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List of Abbreviations

ALEOs	Arm's-length external organisation	ISO	International Standards Organisation
API	Application programming interface	LES	Land and Environmental Services
CITRAC	Centrally Integrated Traffic Control	PID	Project Initiation Documents
CSG	Community Safety Glasgow	PMO	Project management office
FoI	Freedom of Information	PRINCE2	PRojects IN Controlled Environment, version 2
GCC	Glasgow City Council	SPT	Strathclyde Partnership for Transport
GCMB	Glasgow City Marketing Bureau	TSB	Technology Strategy Board aka Innovate UK
GHA	Glasgow Housing Association	VA	Video Analytics
GOC	Glasgow Operations Centre		

EXECUTIVE SUMMARY



This report draws together evidence collected by Glasgow City Council (GCC) and research conducted by mruk to evaluate the Future City Glasgow programme. The purpose of this report is to provide an independent evaluation of the learnings, achievements and challenges from the Future City Glasgow programme from the perspective of internal GCC staff, stakeholders and contractors who helped deliver the programme.



Background

Future City Glasgow was an ambitious and innovative programme to show how new technologies can make life in the city smarter, safer and more sustainable.

The Future City Glasgow programme had an overall budget of £24m. Glasgow was awarded this funding in January 2013 by the Technology Strategy Board (TSB) (now known as Innovate UK) – the UK Government's innovation agency. Future City Glasgow aimed to illustrate additional value that can be created by next-generation integration of city systems. It also enabled a local authority to solve identified challenges through new technologies and innovative ways of working. It provides a model and a range of lessons for future deployments of similar technologies.



THE PROGRAMME HAD THREE MAIN COMPONENTS:

1

The **Glasgow Operations Centre** (GOC) intended to integrate systems across the Future City Glasgow programme, primarily the public-realm CCTV systems, Traffic Management Services, and emergency planning and response functions for the city.



2

The **Open Glasgow** project aimed to integrate a range of city systems and data to deliver improved services and facilitate wider engagement with citizens. Open Glasgow hosted a Data Repository, a 'big data' store that integrated a range of datasets. The aim was to provide a platform to handle real-time information, analytics and models, city dashboards to present live city data, and enhance the existing MyGlasgow app and a City Observatory.



3

Four Demonstrators intended to demonstrate tangible, real-time benefits to people in Glasgow. These covered Energy Efficiency, Integrated Social Transport, Intelligent Street Lighting and Active Travel.





This document is an evaluation of the programme and its associated deliverables. It will provide GCC with a comprehensive set of independent, evidence-based insights into how each of the Future City Glasgow projects was delivered, and will aid understanding of each project, provide ideas for future developments and provide lessons that may be of interest to other ‘smart’ cities projects. This research does not present measured outcomes or a final impact assessment. Data was primarily collected through qualitative, semi-structured interviews with internal stakeholders who were involved in delivering various aspects of the Future City Glasgow programme. Interviews were conducted between March 2014 and September 2015.

Key Findings from Each Component of Future City Glasgow

Glasgow Operations Centre (GOC)

Glasgow Operations Centre transformed GCC's CCTV, traffic management and emergency planning and response technologies. It also improved operational effectiveness, encouraged by the new systems and co-location of teams.

The main challenges of the GOC programme were unifying a project with many different components, translating this into a vision and set of use requirements for each team involved whilst managing staff uncertainty over the new technologies and working practices.

The project's main legacies were the leading role that it has allowed Glasgow to take in the deployment of 'smart', digital technologies, the choice of a system which can be easily expanded and upgraded in the future, and the way in which it brought disparate organisations from across the city together.

Open Glasgow

Open Glasgow's benefits included demonstrating, at scale, the value of open data and big data within the context of a city. The project allowed Glasgow to build a state-of-the-art data platform and to better understand the untapped potential of city data. A series of case studies was delivered that demonstrate how better access to city data, and analytical tools can be used to: increase transparency, create new insight into the city, engage and empower communities, enable services to become more integrated, targeted and proactive and foster innovation.

The main challenges faced by Open Glasgow were encouraging people to recognise the positive implications of sharing their data, helping external contractors recognise the particular constraints that apply to a large public body such as GCC, and ensuring that some of the components happened at the right time so as to best integrate with other aspects of Open Glasgow.

In terms of legacy, the Council's Strategic Plan now makes reference to the pivotal role that digital and data will play in the Council's transformation. It states that open-data and big-data analytics analytics will support and inform how the Council transforms how it operates internally and its role within the city.

