Urban Foresight

Newcastle's System of Systems

The journey towards smart and innovative urban living

PREPARED FOR:

NEWCASTLE CITY FUTURES

Newcastle University
UK | Malaysia | Singapore

NEWCASTLE CITY FUTURES

This report was commissioned by Newcastle City Futures, an Urban Living Partnership pilot funded by RCUK and Innovate UK and led by Newcastle University. It works with local authorities, public sector, businesses, communities and universities to generate new visible, exciting and meaningful projects across the city.

newcastlecityfutures.org

URBAN FORESIGHT

A multidisciplinary innovation practice that is dedicated to accelerating the next generation of technologies, services and policy frameworks for cities. We work with ambitious organisations around the world on projects that improve lives, protect the environment and boost local economies.

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Image credit: Newcastle University

As Britain's cities embrace smart digital and technological developments, one of the biggest challenges will be how to embed these opportunities into existing public-service delivery and governance mechanisms, and how to make those changes visible and meaningful for the non-tech communities.

Facing the future

The status quo is not an option for any of us

In facing the future, the status quo is not an option for any of us. One of the principal objectives in rolling out new technology should be to create smart and socially inclusive cities. Technology should not only deliver business opportunities and create cost-savings for government, but also lead to better outcomes for citizens.

The relationship between digital companies and local government will become critical. Innovative digital and technological developments, by their very nature, should be cutting edge and transformational; but embedding that technology will only happen through fostering a partnership ethos between local government, the private sector, universities, and communities. Addressing our long-term urban living needs will not be done by single sectors or single organisations, but through collaborative working that stretches across different sectors and policies.

Newcastle has a long history of initiating and embracing scientific and technological advancement. It is in the DNA of the city and its people through the birth of railways, through engineering, shipbuilding, mining, and more lately through life sciences, rail and subsea engineering, internationally regarded research, and creative digital solutions.

Newcastle has a long history of initiating and embracing scientific and technological advancement

North East England is the UK's fastest-growing region outside of London for digital and tech employment. It is right that we take these economic opportunities, combine them with our place-based assets, and create homegrown opportunities that can be tried through pilot and proof-of-concept approaches within the city itself.

This major report is a vital contribution to appreciate the significant progress Newcastle has already made in its smart transformation, but also helps us to understand where future opportunities may lie. The breadth and scope of the work is impressive, as are the range of suggested future potential innovations. These opportunities can turn innovation into real growth investment, job creation, and social advantage for Newcastle.

North East England is the UK's fastest-growing region outside of London for digital and tech employment

The city is already a living lab and hive of scientific endeavour. We would encourage the business communities, public organisations, and research centres to sign up to the Principles set out in this report as part of a campaign to make Newcastle a truly smart and socially inclusive place. This report provides a catalyst to harness our proud heritage as a problem solving place where we not only tackle our own challenges but export our solutions to the rest of the world.

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Newcastle

Mapping the Smart City

What is the current and future potential of a 'Smart and Connected City' ecosystem in Newcastle upon Tyne?

Image credit: Newcastle University

Newcastle City Futures commissioned Urban Foresight to undertake a 'system of systems mapping.' This report summarises this analysis, describing the various systems that operate in Newcastle and planned developments in urban services and infrastructure networks across the city.

This supports the ambitions of Newcastle City Council and its partners, who see a smart and connected city as an opportunity to radically transform the delivery of public services and infrastructure. This is motivated by achieving better outcomes for citizens, cost savings, operational gains and the economic benefits from positioning Newcastle as a globally recognised digital destination and tech hub.

The report sets the context for this ambition, summarising past accomplishments and introducing a vision and principles to guide future progress. Key challenges and opportunities are identified which draw on a detailled audit of systems, which is summarised in the Appendix. Finally, five key recommendations are set out to help deliver a successful smart city programme and to realise the significant benefits that this could deliver.

[1] ONS, Mid-Year Population Estimates. 2016 data

[2] ONS, Annual Population Survey, 2017 data

[3] ONS, ONS annual survey of hours and earnings - resident analysis, 2017 data

[4] ONS, Business Register and Employment Survey : open access, 2016 data

[5] Newcastle City Council: 2017-2018 budget

[6] ONS, Business Demographics

[7] ONS, Regional gross value added (balanced) by local authority in the UK, 2016 data

[8] The Chronicle, December 2017

[9] NE1, Annual Report, 2016-17

SOME NEWCASTLE STATISTICS

293,700

- A population of 293,700 in a wider metropolitan region of 1.2 million[1]

1 in 4

- High dependency on public sector employment, representing 1 in 4 of all jobs[4]

£7,802m

- The 18,675 businesses[6] in the city contributed £7,802 million[7] in GVA to the UK economy in 2016

49.7%

- 49.7% of population is economically active[2] with average earnings of £27,690 per year[3]

£682m

- Newcastle City Council spends approximately £682 million per year[5]

£1billion

- The city's main shopping street, Northumberland Street, attracts over 13 million visitors per year[8] contributing to an annual retail spend of over £1 billion in Newcastle[9]

£200m by 2020

Our analysis found that Smart Cities could be worth over £200 million to Newcastle's economy by 2020.

Introducing Newcastle

Newcastle has a proud history of exporting world changing ideas and inventions that have shaped the future of cities.

These breakthroughs include the light bulb and light switch, the steam locomotive and public railways, the hydraulic crane and the national grid.

The city's coal famously fuelled the industrial revolution. Today code from Newcastle helps to power the global digital economy.

Newcastle is the UK's fastest growing region outside of London for digital and technology employment. This includes: Sage, the UK's only FTSE100 listed technology company; an R&D centre of Red Hat, the world's leading provider of open source solutions; and the HM Revenue and Custom's Digital Delivery Centre, which experiments with technologies to create new ways of working.

Newcastle is also home to high growth potential businesses in the smart cities sector, including Connected Energy, Grid Smarter Cities and Urban Foresight. These businesses are all located on the flagship £350 million Newcastle Helix site, a global centre for urban innovation which brings together academia, the public sector, communities, business and industry.

Code from Newcastle helps to power the global digital economy

From 2020, Newcastle Helix will be home to three National Innovation Centres on Data, Ageing and Energy Systems Integration. Hosted by Newcastle University the centres will connect businesses and citizens to £80 million of research.[10]

Newcastle University also hosts the Urban Observatory, which maintains the largest set of publicly available real time urban data in the UK[11] and its computer science department is the top ranked in the UK for research impact.

Elsewhere in the city, the NBS National BIM Library is the primary source of free-to-use building information modelling content in the UK.[12] This is part of a wider cluster of expertise in connected and digital construction, including Northumbria University's BIM Academy.

Northumbria University's design school is one of the top rated in Europe and is central to the city's reputation for innovation and creativity. Notable alumni include Apple's Sir Jonathan Ive and IDEO's Tim Brown.

Newcastle has twice been named the UK's most sustainable city[13] and in a recent index it was rated the 4th most attractive place to live in the UK.[14] Newcastle also holds the accolade of being named the number one place to visit in the world in 2018 by the Rough Guide.[15]

[10] Newcastle University, New £50m national innovation centre given go-ahead, 24th November 2017

[11] Observatory

[12] NBS National BIM Library

[13] Forum for the Future, Sustainable Cities Index

[14] Royal Mail, The UK's most attractive cities to live and work in, 15th March 2018

[15] Rough Guide to 2018 – Best Places to Travel

CASE STUDY

National Innovation Centres

Image credit: GSS Architecture

A new £50 million development will solve real world problems by linking academic talent with industry and the public sector.

The new building on the Newcastle Helix will house the National Innovation Centre for Ageing (NICA), National Innovation Centre for Data (NICD) and National Institute for Health Research Innovation Observatory (NIHRIO). The innovation centres are part funded by the UK government and Newcastle University.

NICA was established in 2014 with £40 million of funding. It engages businesses, researchers and the public in identifying and delivering solutions to enable people to live longer, better lives. NICD is a £30 million programme which applies a similar model of research and development to the use of data – developing and facilitating the exploitation of opportunities relating to the use of digital systems. The £10 million NIHRIO will use Big Data analytics to facilitate global understanding of trends in health innovation.

All three centres will relocate to the new National Innovation Centre building in 2020. The building itself was designed to stimulate engagement and innovation within the research areas, as it is heavily integrated with the public realm, has an inviting shape and design and includes multiple facilities to enable collaborative work.

These investments and the Newcastle City Futures project contributed to Newcastle University being awarded the 2017 Star Award in the UK Smart Cities Index for taking a leading role in developing the city's innovation programme.

The Smart Opportunity

What might a smart and connected ecosystem look like for Newcastle?

Urban Foresight was tasked to help build a shared understanding of the potential impacts and beneficiaries of investments in new smart city technologies and services in the city.

Smart City Concept

The origins of the smart city concept are rooted in the smart growth movement of the 1990s, which advocated new policies for urban planning. It was then adopted by technology companies to market solutions that applied complex information systems to integrate and operate urban infrastructure.

Most recently the concept of smart cities has become a call to action, with a focus on creating dramatic improvements in sustainability and resilience. This emphasises that in addition to using data and integrated technologies, smart cities should also include innovative ways to engage society, collaborative leadership methods and ways of working across disciplines and siloed systems. Collectively these actions enable cities to deliver better services and improve quality of life.

These actions enable cities to deliver better services and improve quality of life

Test Bed City

Newcastle City Council has identified an opportunity to become a test bed for the next generation of technologies and services for cities. This is primarily motivated by an ambition to attract external investment to reduce operational costs, improve service delivery and to realise new commercial opportunities. The Council and its partners also share an ambition that this leads to positive outcomes for citizens and local businesses.

Three high-level aims for a Connected City have been established by Newcastle City Council and its partners:

- **Intelligent:** Using data and assets to solve city problems.
- **Innovative:** Encouraging innovation by all by providing test bed opportunities for experimentation of smart solutions, especially in public service reform.
- **Inclusive:** Using technology to support all communities to grow and achieve.

Newcastle's ambition was discussed in interviews with actors across the city. This provided a basis to expand on the above aims and to define a shared vision and 10 guiding principles for Newcastle as a smart city.

Vision for a smart Newcastle

Newcastle will develop a global reputation for tackling the big challenges facing cities and communities around the world.

Intelligent use of data and new technologies will deliver services and infrastructure that improve lives, protect the environment and boost the local economy. This will be underpinned by a strategic approach to citizen engagement, collaboration and open standards.

This new way of working will transform existing services and make new investments smart from the start. It will create highly visible outcomes that positively impact everyday lives, with value shared between the council, citizens and local businesses

Focusing on long-term strategic outcomes will enable the city to build on its innovation assets, attract inward investment and support local businesses in continuing Newcastle's proud heritage of exporting world-changing innovations.

ntelligent

Ten Guiding Principles for a Smart Newcastle

Part

1/ Problem-led

Start by identifying and prioritising problems.
Clarify needs and priorities of the city to maximise the chances of achieving positive outcomes.

2/ Participatory

Activate and engage all relevant city actors.
Involve all relevant actors in designing, implementing, testing and dissemination.

3/ People-centric

Solutions should put people first.
Emphasise accessibility, choice, empowerment, improved quality of life and creating a liveable environment for all communities across the city.

4/ Joined-up

Frameworks that facilitate collaborative actions.
Create a culture of collaboration across disciplines and systems to improve service delivery and ensure that new systems are 'smart from the start'.

5/ Open

Open standards and competitive supply chain.
Embrace open standards, plan for interoperability, share data where possible, and make the city's infrastructure and procurement contracts open to all suppliers.

6/ Valuable

Better value for citizens, businesses and the council.
Ensure that streamlined or outsourced services create sustained improvements in quality, remain affordable to users and deliver benefits to the Council.

7/ Outcome-focused

Outcomes for people, planet and local economy.
Maximise opportunities to achieve multiple positive outcomes across different policy areas, including social, environmental and economic.

