

# Smart Cities Scotland Blueprint

Prepared for: Scottish Cities Alliance

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# Executive Summary

The Scottish Cities Alliance is a unique collaboration of Scotland’s seven cities and the Scottish Government. This Blueprint provides an initial strategic basis for the Smart Cities area of operational activity within the Alliance, which is referred to as ‘Smart Cities Scotland’. The Blueprint considers what the cities can achieve by working together to advance both individual and joint smart cities activities.

The Blueprint was developed in consultation with all seven Scottish cities, the Scottish Government, Transport Scotland and Scottish Enterprise. Insights were collected through interviews, a workshop, an online survey and a comprehensive desk study which considered priorities established in both local and national strategies.

The Blueprint also builds on earlier and ongoing work within the Alliance’s Operational Plan. The Smart Cities Maturity Model Self-Assessment exercise was designed to establish each city’s overarching ‘smart’ priorities, the results of which were used to produce a seven city-wide Outline Investment Roadmap. Some of the technology and data opportunities identified in the Roadmap are being taken forward in the £10 million European Regional Development Fund (ERDF) Strategic intervention, called “Scotland’s 8<sup>th</sup> City – The Smart City.”

The Blueprint starts by establishing an overarching ambition for Smart Cities Scotland, defining four high-level goals:

Table 1: Summary of the four high-level goals for Smart Cities Scotland

<b>Citizens and Communities</b>	Citizens across different communities should feel engaged and empowered to live a fulfilling life. This should be achieved by providing access to information, realising needs and bringing together the right resources to meet specific challenges.
<b>Business &amp; Economy</b>	Scotland will be recognised as a healthy, innovative and resourceful place to live and work. By working together to establish an expansive programme to achieve mutual goals, Scotland’s cities will attract new funding and become more attractive to Foreign Direct Investment.
<b>Environment</b>	Scottish cities will become smart and sustainable economies powered by renewable energy and using data and technology to drive transformation.
<b>Performance &amp; Operation of Cities</b>	A strategic, evidence-based approach to city performance and operations that uses data and information from public and private sources, achieves the buy-in of all city stakeholders, attracts informed and focused low carbon investment, and improves the quality of life for all.

The Blueprint then sets out five delivery objectives to characterise how cities can work together to advance both individual and joint smart cities initiatives. This places improving the lives of citizens at its heart and establishes that this will be driven by the principles of collaboration & engagement, openness, innovation, sustainability and resource efficiency.

A programme is defined for each of these delivery objectives, prioritising collaborative activities for the Alliance partners to progress. These are referred to as “Pathfinder Programmes” as the intention is that they become exemplars for collaboration between the cities and establish foundations for additional complementary activities in the future.

Table 2: The five delivery objectives for Smart Cities Scotland and linked Pathfinder Programmes

Delivery Objective	Pathfinder Programme	Aim
Improving Lives	Smart & Healthy Living	Scottish cities will work together to establish a nationwide test-bed for innovations in health and wellbeing, while generating data-led insights on the links between health, economic growth and productivity.
Collaboration & Engagement	Sharing & Learning Platform	A Smart Cities Sharing & Learning Platform is scoped and developed to enable cities and associated partners to: freely exchange information, combine resources to solve problems and track emerging projects, funding and solutions.
Open Data & Transparency	Code for Scotland	Moving from passive provision of data to an active engagement with the data community to identify and develop innovative smart city solutions.
Technology & Innovation	MaaS Scotland	Attract investment and create opportunities to test, develop and commercialise smart mobility solutions in Scotland's cities that will be unified by a national Mobility as a Service (MaaS) platform that combines transport options from different providers across Scotland, handling everything from travel planning to payments.
Environmental Sustainability	Circular Economy	Use a 'circular economy' approach to efficiently manage the flow of resources within and between cities.

The final set of recommendations are related to enhancing the capacity of Scottish cities to deliver smart city activities and to maximise the corresponding social, economic and environmental opportunities. These capacity building measures provide an opportunity to support the successful delivery of the five Pathfinder Programmes and to 'scale-up' Smart Cities Scotland, by making 'smart' a pervasive concept across cities and enabling the growth and export of innovative solutions. To achieve this, key enabling actions are identified for each of these measures (see Table 3).

The frameworks offered by the Alliance mean that Scottish cities are uniquely placed to realise the opportunities offered by collaborative smart city activities. This will be supported by the strategic approach established by this Blueprint, which will enable cities to work together to attract external investment, stimulate economic activity and create new jobs and business opportunities. This in turn will make Scotland an even better place to live and a more prosperous and successful country.

Table 3: Summary of the four capacity-building measures and linked enabling actions

Measure	Ambition	Enabling Actions
Leadership and Governance	Improved governance leads to: coordination of smart systems across cities; widespread political and public support; the capture and sharing of data generated across cities which is used to inform the development of new collaborative policies and projects.	<ul style="list-style-type: none"> <li>• Creation of a Smart Cities Scotland Board that brings together leaders from the public, private and voluntary sectors across Scotland.</li> <li>• Creation of a National Smart Cities Champion.</li> <li>• Definition of common Smart Cities roles across each of the the cities and Scottish Government.</li> </ul>
Investment	Collaboration between the cities can attract funding that the cities would not be able to access individually and support the development and piloting of new financing structures.	<ul style="list-style-type: none"> <li>• Joint bids to create compelling offers and a sufficient scale to access new funding opportunities.</li> <li>• Piloting new financing and revenue-generating models.</li> <li>• Collective engagement with investors.</li> <li>• Collaboration to scale-up and commercialise smart activities to generate returns on investment.</li> </ul>
Procurement	Provision of the necessary skills, focused resources and new guidelines across the cities. This will be supported by public relations management, community engagement and open dialogues with citizens.	<ul style="list-style-type: none"> <li>• Learning is shared between the cities on experience gained from procuring innovative products or services.</li> <li>• Cities to work together and with Scotland Excel to create and share dedicated smart city procurement resources.</li> <li>• Supplier forums are held across Scotland.</li> <li>• Cities work together to develop challenge-led competitions and pilot new business models for different forms of procurement.</li> </ul>
Promotion	Smart Cities Scotland identity further establishes Scottish cities as internationally recognised and desired destinations for capital and inward investment.	<ul style="list-style-type: none"> <li>• A more place-based focus in promoting the Smart Cities agenda.</li> <li>• A collaboration agreement is formed between all relevant actors involved in promoting Smart Cities Scotland, including the Scottish Cities Alliance, Scottish Enterprise and Scottish Development International .</li> <li>• Smart Cities to be incorporated into the Alliance's Pitch Book.</li> <li>• Collate case studies and good practice.</li> <li>• Cities to create joint promotion activities such as exhibiting at conferences and expos.</li> </ul>

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# 1 Introduction

The Scottish Cities Alliance is a unique collaboration of Scotland's seven cities (Aberdeen, Dundee, Edinburgh, Glasgow, Inverness, Perth and Stirling) and the Scottish Government working together to attract external investment, stimulate economic activity and create new jobs and business opportunities.

The Alliance has three key workstreams, which are designed to complement each other: Infrastructure, Low Carbon and Smart Cities. This Blueprint provides an initial strategic basis for the Smart Cities workstream, which is referred to under the identity 'Smart Cities Scotland'. It establishes what the cities can achieve by working together to advance both individual and joint smart cities activities.

Scottish cities have made considerable progress in adopting smart technologies, using data as an asset, advancing citizen engagement, embracing innovation and establishing new forms of collaboration across the public, private and tertiary sectors. These methods are being used to make services more effective and to make Scottish cities more attractive to investors, residents, visitors and the business community.

This Blueprint supports this activity and guides further progress, considering what the cities can achieve by working together to advance both individual and joint smart cities initiatives. It establishes key collaborative actions and programmes to deliver smart cities activity, and identifies funding mechanisms, delivery structures and monitoring activities to support delivery.

In accordance with approach shown in Figure 1, the Blueprint is structured as follows:

- **Chapter 2** provides a **Background** to the Smart Cities Scotland and explains the methodology used to compile this Blueprint.
- **Chapter 3** outlines the **Ambition** for Smart Cities Scotland, defining high-level **Programme Goals** in four key areas: citizens & communities; business & economy; environment; and the performance & operation of cities.
- **Chapter 4** sets out a strategic approach to **Working Together** to deliver Smart Cities Scotland, defining five **Delivery Objectives** for the programme. This places improving the lives of citizens at its heart and establishes that this will be driven by the principles of openness, innovation, resource efficiency, collaboration & engagement. A **Pathfinder Programme** is defined for each of these five areas, prioritising collaborative activities for the Alliance partners to progress.
- **Chapter 5** identifies four **Capacity Building Measures** to define how collaboration at the Alliance-level can further support the acceleration and scale-up of smart city projects across Scottish cities.
- **Appendix A** provides additional information on the five **Pathfinder Programmes** and a recommended monitoring framework for delivery.
- **Appendix B** presents a comprehensive summary of Smart City Funding sources and mechanisms.

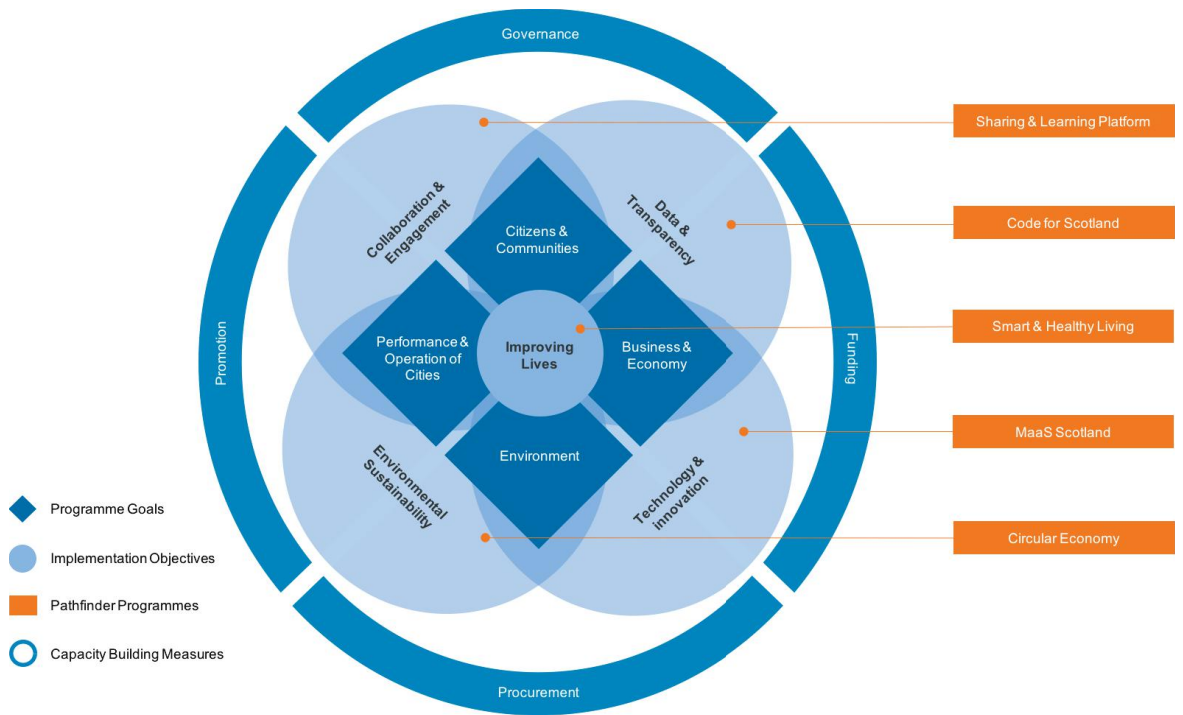


Figure 1: The Smart Cities Scotland Approach

## 2 Background

### 2.1 Smart Cities

The concept of Smart Cities is not new. Its origins are widely attributed to the Smart Growth movement of the late 1990s, which advocated new policies for urban planning. The phrase was subsequently adopted by a number of technology companies to describe the application of complex information systems to integrate and operate urban infrastructure and services such as buildings, transportation, electrical and water distribution, and public safety. It has since evolved to mean almost any form of technology-based innovation in the planning, development, and operation of cities<sup>1</sup>.

More recently the concept of smart cities has become somewhat of a call to action, with a focus on achieving dramatic improvements in sustainability and resilience by:

- Engaging society;
- Applying collaborative leadership methods;
- Working across disciplines and city systems; and
- Using data and integrated technologies to provide better services and quality of life to those in and involved with the city.

For the Scottish Cities Alliance, a smart city can be defined as the integration of data and digital technologies into a strategic approach to sustainability, citizen wellbeing and economic development. Figure 2 illustrates how this is integrated with the Alliance's two other workstreams: Infrastructure and Low Carbon.