Demonstrators

The Demonstrators have enabled GCC to develop innovative applications using the newly created infrastructure. This in turn helped position GCC at the leading edge of technological deployment by local authorities. The Demonstrators have also resulted in improved service delivery and associated cost savings, for example by optimising the use of GCC's fleet of buses and its related record-keeping, or by reducing energy use in council buildings. The Demonstrators have also brought new ideas,

technologies and working practices into GCC, and have benefitted the external organisations involved by providing them with new business, and opportunities to test and develop their commercial products.

Developing working relationships with external partners was sometimes challenging. This often related to communicating effectively and at the right time, and sharing aims and goals. As the Demonstrators often involved personal data, careful consideration had to be made of data privacy issues, often involving time-consuming but essential privacy impact assessments (PIAs). Procurement timescales were also sometimes a challenge; getting the right systems from external providers sometimes took longer than anticipated.

Each of the Demonstrators has been assembled in a way that took its future use into account, leaving GCC with systems and technologies which can adapt to changing needs in the future, or which can be extended to cover larger areas of the city. This has also led to a number of specific improvements which are of direct benefit to the citizens of Glasgow – for example, active travel smartphone apps and improved street lighting.

Overall Key Themes: Project Characteristics, Challenges and Learnings

Innovation and disruption

Future City Glasgow was deliberately exploratory and experimental. It introduced new technologies and new ways of working within GCC. These were described as having improved GCC's technological infrastructure and the delivery of some of its services.

Communication and understanding of the project

Due to the exploratory and experimental approach, it was sometimes difficult to map out processes and communicate likely outcomes to key internal stakeholders and external partners. Working gradually with stakeholders and partners, winning them over with the right language and frequent demonstrations of progress orientated around their needs was key to overcoming this.

Managing change

Future City Glasgow promoted a collaborative working environment for internal GCC staff members, consultants, partner organisations, businesses and citizens. Existing staff were introduced to new approaches, ideas and tools. Such an approach was instrumental in harvesting innovation and introducing exploratory approaches to GCC, some of which are now part of its regular working practices.

Managing this change process carefully, ensuring that everyone understood as early as possible the benefits of

the new approaches and goals, how they will achieve them, and the constraints that apply to a local authority, was felt to have led to better outcomes. Choosing the right project management approach, depending on whether the project was exploratory or aimed at defined outcomes, was crucial.

An integrated, modular and scalable approach

Future City Glasgow provided an innovation space to lay the foundations for a smart city creating the building blocks from which many connected applications could be derived. A lot of background work had to be done to develop the systems to support this. This has left the city with a digital platform which is integrated, modular and scalable, and which offers extensive new opportunities for ongoing

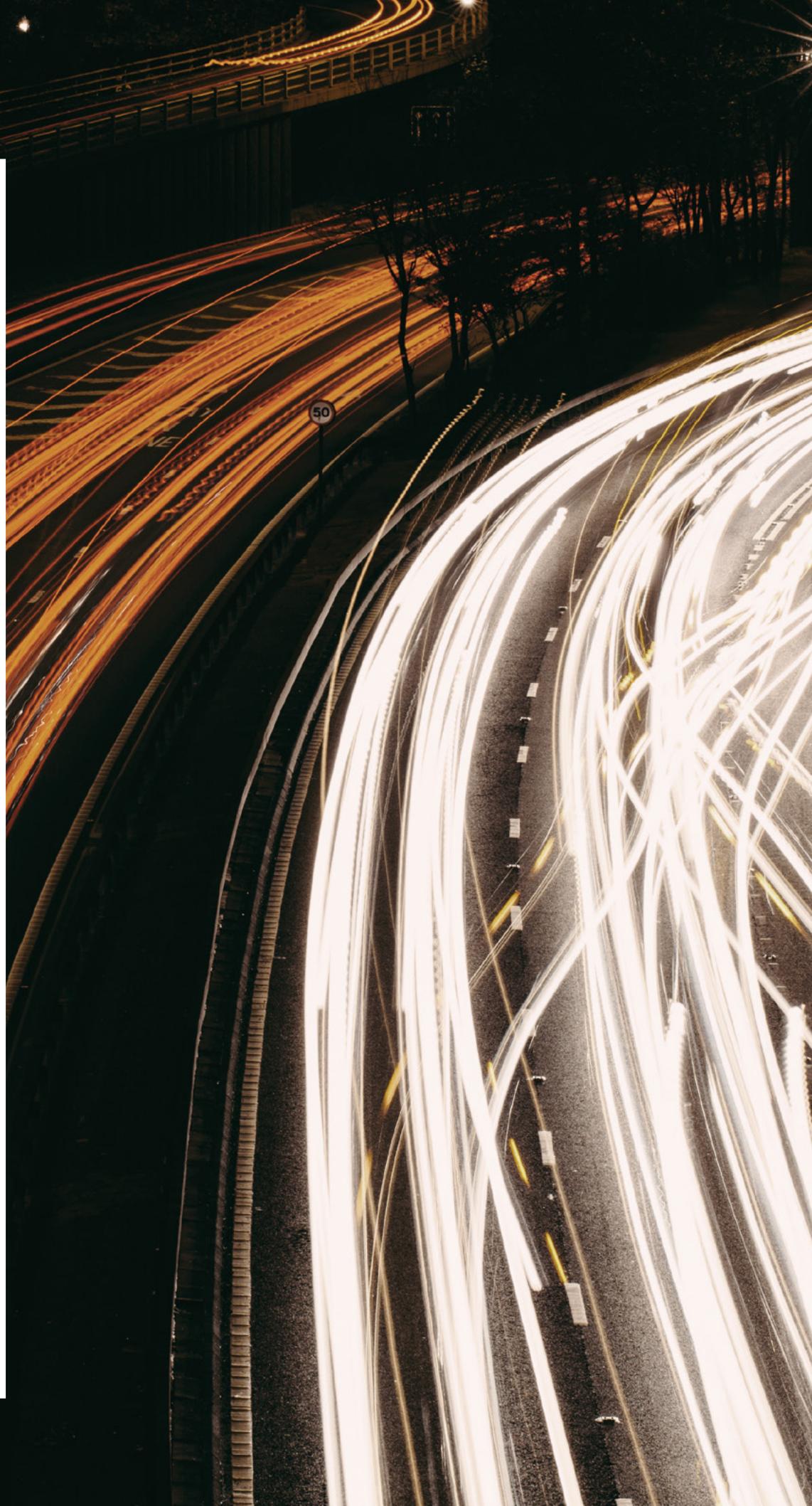
innovation. The long-term opportunities and potential benefits of this approach were balanced against a need to demonstrate progress on projects that would benefit GCC and the city within the funding period.