8/ Visible

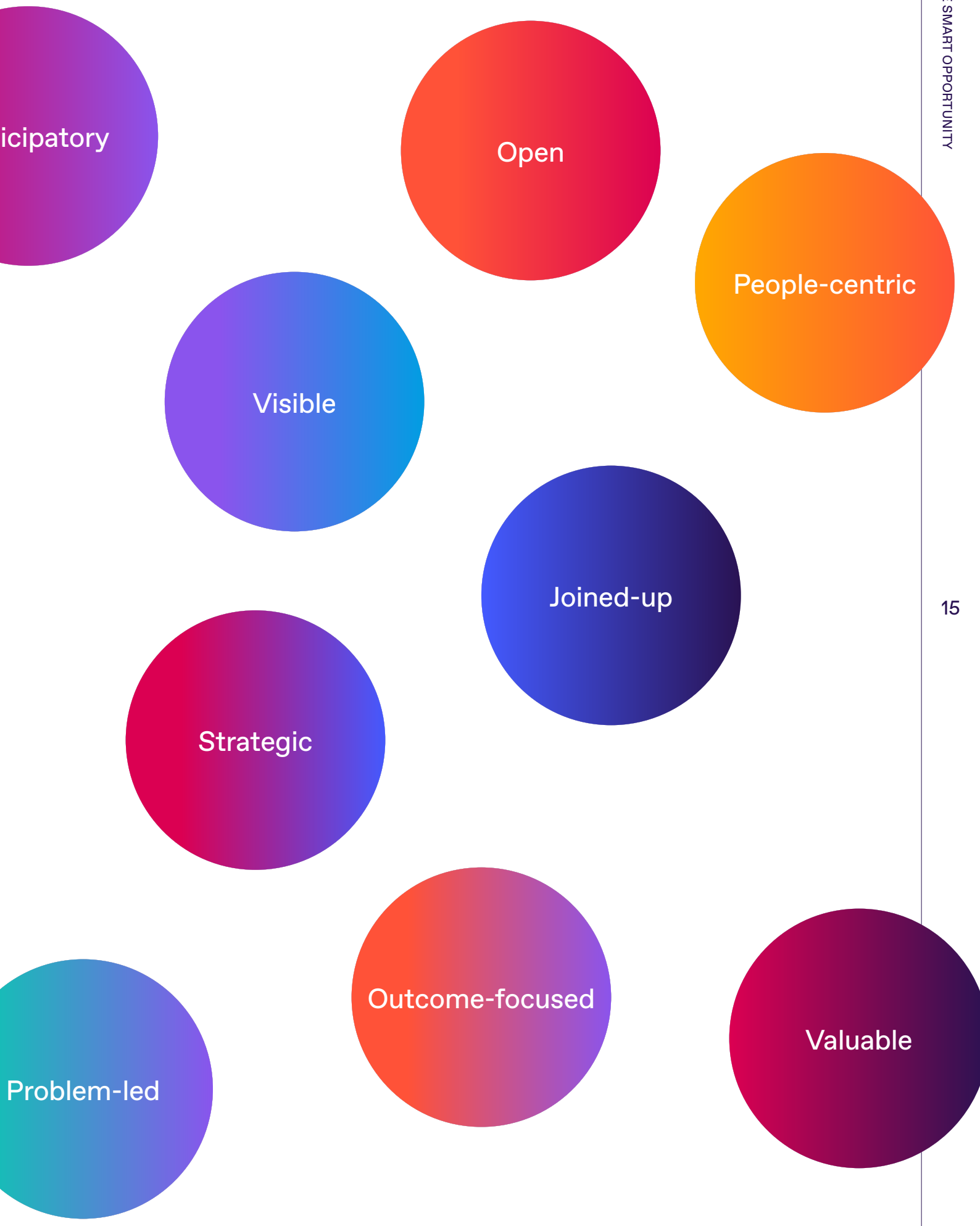
People see and feel the benefits of smart cities.
Create multiple touch points with citizens to promote the benefits and opportunities of the transition to a smarter city.

9/ Intelligent

Responsive and future-proofed solutions.
Harness emerging technology, data and new ways of working to automate systems and make them more intelligently responsive to user needs.

10/ Strategic

Prioritise long-term benefits over quick wins.
Make the best use of available resources and investment by adopting a long-term strategic approach that maximises the value to the city.


icipatory
Open
People-centric
Visible
Joined-up
Strategic
Outcome-focused
Problem-led
Valuable

Mapping the System of Systems

A toolkit was developed to structure the profiling of Newcastle's smart city ecosystem.

Step 1

Set System Boundaries

One of the most critical parts of systems modelling is to define the boundaries between systems and to set an appropriate scope for the analysis. These boundaries need to consider several dimensions, including: geographical area, time horizon considered and related systems that may be included or excluded from the analysis.

A key issue for a city-scale analysis is that local authority boundaries do not constrain the movement of people, goods, data and emissions. Essential infrastructure and services for cities also typically exist beyond the political boundaries of a city.

This analysis largely focused on the systems under the jurisdiction of Newcastle City Council. However, analysis of systems in areas such as healthcare and public transport also brought a regional dimension to the mapping.

A further challenge in setting appropriate boundaries is the number of systems operating in a city and the range of actors that deliver and interface with the services that they support. Reconciling this scope required close working with representatives of Newcastle City Futures and Newcastle City Council. This provided a basis to focus and structure the analysis in priority areas.

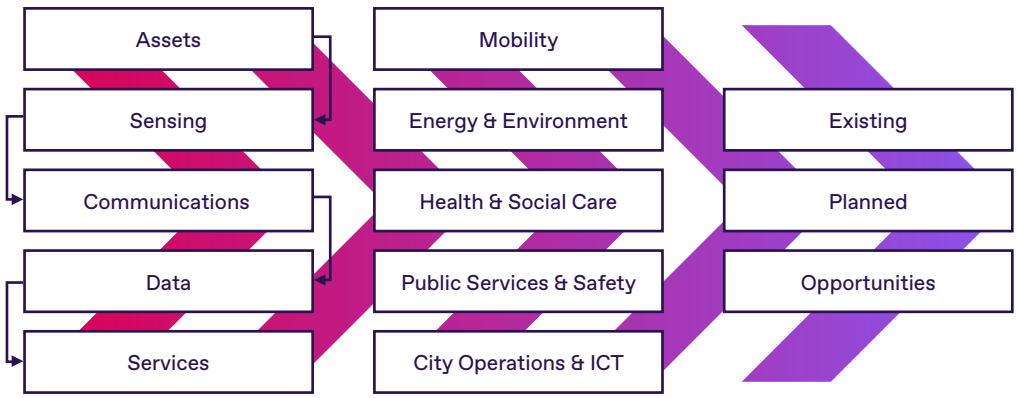


Figure 1. Dimensions of the system architecture for Step 2 of the system mapping.

Defining this approach supports Newcastle City Futures' objective to positively contribute to shaping the design, delivery and decision-making for city services and infrastructure that affect people's everyday lives.

Step 2

Define System Architecture

Once the system boundaries have been established it is then necessary to define an architecture to characterise the structure and behaviour of the system. This provides an analytical framework to review existing systems and to characterise linkages, overlaps and gaps (i.e. the system of systems).

As shown in Figure 1, three key dimensions were considered in this analysis. The first of these characterises five smart city layers:

Assets	Infrastructure and other internet-connected assets that are distributed across an urban area.
Sensing	Systems that collect data about various activities in the physical environment.
Communications	The mesh of technologies across the city that enable the remote transfer of data from assets and sensors.
Data	The intelligence layer where data is managed and organised.
Services	Practical applications that harness urban data and technologies to deliver value-added services.

The second dimension identifies the service areas considered in this analysis, namely: mobility; energy and environment; health and social care; public services and safety; and city operations and ICT.

The final dimension classifies the status of the systems according to whether they are currently deployed (existing), planned, or a more general opportunity for a smart system.

Step 3

Review Individual Systems

Gaining intelligence on individual systems requires engagement with partners across the city. This is bounded by the service areas identified in the previous step, enabling the targeting of key actors. The questions posed in these interactions were also structured by the other two dimensions of the systems architecture (smart city layers and status of systems).

For this analysis, insights were principally collected through a programme of interviews. This included officers in different service areas across the City Council, both universities, transport providers, healthcare providers, social housing landlords, and representatives of the business community.

A further source of intelligence was a review of procurement contracts let by Newcastle City Council over the last 10 years.

Step 4

Gap Analysis

The gap analysis compares the current systems with the desired future performance of the service areas reviewed. This requires quantification of the opportunities to invest in new systems to achieve these desired improvements.

The gap analysis for Newcastle was informed by the consultation with the 'system owners' and by a roadmapping workshop which brought together officers from across Newcastle City Council to define the future opportunities and challenges in delivering key service areas.

Insights were gained through a process of opportunity scanning, which included interviews with representatives of other UK cities and desk research to identify emerging good practice and innovative solutions developed around the world.

Step 5

Recommendations for Future Action

The final step is to translate the analysis into practical recommendations to guide future actions by the city. The intention is to provide insights that support the city in implementing new systems and in scaling-up existing investments.

Given the constraints of limited capital and resources, a key output is to prioritise opportunities. As shown in Figure 2, the systems were scored in terms of their relative state of maturity and the fit with the design principles established for a Smart Newcastle. This positioned the systems in four quadrants to help inform which opportunities should be taken forward as part of a Smart Newcastle programme.

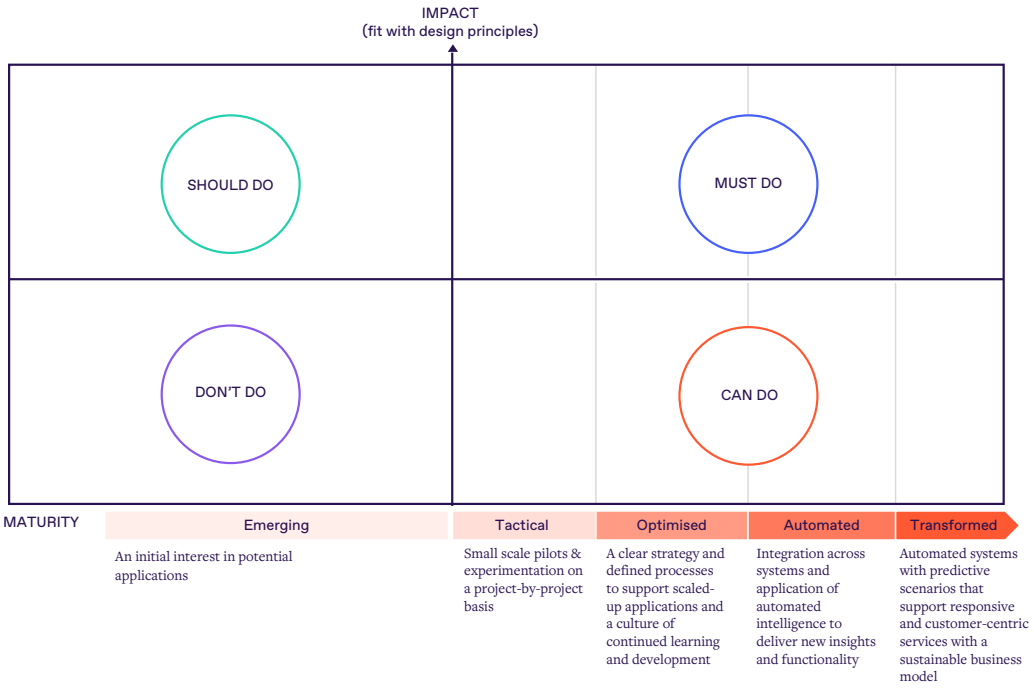


Figure 2. Impact-maturity matrix to support prioritisation of needs and opportunities.

Mobility Systems

Newcastle has an extensive and well used public transport and highways network, including a growing estate of electric vehicle charging points.