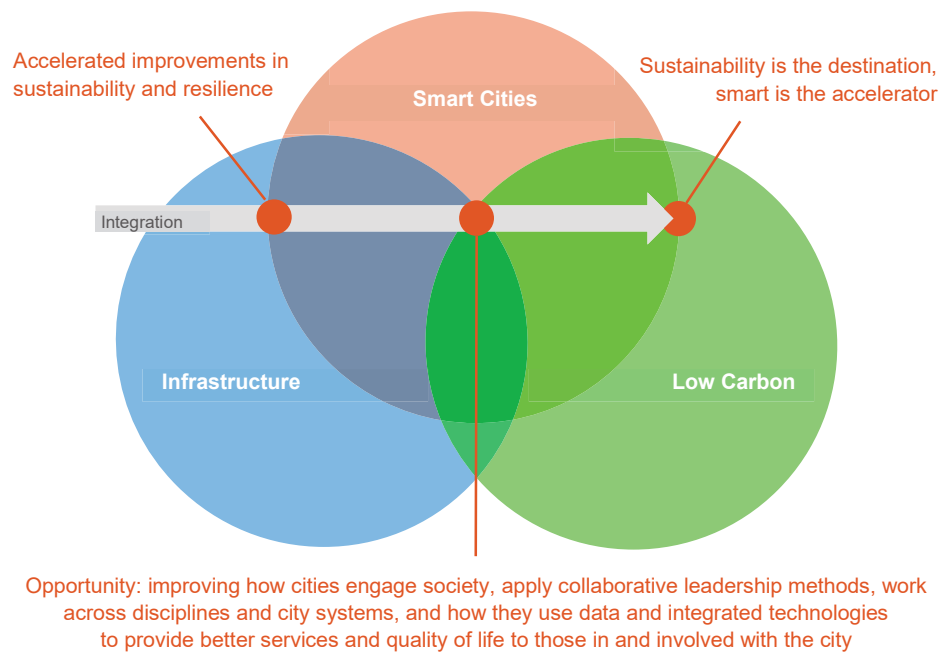


Figure 2: Integration between Smart Cities and the Scottish Cities Alliance's workstreams on Infrastructure and Low Carbon

<sup>1</sup> Harrison and Donnelly, [A Theory of Smart Cities](#)



## 2.2 Smart Cities Scotland

Through Smart Cities Scotland, a range of projects are being developed across all seven cities to make them internationally competitive and boost their economic growth:

- **The UK Future Cities Demonstrator:** Smart Cities Scotland builds on the foundation of Glasgow's world-leading Future City Glasgow programme, which in 2013 was awarded £24 million of funding from Innovate UK (formerly known as the Technology Strategy Board) to become the UK's official Future Cities Demonstrator.
- **Smart Cities Maturity Model and Self-Assessment Tool:** In 2014, the Scottish Cities Alliance in partnership with the Scottish Government and Urban Tide produced a self-assessment document designed to establish each city's smart priorities.
- **Smart Cities Outline Investment Roadmap:** The results of the Self-Assessment process led to the production of a Smart Cities Outline Investment Roadmap, and the Alliance is now working with the cities to identify collaborative projects and funding streams using the Roadmap and the priority areas identified as a starting point.
- **Open and Agile Smart Cities Network:** The Scottish Cities Alliance joined the OASC network in September 2015 as one of only two national networks of cities. The network is being used to: establish connections to develop the Alliance's work programme; attract future funding; and play an active role in shaping the development of smart cities standards and approaches across the globe.
- **Smart Cities Scotland** was launched in 2015 as an identity under which all smart cities activity taken forward by the Alliance could sit .
- **Scotland's 8th City – the Smart City:** In 2015, the Scottish Cities Alliance approved funding to support the establishment of a Programme Management Office which supports the coordination, management and delivery of a £10 million European Regional Development Fund Strategic Intervention known as the 8th City programme. With match funding, the 8<sup>th</sup> City Programme will support £24 million of projects across the seven Scottish Cities. The programme is organised into seven operation clusters of collaborative activity: energy, health, mobility, public safety, infrastructure, communities and data.
- This **Smart Cities Blueprint** was commissioned by the Alliance in 2016 to give a more strategic approach to Smart Cities Scotland. Its development was led by future cities consultancy Urban Foresight, which worked with the Alliance to engage all seven cities, the Scottish Government, Transport Scotland and Scottish Enterprise.

In summary, all seven Scottish cities are advancing smart city activities, but there is scope for the unique inter-city structures offered by the Alliance to facilitate collaboration to drive further progress. This includes: realising opportunities linked to City-Region Deals, sharing resources and efficiencies, accessing strategic funding opportunities and collectively contributing to National Outcomes. Examples of this activity are summarised in Figure 3, with key milestones in Smart Cities Scotland shown in Figure 4.

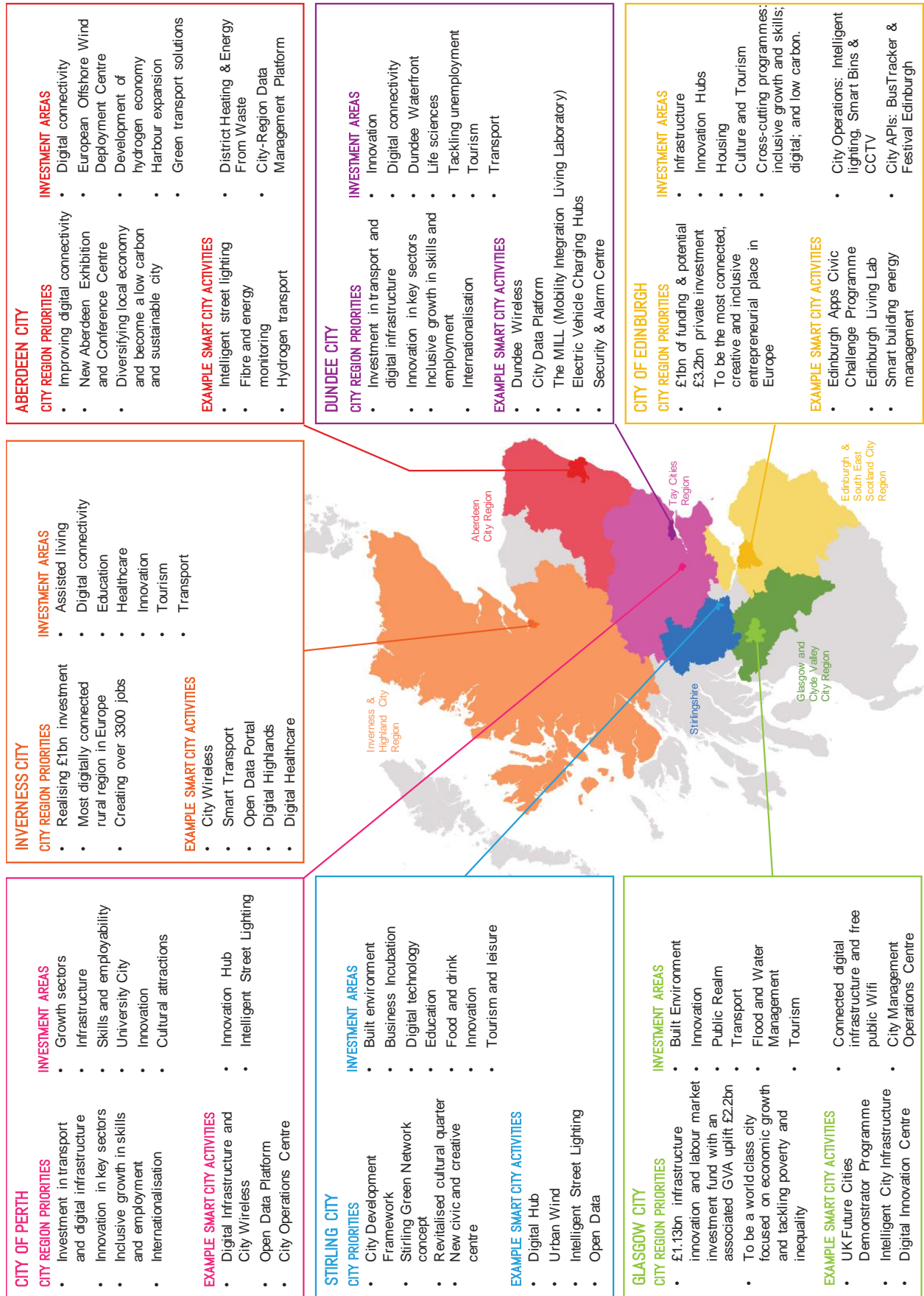


Figure 3: Smart Cities Scotland investment map

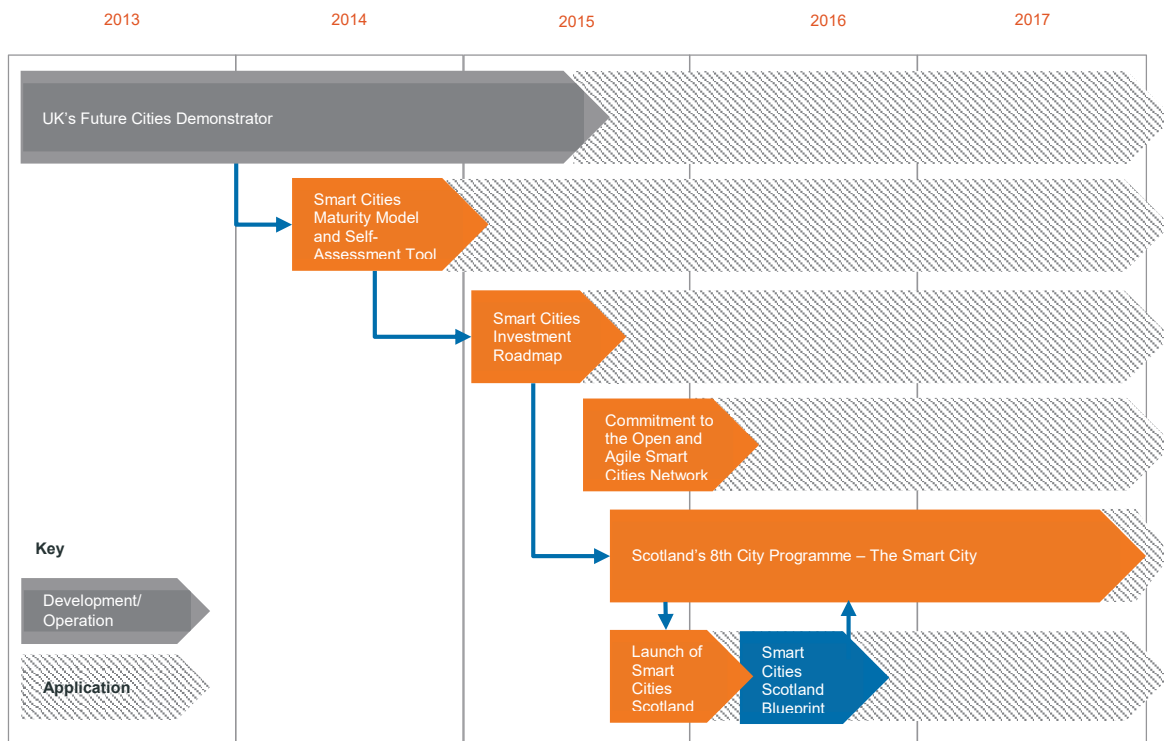


Figure 4: Key milestones in Smart Cities Scotland

## 2.3 Methodology for Developing the Blueprint

The following activities informed the development of the Blueprint:

- **Desk-based review** of: past activity (including cities' responses to the Smart Cities Maturity Model and Self Assessment Tool, and the Outline Investment Roadmap); activities linked to other Alliance workstreams and activities (Infrastructure, Low Carbon, Hydrogen, Investment Promotion); existing and evolving policies and strategies for Smart Cities and Smart Cities Networks; the developing policy agenda for cities, City-Region Deals and place-making; and current funding and financial instruments.
- **Interviews** with representatives of each of the cities and the Scottish Government to review existing smart cities activities and priorities for collaboration under Smart Cities Scotland.
- **Workshop** that brought together representatives from all seven Scottish cities, the Scottish Government, Transport Scotland and Scottish Enterprise to establish a shared ambition for Smart Cities Scotland and to shape collaborative priorities for Smart Cities Scotland.
- **Online survey** to map current and planned smart cities activity across the cities and establish the value-added by collaboration.
- **Analysis** to identify key collaborative actions, which are presented in this Blueprint as Pathfinder Programmes, which were selected based on a weighted evaluation of criteria to characterise the strategic fit with the cities, the value added by inter-city collaboration and the expected social, economic and environmental impact.



Figure 5: Blueprint workshop

## 3 Ambition

Scottish cities face a range of common challenges, prospects for economic growth and opportunities to improve the lives of their citizens. Collaboration on smart solutions to these challenges offers significant opportunities for the cities collectively to benefit. It also offers a compelling opportunity to make Scotland an even better place to live and a more prosperous and successful country.

### 3.1 Current Situation and Outlook

The SWOT analysis below characterises important factors that are likely to impact collaborative activities under Smart Cities Scotland.