Timescales and maintaining momentum

Future City Glasgow delivered a large project with many complex components in a short time. This meant that a small number of components did not integrate as effectively as originally envisaged, and it was sometimes difficult for some projects to maintain momentum into business as usual at GCC.



INTRODUCTION



This report draws together evidence collected by Glasgow City Council and research conducted by mruk, an independent research organisation, to evaluate the Future City Glasgow programme. The principal evaluation approach was to collect primary qualitative data from internal stakeholders.

This is a formative evaluation and does not aim to determine or measure final outcomes. Instead this evaluation has been prepared with a view to sharing relevant learnings with other local authorities. As such, the emphasis is on understanding the organisational context; considering resources, personnel, procedures and inputs; and discussing major achievements and challenges from the personal perspective of the research participants.

This evaluation is based on feedback from internal Future City Glasgow stakeholders and staff, as well as contractors who helped deliver the programme, supported with secondary data sources. In addition, other information sources – such as secondary data and project-specific documentation – were also considered and are referenced throughout this report where appropriate.



Glasgow and the City Council

Glasgow is the largest city in Scotland and the third largest in the United Kingdom (after London and Birmingham). With a population of just under 600,000 citizens, Glasgow accounts for 11% of the total population of Scotland. At the last census, Glasgow City local authority area had a total of 285,693 households.

Glasgow City Council is made up of a number of core services employing just under 19,000 staff: Chief Executives Office, Corporate Services, Development and Regeneration Services (DRS), Education Services, Financial Services, Land and Environmental Services (LES) and Social Work Services. They have a network of wholly and partly owned arm's-length external organisations (ALEOs) providing services on behalf of the Council: ACCESS LLP, City Building (Glasgow) LLP, City Parking (Glasgow) LLP, City Property (Glasgow) LLP, Clyde Gateway URC, Cordia Services LLP, Glasgow Life, Glasgow City Marketing Bureau Limited, Community Safety Glasgow and Jobs and Business Glasgow.¹

Glasgow is a city with a track record of embracing challenge and delivering change. The Future City Glasgow programme aimed to address Glasgow's specific challenges in health, energy, transport and public safety through three high-level projects that would evidence integration of city systems and realise benefits to the city. Stakeholder engagement focused on city challenges that informed the projects chosen:

- Glasgow Operations Centre
- Open Glasgow
- Demonstrators
 - Energy Efficiency
 - Integrated Social Transport
 - Intelligent Street Lighting
 - Active Travel

The Future City Glasgow programme aimed to demonstrate how technology could make the city safer, smarter or more

sustainable. The focus was on four key themes: public safety, energy efficiency, transport and health.

Public Safety

Although Glasgow is seen to experience a disproportionately high level of community safety issues compared with other Scottish local authority areas, general trends suggest there has been a significant improvement over the past decade. Overall total recorded crime between 2004/05 and 2013/14 has fallen by 35% in Glasgow City (compared to Scotland's average of 38%).