Newcastle sees 58% of its workforce commute into the city each day from elsewhere in the North East.[16] There is an average of 29.9 deaths or serious injuries on the city's roads per 1,000 population, which is 8.6 fewer than the national average.[17]

The city hosts the third most used light rail network in the UK, with 37.7 million trips made in 2017. In fact, 8 million more trips were made on the Metro than the London Tramlink network in South London.[18] The reliability of the Metro is improving, with close to 83% of trains on time in 2016/2017, up from 80% the previous year.[19]

Newcastle is well connected by bus, and across Tyne & Wear 101 trips per person were made in 2017, second only to London (254 trips) and greater than both the averages for England (80 trips) and Greater Manchester (72 trips).[20]

High bus usage reflects high customer satisfaction. Out of 27 areas surveyed by Transport Focus, Tyne & Wear had the third highest level of passenger satisfaction, with 93% of passengers satisfied.[21]

7% of Newcastle residents usually cycle to or from work, with almost 9 million trips made by bike in total in the city in 2017. With the deployment of Mobikes, Newcastle has become one of only a handful of cities in the UK with a dockless bicycle sharing service.[22]

Challenges

- **Traffic congestion**. Newcastle is the 9th worst city for traffic congestion in the UK, with commuters spending 24 hours a year in traffic jams in 2017, costing each driver £991 and the whole city £139m.[23]

- **Air quality hotspots** across the city are largely attributable to road transport.

- **Changing the way people travel** has other impacts on public health. Only 25.7% of adults in Newcastle exercised moderately for at least 30 minutes more than 12 times in one month. 48.5% of Newcastle did not exercise at all in this period.[24]

[16] ONS Census Data, WF01BEW - Location of usual residence and place of work, 2011 data

[17] Public Health England, Newcastle upon Tyne, Health Profile 2017

[18] Urban Transport Group Data Hub

[19] Nexus, accessed via the North East Data Hub, Metro reliability Percentage of on-time arrivals, 2017 data

[20] Urban Transport Group Data Hub

[21] Bus Passenger Survey Autumn 2017 Report

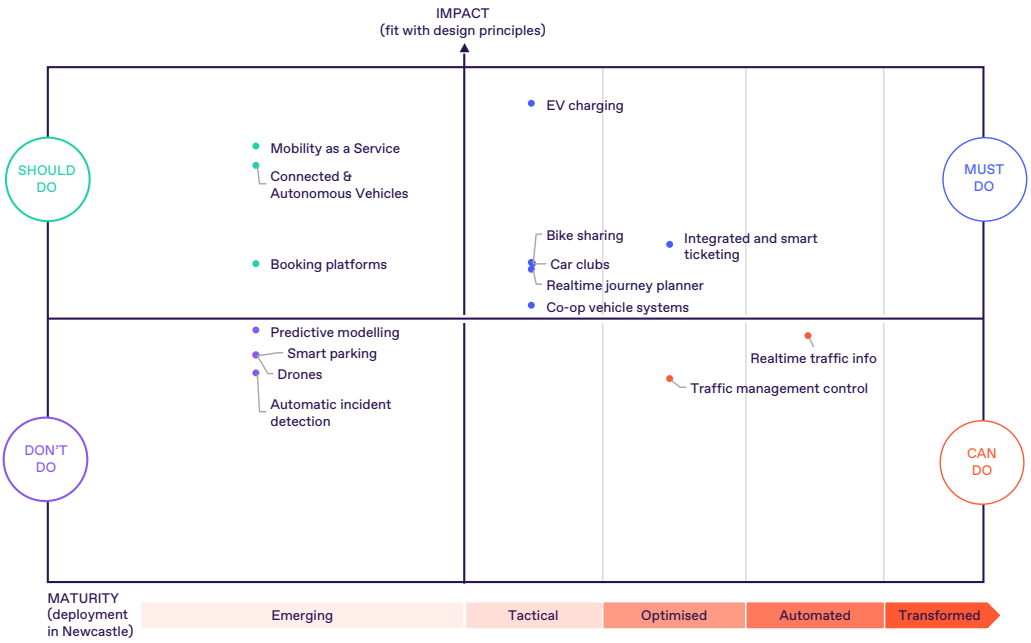
[22] Sustrans, Bike Life Newcastle, 2017

[23] INRIX, Global Traffic Scorecard, 2017

[24] Sport England, Active People Survey

Overview of Systems & Maturity

Details of mobility systems in Newcastle are listed in Appendix I. These systems and a range of other opportunities identified in the consultation are summarised in the Impact-Maturity matrix below.



Opportunities Identified

Mobility-as-a-Service platform

A single App to plan and pay for all modes of transport in the city that builds on host card emulation for the Pop card.

Example: Helsinki

City-wide intelligent traffic signal services

Expanding the user base and geographic coverage of Connected Intelligent Transport Systems (CITS) Corridor through use of mobile networks and open APIs.

Example: Milton Keynes

Intervention intelligence layer

Working with the Urban Traffic Management and Control (UTMC) common database, incorporating automation, feedback loops and machine learning.

Example: Various

CASE STUDY

Newcastle's Smart Corridor

Image credit: Newcastle University

Newcastle is hosting an innovative pilot where the traffic lights 'talk' to motorists to tackle congestion and pollution.

Newcastle City Council, in collaboration with Newcastle University, established a 'Smart Corridor' that uses technology to help manage traffic flow on a busy Newcastle street. The scheme is one of only two in the country and builds on a three-year European project called Compass 4D.

Buses travelling along the Great North Road are fitted with units that communicate their locations to the traffic light systems. On receiving signals that a bus is approaching, the algorithm timing the traffic lights is interrupted and the light remains on green until the bus has passed through. In reducing the amount of time buses spend idle at red lights, air quality, passenger comfort and road safety should improve.

These Cooperative Intelligent Transport Systems (C-ITS) are the first steps towards a fully automated system with intelligent infrastructure and driverless cars. Additional applications include giving priority to certain road users such as ambulances and redirecting drivers on quieter routes to reduce congestion, fuel use and emissions. CITS also offers the opportunity to introduce a range of safety benefits, particularly for vulnerable road users such as cyclists.

Energy & Environmental Systems

Newcastle's environmental credentials gained prominence in 2009 and 2010, with the city claiming first position in Forum for the Future's Sustainable Cities Index.

In 2010, the city signed up to the Covenant of Mayors, committing to carbon emission reductions of 20% by 2020 compared to the baseline of 2005. Through its Sustainable Energy Action Plan (SEAP) the city has reduced its carbon footprint by 30% since 2005, improving living standards of citizens and at the same time helping to reduce fuel poverty and improving the physical condition of the property.

Newcastle's CO2 emissions of 4.5 tonnes per head is lower than the English average (5.3 tonnes per head), but it is the second highest of the eight Core Cities.[25]

Newcastle University is at the forefront of using big data and connected technologies to respond to climate change. The Urban Observatory maintains one of the largest open-source digital urban sensing networks in the world. This is supporting leading research on how connected technology can monitor the impacts of plans to reduce emissions.

Newcastle currently produces around 141,000 tonnes of municipal waste per year which costs the Council £18.5 million per year to collect, treat and dispose of.[26]

Air quality has improved in the last 5 years and is nearly 50% better than the UK average. However, moderate levels of air pollution were exceeded on 5 days per year.[27]

Newcastle University is also pioneering innovations in energy, with a £2 million energy storage test bed. This grid scale storage demonstrator will be the first of its kind in the UK and will be integrated with a full scale smart grid on the Newcastle Helix site.

Challenges

- **Domestic demand side management**. The 122,000 domestic properties in Newcastle contribute 34% of CO2 generated by the city.[28]

- **Energy poverty**. 14.4% of Newcastle's households are fuel poor; rising to 15.4% in the Newcastle East constituency and 15.8% in Newcastle Central. This is 39% higher than the national average of 11.4%.[29]

- **Low recycling rates**. In 2016 only 34% of Newcastle's household waste was sent for recycling or composting (with 35% sent to landfill) compared to an England average recycling rate of 45% and an EU target of 50% by 2020.[30]

[25] Department for Business, Energy & Industrial Strategy (2018)

[26] Newcastle Waste Commission, No Time to Waste, 1st February 2018

[27] Gov.uk, ENV02 - Air quality statistics, 27th April 2017

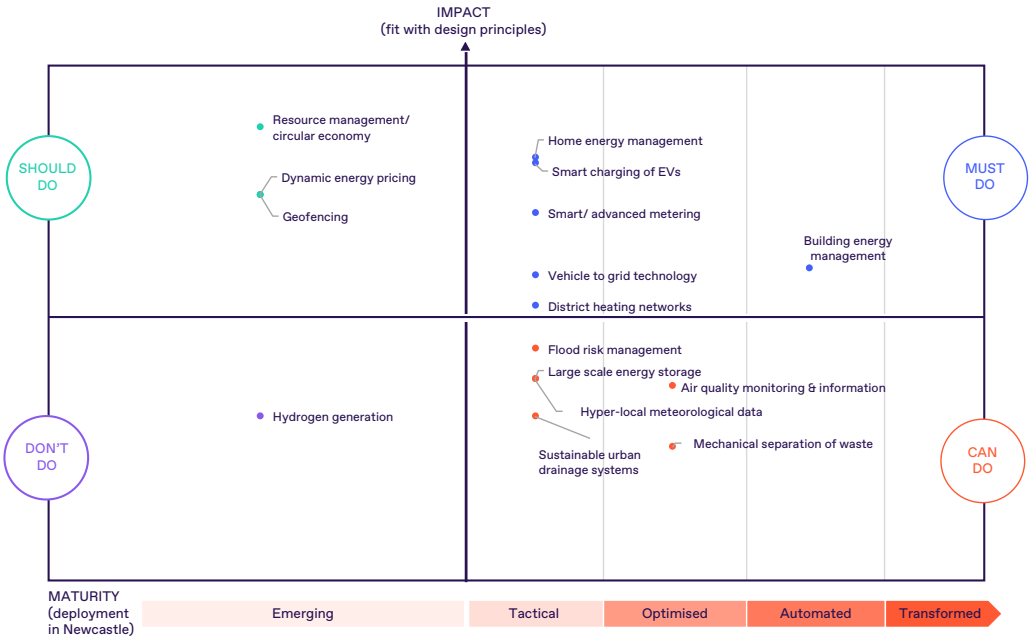
[28] The Newcastle Partnership, Citywide Climate Change Strategy & Action Plan 1 2010 – 2020

[29] Department for Business, Energy & Industrial Strategy, Sub-regional Fuel Poverty, 2016 data

[30] Newcastle Waste Commission, No Time to Waste, 1st February 2018

Overview of Systems & Maturity

Details of energy and environment systems in Newcastle are listed in Appendix II. These systems and other opportunities are summarised in the impact-maturity matrix.



Opportunities Identified

Energy Services Company (ESCo)

Publicly-owned company that works in the interests of the city to manage an integrated urban energy system by intelligently generating, distributing and storing energy for power, heat and transport.

Example: Nottingham

City Circle Scan

Assess and identify opportunities to implement high-impact circular economy projects, supported by engagement across the public sector and with local businesses.

Example: Glasgow

Geofencing

A technology-enabled ultra low emission zone to dynamically switch hybrid-electric drivetrains to zero emissions mode when they enter pollution hotspots.

Example: Leeds

CASE STUDY

Home Energy Services Gateway

Image credit: Energy Systems Catapult

55 homes in Newcastle have been fitted with equipment to become living labs for the energy sector.

Data on the energy use and management systems of homes is being fed back to energy service providers and device vendors. This is intended to develop understanding of how energy use is managed in homes and to assist households in comparing different offerings from competing energy service providers.

Energy service providers can access the critical data and devices to design, price and deliver innovative, high value services. This also enables vendors of connected devices to make their products available to energy service providers, creating a marketplace to establish new services.

The Home Energy Management System supports the industry's ambitions to address fuel poverty and energy inequalities through the servitisation of home energy provision. This pilot builds on work undertaken by Cambridge Consultants and the Energy Systems Catapult in a programme funded by the Energy Technologies Institute.

The intention is that by engaging with the living labs, the energy sector will be able to develop products, services, business models and processes that are sustainable, secure, economical and customer-focused.