Table 4: SWOT analysis of factors influencing Smart Cities Scotland

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>All 7 cities currently engaged in smart city activities and working together under the 8<sup>th</sup> City Programme.</li> <li>Experience and international profile in smart cities from Glasgow's time as UK Future Cities Demonstrator.</li> <li>Scotland is top ranked UK region for foreign direct investment and related job creation outside London.</li> <li>Strengths in key sectors such as financial services, digital, life sciences and energy.</li> <li>World leading universities with strengths in research and well established industry links.</li> <li>Strong political commitment to the reduction of carbon emissions.</li> <li>Skilled and highly educated workforce.</li> <li>Strong history and tradition in innovation.</li> </ul>	<ul style="list-style-type: none"> <li>Access to funding and ability to use available funding to effectively manage collaborative investments.</li> <li>Public understanding of smart cities.</li> <li>Highly concentrated pockets of extreme deprivation across cities.</li> <li>Citizens' perceptions of empowerment at the local level, with only one in four believing that they could influence decisions affecting their local area<sup>2</sup></li> <li>Relatively small business base with lower rates of business start-ups than the UK as a whole.</li> <li>International recognition of the unique characteristics of each city and what they deliver for Scotland individually and collectively.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>Sharing of resources, risks and rewards between cities.</li> <li>Collaboration to access new funding and revenue streams.</li> <li>City Deal investments made "smarter".</li> <li>Potential for cities to be given more control over their budgets to tailor investments to local priorities and deliver higher national economic growth.</li> <li>Developing meaningful links with Europe and globally to influence decisions, learn from other nations and share good practice from Scotland.</li> </ul>	<ul style="list-style-type: none"> <li>Spending cuts driven by reductions in central government funding.</li> <li>Economic climate and political/competitive pressures that restrict efforts and investments to short-term opportunities.</li> <li>Increased stress on infrastructure and services by population growth and an aging population.</li> <li>Air quality is improving in cities, but still represents a significant threat to human health.</li> <li>Impact of climate change on infrastructure and services.</li> <li>Economic and environmental impact of traffic congestion.</li> </ul>

### 3.2 Moving Forward

Four high-level **Goals** for Smart Cities Scotland clarify what this programme can achieve, identifying the outcomes that can be expected. These outcomes are expressed in terms of the Scottish

<sup>2</sup> Scottish Government (2015) Scottish Household Survey 2014

Government's National Performance Framework, which defines what the cities are collectively trying to accomplish.

These goals build on the Transformation Programme agenda, with each of the seven cities aiming to do more and better with less. Local authorities, working with linked local partners and stakeholders, have the opportunity to go beyond business as usual, with data, innovation and smart technologies enabling a fundamental redesign of the way in which infrastructure and services are planned and delivered.

Table 5: Programme goals and linked outcomes from the National Performance Framework

Citizens & Communities	<p><b>Goal</b></p> <p>Citizens across different communities should feel engaged and empowered to live a fulfilling life. This should be achieved by providing access to information, realising needs and bringing together the right resources to meet specific challenges. To achieve this, all services need to be recreated as systems of reference, with a common, shared platform that allows safe information sharing that is responsive to citizens' needs.</p> <p><b>National Outcomes</b></p> <ul style="list-style-type: none"> <li>• Our young people are successful learners, confident individuals, effective contributors and responsible citizens.</li> <li>• Our children have the best start in life and are ready to succeed.</li> <li>• We live longer, healthier lives.</li> <li>• We have tackled the significant inequalities in Scottish society.</li> <li>• We have improved the life chances for children, young people and families at risk.</li> <li>• We have strong, resilient and supportive communities where people take responsibility for their own actions and how they affect others.</li> <li>• We take pride in a strong, fair and inclusive national identity.</li> <li>• Our people are able to maintain their independence as they get older and are able to access appropriate support when they need it.</li> </ul>
Business & Economy	<p><b>Goal</b></p> <p>Scotland will be recognised as a healthy, innovative and resourceful place to live and work. By working together to establish an expansive programme to achieve mutual goals, Scotland's cities will attract new funding and become more attractive to Foreign Direct Investment. Improved stakeholder engagement will produce joint initiatives, and connections with other local and national cities will enable the import/export of inter-city smart city solutions. This will create jobs and opportunities across Scotland and will be supported by ensuring that skills and training are provided to satisfy the city region need.</p> <p><b>National Outcomes</b></p> <ul style="list-style-type: none"> <li>• We live in a Scotland that is the most attractive place for doing business in Europe.</li> <li>• We realise our full economic potential with more and better employment opportunities for our people.</li> <li>• We are better educated, more skilled and more successful, renowned for our research and innovation.</li> </ul>
Environment	<p><b>Goal</b></p> <p>Scottish cities will become smart and sustainable economies powered by renewable energy and using data and technology to drive transformation. Cities will be empowered with the confidence and the financial and technical instruments necessary to deliver a smart and sustainable agenda for their citizens. Working together, Scotland's cities will embed sustainability, attract investment and create environmentally-aware citizens.</p> <p><b>National Outcomes</b></p> <ul style="list-style-type: none"> <li>• We value and enjoy our built and natural environment and protect it and enhance it for future generations.</li> <li>• We reduce the local and global environmental impact of our consumption and production.</li> </ul>
Performance & Operation of Cities	<p><b>Goal</b></p> <ul style="list-style-type: none"> <li>• A strategic, evidence-based approach to city performance and operations that uses data and information from public and private sources, achieves the buy-in of all city stakeholders, attracts informed and focused low carbon investment, and improves the quality of life for all.</li> </ul> <p><b>National Outcomes</b></p> <ul style="list-style-type: none"> <li>• We live in well-designed, sustainable places where we are able to access the amenities and services we need.</li> <li>• Our public services are high quality, continually improving, efficient and responsive to local people's needs.</li> </ul>

## 4 Working Together

Five **Delivery Objectives** define how Scotland's seven cities can work together and with partners to become smarter. These objectives place improving the lives of citizens at the centre of all smart city activities and show that transformation will be driven by principles of collaboration & engagement, openness, innovation, sustainability and resource efficiency.

Given the breadth of opportunities and challenges facing Scottish cities, a **Pathfinder Programme** is defined for each of these five areas<sup>3</sup>, prioritising collaborative activities for the Alliance partners to progress. The intention is that these five programmes become exemplars for collaboration between the cities and establish foundations for additional complementary activities in the future.

### 4.1 Improving Lives

Working together, Scottish cities can more effectively deliver smart infrastructure and services to meet the needs of their citizens, while also enhancing quality of life and contributing to sustainable and inclusive growth at the national level.

This covers a broad range of activities, including: promoting healthy living, independence, confidence and self-esteem; tackling inequality; enhancing participation and access to public services; giving children the best start in life; improving life chances and creating opportunities for citizens to succeed.

Smart city activities can provide benefits in all of these areas, addressing a range of complex socio-economic challenges, and offering new opportunities and positive experiences to citizens. Improving quality of life across all seven cities will also help to retain and attract talented workers, while further strengthening the attractiveness of Scotland to international investors

A key focus is the potential for smart city initiatives to improve the quality and accessibility of essential services for citizens, while also achieving significant savings in time, money and resources required. For example, for some UK Government services, the average cost of a digital transaction is almost 20 times lower than the cost of a telephone transaction, about 30 times lower than the cost of postal transaction and about 50 times lower than a face-to-face transaction.<sup>4</sup> Given the scale of public investment in areas such as healthcare, with revenue funding amount to £89m per annum<sup>5</sup>, smart cities activities can deliver massive savings and real health benefits.

#### Pathfinder Programme #1: Smart & Healthy Living

Scottish cities will work together to establish a nationwide test-bed for innovations in health and wellbeing, while generating data-led insights on the links between health, economic growth and productivity.

An integrated approach to the use of digital technologies can increase the connectedness of people to information and city functions, improving health and wellbeing, reducing citizen inequalities and supporting a higher quality of life for all citizens. Applications include: promoting active and healthy lifestyles; deploying remote monitoring systems; developing preventative measures for citizens at risk; assistive technologies and supporting independent living; and enhancing community cohesion.

The global telehealth and telecare market was forecast to be to £14.3 billion by 2015<sup>6</sup> with European markets for assistive living technologies forecasted to reach \$525.7 in the same year<sup>7</sup>,

<sup>3</sup> These programmes were selected based on a comprehensive analysis of a range of criteria to characterise the strategic fit with the cities, the value added by inter-city collaboration and the expected social, economic and environmental impact.

<sup>4</sup> Cabinet Office and Government Digital Service (2012) [Digital Efficiency Report](#)

<sup>5</sup> over the course of the Spending Review 2011-12 to 2014-15, source: Scottish Government (2012) 'eHealth Finance Strategy 2011-17'.

<sup>6</sup> Deloitte Health Solutions (2012) Primary care: Working differently – telecare and telehealth

<sup>7</sup> Frost & Sullivan (2015) European markets for assistive living technologies

Collaborative projects offer an opportunity to deploy solutions at a scale that will provide transformational economic and social impacts. To achieve this, the Pathfinder Programme will focus on the following two areas:

- Accelerating the development and deployment of products and services that support a more holistic management of health and wellbeing across Scotland's cities (including links to the Alliance's current activity on Assisted Living under the Infrastructure workstream)
- Intelligent use of data to generate insights on the interdependencies between health and the economy. This includes links to employment, low pay and how infrastructure and services can be delivered in a way that promote wellbeing. It also includes ways in which datasets can be opened-up and used to assist in achieving these ambitions (see Pathfinder Programme #5 – Code for Scotland).

#### Case Study: Home Health Monitoring System in the Highlands

NHS Highland's Technology Enabled Care service has deployed Florence, a home health monitoring system, that enables patient follow up through automated text messaging. After patients have left the hospital they receive a series of text messages specific to their need/condition, following up on their progress/recovery without the need to come in and see a nurse/clinician. Different protocols are co-designed with patients and clinicians covering different areas such as post natal wound care, weight management, heart failure, COPD, smoking cessation, pain management, mental health. Decision points are individually set and healthcare staff are alerted if the responses texted by the patient indicates the need for a face to face intervention/problems. NHS Highland aims to increase the number of areas and patient numbers over the next year.

## 4.2 Collaboration & Engagement

Sharing resources, expertise and rewards, as well collectively engaging citizens, decision-makers and solution-providers, will support the successful implementation, scale-up and commercialisation of smart city projects across Scotland.

The importance of collaborative networks is underlined by the fact that no single city anywhere in the world possesses all of the necessary skills and resources to independently implement a smart city programme. Moreover, the global nature of smart cities means that no single city could logically position itself as a standalone marketplace for investment.

Smart cities invariably end up as 'islands', independently implementing technical solutions to local challenges. Such bespoke initiatives can be expensive and difficult to replicate elsewhere, making it problematic to justify investments and to create long-term sustainable markets for solutions developed.

The unique structures offered by the Alliance will enable Scotland's cities to take a different approach. Inter-city collaboration will enhance the delivery of smart projects and enable more effective engagement with: businesses, investors, non-governmental organisations, the voluntary sector, academia and the general public. It will also provide efficiencies to organisations that work across cities and help businesses to expand their offer across Scotland

However, achieving this will require a significant change in the way that cities currently deliver infrastructure projects and services. Collaborating means moving beyond shared agreements and understanding, to a process of shared creation that results in something new that was not there before<sup>8</sup>. It means that cities will share risks, responsibilities, rewards, and resources; freeing up time and capacity to focus on the things that they do best.

The current engagement between Scotland's cities can be characterised as being more cooperative than collaborative. Smart Cities Scotland will therefore work to ensure that the

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<sup>8</sup> Collaboration for Impact (undated) [Where does Collective Impact fit on the Collaboration continuum?](#)



necessary frameworks and approaches are in place to strengthen collaboration and to maximise the benefits that can be realised from inter-city activities.

#### Pathfinder Programme #2: Sharing & Learning Platform

Scotland's cities and linked agencies are developing a wealth of knowledge and expertise on how to plan for and deliver smart city activities. Sharing this knowledge across and between cities will support the scale-up and acceleration of smart city activities countrywide. As Scotland's cities currently have limited access to this knowledge it is recommended that a Sharing & Learning Platform is developed to enable cities and associated partners to: freely exchange information, combine resources to solve problems and track emerging projects, funding and solutions.

It is proposed that the platform combines following core activities:

- A searchable web portal that provides case studies, briefings, research findings, and useful data.
- Use of social business tools, enabling communication and collaboration across boundaries at a relatively low cost.
- A programme of regular learning events/practitioner forums held across the country to facilitate networking, broaden engagement and promote understanding of smart city opportunities. These will be linked to existing activities such as Open Knowledge and Cleanweb events.

#### Case Study: Care Inspectorate The Hub

The Hub<sup>9</sup> provides 'one-stop-shop' access to a range of resources aimed at supporting improvement in the social care and social work sectors in Scotland through the use and sharing of intelligence and research-led practice.

The resources offered include:

- A library of good practice guidance
- Information on the latest developments in policy and legislation
- Video based examples of innovative practice
- Guidance to help users carry out their own research
- Toolkits and resources aimed at supporting improvement

The Hub also supports a number of the Care Inspectorate's purposes, including:

- Acting as a catalyst for change and innovation
- Supporting improvement and signposting good practice.

## 4.3 Data & Transparency

Collaboration between Scottish cities will enable better provision of data and information to businesses, citizens and public bodies.

Open data is recognised as an engine for innovation, growth and transparent governance<sup>10</sup>. The Scottish Government's Open Data Strategy<sup>11</sup> adopts the G8 Open Data Principles and sets an underlying framework for public data in Scotland to be open and available for others to use and reuse. In doing so, Scotland aims to provide a societal asset, which offers significant benefits and enables: improved delivery of services; greater accountability and transparency; and re-use by other actors to unlock innovative applications that provide wider social and economic benefits.

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<sup>9</sup> <http://hub.careinspectorate.com/>

<sup>10</sup> European Commission (2011) [Open data: An engine for innovation, growth and transparent governance](#)

<sup>11</sup> Scottish Government (2015) [Open Data Strategy](#)

Many of Scotland's cities have an open data policy in place or are developing one. All seven Scottish cities are also signatories to the Open & Agile Smart Cities<sup>12</sup> initiative which aims to kickstart the use of a shared set of ways to develop systems once for multiple cities and make them interoperable between cities, and within a city.

