- energy efficiency

Connecting Europe Facility
The Connecting Europe Facility supports efforts to connect European infrastructure in transport, energy and telecommunications. The facility issues requests for proposals in all of these areas.

To support the aim of creating a Digital Single Market across Europe, the Connecting Europe Facility supports trans-European digital services infrastructure and broadband networks through a 1bn euro fund.

LIFE
Under its Environment & Resource Efficiency programme, LIFE will co-finance grants for demonstration projects for environmental challenges.

COSME
Europe's SME programme provides financing for SMEs through local financial intermediaries. It also supports clusters through the clusters for excellence sub-programme.

Urban Innovative Actions
Urban Innovative Actions (UIA) is an Initiative of the European Commission that provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. Based on article 8 of ERDF, the Initiative has a total ERDF budget of EUR 372 million for 2014-2020. City councils are expected to lead projects with a consortium of local stakeholders (no need to partner up with EU stakeholders). UIA launches a call for proposals a year (opening in December and closing in April). Topics change every year but usually deal with: circular economy, urban poverty, urban mobility etc.

Other Project Financing Types

Tax increment financing

Smart city projects have the potential to generate value through economic growth and improved services, leading to higher land values, increased service utilisation, increased rates collection etc. Tax increment financing uses these increases in land value to repay debt finance.

Equity finance and Public Private Partnership

PPPs are a common practice for smart city projects, where private technology companies seek to demonstrate and embed their technologies in a city. PPPs can take many forms in the UK including joint ventures, concessions and private finance initiatives (PFIs).

In Scotland, PFIs are being supplanted by non-profit distribution models, which limit the equity returns to a reasonable rate set in competition through an open procurement process.

Social impact bonds and smart bonds

These are a relatively new form of financing from social investors, whereby investors are paid back based on measurable social impacts produced by the project. Notable investors in social impact bonds:
- Bridges Ventures
- Big Society Capital
- Big Issue Invest
- Esmee Fairbairn Foundation
- CAF Venturesome
- The Key Fund
- Barrow Cadbury Trust
- Impetus-PEF

Smart bonds are similar to social impact bonds in that they are repaid following the achievement of measurable goal. Smart bonds are more applicable for infrastructure or economic projects, where social impact is not the main objective.

Specialised financial instruments

To attract investment from traditional lenders and the private sector, public bodies can create financial instruments that change the risk and return profiles of projects (e.g. loan guarantees, senior debt). When this involves contracting with multiple parties/investors, this may require the creation of a specialised funding vehicle.

Energy service companies (ESCOs) follow this model. They raise investment and run large portfolios of energy saving projects, thereby spreading risks.

Crowdfunding

Civic crowdfunding is raising significant amounts for urban regeneration and community projects. These range from a few thousand pounds (e.g. repairing a local bus) to hundreds of thousands (e.g. creating a community building). Funds raised through this channel have the added

bonus of carrying the weight of citizen sponsorship and engagement.