Health & Social Care Systems

Like all local authority areas in the UK, Newcastle has faced continued challenges in delivering health and social care services.

In May 2018, the Public Accounts Committee reported that across the country "the adult social care sector is underfunded" and that "growing levels of unmet need for people with moderate care needs" could lead to more acute and urgent care needs in the future.[31]

Currently, Newcastle City Council spends 3% of its budget on service areas directly related to social care (namely Care Services, Other Social Care Services, and Social Care Services East / West). Wider health and support services form 44% of the council's annual budget, including: older people (£55,353,500); support for people with learning disabilities (£42,007,000); and public health (£22,664,000).[32]

Newcastle has a smaller proportion of residents aged 65 and over compared to the rest of England (14% against a national average of 18%) but a higher proportion of residents aged 16 to 64 (68% compared to 63%).[33]

Newcastle performs significantly worse than the England average on a range of public health indicators, across a mix of demographics. This includes life expectancy for women (81.5 years compared to the national average of 83.1) and men (77.8 compared to 79.5).[34]

Challenges

- **Life expectancy in deprived communities** is 13.1 years lower for men and 10.9 years lower for women compared to wealthy areas of the city.[35]

- **Unemployment for those aged 50+** is at 4.1% of the working age population compared to an average of 1.9% across England,[37] suggesting fewer residents will have the means to fund their care needs in later life without public support.

- **Obesity amongst children.** 24.8% of Year 6 age children are obese compared to 19.8% across England.[36] Ill-health related to obesity will increase pressure on the city's healthcare services as these children grow-up.

[31] House of Commons Public Accounts Committee, 2018

[32] Newcastle Council, Budget 2017-18

[33] ONS, Mid-Year Population Estimates. 2016 data

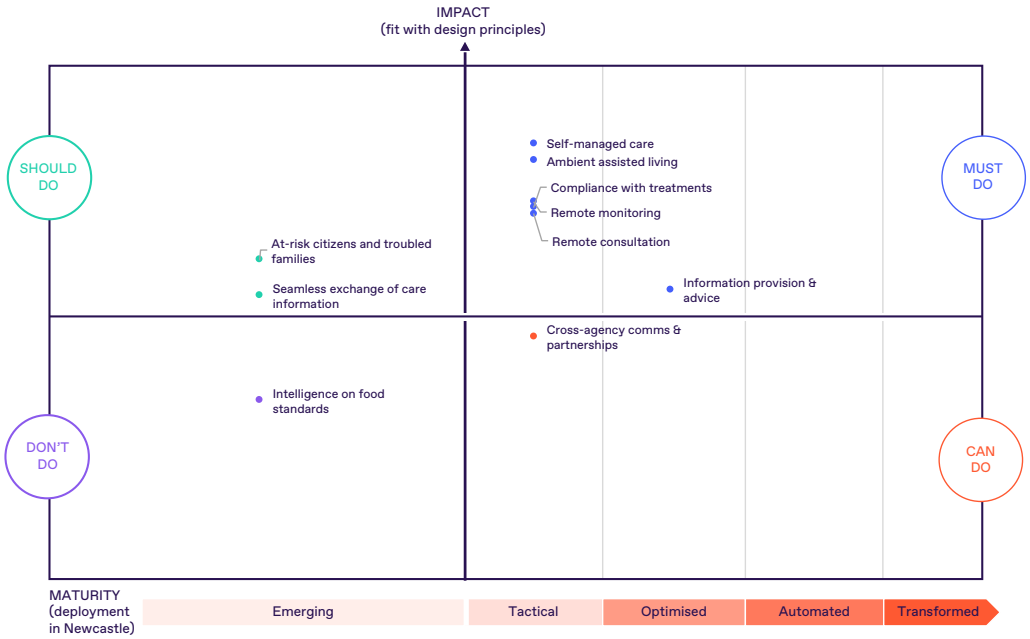
[34] Public Health England, Newcastle upon Tyne, Health Profile 2017

[35] ONS, Claimant count, March 2018 data

[36] Public Health England, Newcastle upon Tyne, Health Profile 2017

Overview of Systems & Maturity

Details of health and social care systems in Newcastle are listed in Appendix III. These systems and other opportunities are summarised in the impact-maturity matrix.



Opportunities Identified

Scaled-up Smart Assistive Home pilot

Build on existing pilot in Newcastle to enable more people to live independently in their own homes for longer and to reduce care costs.

Example: Leeds

Continued Integration of Health & Social Care Systems

Integration to create efficiencies, support sustained improvements in services and to make better use of data assets to identify risks and unmet needs.

Example: Leeds

Gamification and Nudge Messages

Facilitated by data and mobile technologies, to encourage compliance with medical treatments and change behaviour to improve public health.

Example: Gloucester

CASE STUDY

PharmOutcomes

Electronic referral to improve medicine adherence, safety and outcomes for patients.

Evidence shows that: 5-8% of unplanned hospital admissions are due to medication issues; when patients are prescribed a new medicine, a third are non-adherent after 10 days; and 30-50% of medicines are not taken as intended. However on-going community pharmacist support has been shown to improve medicine adherence.

PharmOutcomes is an online data management system for pharmacy management on a community scale. It is designed for the effective central management of multiple pharmacies across local areas.

Newcastle Hospitals worked with North of Tyne Local Pharmaceutical Committee (LPT) and Pinnacle Health to develop an electronic referral template using PharmOutcomes. Hospital pharmacy staff used the system successfully in the North of Tyne area to refer patients to their community pharmacist if considered beneficial after leaving hospital.

The use of PharmOutcomes within Newcastle has been supported by the Academic Health Science Network for the North East and North Cumbria; an organisation which is dedicated to improving healthcare across the region by harnessing partnerships between the NHS, academia and industry bodies.

Public Services & Safety Systems

In 2017, 76% of Newcastle residents were satisfied with their local area as a place to live.[37]

Levels of resident satisfaction in Newcastle are 6% lower than the national average of 82%. Similarly, only 52% of residents are satisfied with Newcastle City Council's performance compared to 65% across England.

The highest-ranking of Newcastle City Council's services for residents' satisfaction are:[40]

1. Street lighting (81%)
2. Local tips, recycling centres (66%)
3. Theatres, concert halls, arts venues (65%)
4. Parks and green spaces (60%)
5. Museums, galleries (60%)

The lowest-ranking services for residents' satisfaction in Newcastle are:[40]

1. Upkeep of grass verges, flower beds, trees & shrubs in streets & public spaces (43%)
2. Street cleaning (41%)
3. Road maintenance (38%)
4. Pavement maintenance (37%)
5. Winter maintenance (32%)

73% of residents rated the city as safe, particularly when visiting the city centre where 81% of people feel safe.[38]

Challenges

- **Limited funding and resources** to deliver 'business as usual' services make it difficult to invest in developing the next generation of services.

- **Collaborating with citizens** to improve the design and delivery of services.

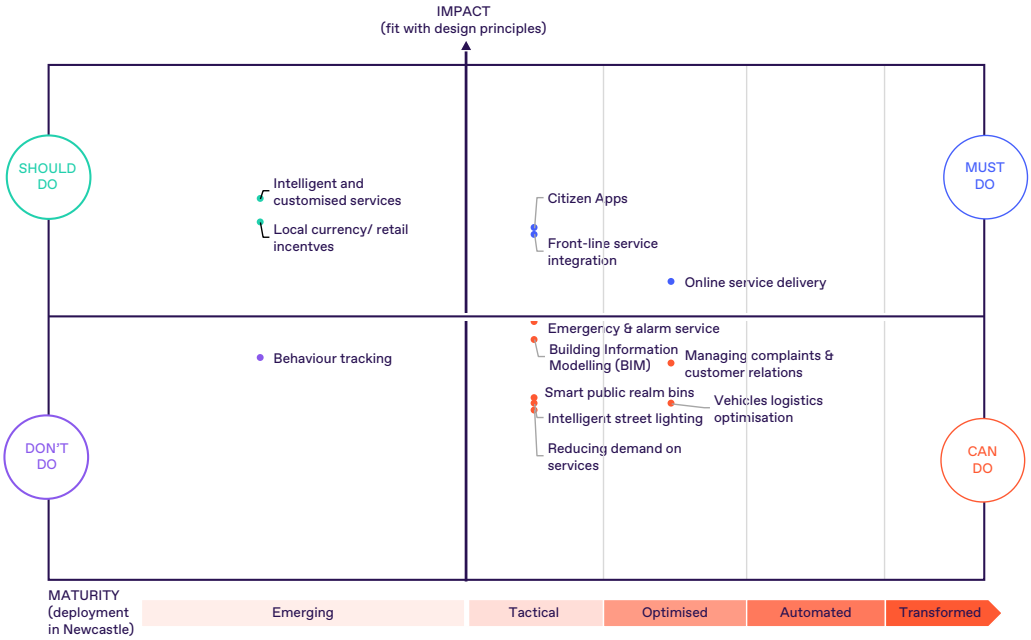
- **Establishing effective two-way communication channels** with citizens to facilitate easy issues reporting, support the smooth introduction of new services and to convey the benefits of smart city investments.

[37] Newcastle City Council, Residents' Survey 2017, 12th March 2018

[38] Local Broadband Information

Overview of Systems & Maturity

The systems related to public services and safety in Newcastle are listed in Appendix IV. These systems and other opportunities are summarised in the impact-maturity matrix.



Opportunities Identified

Continued Front-end Integration and Automation

Bringing services into one single customer profile to deliver a more user-friendly service and reduce operational costs.

Example: Camden

Newcastle Pound

A community currency or shopping reward points to encourage spend in local businesses.

Examples:
Bristol and Gloucester

Community Crowd-funding Platform

A platform to gather project ideas and finance for bottom-up projects.

Example: Croydon

CASE STUDY

Q-bot

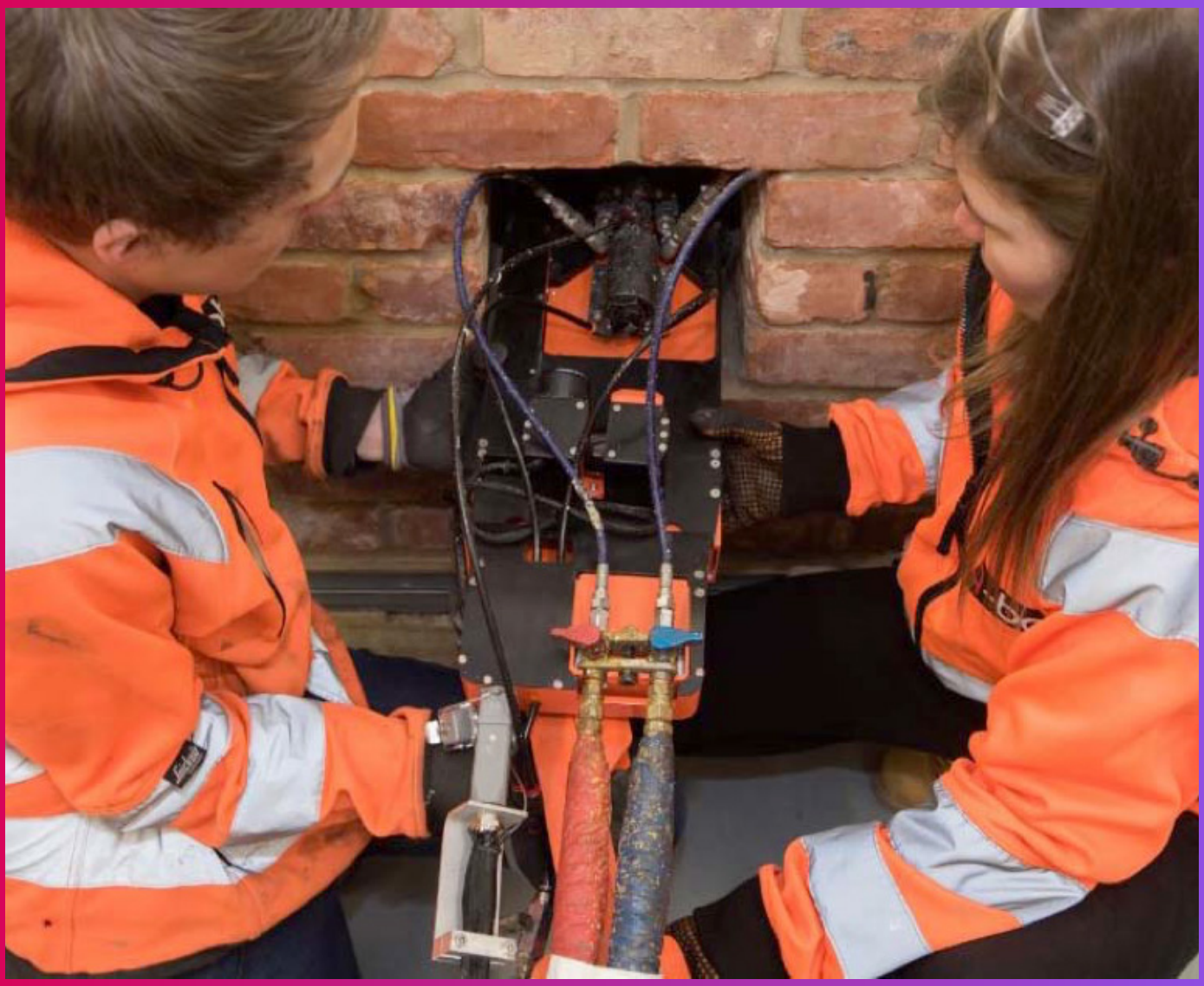


Image credit: Q-Bot

An innovative partnership to use robots to insulate social housing.