Collaboration to create data ecosystems and will enable Scottish cities to:

- Adopt common standards and approaches<sup>13</sup>.
- Develop more valuable sources of intelligence by combining data across cities and with additional sources from both the public and private sector.
- Influence package vendors to develop interfaces that allow the easy extraction of data.
- Develop skills and shared resources for mining and visualising data.
- Refine existing solutions and business models to meet current and future needs in Scotland.
- Engage the data community to develop innovative smart city solutions, and enable councils that are geographically distant from developers, coders and service-designers to access this talent.

### Pathfinder Programme #3: Code for Scotland

Scottish cities are all currently working to develop open data platforms and standards under the 8<sup>th</sup> City Programme and via their commitment to the Open and Agile Smart Cities Network. Projects within this Pathfinder Programme will represent the next step in that process, helping move from passive provision of data to an active engagement with the data community to identify and develop innovative smart city solutions. Collaboration at the Alliance level will enable further standardisation and interoperability between cities. It will also allow data to flow freely across municipal boundaries, facilitate engagement with developers right across Scotland and support the growth of innovative data-led businesses.

It is proposed that the platform combines the following core activities:

- Support for cities and end-users to develop and use data-led solutions through partnerships with universities, businesses and, where desirable, embedded technologists/coders and service designers in residence placed in local authorities.
- Challenge-led competitions aligned with priorities defined by the Scottish Government's national outcomes and shared objectives in city region agendas.
- A programme of meet-ups and business support to link cities to data and visualisation communities, and to assist data-led companies to grow. This will build on initiatives such as the IoT Boost undertaken with Innovation Centres Censis and The Data Lab, as well as Informatics Ventures. This should develop alongside and various civic innovation events currently in existence. It will also provide a follow-up pipeline of support to commercialise and export solutions developed.

### Case Study: Open Data Scotland

The Open Data Scotland programme was run by Nesta to encourage collaboration between local authorities and digital media developers to provide innovative, digital services to solve real issues. The programme supported four technology developers to join local authority teams in Edinburgh, Aberdeen, East Lothian and Clackmannanshire. This led to the development of new digital services that were built open so that digital frameworks could be copied, modified and scaled. Opening data in this way offers the opportunity to save time and money and create efficiencies, create businesses and increase citizen participation by creating access to public sector information.

A key finding of the programme was that it is not enough to open data, but that supporting its use and application is critical. This recognised that councils do not always have the leadership and resource requirements for stimulating and supporting open data development projects; the skills and expertise to achieve this are not always accessible

<sup>12</sup> <http://oascities.org>

<sup>13</sup> with reference to: the 'Smart City Certification' being developed by the City Standards Institute in which several of the Scottish cities individually participate; ISO 37120 (Sustainable Development of Communities – indicators for city services and quality of life); PD 8101 (Smart City Planning Guide); and the PAS documents (including forthcoming PAS 183 on Data Standards and Interoperability)

(especially to councils that are not located in major cities); and current approaches to securing skills and expertise may not be sustainable, with councils sometimes relying on developers and coders giving their time freely at hack events.

## 4.4 Technology & Innovation

Scotland has a strong tradition of creativity, ingenuity and invention. Embracing new technology and innovation will enable Scottish cities to work together to deliver infrastructure and services that are more intelligently responsive to the current and future needs of citizens.

This is not about digitalisation of 'business as usual', but rather an opportunity to design new innovative goods and services for smart cities. Partnership working will enable Scottish cities to co-create innovative solutions that harness the ideas and energy of businesses, citizens and the country's world-leading academic institutions.

This will culminate in the creation of a countrywide network of urban living laboratories to enable real-world testing and development of new products and services that are co-designed with citizens. Collaboration between the cities will foster open, problem-solving environments where shared working, interdisciplinary thinking and co-creation can occur. It will also support the scale-up, commercialisation and export of smart city solutions developed in Scotland.

This will: boost the global profile of Scottish cities; create new employment opportunities; attract new knowledge and expertise in strategically important sectors; and give a 'voice' to citizens in the development and implementation of projects, including vulnerable members of society and those with specific needs and requirements.

### Pathfinder Programme #4: MaaS Scotland

The key concept behind Mobility as a Service (MaaS) is to put the users, both travellers and goods, at the core of transport services, offering them tailor made mobility solutions based on their individual needs. This means that, for the first time, easy access to the most appropriate transport mode or service will be included in a bundle of flexible travel service options for end users<sup>14</sup>.

Scottish Enterprise and Scottish Development International currently promote Scotland as a countrywide Smart Mobility Living Laboratory. However, Scottish cities have limited direct engagement with this initiative. It is therefore recommended that a national programme is established to pull together cities, universities and businesses to gain early access to the opportunities offered by Smart Mobility/ Mobility as a Service (MaaS).

Mobility is a key priority for Scotland's cities. All seven cities have current or planned "smart mobility" projects, which Scottish Enterprise define as the opportunity arising from the convergence of transport systems, ICT and energy.

Scottish Enterprise estimate that smart mobility will represent a \$13 trillion global opportunity by 2020<sup>15</sup>. Accessing inward investment would deliver improvements in infrastructure; services for citizens; new jobs; and new opportunities for Scottish businesses.

It is proposed that the smart mobility partnership and platform would focus on two key objectives:

- Attract investment and create opportunities to test, develop and commercialise smart mobility solutions in Scotland's cities.
- Develop a single MaaS platform that combines transport options from different providers across Scotland, providing a personalised and integrated system that is not restricted by municipal boundaries, handling everything from travel planning to payments

<sup>14</sup> European Mobility as a Service Alliance (2015) [Press release](#)

<sup>15</sup> Scottish Enterprise (2014) [The Mobility Integration Challenge](#)

### Case Study: Smart Mobility Accounts in Dundee

Transport Scotland's vision is "That all journeys on Scotland's bus, rail, ferry, subway and tram networks can be accessed using some form of smart ticketing or payment"<sup>16</sup>.

In 2014, Dundee College piloted a smart travel product that enabled eligible students to opt for smart travel as their travel bursary as opposed to a spot payment system. The bursary was added to the students' National Entitlement Card and transport operator National Express enhanced the value by including the mid-term April break without charge, making the product run from the start of term in January through to the end of a course in summer.

The pilot proved successful for the students, the college and transport operators. It also generated evidence that Smart Travel for students eligible for bursaries leads to improved outcomes in relation to attendance, transport modal shift and wider social inclusion benefits.

Further work undertaken by Dundee City Council in the "Smart to Smart Places" project, which was supported by the Scottish Cities Alliance and the Scottish Government, identified a range of potential smart travel applications for the National Entitlement Card that support access to education and employment, as well as promoting active and independent living, social inclusion and modal shift. This is also being further developed in the city's ShareMORE project, which is making connections between smart mobility and the sharing economy.

## 4.5 Environmental Sustainability

Scottish cities have a critical role in the country's transition to a low carbon and resource efficient economy. This includes driving, regulating and supporting such investment and realising associated economic opportunities.

The combined scale of Scottish cities provides a means to achieve significant emissions reductions and attract investment in low carbon infrastructure and transformational programmes. These actions include improved street lighting, energy efficiency retrofitting, district heat and power, hydrogen fuel initiatives, green transport, electric vehicles and sustainable waste management programmes.

These initiatives are all being progressed under the Alliance's Low Carbon workstream and its work on Hydrogen. Smart Cities Scotland offers the potential to develop and scale-up innovations in this area to help cities meet their contribution toward legislated environmental targets across a range of environmental challenges, including carbon emissions, air quality, recycling rates, and water management.

### Pathfinder Programme #5: Circular Economy

A circular economy aims to decouple economic growth from resource consumption. In Scotland, the Circular Economy has the potential to add substantial economic (£3 billion GVA and 5,700 jobs from remanufacture), environmental (11 million tonnes of CO<sub>2</sub> reduction) and social benefits.

Smart solutions within cities are the "glue" to make the Circular Economy vision a reality<sup>17</sup>. There is an opportunity for innovative ICT solutions and business models to more effectively manage the flow of resources within and between cities. Examples include:

- Deploying intelligent assets and connected devices
- Promoting and developing digital exchange platforms (e.g. WARP-IT)
- Support business growth and innovation (such as social enterprises like NewStart Highlands)
- Engage citizens and support behavioural changes necessary to the Circular Economy

This could initially be achieved through the development of City Scans across the Scottish Cities and joint bidding activities to the Circular Economy Investment Fund and the Urban Innovative Actions, which is currently being progressed under the Alliance's Low Carbon workstream.

<sup>16</sup> Transport Scotland (2012) [Delivery strategy – smart & integrated ticketing](#)

<sup>17</sup> Ellen McArthur Foundation (2016) Intelligent Assets report

### Case Study: Peterborough - The UK's First Circular City

Peterborough has launched a vision to become the UK's first circular city. Using a citywide circular economy approach to efficiently manage the flow of resources within its geographical boundaries, it is working with businesses and communities to repair, remanufacture, reuse, recycle and recover on a city-wide scale.<sup>18</sup>

The initiative, which was launched in November 2015, is being run through Peterborough DNA, the smart city programme delivered by Opportunity Peterborough, the city's economic development company, in partnership with Peterborough City Council. City leaders, academics and experts are working together to create a roadmap to deliver the circular vision.

The importance of engaging with key local stakeholders on a city-wide scale is recognised, and together with the support of national circular economy experts, is helping develop the roadmap and action plan which is owned and tailored by the various stakeholders. A series of events and collaborative workshops have already enabled engagement with organisations currently embracing the circular concept and helped seek ideas and inspiration from students.

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<sup>18</sup> Opportunity Peterborough (2015) [Peterborough launches vision to become the UK's first circular City](#)

## 5 Scaling-Up

Four **Capacity Building Measures** establish how the Alliance partners will work together to: develop shared resources and expertise for the successful delivery of our Pathfinder Programmes; make ‘smart’ a pervasive concept across cities; and enable the growth and export of transformative smart city solutions developed in Scotland. This will also enable cities to collectively make progress in accordance with the Alliance’s Smart Cities Maturity Model.



Figure 6: The five dimensions of the Alliance’s Smart Cities Maturity Model

### 5.1 Provide Leadership & Strategic Governance

Governance at the Alliance-level will allow cities to coordinate smart systems, secure political and public support, capture and share data generated across cities and use it to inform the development of new collaborative policies and projects. This will lead to the definition of shared challenges, provide a mechanism to oversee the delivery of collaborative projects and support the scale-up of successful activities.

Formalising these governance structures will make it easier for cities to secure funding for collaborative projects and provide a means to ensure that delivery can be aligned with both local and national priorities.

This level of governance will also support effective engagement with the business community and national bodies, facilitate cross-sectoral engagement and help to unlock smart city opportunities in linked programmes, such as investments under City-Region deals.

Table 6: Overview of the Leadership & Strategic Governance capacity-building measure

<p><b>Current situation</b></p>	<p>Smart city projects in many of the cities have been led by funding rather than being part of a more strategic programme.</p> <p>Projects are largely focused on meeting local needs rather than supporting national priorities.</p>
<p><b>Ambition</b></p>	<p>Improved governance leads to: coordination of smart systems across cities; widespread political and public support; the capture and sharing of data generated across cities which is used to inform the development of new collaborative policies and projects.</p>
<p><b>Enabling Actions</b></p>	<ul style="list-style-type: none"> <li>• Creation of a Smart Cities Scotland Board that brings together leaders from the public, private and voluntary sectors across Scotland.</li> <li>• Creation of a National Smart Cities Champion.</li> <li>• Definition of common roles across the cities.</li> </ul>

## 5.2 Secure Investment

Collaboration between the cities will provide a mechanism to attract investment for pilots and to develop infrastructure and smart solutions across Scotland.

Appendix B presents a comprehensive review of the funding sources available to smart cities. It demonstrates that funding smart city initiatives can be complex and is likely to be achieved through a mix of sources that require a blend of technical and financial knowledge. Collaboration will therefore provide a means to share specialist expertise and resources to develop and implement projects which capitalise on the funding opportunities available.

Collaboration will also lead to the creation of new financing structures and investment propositions. This includes the development of investment platforms for technology companies and other stakeholders.

It will also give cities a greater influence over large funding programmes and a means to maximise investor confidence and to increase the chances of success in competitive processes.

Table 7: Overview of the Investment capacity-building measure

<b>Current situation</b>	<p>Access to funding is a key barrier to smart city activities.</p> <p>Funding landscape for smart city activities is complex, requiring both technical and financial knowledge for projects to be developed and implemented.</p>
<b>Ambition</b>	<p>Collaboration between the cities attracts funding that the cities would not be able to access individually and enables new financing structures to be developed and piloted in Scotland.</p>
<b>Enablers</b>	<ul style="list-style-type: none"> <li>• Joint bids to create compelling offers and a sufficient scale to access new funding opportunities.</li> <li>• Piloting new financing and revenue-generating models that benefit from the increased scale offered by collaboration.</li> <li>• Collective engagement with investors.</li> <li>• Collaboration to scale-up and commercialise smart activities to generate returns on investment.</li> </ul>

## 5.3 Encourage Smart Outcome-Focused Procurement

Collaboration will help to ensure that Scottish cities can identify and procure the best technical solution for their communities and businesses, demonstrate local economic benefits and realise environmental improvements.

At the most basic level this requires a coordinated approach to share existing experience and learning across local authorities and the wider public sector. However, collaboration can also facilitate the sharing of resources and the creation of joint activities to secure the best outcomes for cities.

Achieving this will require the provision of the necessary skills, focused resources and new guidelines developed across the cities. It will also be supported by public relations management, community engagement and open dialogues with citizens.

Table 8: Overview of the Procurement capacity-building measure

<b>Current situation</b>	<p>Procurement is seen as both a key enabler and key barrier to smart city activities.</p>
<b>Ambition</b>	<p>Provision of the necessary skills, focused resources and new guidelines across the cities. This will be supported by public relations management, community engagement and open dialogues with citizens.</p>

<b>Enablers</b>	<ul style="list-style-type: none"> <li>• Learning is shared between the cities on experience gained from procuring innovative products or services (such as hydrogen vehicles) and the rationale for why the city decided to select a certain product or supplier.</li> <li>• Cities to work together and with Scotland Excel to create and share dedicated smart city procurement resources, including frameworks, guidance, personnel and the development and training of subject matter experts.</li> <li>• A programme of supplier forums are held across Scotland to promote a better understanding of the cities' plans and to allow solution providers to demonstrate capabilities.</li> <li>• Cities work together to develop challenge-led competitions and pilot new business models for different forms of procurement.</li> </ul>
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## 5.4 International Promotion

Smart Cities Scotland offers an opportunity to further establish Scottish cities as internationally recognised and desired destinations for capital and inward investment.

The unique collaboration of seven cities is an internationally significant development in the smart cities field. And although Scotland's cities may be small by international standards, when combined they have much to offer on the global stage.

This will be supported by developing marketing materials and participating in events to promote Scottish cities as leading locations for trialling and developing new smart city solutions

Working in partnership with Scottish Enterprise and Scottish Development International, the cities and their regions can communicate what they individually and collectively deliver for the nation and their respective smart city aspirations. Global marketing of these strengths will support Scotland's ambitions to grow and internationalise its business base, while also attracting further investment in smart infrastructure and services across the seven cities.

Table 9: Overview of the Promotion capacity-building measure

<b>Current situation</b>	<p>Scotland is the top ranked UK region for foreign direct investment and related job creation outside London.</p> <p>However, the current top-down promotion of smart cities in Scotland (i.e. when the cities are promoted collectively) could be made more effective by giving greater recognition to the unique characteristics of each city and what they deliver for Scotland both individually and collectively. This would also benefit from drawing in local strengths to add greater colour to the promotion.</p>
<b>Ambition</b>	<p>Smart Cities Scotland further establishes Scottish cities as internationally recognised and desired destinations for capital and inward investment.</p>
<b>Enablers</b>	<ul style="list-style-type: none"> <li>• Scottish Cities Alliance to engage with Scottish Development International to develop a more place-based focus in promoting the Smart Cities agenda.</li> <li>• A collaboration agreement is formed between all relevant actors involved in promoting Smart Cities Scotland, including the Scottish Cities Alliance, Scottish Enterprise and Scottish Development International.</li> <li>• Smart Cities to be incorporated into the Alliance's Pitch Book.</li> <li>• Through the Alliance, cities should collate case studies and examples of projects and good practice to support aspirations of Smart Cities Scotland, which could ultimately form the basis of a standalone Smart &amp; Sustainable Pitch Book.</li> <li>• Cities to create joint promotion activities such as exhibiting at conferences and expos.</li> </ul>



## 6 Final Words

This Blueprint establishes a joined-up approach for how Scotland's seven cities can work together to develop, deploy and scale smart cities solutions.

Collaborative smart city activities offer opportunities to save cities money, achieve better outcomes for their citizens and to limit their negative impact on the environment.

With the value of global markets for Smart Cities expected to exceed \$1,400 billion by 2020 (from around \$600 billion in 2013)<sup>19</sup> there are also compelling opportunities to attract external investment, stimulate economic activity and create new jobs and business opportunities.

The frameworks for collaboration offered by the Alliance mean that Scottish cities are uniquely placed to realise these opportunities. This will be supported by the strategic approach established by the Blueprint, which will enable cities to work together to maximise these benefits. This in turn will make Scotland an even better place to live and a more prosperous and successful country.

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<sup>19</sup> Research cited by BSI (2016) UK plc First and Best A Programme to Shape the UK Smart Cities Market – source: <http://www.grandviewresearch.com/industry-analysis/smart-cities-market>

# Appendix A Pathfinder Programmes

The following tables provide additional detail on the five Pathfinder Programmes:

- Smart & Healthy Living
- Sharing & Learning Platform
- Code for Scotland
- MaaS Scotland
- Circular Economy

A 'Recommended Lead' is identified for each of these programmes, establishing the organisation(s) that are likely to play a central role in developing these activities further under the framework of Smart Cities Scotland. This includes developing business cases for projects under the five Pathfinders, as well as more general implementation of each of the Programmes.

<p><b>Smart &amp; Healthy Living</b></p>	<p><b>Recommended lead:</b> Scottish Cities Alliance</p>		<p><b>Key stakeholders</b></p> <ul style="list-style-type: none"> <li>Health and Social Care Partnerships</li> <li>Health care practitioners</li> <li>Hospitals</li> <li>Social Care staff</li> <li>Digital Health Institute</li> <li>NHS Scotland</li> <li>Scottish Centre for Telecare and Telehealth</li> <li>Housing</li> <li>Scottish Care</li> <li>Community groups</li> <li>Universities</li> </ul>
<p><b>Summary</b></p> <p>Scottish cities will work together to establish a nationwide test-bed for innovations in health and wellbeing, while generating data-led insights on the links between health, economic growth and productivity.</p> <p>An integrated approach to the use of digital technologies can increase the connectedness of people to information and city functions, improving health and wellbeing, reducing citizen inequalities and supporting a higher quality of life for all citizens. Applications include: promoting active and healthy lifestyles; deploying remote monitoring systems; developing preventative measures for citizens at risk; supporting independent living; and enhancing community cohesion.</p> <p>Collaborative projects offer an opportunity to deploy solutions at a scale that will provide transformational economic and social impacts. To achieve this, the Pathfinder Project will focus on the following two areas:</p> <ul style="list-style-type: none"> <li>Accelerating the development and deployment of products and services that support a more holistic management of health and wellbeing across Scotland's cities</li> <li>Intelligent use of data to generate insights on the interdependencies between health and the economy. This includes links to employment, low pay and how infrastructure and services can be delivered in a way that promote wellbeing.</li> </ul>	<p><b>Market failures/ issues to be addressed</b></p> <ul style="list-style-type: none"> <li>Infrastructure (e.g. in Care Homes and Shelter accommodations)</li> <li>Economy of scale/scaling up projects</li> <li>Access to funding</li> <li>Take up of digital health solutions</li> <li>Involvement of private sector</li> <li>Response from back office infrastructure</li> <li>Discrepancy in regulations</li> </ul>	<p><b>International markets interested in a solution to this activity</b></p> <ul style="list-style-type: none"> <li>North America</li> <li>Europe</li> <li>China</li> <li>Developing countries with lack of infrastructure</li> </ul>	
<p><b>Existing activity in cities</b></p> <ul style="list-style-type: none"> <li><b>Aberdeen:</b> Better Health Intelligence, Technology Enabled Care Development Programme</li> <li><b>Dundee:</b> Technology Enabled Care Development Programme, Biodundee</li> <li><b>Edinburgh:</b> Technology Enabled Care Development Programme</li> <li><b>Glasgow:</b> Active Travel Demonstrator, Technology Enabled Care Development Programme</li> <li><b>Inverness:</b> Technology Enabled Care Development Programme, Florence, RAPID, SURS, Smart Health Care (HIE/NHS), UHI Rural Health and Wellbeing</li> <li><b>Pertth:</b> Technology Enabled Care Development Programme, Server upgrades for telecare/health capabilities including home monitoring equipment and smartphones</li> <li><b>Stirling:</b> Technology Enabled Care Development Programme, Dementia Lab</li> </ul>	<p><b>Links to Alliance activities</b></p> <ul style="list-style-type: none"> <li>Infrastructure: Assisted Living</li> </ul>	<p><b>International promotion recommendations</b></p> <ul style="list-style-type: none"> <li>Existing Networks, EIP SCC, Open and Agile Smart Cities, 'European Week for Regions and Cities' partners.</li> </ul>	
<p><b>Procurement option</b></p> <ul style="list-style-type: none"> <li>Joint venture/ competitive dialogue</li> <li>Challenge fund for pilots and trials</li> <li>Start-ups and SMEs market place</li> <li>Living Laboratory opportunities</li> <li>Collaborative partnerships formed for bids to funding competitions</li> </ul>	<p><b>Funding</b></p> <ul style="list-style-type: none"> <li>Technology Enabled Care Development Programme</li> <li>Social Impact Bonds</li> <li>Innovate UK</li> <li>NESTA</li> <li>Scottish Health Innovation Ltd</li> <li>H2020 (Societal Challenges)</li> <li>Europe HEALTH programme</li> <li>Europe EIT Health</li> </ul>	<p><b>Governance structure recommendations</b></p> <ul style="list-style-type: none"> <li>Identify a Smart Cities representative across the cities' Health and Social Care Partnerships</li> <li>Manage programme through existing Alliance governance linking in eHealth governance in Scotland and across cities</li> </ul>	
<p><b>Is this a short, medium or long-term opportunity for Scotland?</b></p>			<p>Medium Term</p>

**Summary**

Scotland's cities are each developing a wealth of knowledge and expertise on how to plan for and deliver smart city activities. Sharing this knowledge across and between cities will support the scale-up and acceleration of smart city activities countrywide. As Scotland's cities currently have limited access to this knowledge it is recommended that a Sharing & Learning Platform is developed to enable cities and associated partners to: freely exchange information, combine resources to solve problems and track emerging projects, funding and solutions.

It is proposed that the platform combines following core activities:

- A searchable web portal that provides case studies, briefings, research findings, and useful data.
- Use of social business tools, enabling communication and collaboration across boundaries at a relatively low cost.
- A programme of regular learning events/practitioner forums held across the country to facilitate networking, broaden engagement and promote understanding of smart city opportunities.

**Existing activity in cities**

- **Aberdeen:** Aberdeen Hydrogen Showcase Event, ABERIN
- **Dundee:** E-cosse forum
- **Edinburgh:** ICT and Digital Strategy
- **Glasgow:** Glasgow Future City Demonstrator Learning Event, Future City Glasgow Packaging Up website
- **Inverness:** Coders User Groups, Hello Digital, Digital Highlands
- **Perth:** Digital Learning Initiative (Digital Strategy 2015-20), city coding events

**Market failures/ issues to be addressed**

- Contribution to public sector reform:
  - Local collaboration & partnership;
  - Empowerment of public service to work together in innovative ways;
  - Prevention of problems arising by dealing with them early on;
  - Focus on continuous improvement of the national outcomes.

**International markets interested in a solution to this activity**

- Finland
- Denmark
- Australia
- Germany
- United States

**Procurement option**

- Task sharing approach across cities to develop content and organise events
- Potential to use free-to-access social business tools, or utilise existing software licenses (e.g. Knowledge Hub)
- Option to procure web portal or develop in-house solution

**Funding**

- 'In-kind' funding from cities and associated partners
- Cities Investment Fund

**Governance structure recommendations**

- Smart Cities Working Group to plan and oversee the delivery of the programme
- Politicians and senior managers should be engaged to demonstrate commitment and leadership
- New service models will require different skills and capabilities – wide engagement needed.

**Links to Alliance Activities**

- 8<sup>th</sup> City Programme
- Infrastructure: Connectivity
- Low Carbon
- Hydrogen
- Investment Promotion

**International promotion recommendations**

- Case studies to be developed with Scottish Enterprise and Scottish Development International to support international promotion activities