In February 2018, social housing provider Your Homes Newcastle (YHN) announced a new partnership with Q-bot to bring innovative robotics and AI technologies to the housing management market. This is the first partnership of its kind for Q-bot, which is a London-based robotics and AI firm.

Q-bots can inspect underfloor cavities in homes with suspended wooden floors and, where needed, install insulation. This insulation has the potential to improve a home's energy efficiency by up to 40%.

Traditional installation practices would require the removal of tenants, carpets, underlay, and floorboards to fit insulation between joints. Q-bot results in minimal disruption to residents, which is one of the key reasons why YHN deemed it to be the most cost-effective solution.

YHN manage 18,000 homes that could benefit from the Q-bot's installation and have a target to retrofit 1,500 of them with under-floor insulation in the next three years.

City Operations & ICT Systems

Newcastle has recognised the need to invest in underpinning infrastructure and back-end systems to build a future smart city.

Newcastle outstrips much of the UK on connectivity. Broadband coverage in the city is close to 98% and 87% of indoor premises in Newcastle received 4G coverage in 2017.[38]

Go Digital Newcastle provides 69 public buildings and 71 outdoor spaces with free wi-fi as part of a concession contract with BT and is trialling Openreach's Ultrafast broadband in Gosforth. In August 2017, Hyperoptic was awarded a contract to supply 25 of Newcastle's social housing developments with full fibre gigabit broadband. A 40km fibre network links businesses across North Tyneside and Newcastle to the state of the art Stellium Data Centre.

The use of technology in operational processes has been strongly motivated by necessity. The City Council's budget has decreased by £220 million over six years to 2018. The council will need to reduce spending by a further 30% to meet the government's 2020 spending targets.[39]

The ability to manage and share customer data is a key challenge for all public sector organisations. Newcastle City Council is one of several UK local authorities that has experienced data breaches in recent years. Such incidents are often due to human error, but highlight the need to make provision for procedures and training as Council's strive to make greater use of data to deliver improvements in services.

Challenges

- **Linking processes** within and between organisations to provide customers with a smooth and consistent end-to-end experience of a service.

- **Secure sharing and management of personal data** in real time to improve customer experience and better understand patterns of need.

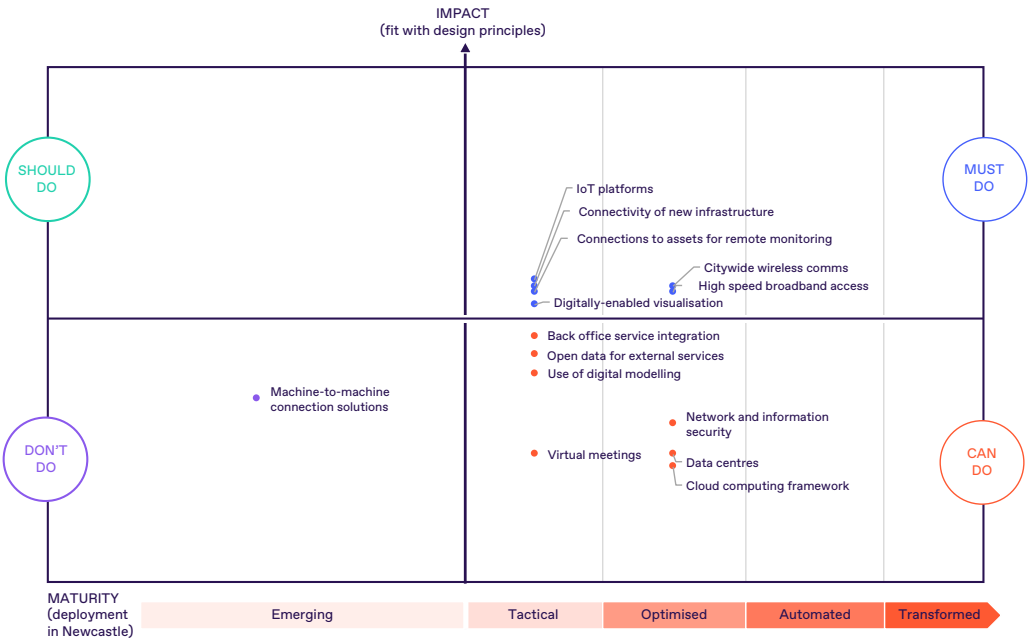
- **Procuring innovation** requires public sector organisations to adopt new practices and take an intelligent view to managing risks, liabilities, intellectual property and uncertain outcomes.

[38] Local Broadband Information

[39] Newcastle City Council: 2017-2018 budget

Overview of Systems & Maturity

Details of systems related to the underpinning infrastructure and city operations in Newcastle are listed in Appendix V. These systems and other opportunities are summarised in the impact-maturity matrix.



Opportunities Identified

Citywide Public WiFi

A Wi-Max mesh using broadband supplied to schools and community buildings as a backbone to benefit local communities.

Example: Helsinki

Single Wireless Sensor Network

Networks for traffic signals and air quality sensors are at a very similar frequency. Opportunity to develop a single federated sensor network.

Example: Various

Code for Newcastle

Embed developers in different service areas across the council to support the uptake of new technologies and working practices.

Example: Scotland

CASE STUDY

Microsoft BOT Framework

Investing in capabilities to develop intelligent conversation apps.

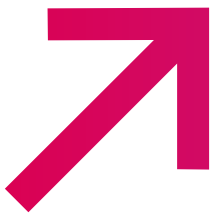
In March 2017, Newcastle's City Council was awarded £15,000 from the national Digital Shift Channel fund. This was used to develop in-house capabilities in Microsoft's BOT Framework. The digital service allows hosts to create intelligent conversation apps for use in desktop and device chat apps, such as Skype, Slack, Messenger and Outlook.

The first service was a Waste Bot service, which was launched in Spring 2018. The service enables households to manage their permits for unloading bulky waste at the city's recycling centres. Van drivers are limited to six drop offs per household a year and previously they had to apply in writing to be allocated a time slot. This analogue system took up to 14 days to process a request. Now, drivers can text the Waste Bot to apply for a permit, which reduces the processing time to seconds.

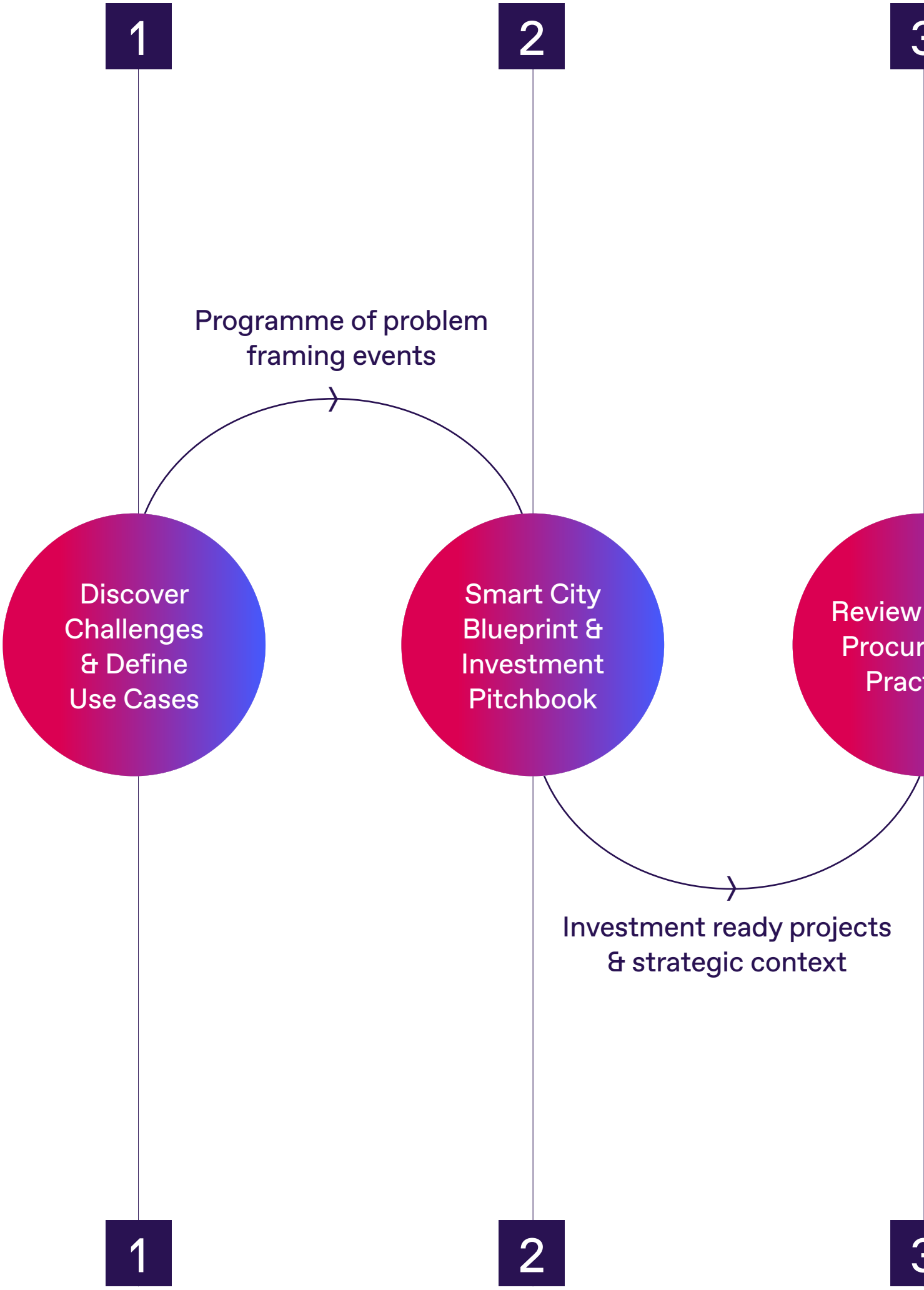
The Waste Bot has received positive feedback from customers, particularly on the speed of the service. It has also reduced calls to the Council from about 60 per month to three and saved the equivalent of about £25,000 per year in staff time.