**Is this a short, medium or long-term opportunity for Scotland?**

Short to Medium-term

<p><b>Code for Scotland</b></p>	<p><b>Recommended leads:</b> Scottish Government, Scottish Cities Alliance</p>	
<p><b>Summary</b></p> <p>Scottish cities are all currently working to develop open data platforms and standards under the 8<sup>th</sup> City Programme. This project represents the next step in that process, moving from passive provision of data to an active engagement with the data community to develop innovative smart city solutions. Collaboration at the Alliance level will enable further standardisation and interoperability between cities. It will also allow data to flow freely across municipal boundaries, facilitate engagement with developers right across Scotland and support the growth of innovative data-led businesses.</p> <p>It is proposed that the programme combines the following main activities:</p> <ul style="list-style-type: none"> <li>• Embedded technologists/coders in residence placed in local authorities to support cities and end-users to develop and use data-led solutions</li> <li>• Civic challenges aligned with national outcomes and city region agenda</li> <li>• A programme of meet-ups and business support to create a community around data and visualisation, and assist data-led companies to grow.</li> </ul>	<p><b>Key stakeholders</b></p> <ul style="list-style-type: none"> <li>• Local authorities (including Aberdeen, Clackmannanshire, East Lothian, Edinburgh and Glasgow) and COSLA</li> <li>• NESTA</li> <li>• Scottish Enterprise, Highlands and Islands Enterprise</li> <li>• Digital Catapult, Future Cities Catapult</li> <li>• Open Data Institute</li> <li>• Society of IT Managers</li> <li>• Service owners, service users, coders, front-end developers</li> </ul>	<p><b>International markets interested in a solution to this activity</b></p> <ul style="list-style-type: none"> <li>• Finland</li> <li>• Austria</li> <li>• The Netherlands</li> <li>• Spain</li> <li>• United States</li> <li>• Estonia</li> <li>• Poland</li> </ul>
<p><b>Existing activity in cities</b></p> <ul style="list-style-type: none"> <li>• <b>Aberdeen:</b> Code the City, Open Data Scotland, MatchTheCity, Aberdeen Active, ScotGov Camp unconference.</li> <li>• <b>Dundee:</b> Design In Action, Aberbay Prototype Fund, Dundee Digital Observatory</li> <li>• <b>Edinburgh:</b> Civic Challenges, ICT and Digital Strategy, Open Data Scotland, Edinburgh Collected, Edinburgh Stories, 'Fast Hack', EdinApps</li> <li>• <b>Glasgow:</b> Future City Hackathons, Open Data Platform, SECURE (Statistics of Environmental Change, Resources and Ecosystems)</li> <li>• <b>Inverness:</b> Highlands CoderDojo</li> <li>• <b>Stirling:</b> Hackathon with StirHack</li> <li>• <b>Perth:</b> Code the City, Coder Dojo Perth.</li> </ul>	<p><b>Market failures/ issues to be addressed</b></p> <ul style="list-style-type: none"> <li>• Demand, use and impact of open data</li> <li>• Scottish Government Commitment to G8 Open Data Principles</li> <li>• Links to national outcomes and single outcome agreements</li> <li>• Standardisation between local authorities</li> </ul>	<p><b>International promotion recommendations</b></p> <ul style="list-style-type: none"> <li>• Existing Networks: EIP SCC, Open and Agile Smart Cities, 'European Week for Regions and Cities' partners</li> <li>• Formalise links to similar programmes Code for Europe, Code for America, Code for Africa</li> </ul>
<p><b>Procurement option</b></p> <ul style="list-style-type: none"> <li>• Explore opportunities to partner with an organisation such as NESTA</li> <li>• Procure a delivery partner (ideally linked to the academic knowledge base and integrating public-private-voluntary sector expertise)</li> </ul>	<p><b>Funding</b></p> <ul style="list-style-type: none"> <li>• ERDF</li> <li>• H2020/ societal challenges</li> <li>• Interreg</li> <li>• Innovate UK, IoT Boost</li> <li>• NESTA</li> <li>• Cities Investment Fund</li> <li>• Aberbay Prototype Fund</li> </ul>	<p><b>Links to Alliance activities</b></p> <ul style="list-style-type: none"> <li>• 8<sup>th</sup> City Programme Data Cluster</li> <li>• Digital Connectivity</li> </ul>
<p><b>Governance structure recommendations</b></p> <ul style="list-style-type: none"> <li>• Develop a Code for Scotland Taskforce bringing together representatives of different stakeholders to oversee delivery of the programme</li> <li>• Delivery should have a strong focus on co-creation/ end-user engagement</li> </ul>	<p><b>Is this a short, medium or long-term opportunity for Scotland?</b></p> <p>Medium to Long-term</p>	

<p><b>MaaS Scotland</b></p>	<p><b>Recommended leads:</b> Scottish Enterprise, Transport Scotland, Scottish Cities Alliance</p>	
<p><b>Summary</b></p> <p>Scottish Enterprise/ SDI currently promote Scotland as a countrywide Smart Mobility Living Laboratory. However, Scottish cities have limited direct engagement with this initiative. It is therefore, recommended that a national programme is established to pull together cities, universities and businesses to gain early access to the opportunities offered by Smart Mobility/ Mobility as a Service (MaaS). Mobility is a key priority for Scotland's cities. All seven cities have current or planned "smart mobility" projects, which Scottish Enterprise define as the opportunity arising from the convergence of transport systems, ICT and energy.</p> <p>Scottish Enterprise/ SDI estimate that smart mobility will represent a \$13 trillion global opportunity by 2020. Accessing inward investment would deliver improvements in infrastructure; services for citizens; new jobs; and new opportunities for Scottish businesses. It is proposed that the smart mobility partnership and platform would focus on two key objectives:</p> <ul style="list-style-type: none"> <li>• Attract investment and create opportunities to test, develop and commercialise smart mobility solutions in Scotland's cities.</li> <li>• Develop a single MaaS platform that combines transport options from different providers across Scotland, providing a personalised and integrated system that is not restricted by municipal boundaries, handling everything from travel planning to payments.</li> </ul>	<p><b>Key stakeholders</b></p> <ul style="list-style-type: none"> <li>• Local authorities, SCOTS, COSLA</li> <li>• Regional Transport Partnerships</li> <li>• Scotland Development International, UKTI</li> <li>• Universities</li> <li>• Scottish Gov. (Digital, Energy, Transport)</li> <li>• Scottish Enterprise MaaS cluster (&gt;120 companies from transport, energy &amp; ICT)</li> <li>• Mobility operators (bus, rail, car clubs; bikesharing; ride sharing; ride sourcing; taxis, rental; parking)</li> <li>• Traffic Scotland &amp; ChargePlace Scotland</li> </ul>	<p><b>International markets interested in a solution to this activity</b></p> <ul style="list-style-type: none"> <li>• Finland</li> <li>• Australia</li> <li>• Germany</li> <li>• United States</li> <li>• Italy</li> <li>• Spain</li> <li>• Japan</li> <li>• South Korea</li> </ul>
<p><b>Existing activity in cities</b></p> <ul style="list-style-type: none"> <li>• <b>Aberdeen:</b> Common Database System; Car Club booking improvement; Journey Time Monitoring; Hydrogen (H<sub>2</sub>) car club vehicle; H<sub>2</sub> bus project; H<sub>2</sub> refueling</li> <li>• <b>Dundee:</b> Mobility Integration Living Laboratory (The MILL); ShareMORE; electric taxi project; Go Ultra Low City Scheme; Bluetooth Journey Time Detection; NEC Data Platform; car club</li> <li>• <b>Edinburgh:</b> Contactless Parking Meter pilot; Wi-Fi on buses and trams; bus tracker; car club; IoT UK boost challenges; EV</li> <li>• <b>Glasgow:</b> Glasgow Operations Centre; MyGlasgow App; social transport; active travel; EV charging; car club</li> <li>• <b>Inverness:</b> smart transport (8<sup>th</sup> City project); cycling infrastructure; green buses; EV charging</li> <li>• <b>Perth:</b> Smart Car Parking; Smart Ticketing Pilot; Bluetooth Journey Time Detection; STRATOS, TACTRAN Connect (GoToo); LaMiLo (freight consolidation), Real Time Travel Information for Buses</li> <li>• <b>Stirling:</b> Bike Hub and active travel promotion; bike sharing; EV charging infrastructure</li> </ul>	<p><b>Market failures/ issues to be addressed</b></p> <ul style="list-style-type: none"> <li>• Pre-commercial technology and business models</li> <li>• Operator timetabled services, not user-led</li> <li>• Citizen engagement</li> <li>• Congestion, climate change, air pollution, natural resource depletion</li> <li>• Transport inequalities: accessibility and transport poverty</li> </ul>	<p><b>International promotion recommendations</b></p> <ul style="list-style-type: none"> <li>• Scottish Development International currently promote Scotland as a countrywide Living Laboratory for smart mobility</li> <li>• It is recommended that this messaging is more place-based, promoting the challenges and opportunities offered by each of Scotland's seven cities</li> <li>• Brand development e.g. "MaaS Scotland"</li> </ul>
<p><b>Procurement option</b></p> <ul style="list-style-type: none"> <li>• Procure a delivery lead (ideally collaboration between academic knowledge base and private sector expertise)</li> <li>• Challenge fund for pilots and trials</li> <li>• Joint venture/ competitive dialogue for MaaS platform and large projects</li> <li>• Collaborative partnerships formed for bids to funding competitions</li> </ul>	<p><b>Funding</b></p> <ul style="list-style-type: none"> <li>• H2020/ societal challenges</li> <li>• City Deals</li> <li>• Transport Scotland Low Carbon Transport &amp; Travel Challenge Fund</li> <li>• Transport Scotland Smart &amp; Integrated Ticketing Strategic Intervention</li> <li>• ERDF</li> <li>• Growth accelerator</li> <li>• PPD/NPD</li> </ul>	<p><b>Links to Alliance activities</b></p> <ul style="list-style-type: none"> <li>• Connectivity (digital and transport)</li> <li>• Low carbon</li> <li>• Hydrogen</li> </ul>
<p><b>Governance structure recommendations</b></p> <ul style="list-style-type: none"> <li>• Develop a MaaS Scotland Board comprising representatives of the key stakeholders</li> <li>• Strong focus on co-creation/ end-user engagement</li> </ul>	<p><b>Is this a short, medium or long-term opportunity for Scotland?</b></p> <p>Medium to Long-term</p>	<p><b>Is this a short, medium or long-term opportunity for Scotland?</b></p> <p>Medium to Long-term</p>

Circular Economy	Recommended lead: Scottish Cities Alliance	
<p><b>Summary</b></p> <p>A circular economy aims to decouple economic growth from resource consumption. In Scotland, the Circular Economy has the potential to add substantial economic (£3 billion GVA and 5,700 jobs from remanufacture), environmental (11 million tones of CO<sub>2</sub> reduction) and social benefits. Smart solutions within cities are the “glue” to make the Circular Economy vision a reality<sup>1</sup>. By Focusing on four key priority areas identified by the Scottish Government (Food and Drink, Remanufacture, Construction and Built Environment and Energy Infrastructure) there is an opportunity for Scottish Smart Cities to:</p> <ul style="list-style-type: none"> <li>• Deploy intelligent assets and connected devices</li> <li>• Develop digital and exchange platforms (such as WARP-it)</li> <li>• Support business growth and innovation (such as social enterprises e.g NewStart Highlands)</li> <li>• Engage citizens and support behavioural changes necessary to the Circular Economy</li> </ul> <p>This could initially be achieved through the development of City Scans across the Scottish Cities and joint bidding activities to the Circular Economy Investment Fund and the Urban Innovative Actions.</p>	<p><b>Key stakeholders</b></p> <ul style="list-style-type: none"> <li>• Local authorities</li> <li>• Scottish Government</li> <li>• Zero Waste Scotland</li> <li>• Scottish Enterprise, Highlands and Islands Enterprise</li> <li>• Universities</li> <li>• SCDI</li> <li>• ECCI</li> <li>• Scottish Universities Insights Institute</li> <li>• V&amp;A Dundee</li> <li>• Ellen McArthur Foundation</li> </ul>	<p><b>Any market failures/ issues to be addressed</b></p> <ul style="list-style-type: none"> <li>• No Circular Economy champions in cities</li> <li>• Flexible business models that can respond to price variability and rapid technology evolution</li> <li>• Awareness and Education: businesses and citizens</li> <li>• Data security and trust</li> <li>• Interoperability of assets and networks</li> <li>• Collaboration and data sharing</li> <li>• Public Procurement guidelines</li> </ul>
<p><b>Existing activity in cities</b></p> <ul style="list-style-type: none"> <li>• <b>Aberdeen:</b> Big Belly Bins, Fleet Route System</li> <li>• <b>Dundee:</b> ShareMore, Dundee Digital Observatory, WARP-it, Smart Waste Strategy</li> <li>• <b>Edinburgh:</b> WARP-it, SHRUB (University of Edinburgh)</li> <li>• <b>Glasgow:</b> City Scan, City Deal, WARP-it</li> <li>• <b>Inverness:</b> City Deal, WARP-it, NewStart Highlands</li> <li>• <b>Perth:</b> Tay Eco Valley, Binn Eco Park, Smart Waste and Routesmart system</li> <li>• <b>Stirling:</b> Energy Data Sharing, Traffic Modelling and Monitoring</li> <li>• <b>Scottish Cities Alliance:</b> Circular Economy project</li> </ul>	<p><b>Links to Alliance Activities</b></p> <ul style="list-style-type: none"> <li>• Direct link to the Low Carbon activities led by the Scottish Cities Alliance</li> </ul>	<p><b>International markets interested in a solution to this activity</b></p> <ul style="list-style-type: none"> <li>• Finland</li> <li>• Denmark</li> <li>• Taiwan</li> <li>• Spain</li> <li>• France</li> <li>• USA/North America</li> <li>• South America</li> <li>• China</li> </ul>
<p><b>Procurement option</b></p> <ul style="list-style-type: none"> <li>• Joint venture/ competitive dialogue for particular circular economy project (e.g. better product design in a chosen sector)</li> <li>• Challenge fund for pilots and trials</li> <li>• Living Laboratory opportunities</li> <li>• Collaborative partnerships formed for bids to funding competitions</li> </ul>	<p><b>Funding</b></p> <ul style="list-style-type: none"> <li>• Zero Waste Scotland £18m ERDF Circular Economy Investment Fund</li> <li>• Circular Economy Urban Innovative Action</li> <li>• H2020 through Circular Economy Package</li> <li>• NESTA</li> <li>• Innovate UK</li> </ul>	<p><b>Governance structure recommendations</b></p> <ul style="list-style-type: none"> <li>• Identify a Circular Economy representative in cities</li> <li>• Identify CE100 Scottish Cities Alliance representative</li> <li>• Develop a Circular Economy Board (to include: Scottish Government, Zero Waste Scotland, Scottish Enterprise)</li> <li>• Strong focus on co-creation/ end-user engagement</li> </ul>
<p><b>International promotion recommendations</b></p> <ul style="list-style-type: none"> <li>• Existing Networks: EIP SCC, Open and Agile Smart Cities, Open Days partners</li> <li>• CE100/Ellen McArthur Foundation networks</li> <li>• World Economic Forum – Circular Economy</li> <li>• Circular Europe Network</li> <li>• Clean Europe Network</li> <li>• European Environment Agency</li> <li>• GENSE</li> </ul>	<p><b>Is this a short, medium or long-term opportunity for Scotland?</b></p> <p>Long-term</p>	

1. Ellen McArthur Foundation (2016) Intelligent Assets report

## Monitoring Framework for Pathfinder Programmes

	Operational Measures	Project Outcomes	Linked National Outcomes
Smart & Healthy Living	<ul style="list-style-type: none"> <li>Promoted active and healthy lifestyles.</li> <li>Deployed remote monitoring services.</li> <li>Developed preventative measures for at-risk citizens.</li> </ul>	<ul style="list-style-type: none"> <li>Improved health and wellbeing and life expectancy.</li> <li>Reduction in health inequalities and a higher quality of life achieved.</li> </ul>	<ul style="list-style-type: none"> <li>We live longer healthier lives.</li> <li>Our people are able to maintain their independence as they get older and are able to access appropriate support when they need it.</li> </ul>
Sharing & Learning Platform	<ul style="list-style-type: none"> <li>Established an online sharing and learning platform for the cities and its associated partners to network, engage and promote understanding of smart city opportunities and achieved X<sup>20</sup> number of users</li> <li>Setup an online space for access to general information, social business tools, data and research findings.</li> <li>Delivered a series of learning events and practitioner forums</li> <li>Increased the number of scaled up smart city activities across Scotland</li> </ul>	<ul style="list-style-type: none"> <li>Improved knowledge exchange is achieved on smart cities.</li> <li>Scaling up and acceleration of projects is achieved supporting increased spending on research and development and helping to increase the number of businesses and exports.</li> </ul>	<ul style="list-style-type: none"> <li>We live in a Scotland that is the most attractive place for doing Business in Europe.</li> <li>We realise our full economic potential with more and better employment opportunities for our people.</li> </ul>
Code for Scotland	<ul style="list-style-type: none"> <li>Coders, technologists and Service Designers embedded/ engaged with local authorities</li> <li>Implemented an events &amp; business support programme to develop a community around data/visualisation and assist data driven companies to grow.</li> <li>Applications, software and datasets from the Scottish public sector made open source.</li> </ul>	<ul style="list-style-type: none"> <li>Smart city solutions developed through data use</li> <li>Public services are improved.</li> </ul>	<ul style="list-style-type: none"> <li>We realise our full economic potential with more and better employment opportunities for our people.</li> </ul>
MaaS Scotland	<ul style="list-style-type: none"> <li>Funding obtained from X<sup>20</sup> number of investors.</li> <li>Established a collaboration network to mobilise cities, universities and businesses.</li> <li>Deployed a city-led scheme for funding research, development and testing of Maas pilot projects.</li> <li>Developed and built a MaaS IT platform to provide the infrastructure for potential roll out of a MaaS application.</li> </ul>	<ul style="list-style-type: none"> <li>Scottish Cities are fully engaged with MaaS as it develops</li> <li>Economic opportunities are realised through the creation of new products and services related to mobility and cost savings</li> <li>Improved mobility within cities reduces traffic congestion, transport emissions and traffic accidents and improves air quality</li> </ul>	<ul style="list-style-type: none"> <li>We live in well-designed, sustainable places where we are able to access the amenities and services we need.</li> <li>We realise our full economic potential.</li> </ul>

<sup>20</sup> The quantitative indicators provided in this guidance will be further developed in the next phase, as connected to the developing business cases for projects under the Pathfinder Programmes, and more generally in implementing the Blueprint.



Circular Economy	<ul style="list-style-type: none"> <li>• Citizens engaged with through behaviour change initiatives that support 'circular' principles.</li> <li>• Developed digital and exchange platforms</li> <li>• Supported businesses to innovate, deploy and grow circular</li> <li>• Number of Smart city solutions linked to the circular economy</li> </ul>	<ul style="list-style-type: none"> <li>• Waste per capita reduced and proportion of waste recycled increases</li> <li>• CO<sub>2</sub> emissions per capita reduced</li> </ul>	<ul style="list-style-type: none"> <li>• We reduce the local and global environmental impact of our consumption and production</li> <li>• We realise our full economic potential with more and better employment opportunities for our people.</li> <li>• We are better educated, more skilled and more successful, renowned for our research and innovation.</li> </ul>
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# Appendix B Smart City Funding

A recent survey demonstrated that the biggest obstacle to the development of Smart Cities is funding<sup>21</sup>. The same report also shows that “the Smart City financing challenge can only be solved through collaboration”.

This appendix summarises the funding sources and mechanisms for Smart Cities.

<b>Funders</b>	<ul style="list-style-type: none"> <li>• Government             <ul style="list-style-type: none"> <li>▪ through direct procurement or publicly owned institutions</li> <li>▪ through government-backed funds (i.e. Low Carbon Networks Fund, European Investment Bank)</li> </ul> </li> <li>• Institutional/ infrastructure funds</li> <li>• Utilities</li> <li>• Corporate investment (through private or publicly owned companies)</li> <li>• Sovereign wealth funds</li> <li>• Private equity/ venture funds</li> <li>• Bonds</li> <li>• Crowdfunding</li> </ul>
<b>Public Funding Sources</b>	<p><b>Council tax</b> From 2017 local authorities will have discretion to increase council tax by up to a maximum of 3 per cent per year. This would enable local authorities to raise additional revenue of up to £70 million per year. However, in the context of funding cuts, Council Tax alone is unlikely to be a major source of funding for Smart Cities initiatives but they can be used as leverage for financial instruments.</p> <p><b>Non-Domestic Rates</b> Councils have relatively little control over local business tax income, known as non-domestic rates (NDR). Non-domestic rates income is set centrally and pooled centrally but generated locally and is distributed back to local authorities through the distribution formula agreed with COSLA as part of the local government finance settlement. Each council's share of the estimated non-domestic rate income for the year ahead is distributed proportionately on the basis of council's latest mid-year income returns net of prior year adjustments. NDR can be used to support more innovative financial instruments such as Tax Incremental Financing.</p> <p><b>Tax Incremental Financing</b> A way of funding infrastructure investment that unlocks regeneration and economic growth. TIF seeks to capture locally generated, incremental public sector revenues (e.g. non-domestic rates) that would not have arisen were it not for the delivery of “enabling” public sector infrastructure investment. Captured revenue is then used to repay the debt raised to finance the public sector infrastructure.</p> <p><b>Service Fees and Charges</b> Councils have more control over the income they receive from service fees and charges<sup>22</sup>. In addition to being a vital source of income for council, charges can be used to influence behaviours – for example, low gym charges can be used to encourage exercise or car parking charges can be used to discourage people from taking their cars into city centres. The introduction of Smart Technologies to redesign services can also lead to savings on existing services which can be reinvested in additional activities leading to greater economic and social impact.</p> <p><b>Borrowing</b> The Local Government in Scotland Act 2003, provides local authorities with the power to finance capital expenditure by borrowing without securing Government approval. Local authorities have a statutory duty to set their own maximum capital expenditure limits. These limits must be set with regard to the Chartered Institute of Public Finance &amp; Accountancy (CIPFA) Prudential Code, which requires that capital expenditure undertaken by local authorities must be affordable, prudent and sustainable.</p>

<sup>21</sup> Smart Cities in Europe, Enabling Innovation – Osborne Clarke International - 2015

<sup>22</sup> Councils' income from fees and charges was an estimated £1.3 billion in 2012/13 – source: Fiscal Affairs Scotland (2015) [Local government funding challenges](#)

City-Region Deals	<p>The 2011 Localism Act included the Core Cities Amendment, which offered local councils the opportunity to submit plans on how they planned to promote local economic growth. If successful, councils would then be invited to negotiate deals with central government for greater local autonomy over financial and planning matters.</p> <p>The City Deals have sought to incentivise local actors to identify and prioritise ‘asks’ of UK and devolved governments, fund, finance and deliver infrastructure and other economic development interventions, and to reform city/city-region governance structures to ‘unlock’ urban growth. City Deals are reworking the role of the UK state internally and through changed central-local and intra-local (city-regional) relations.</p> <p>There is a real opportunity to ensure Smart City initiatives are embedded, and funded, via agreed projects in City Deals.</p>
Social Impact Bonds	<p>Social Impact Bonds (SIBs) improve the social outcomes of publicly funded services by making funding conditional on achieving results. Investors pay for the project at the start, and then receive payments based on the results achieved by the project. SIBs are based on achieving social ‘outcomes’ (e.g. improved health). The outcomes are predefined and measurable.</p> <p>Because payment is based on results rather than process, there is more room for innovation and greater freedom to demonstrate solutions that work. The result is better outcomes for the public and reduced costs. SIBs benefits include:</p> <ul style="list-style-type: none"> <li>• Allowing commissioners to attract private investors to fund early and preventative action on complex and expensive social problems</li> <li>• Enabling new services to be tried without commissioners having to pay if they do not work</li> <li>• Helping services to adapt so that they have a greater emphasis on prevention</li> <li>• Allowing greater flexibility for those providing the services to adapt and change the service according to their experience</li> <li>• Helping charities and social enterprises bid for and manage ‘payment by results’ projects</li> </ul> <p>SIBs take a number of forms, are being delivered by a range of service providers and are supported by a number of social investors including both Foundations and Trusts with a long history of grant giving to achieve social change, and specialist fund managers. Notable investors include Big Society Capital which has invested in seven SIBs, and Bridges Ventures which has also invested in seven and has established the Social Impact Bond Fund specifically to invest in SIBs.</p> <p>The UK has been leading the way in SIB internationally but the majority of projects have been in England where several funds were established to support SIBs. In 2015 the UK Government announced the £80m Life Chances Fund which will be open to applicants across the UK in summer 2016. An example of SIBs in Scotland is the Living Balance, operated by YMCA in Perth to support 300 youth into employment supported by DWP Innovation Fund. The Centre for Social Impact Bonds has produced a range of tools including a template legal contract.</p>
Participatory Budgeting	<p>Participatory budgeting (PB) is recognised internationally as a way for local people to have a direct say in how, and where, public funds can be used to address local requirements. Different PB models exist, although it normally involves members of the community deciding through a voting process how to spend part of the budget of a public agency such as a local authority.</p> <p>The Scottish Government supports this as a tool for community engagement and as an important resource to build on the wider development of participatory democracy in Scotland. For example, the Scottish Government’s Community Choices Fund was announced on the 26th February 2016. The £2 million fund builds on the £500,000 which has already been invested in PB projects across 20 local authority areas. In the financial year 2016/17 the funds will be prioritised across more deprived areas and will likely achieve further involvement from community organisations and other public bodies.<sup>23</sup></p>

<sup>23</sup> PB Scotland (2016) Better decisions, local priorities: Cardenden visit for £2m PB funding announcement: <http://pbscotland.scot/blog/2016/2/29/better-decisions-local-priorities-cardenden-pb-funding-announcement>

Municipal Bonds	<p>The UK Municipal Bonds Agency Plc was established in June 2014 as a public limited company owned by local councils and the Local Government Association, with the primary purpose of reducing local authority financing costs by:</p> <ul style="list-style-type: none"> <li>• Issuing bonds in the capital markets and on-lending to councils.</li> <li>• Lending between councils.</li> <li>• Sourcing funding from 3rd party sources, and on-lending to councils.</li> </ul> <p>The Agency helps local councils to finance their investment in projects including infrastructure and housing. It issues bonds to finance local authority projects at a lower cost than the Debt Management Office. This lowers council's finance costs, which means more can be invested into local economies, infrastructure and housing projects. The Agency also reduces borrowing costs by helping councils borrow from one another and negotiating better rates from lenders. The agency also acts as a centre of expertise, offering tailored lending services.</p>
Project Finance	<p>Project Finance structures are a way to encourage investment from the private sector into Smart City initiatives when they can provide an adequate risk-reward proposition. Project Finance use a combination of debt and equity and have been widely used to support renewable energy projects through Energy Service Companies (ESCOs).</p> <p>An energy services company (ESCO) seeks to deliver the same or better service at a lower price and with reduced environmental impact. An upfront contract is agreed between the client and service provider for the service to be delivered at a value lower than the client currently pays and for lower energy use. This leaves the risk of delivery with the ESCO if savings are not realised.</p> <p>These services are provided via long-term, normally lasting between 5 and 25 years, energy service contracts providing enough time for the service provider to make any investment and realise savings, which fall into two broad categories:</p> <p>There may be scope for an ESCO to be established across the Alliance to implement smart city initiatives aimed at reduced energy use. The ESCO would seek to finance the upfront investment to implement the initiatives with realised savings shared between the ESCO and client cities.</p>
Public Private Partnerships	<p>Public Private Partnerships structures are likely to be the most efficient way to fund smart technology infrastructure programmes in the short to medium-term. PPP (Public Private Partnership) is the general term for partnerships which involve everything from operating facilities and providing services on behalf of the public, to flexible methods of financing these services. Types of PPP in the UK include: joint ventures, concessions, information and communication technology (ICT) PPPs, as well as the more well-known PFI (Private Finance Initiative).</p> <p>PFI is a particular method of financing capital investment which requires that the private sector design, build, finance and operate specific facilities. The Scottish Government no longer uses PFI as a procurement method adopting instead a Non-Profit Distribution (NPD) model. It is important to note that the NPD model is not a "not for profit" model. Contractors and lenders are expected to earn a normal market rate of return as in any other form of privately-financed PPP deal. Rather, the model aims to eliminate uncapped equity returns associated with the traditional PFI model and limit these returns to a reasonable rate set in competition through an open procurement process compliant with EU rules.</p> <p>NPD is being used to fund projects in three main sectors: further education, health and transport. Where the NPD model is to be implemented in a sector for the first time it may need further development to adapt to the specific risks and requirements (e.g. technology, regulation, stakeholder interface) of that sector. Any such development must be done in consultation with the Scottish Futures Trust.</p> <p>There is no specific corporate structure required, however, all successful consortia for NPD projects to date have adopted a structure involving the creation of a special purpose vehicle that is a company limited by (non-dividend bearing) shares. The shares in the Project Company are held by the private sector investors with the exception of one "golden share" held by the Authority which increases transparency and accountability and underpins the NPD principle of enhanced stakeholder involvement.</p>
Growth Accelerator Model	<p>The Growth Accelerator Model (GAM) is a funding mechanism for combining public and private investment for new infrastructure projects. The funded infrastructure should enable economic growth and job creation. This additional economic activity results in a series of income streams, with these income streams flowing to different parties: Local Government, Central Government and private sector investors. The GAM is predicated on diverting a portion of these income streams to repay the initial enabling infrastructure funding.</p> <p>Initially developed for the St James Quarter in Edinburgh, the new Growth Accelerator has been adopted for wider use by the Scottish Government. There are some core principles at the heart of this approach, notably a focus on:</p> <ul style="list-style-type: none"> <li>• Outcomes that deliver economic growth; and</li> <li>• A payment by results approach that shares risk across the public and private sectors.</li> </ul>