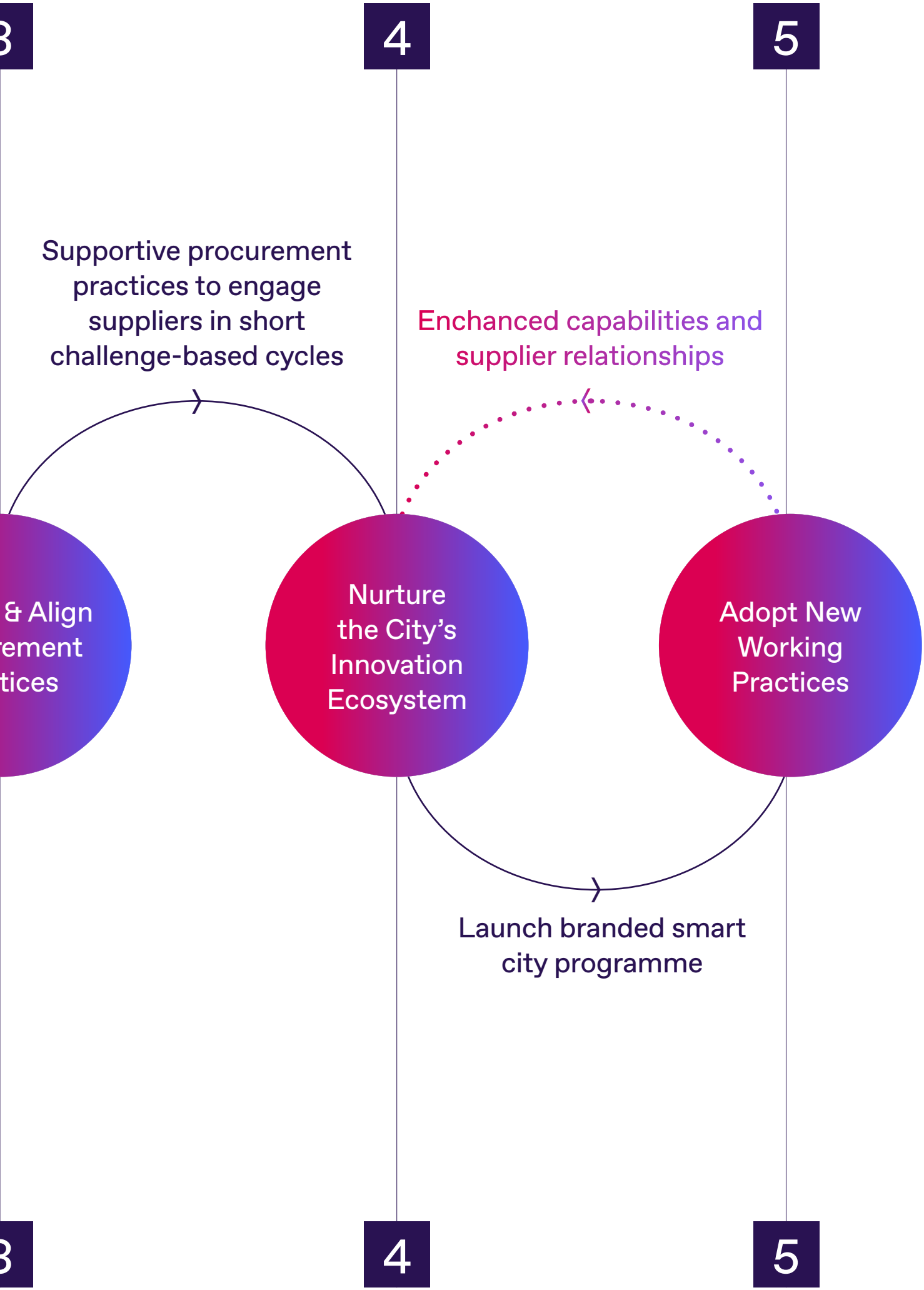
Newcastle City Council is hoping to apply the BOT Framework to other services. The latest project is a 'virtual advisor' chatbot for social care but this time working as a website bot.

Five key recommendations set out how to accelerate the development and delivery of a successful smart city programme in Newcastle.



Future Action


1
2
3
Programme of problem framing events
Discover Challenges & Define Use Cases
Smart City Blueprint & Investment Pitchbook
Review Procur Prac
Investment ready projects & strategic context
1
2
3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Supportive procurement practices to engage suppliers in short challenge-based cycles
Enchanced capabilities and supplier relationships
& Align
rement
tices
Nurture the City's Innovation Ecosystem
Adopt New Working Practices
Launch branded smart city programme
3
4
5

Recommendation 1

Discover Challenges & Define Use Cases

Image credit: Newcastle University

A programme of problem framing events to define use cases to prioritise investments in the right systems and outcomes.

Smart city projects should start with the big challenges and then consider how technology will address these needs. This should be done in an iterative and collaborative manner that seeks to:

- Involve all relevant city stakeholder groups.
- Draw on evidence including user research and engagement.
- Use social media and other technologies to enable public participation.

Challenges should embrace the opportunities created by technologies, data and new business models. However, it is important that challenges are technology-fed, not technology-led.

For the challenges to be translated into meaningful solutions, it is necessary to define and prioritise associated use cases. These should identify, clarify and organise system requirements. They should also define specific goals and outcomes to which systems and user interactions can be designed.

There are various ways to structure the problem framing events, but it is recommended that they are delivered as part of an ongoing programme that engages with all relevant stakeholders. These events should be engaging and outcome-focused to justify the necessary investment of time by all parties.

Recommendation 2

Smart City Blueprint & Investment Pitchbook

Image credit: Newcastle University

Define a series of investment ready projects and the wider outcomes, activities and resources to deliver a successful multi-stakeholder Smart Newcastle programme.

The design and delivery of a successful smart city programme requires collaboration and change across a wide range of individuals, communities and organisations over a sustained period. Aligning actions and decisions across these actors requires a clear understanding of roles, responsibilities and desired outcomes.

Failure to do this results in an ad-hoc approach that invariably fails to the make best use of funding, resources and expertise available. It also increases the risks of missing opportunities to reduce costs, attract investment and to achieve positive outcomes for different actors.

This systems mapping lays the foundations for Newcastle's Smart City Blueprint. It introduces a consensus vision, guiding principles and maps key systems on which to build an integrated smart city programme. This analysis should be further expanded to set out:

- **Why?** – the outcomes the city is working towards, what does success looks like and how should this be measured?
- **What?** - the enabling systems, infrastructure and processes that will deliver these outcomes.
- **How?** - the resources, governance, funding, policies and underpinning infrastructure to successfully develop, deliver and maintain the systems.

The blueprint should include a roadmap that defines actions and investments to achieve these outcomes for the city. This should include quick wins that demonstrate short-term value, providing learning and the necessary momentum to tackle more complex long-term challenges. It will also act as a pitchbook that enables investors and suppliers to better understand where they can add value to the city's future ambitions.

Recommendation 3

Review & Align Procurement Practices

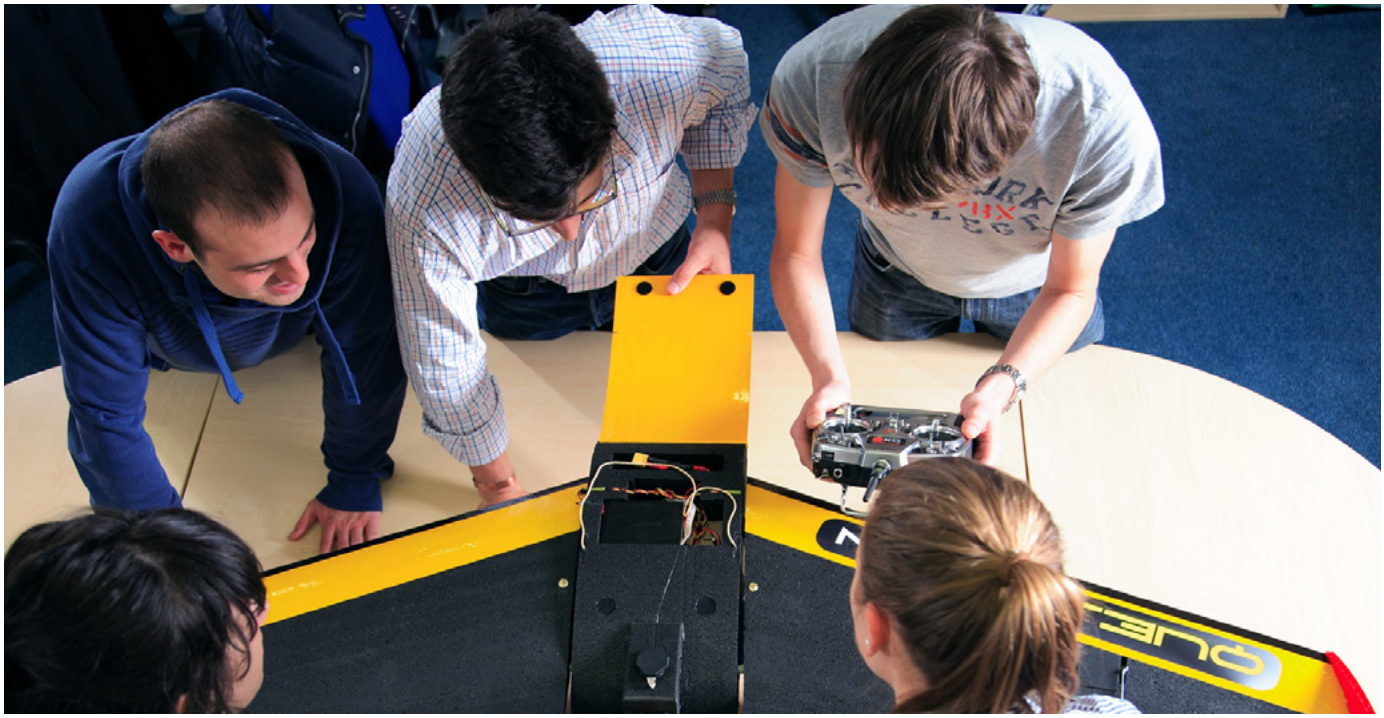

Image credit: Newcastle University

Develop innovative contracting and procurement arrangements with partners and suppliers.

Failure to align procurement practices with smart city principles can result in extended delays and high costs when attempting to engage suppliers. It can also discourage suppliers from bidding and investing in smart city projects.

Procuring innovation requires changes to the standard terms and conditions. This includes standard clauses for intellectual property and liabilities. Provisions should also be made for how procurement can better focus on outcomes, make provisions for open data, incentivise innovation and collaboration and avoid vendor lock-in.

Making these changes requires a concerted programme of engagement with officers in procurement, legal and service areas across the council. This dialogue should build an understanding of the practical implications to suppliers of existing policies and create a new culture that takes a more pragmatic view of risks and opportunities.

The city should take an integrated view of its procurement requirements to discover opportunities for investments to be "smart from the start", to build open and interoperable systems and to incentivise developers to invest in smart infrastructure. The city should also seek to access external expertise and supplier perspectives to write technical specifications to ensure that requirements are clearly stated and achievable.

Good progress has been made in Newcastle. The council is working across service areas to integrate standard "smart clauses" in procurement specifications. The North East Combined Authority also held supplier days to inform specifications for electric vehicle charging infrastructure.

Going forward, it is recommended that procurement for a smart city programme is structured into regular short cycles that engage the suppliers that are best positioned to address the specific needs defined in the use cases and blueprint developed for the city.

Recommendation 4

Nurture the City's Innovation Ecosystem

Image credit: Newcastle University

Deliver a branded smart city innovation programme to attract funding, investors and suppliers.

Smart cities are based on models of open standards and open innovation. This enables cities to engage with a competitive ecosystem of suppliers to develop a pipeline of innovative solutions. It also avoids being locked-in to a single technology company whose offering may become uncompetitive or obsolete over time.

It is recommended that a branded smart city innovation programme is launched by the City Council and its key partners in the city and managed by a neutral innovation partner. The innovation partner's role is to translate the requirements of the city and service users into specifications to support procurement, to assemble the necessary teams and to oversee the delivery of services provided by external contractors.