Private Sector Resources	<p>In order to implement smart initiatives, cities need access to readily available innovative technologies that meet their needs. The lack of proven technology is an obstacle to the roll-out of smart programmes in cities.</p> <p>Funders of innovative smart technologies are different from those that invest in smart city infrastructure. Venture Capital and Private Equity funds are generally the most active investors in smart technology companies along with corporate investors and government-backed funds.</p> <p>A recent report published by the Scottish Government<sup>24</sup> reviews the current funding available to SMEs in Scotland. These include:</p> <ul style="list-style-type: none"> <li>• The Local Authority Loan Funds</li> <li>• The Scottish Investment Bank Co-Investment Funds</li> <li>• The Scottish Loan Fund</li> <li>• Specialist Sector Support Funds such as the Renewable Energy Investment Fund delivered by the Scottish Investment Bank</li> </ul> <p>Funding is also available to Social Enterprises through Social Investment Scotland or the Care and Wellbeing Fund for example.</p> <p>The Scottish Government is currently working on bringing together and simplifying the funding landscape and build on existing finance options to identify new sources of capital available to SMEs. The Programme for Government 2014-15 also announced the establishment of a Scottish Business Development Bank.</p>
UK/ Scottish Funding Schemes (Innovation)	<p><b>Innovate UK</b> The UK's Innovation Agency and funder of the £24m Glasgow Future Cities demonstrator project. Innovate UK also funds the The Future Cities Catapult, which has been a catalyst to many Smart Cities activities and has fostered partnerships between city leaders, universities and private sector organisations. In addition to the Catapult, Innovate UK administer a number of grants and loans which can support Smart Cities activities. These include the LaunchPads, the Collaborative R&amp;D grants, SBRI and Smart Grants. These are organised around 4 themes namely, Emerging and Enabling Technologies, Health and Life Sciences, Infrastructure Systems and Manufacturing and Materials. Most funding is administered through open competitions. The UK government will be publishing a National Innovation Plan which is likely to impact on the governance and funding of Innovate UK in the future.</p> <p><b>NESTA</b> An 'innovation charity' and has dedicated Smart Cities programmes. NESTA are recognising the holistic nature of Smart Cities and are supporting many initiatives that include citizens and local communities. NESTA launched the Bloomberg Mayors Challenge in 2013, manage the People Powered Health project and are part of the D-Cents project focusing on democratic engagement platforms. NESTA run the Impact Investment and the NESTA Challenges Funds to tackle major challenges faced by citizens and communities in cities.</p> <p><b>Big Lottery Fund</b> Support for community led-initiatives. Grants available in Scotland include the Grant for community-led activity, the Grant for Improving Lives, Our Place and the Scottish Land Fund.</p>
UK/ Scottish Funding (Research)	<p><b>Skills Funding Agency</b> Responsible for funding teaching and learning provision, research and other activities in Scotland's colleges, universities and higher education institutions. This includes the allocation of the Research Excellence Grant and University Innovation Fund. Funding for research is also available from the seven UK Research Councils. As smart cities programmes fall across themes the appropriate council for funding will depend on the specific project.</p> <p><b>Scottish Enterprise's Research and Development Grant</b> Supports businesses developing new products, processes and services to improve company competitiveness and to benefit the Scottish economy. Most sectors are eligible and applications from traditional industries, hi-tech businesses and the service sector are equally welcome. Projects typically last 6 to 36 months, and the grant can cover up to 50% of the project costs. The project must represent a significant innovation for the company concerned and significant risks should be associated with the challenge of developing a new product, process or service.</p> <p><b>SMART: SCOTLAND</b> Provides grants to SMEs based in Scotland to help them undertake technical feasibility studies and research and development projects that have a commercial endpoint. The company must be a small or medium sized business, university spin-out or an individual, and based, or planning to set up, in Scotland. The project must exhibit an advance in technological innovation for the UK industry or sector concerned, and the technical risks and challenges associated with defining and developing the technology.</p>

<sup>24</sup> Scottish Government (2015) The Market for SME finance in Scotland.

UK/ Scottish Funding (Health)	<b>Wellcome Trust</b>	An independent global charitable foundation dedicated to improving health. They provide more than £700 million a year to support innovation in science, the humanities and the social sciences, as well as education, public engagement and the application of research to medicine. There are five funding areas including strategic funding, biomedical science, and humanities and social science; but, those most closely aligned with smart cities are: innovations and public engagement. The Health Innovation Fund <sup>25</sup> is a parallel funding partnership between the Wellcome Trust and the Department of Health to stimulate the creation of innovative healthcare products, technologies and interventions for the benefit of patients in the NHS and beyond.
	<b>Scottish Health Innovation Ltd</b>	SHIL was established to help protect and develop new innovations that come from healthcare professionals, creating new products and technologies that will improve patient care and generate income for NHS Scotland. SHIL has established over 15 products and five spin-off companies. SHIL could support the development, and the possible commercialisation, of smart health initiatives including helping to source funding.
UK/ Scottish Funding (Infrastructure & Resource Efficiency)	<b>Infrastructure and Innovation Fund</b>	Aims to stimulate innovative approaches to unlock potential for local renewable energy generation. The fund is open to community groups, registered charities, community benefit societies, community interest companies, local authorities and registered social landlords. Match funding is encouraged but not required. The maximum available grant is £100,000 per project. The grant funding for this programme is currently being reviewed by the Scottish Government and there are currently no dates set for the next IIF funding panel meeting to review grant applications.
	<b>Circular Economy Investment Fund</b>	Funding and support available to help small and medium businesses be resource efficient and create a more circular economy. The programme will run between 2016 and 2018 with a focus on priority commercial and industrial sectors: the bio economy (food and drink); built environment (construction and demolition); and, energy infrastructure (oil and gas decommissioning, renewables, transmission). There will also be funding available for key activities such as reuse, remanufacturing, repair and reprocessing.
	<b>Scottish Recycling Fund</b>	A £3.8M fund established by Zero Waste Scotland and Scottish Enterprise to develop or expand materials reprocessing capacity and remanufacturing facilities in Scotland. The fund offers loans, repayable over a 3-5-year period on commercial terms, to organisations that are interested in developing the relevant infrastructure in Scotland.
European Structural Investment Funds	<p>European Structural and Investment Funds (ESIF) provide EU Member States with financial assistance to deliver the EU2020 strategy of Smart, Sustainable and Inclusive Growth, increasing economic activity and employment across the EU.</p> <p>The funds are focused on EU priorities in areas such as employment, innovation, education, poverty reduction and climate/energy. They also align with Scottish Government priorities to reduce poverty and social exclusion, boost educational attainment and skills development, grow employment levels, economic activity and innovation, and climate change/renewable energy.</p> <p>The Scottish Government is the Managing Authority for the European Regional Development Funds (ERDF) and European Social Funds (ESF) programmes in Scotland.</p> <p>ERDF focuses its investments on several key priority areas including Innovation and Research, the Digital agenda, support for SMEs and the low-carbon economy. It is well suited to support Smart Cities initiatives provided match funding, not already linked to other European funding, is available. The 8<sup>th</sup> City PMO are currently administering a £10m ERDF Strategic Intervention focused on Smart Cities and there is scope for progressing other 'smart' activity via different Strategic Interventions in the 2014 – 2020 ERDF period.</p> <p>The Urban Innovative Actions provide urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. This has a total ERDF budget of EUR 372 million. It is available to cities of a minimum of 50,000 inhabitants and encourages groupings of urban authorities.</p>	
EU Programmes	<b>Connecting Europe Facility</b>	Focusing on energy, low carbon and transport
	<b>LIFE</b>	The LIFE programme is the EU's funding instrument for the environment. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental policy and legislation by co-financing pilot or demonstration projects with European added value. The new LIFE Programme starting co-funds projects on air quality and emissions, including urban environment.
	<b>HEALTH</b>	Financial instrument to implement EU's Health strategy

<sup>25</sup> Health Innovation Challenge Fund:

	<b>COSME</b>	Programme to support the competitiveness of enterprise and SMEs to address the challenges faced by EU SMEs	
	<b>INTERREG</b>	Cross-border and inter-regional collaboration to share solutions and best practice between cities	
	<b>URBACT</b>	A European exchange and learning programme promoting sustainable urban development, which integrates economic, social and environmental dimensions. It enables cities to work together to develop new, pragmatic and sustainable solutions to major urban challenges, reaffirming the key role they play in facing increasingly complex societal changes. So far 7 000 people from 500 cities, in 29 countries, have participated in the URBACT programme.	
Horizon 2020	Europe's flagship 80 billion EUR programme, designed to support Research, Development and Innovation activities.		
	<b>Programme</b>	<b>Relevant Themes</b>	<b>Example of Actions/ Activities</b>
	Excellent Science	<a href="#">European Research Council (ERC)</a>	ERC Grants for researchers and PoC Grant for researchers
	Industrial Leadership	<a href="#">Enabling and Industrial Technologies: ICT</a>	Includes calls of Future Internet, content technologies and Information management
		<a href="#">Innovation in SMEs</a>	COSME – The SME Instrument
	Societal Challenges	<a href="#">Health, Demographic Change and Wellbeing</a>	European Innovation Partnership on Active and Healthy Aging – Coordination Action  <a href="#">Personalising Health and Care</a>
		<a href="#">Smart, Green and Integrated Transport</a>	Mobility for Growth, Green Vehicles, Fast Track Innovation for Transport
		<a href="#">Climate Action, Environment, Resource Efficiency and Raw Materials</a>	Many themes covered including eco-innovation
		<a href="#">Europe in a Changing World</a>	Covers many topics including: education and skills, public policy, social inclusion/inequalities
		<a href="#">Cross Cutting Activities (Focus Areas)</a>	Industry 2020 in the Circular Economy, Internet of Things, Smart and Sustainable Cities
	Fast Track to Innovation (FTI)	<a href="#">FTI Pilot Programme</a>	Pilot programme to reduce time of ideas to market, encourage industry participation in Research and Innovation. (fits well with CTALC objectives)
	European Institute of Innovation and Technology (EIT)	<a href="#">EIT Health</a>	Promotes entrepreneurship and innovates in healthy living and active ageing, with the aim to improve quality of life and healthcare across Europe.
<a href="#">EIT Digital</a>		Support for SMEs in international customer acquisition and fundraising	
EU Financial Instruments for Urban Development	<b>JESSICA</b>	Joint European Support for Sustainable Investment in City Areas (JESSICA) is a range of sophisticated financial tools are used including equity investments, loans and guarantees, offering new opportunities for the use of EU Structural Funds and are managed through countries' Managing Authorities.	
	<b>ELENA</b>	European Local Energy Assistance (ELENA) is funded through the EC's Intelligent Energy Europe Programme and supports EU cities to implement large energy efficiency and renewable projects. ELENA covers up to 90% of the technical support cost needed to prepare, implement and finance an investment programme.	

Integrated territory investment mechanism

The Scottish Cities Alliance is exploring opportunities to pull together several strands of EU funding to create a cities fund to deliver a substantial programme of smart cities initiatives. This is based on the experience of Finnish 6Aika in using the integrated territory investment mechanism.

The Alliance is working with partners from four member states to organise an event in October 2016 as part of the European Week of Cities and Regions in Brussels on 11th October 2016. The ultimate aim is to inspire cities to develop a similar approach to Finnish 6Aika and to make recommendations on how European funds could be structured to make the inter-city approach more accessible to inter-city partnerships.



Urban Foresight Limited  
The Core, Science Central, Bath Lane,  
Newcastle upon Tyne, NE4 5TF, United Kingdom

E: [info@urbanforesight.org](mailto:info@urbanforesight.org)  
T: +44 191 495 7350  
W: <http://urbanforesight.org>

Registered in England & Wales No. 07705420  
VAT No. 179 2207 93

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Scottish Cities Alliance  
C/O, Scottish Council for Development and Industry  
1 Cadogan Square  
Cadogan Street  
Glasgow  
G2 7HF

E: [info@scottishcities.org.uk](mailto:info@scottishcities.org.uk)  
T: +44 (0) 141 222 9737  
W: [www.scottishcities.org.uk](http://www.scottishcities.org.uk)  
[@scottishcities](#) [#smartcitiesScotland](#)