Being independent from suppliers ensures that this partner is not subject to commercial bias and can help the city to manage costs, risks and quality. Being at arms length from the council allows the innovation partner to work across service areas and city actors to promote necessary changes in culture and to realise opportunities for alignment and integration of systems. It also provides an expert resource to commercialise, scale-up and export solutions to the benefit of the city and its partners.

Developing an ongoing pipeline of strategic projects requires the innovation partner to build wide networks for the city and to have expertise in securing funding and investment. This needs to be cultivated through regular meetings, events, and talks that facilitate the sharing of experiences, the formation of new partnerships and promote Newcastle's credentials to potential funders and investors.

The innovation partner has an important role in helping to empower stakeholders to co-design and deliver new services. It should also engage local businesses and networks to support ambitions related to job creation and SME participation in smart city projects.

Recommendation 5

Adopt New Working Practices

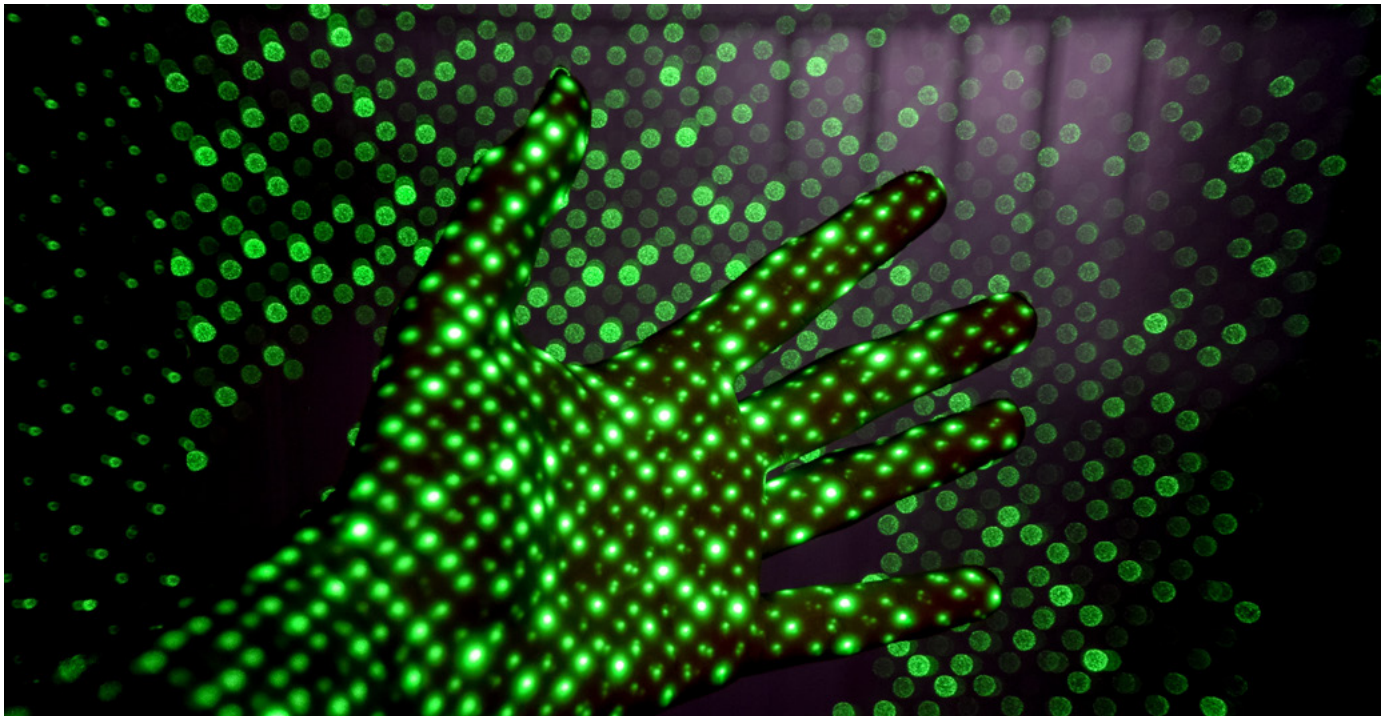

Image credit: Newcastle University

Transform internal work practices to make best use of data and technology, while investing in supplier relationships to achieve integration.

Technology and platforms do not make cities smart. It is how cities use the data and intelligence offered by these systems that enables them to transform services and user experiences.

Newcastle City Council and its partners should consider how to develop the analytical skills to capitalise on smart city data. New operating models will also be needed to drive innovation and collaboration across delivery silos. This will unlock valuable data, leverage new partnerships and drive city-wide change at speed.

Managing relationships with a network of external suppliers is essential to achieving integration across systems. Technical integration is often far more straightforward than the challenge of gaining commercial agreements between competing suppliers. Who pays for this integration and the cost of the resource required to mediate these discussions is an important consideration in planning smart city projects.

A related issue is to consider whether outsourcing services and assets will result in the city losing the expertise to procure and manage contracts with suppliers. Handing control of assets, services or data to external suppliers may also impact on other areas of policy. For example, transferring control of parking assets may make it difficult to implement environmental measures to discourage car use, or to provide free parking incentives to boost the retail and leisure economy.

Finally, Newcastle City Council should work with partners to establish governance, leadership and decision-making frameworks that enable the city to deliver complex projects across organisational boundaries. These structures will also help to realise transformational benefits for communities and organisations across the city.

Appendix

Appendix 1
Mobility Systems: Existing

	Systems	Description	Supplier	Status
Assets	**Variable Message Signs**	27 signs across Tyne & Wear proving messages to road users	SWARCO	Purchased
	Gosforth CITS Corridor / Compass 4D	Intelligent, connected traffic lights that interact with devices in public buses to allow for a smoother and safer journey through the corridor	Newcastle University/ Siemens	Pilot
	EV charge points	Over 100 electric vehicle charge points of various kW capacity.	Newcastle CC / NECA	
Sensing	**Automatic Cycle Counters**	Sensors tracking cycles	TADU / Gateshead Council	
	280 ANPR cameras	Installed at 3 city car parks and key links into/ out of city	CA Traffic	Maintenance contract ends in 2021
	Traffic signal detectors	Sensors to aid efficiency in traffic flow management, sending data to the UTMC		
	UTMC CCTV	Closed-circuit television for urban traffic management & control	USS	
	SCOOT loops	Split Cycle and Offset Optimisation Technique (SCOOT), an adaptive urban traffic signal control system	Siemens	
Comms	**Radio network for UTMC**	Radio network to facilitate traffic management & control	USS	contract to 2019
	Radio network for traffic signals	Radio network to facilitate the operation of traffic signals	Siemens	

	Systems	Description	Supplier	Status
Data	**POP card journey data**	Pop Pay as You Go (PAYG) can be used to pay for journeys in the North East of England	Nexus	
	Urban Traffic Management Centre back office	Information from a range of sensors and cameras can be monitored from the UTMC, allowing officers to adjust signal timings and update variable messages signs to improve traffic flow	Mott MacDonald	Contract to 2022
	ANPR back office	Supporting public transport planning with origin and destination data	CA Traffic	Maintenance contract ends in 2021
	Traffic and Transport Mode Use Data Framework	78 automatic counter sites monitoring traffic volume and transport mode	Department for Transport	
	Annual road condition SCANNER surveys	Annual survey on A roads and classified B&C roads. Data from the condition surveys/ inspections is used to produce detailed road condition information sets	Newcastle City Council	Delivered annually as part of Annual Status and Options Report
	Streetworks	Interactive map with live data on road works.	Elgin	Existing, Gateshead Council
	EV charging network back office	Back office operations including software, payment systems etc	Charge Your Car	New procurement planned in 2018

Mobility Systems: Existing

	Systems	Description	Supplier	Status
Services	**POP card**	Integrated and smart ticketing	Nexus, Ecebs, Scheidt & Bachmann	
	Newcastle CC cashless parking	Motorists register online for a cashless payment parking service at the 42 council owned car parks in the city centre	PayByPhone	
	NCP cashless parking	For a £0.20 charge, car park users can use the Ringo app to pay by card	RingGo	
	Parking Fairy	A free location tracking app guiding drivers to the nearest car park with available spaces as they approach the city	Nebula Labs	
	MyTrav app	The App enables travel trainers to create individual journeys for SEN children by creating a series of landmarks on a journey using voice and visual instructions, and which can be tracked by carers or parents	KMS Solutions	
	North East Live Traffic	Live traffic updates from the Urban Traffic Management & Control facility	T&W UTMC	
	Car club	Pay-as-you-go car-sharing service with EV and hybrid options	Co-Wheels	
	Dockless bike sharing	Dockless bikes available to use on a pay-as-you-go basis	Mobike	
	Bus lane enforcement	Cameras for automatically identifying bus lane infringements, with footage available for drivers to view their event online		

Mobility Systems: Planned

	Systems	Description	Status
Assets	**Variable Message Signs**	The purchase of 14 new variable message signs for Tyne and Wear, enabling the UTMC to provide information to road users	Planned procurement by Tyne & Wear UTMC
	Intelligent traffic signals	Intelligent traffic signals along the Newcastle Quayside	Funding awarded from Governments Joint Air Quality Unit in March 2018
	Go Ultra Low Filling Station	Filling station for alternative fuelled vehicles	NECA appointed FastNed to design, build & operate
	Rapid Charging Clusters	Clusters of rapid charging infrastructure (>/= 43kW)	NECA appointed The Phoenix Works to install and operate
	North East EV Charging Estate	Electric vehicle charging infrastructure owned by NECA / local authorities	To be procured in 2018
	Connected bus shelters	Provision made to be able to install sensing infrastructure on new bus shelters for the city	Clause to be included in procurement specification
Sensing	**Traffic radar counters**	Lamp post mountable traffic radar counters for short-term deployments	Procured by Urban Observatory in 2018
	Cameras at car parks	Cameras linked to regional traffic management centre to monitor occupancy levels in Newcastle city centre car parks	Funding awarded from Governments Joint Air Quality Unit in March 2018
	Upgrade of ANPR cameras	To capture an overview picture	Planned
Services	**Host Card Emulation**	Your phone becomes your POP Card trial on Metro	Following successful "Proof of Concept" test, a competition is being run by the NE&TV Digital Catapult and Nexus to embed this functionality into a wider transport application

Appendix 2

Energy & Environment Systems: Existing

	Systems	Description	Supplier	Status
Assets	**CityTree**	The living moss covering the main walls of the structure filter pollutants from the air at an equivalent rate to 275 trees	Northumbrian Water, Green City Solutions,	In-situ
	Radio network for Air Quality sensors	Communications network for connecting sensors to data system to make real-time air quality data available		
	Vehicle-to-grid (V2G) electric vehicle chargers	Pilot of how V2G chargers that allow bi-directional power flows can support operation of the power system	Newcastle University, Nissan, Nuvve	First V2G charger installed by Newcastle University

	Systems	Description	Supplier	Status
Sensing	**Weather and laser precipitation monitors**	Measure visibility and profile rainfall in terms of velocity and drop sizes	Urban Observatory	2 sensors currently active, with no third party involvement
	Weather stations	Four full weather stations currently operational, as well as temperature measurements at every university building. All air quality instruments mentioned below also measure temperature and humidity	X-Band / Urban Observatory	Installed
	Air Quality Sensor	4 deployed precision sites (>£100k highly accurate roadside cabinets), 117 (111 live) e-motes measuring gases, 54 (38 live) AQMesh measuring gases and particulate matter	Emote / Urban Observatory	90 out of 119 sensors currently active
	Bee hive monitors	14 sensors measuring Brood, Temperature, Weight, Humidity, Hive Activity, Mean Flight Noise, Mean Fanning of bee hives - for example on the green wall on the Helix	Urban Observatory	11 sensors currently active
	Tidal gauges & water quality measures	9 water quality devices on the Ouseburn deployed by Urban Observatory and 23 sensor deployed by Environment Agency	Environment Agency / Urban Observatory	
	Handheld dust sensors	Measures different sizes find dust particles in the air	Urban Observatory/ Open Lab	Deployed with residents of Heaton as part of the SenseMyStreet project
	Noise mote	Measures noise level in decibels	Envirowatch	3 sensors deployed
Data	**Building management systems**	A data platform for monitoring and managing public sector buildings and social housing. A BMS controls system enables better zoning, control and monitoring of building heating and energy use		
Services	**Home Energy Service Gateway**	55 homes in Newcastle have HESG systems installed as part of a living lab to connect to offerings from multiple energy service providers and device vendors	Energy Technologies Institute, Energy Systems Catapult	Pilot deployment
	Redheugh Bridge Wind Warning System	Warning system to alert for need for closure or restrictions to vehicles most at risk from high-winds	T&W UTMC	In operation

Energy & Environment Systems: Planned

	Systems	Description	Status
Sensing	**Weather stations**	A further 15 full weather stations planned to be deployed in 2018.	Part of the Urban Observatory's deployment
	Air Quality Sensors	3 further precision sites planned	Part of the Urban Observatory's deployment
Services	**Domestic Demand Side Response**	With smart meters and smart energy systems designed, DSR can be used to reduce demand from the grid at peak periods	Newcastle City Council Bid submitted to BEIS
	Positive Energy District	Balancing load profiles and using low temperature heat networks as a large thermal store	Newcastle City Council is part of a H2020 proposal submitted with E.ON, Malmo and Energy Systems Catapult
	Waste enforcement	Use of CCTV cameras to identify incidents of fly tipping	Proposals being considered following publication of waste strategy

Appendix 3

Health & Social Care Systems: Existing

	Systems	Description	Supplier	Status
Sensing	**Home Activity Monitoring**	Discreet motion and contact sensors are placed around the homes of vulnerable people to monitor their movements and the opening and closing of doors	Just Checking	Pilot
	SmartSole	Wearable tracking solution for vulnerable persons e.g. elderly with dementia	Possum	Pilot
Data	**Social Care Case Management and Finance System**	An integrated system from assessment through to commissioning and payment of service provision across Early Help, Children's and Adult Social care	TBC (to replace existing Care First solution from OLM Systems)	Contract out to tender. To be live by March 2020 for up to 15 years.
	Assistive technology platform	Allowing for greater independence for people with learning disabilities, a touch screen system is installed in their homes. It reminds people to take medication, allows them to plan their days and can be monitored remotely by family and carers	Grandcare, funded through the Department of Health's Housing and Technology Capital Fund	Pilot of 30 individuals
	QuitManager	A data collection and reporting solution for Public Health Stop Smoking Services. QuitManager is being used by more than 90 services around the country	North 51 HealthWare	New procurement planned in 2018
	PharmOutcomes	Online data management system for pharmacy management	PharmOutcomes	
Services	**Automatic pill box**	Solution to support compliance with medicines	YHN	In use
	Community Care Alarm	24-hour support service for emergency care, which installs home alarms to help residents remain independent in their own home	Ostara	Ongoing service

Health & Social Care Systems: Planned

	Systems	Description	Status
Data	**TotalView**	Social care document and resourcing management system	
	MIG system	Connected network for sharing information from Primary Care with Adult Social Care	In development by Cisco

Appendix 4

Public Services & Safety Systems: Existing

	Systems	Description	Supplier	Status
Assets	**Large format digital advertising**	Wi-Fi enabled digital screen installed in the high-footfall monument area to target affluent shoppers and commuters	Ocean outdoor	Installed
	Street lighting	£245 million joint street lighting Private Finance Initiative (PFI) contract between Newcastle City Council and North Tyneside Council	SSE	Contract to 2028
	Fleet vehicles	Newcastle maintains a fleet of vehicles, some of which are fitted with telematics and tracking technologies	Various	In operation
Sensing	**CCTV**	Newcastle City Council has over 900 CCTV cameras in a range of public places and buildings. They are installed in and around major Council buildings, such as the Civic Centre, Libraries, Leisure Centres, Parks and Car Parks		
	People counting sensors	Sensors tracking footfall	Springboard and Almere	Operated by NE1 and Urban Observatory
Data	**Virtual Newcastle Gateshead**	Virtual 3D model of the core urban areas of the two cities to support urban planning processes	Northumbria University	Ongoing development
	ICT systems for Your Homes Newcastle Furniture Service	Changes include updates to the Prisym stock management system, integration of the workforce scheduling and stock management systems, and rollout of an online portal for use by clients and their tenants	Prisym Visual	End of 2016 onwards
	YHN predictive analytics	To identify late rent payers with automatic call out and collection		

Public Services & Safety Systems: Existing

	Systems	Description	Supplier	Status
Services	**Digital Citizen Engagement**	Automated digital customer service for citizens and employees	Verint Technology	Existing
	Self-service portal	A citizen portal for council tax, business rates, benefits & landlords		Contract to Dec 2017
	Your Homes Newcastle Automated Contact Solution	As part of a delivery commitment to deal with every issue at first point of contact, YHN is introducing an automated customer service system		Contract to run April 2018 to March 2023
	Vehicle route optimisation and tracking	Ordnance Survey's OS MasterMap Integrated Transport Network (ITN) Layer used to plan the refuse collections for 117, 000 properties, helping to reduce the number of required vehicles whilst still maintaining a weekly service	Ordnance Survey	Ongoing
	Assessing the visual impact of planning applications	Use of 3D Virtual Newcastle Gateshead model to assesses the impact of proposed developments	Northumbria University	Ongoing
	Installing underfloor insulation	Robots used to survey and install insulation under suspended wooden floors	Q-bot/ YHN	Partnership announced in February 2018

Public Services & Safety Systems: Planned

	Systems	Description	Status
Assets	**Smart street trial**	A 'smart street' showcase by Cisco with sensors for bins, lights, traffic flow and air quality to demonstrate smart place applications, with all the data routed through the Urban Observatory	Funded by Cisco and installed in Summer 2018 as part of the Great Exhibition of the North
	Tech Totems	Connected street furniture to local information, interactions with local services, and test opinions on plans	Four tech totems will be installed in high footfall areas across Newcastle in Summer 2018.

Appendix 5

City Operations & ICT Systems: Existing

	Systems	Description	Supplier	Status
Comms	**Ultrafast broadband pilot**	One of the first UK cities to benefit from the "Gfast" technology trials, with speeds of up to 330 Mbps	Openreach	Launched in parts of the city in 2018
	Newcastle Metropolitan Area Network	A 40km fibre network to bring Newcastle's major business communities within easy reach of Cobalt datacentres and connectivity to major service-provider hubs to create high-volume national data paths	Stellium	Completed 2016
	Gigabit broadband in Newcastle city centre	Installed at a number of business premises including Hanover Mill, 55 Degrees North, Merchants Quay, Marconi House, Ouseburn Wharf and 38 Lower Friar Street	Hyperoptic	Launched Feb 2017
	Gigabit broadband for social housing	5,000 properties in 25 social housing developments are to benefit from a roll out of gigabit broadband	Hyperoptic	Announced
	Go Digital Newcastle	Wi-Fi in Public and Community Buildings. The concession contract with BT is at no cost to Newcastle and Gateshead councils, who receive an initial upfront rental fee and annual rent from BT for the use of street furniture. The annual income is based on a revenue share with BT	BT	Contract runs May 2014 to Apr 2024
	Emergency Services Network	Home Office project for a new communication system used by the three emergency services	EE, Motorola Solutions	Contracted in March 2015, handsets delivered Spring 2018

	Systems	Description	Supplier	Status
Data	**Open data publishing**	32 different data sets are available online	Leeds Data Mill	Contract ending May 2018
	IOT Platform	The Urban Observatory maintains the largest set of publicly available real time urban data in the UK	Newcastle University	
	Power BI	A suite of analytics tools to analyse data and share insights. Currently being used by multiple services in Newcastle City Council and 130+ staff	Microsoft	Included in the council's enterprise agreement with Microsoft – next renewal April 2019
	Azure cloud services	A set of cloud services used to develop and deploy applications (Azure Data Factories, Azure SQL DBs, Azure Data Catalogue)	Microsoft	
	E-case	Case management platform specially designed for the UK public sector to help manage FOI, Parliamentary Questions, Ministerial Correspondence, Complaints, and more	Fivium	Procurement planned for 2018
	Data matching engine	Used by Newcastle City Council to enable a single view of the customer	Datactics	
	Business objects	Reporting tool used in multiple lines of business systems	SAP	
Services	**Corporate workforce scheduling**	YHN mobile workforce scheduling system allowing for location independent working	YHN	
	BOT framework	The use of Artificial Intelligence and Cognitive Services tools to enhance customer experience	Microsoft	Renewal April 2019

City Operations & ICT Systems: Planned

	Systems	Description	Status
Comms	**Metro Wireless Concession**	Connectivity on-board trains and at stations	Previous unsuccessful procurement exercise to be retendered by Nexus as part of a wider contract
	Metro dark fibre	Existing fibre on metro network that is not used (reserved for public sector use)	Currently proposed to be used for Newcastle and Gateshead Disaster Recovery arrangements.
	North Sea Connect	Plan developed by Aqua Comms, and Stellium for a high capacity system connecting the North East to Denmark, with branching potential to Germany and the Netherlands	Plan awaits investment and customer demand, but permissions are in place
	Things Connected North East	Free-to-use LoRaWAN and Sigfox gateways deployed across North East and Tees Valley for the use of testing, experimentation, demonstration and piloting of IoT products and services	Managed by Sunderland Software City, Digital Catapult. Starting Spring 2018 and running to March 2019
	Wide Area Network (WAN)	Core WAN and Data Centre Network Refresh, linking data from city-wide WAN networks in a central location	Newcastle City Council planning procurement for 2018
	5G Test Bed	Newcastle will act as a testbed for 5G infrastructure, using the Tyne and Wear Metro system as the backbone	NE LEP, Nexus, NECA and University of Surrey working together since September 2017 to secure funding
	Wi-Fi network on Newacstle Helix	High speed public W-Fi network to be established on the Science Central / Helix site	Newcastle University in discussions with Virgin Media

	Systems	Description	Status
Data	**Visual Studio/ Xamarin**	Microsoft's visual studio enables the City Council to build native apps using Xamarin for a range of purposes	Included in the council's enterprise agreement with Microsoft – next renewal April 2019
	Machine learning and predictive analytics	The City Council is exploring the use of Artificial Intelligence and Cognitive Services tools to enhance customer experience - for example by using machine learning to respond to text enquiries	
Services	**Shared services**	Merged transactional services Newcastle City Council and Northumberland County Council	Cabinet approval granted in January 2018, and new service aimed to be complete in Spring 2018
	Tyneside Crowd	Crowdfunding platform supported by Newcastle City Futures and Newcastle City Council	Launch in June 2018

Acknowledgements

With thanks to the following who contributed valuable insights to this work:

Adrian McLoughlin *Newcastle City Council*
Alistair Baldwin *Newcastle City Council*
Claire Toas *Newcastle City Council*
David Bartlett *Nexus*
David Dunn *Sunderland Software City*
Glasgow City Council
James Charlton *Northumbria University*
Jennifer Hartley *Consultant*
Jenny Nelson *Newcastle City Council*
Jim Lowden *Newcastle City Council*
John Wilson *Stellium*
Jon Ritchie *Your Homes Newcastle*
Louise Kempton *Newcastle University*
Luke Smith *Urban Observatory*
Mark Tewdwr-Jones *Newcastle University*
Nick Corrigan *Southend-on-Sea Borough Council*
Paul Armstrong *Newcastle City Council*
Phil James *Urban Observatory*
Rachel Baillie *Newcastle City Council*
Ray King *Tyne & Wear UTMC*
Richard Watson *Northumbria University*
Ritchie Somerville *University of Edinburgh*
Sean Cocking *Newcastle City Council*
Simon Hanson *Federation of Small Businesses*
Sohail Bhatti *NHS Newcastle Gateshead*
Steve Caughey *Arjuna*
Tom Warburton *Newcastle City Council*