The Glasgow Operations Centre project aimed to co-locate public-space CCTV, Traffcom and the GCC Resilience Team to create a co-ordinated approach in responding to and managing incidents across the city, and enhance intelligence-led crime reduction and prevention strategies.²

Energy Efficiency

According to figures from the Department of Energy and Climate Change, Glasgow's energy consumption fell by 14% between 2006 and 2012.³

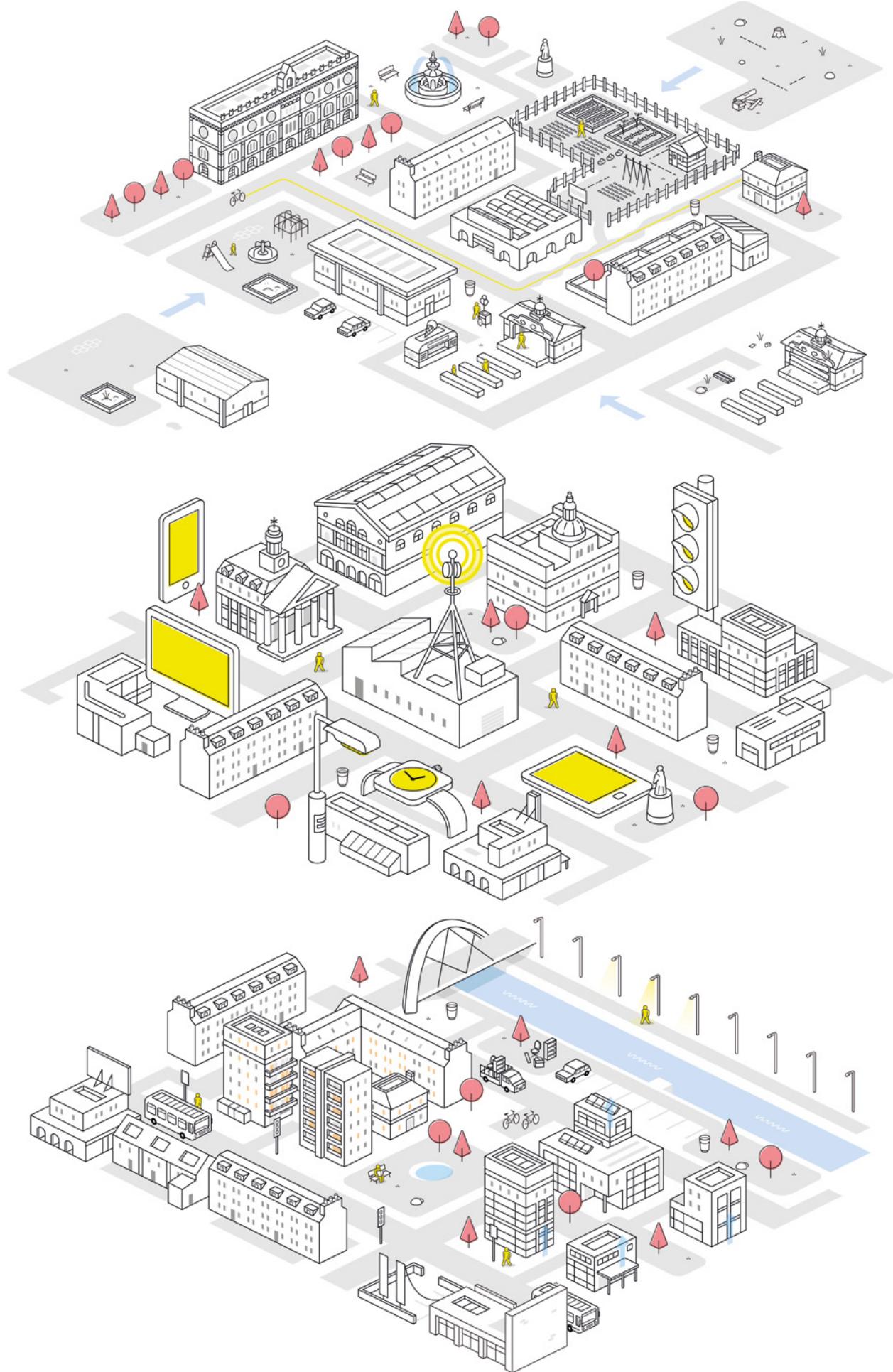
Despite a reduction in overall fuel consumption, the Scottish Households Condition Survey reported that between 2011 and 2013, a third of households in Glasgow were in fuel poverty (defined by the Scottish Government as spending more than 10% of household income on all household fuel). This was higher than Edinburgh and Aberdeen, but lower than Dundee and levels of fuel poverty recorded across Scotland as a whole. It is thought that household fuel poverty is influenced by income, fuel costs and energy efficiency of the home.⁴

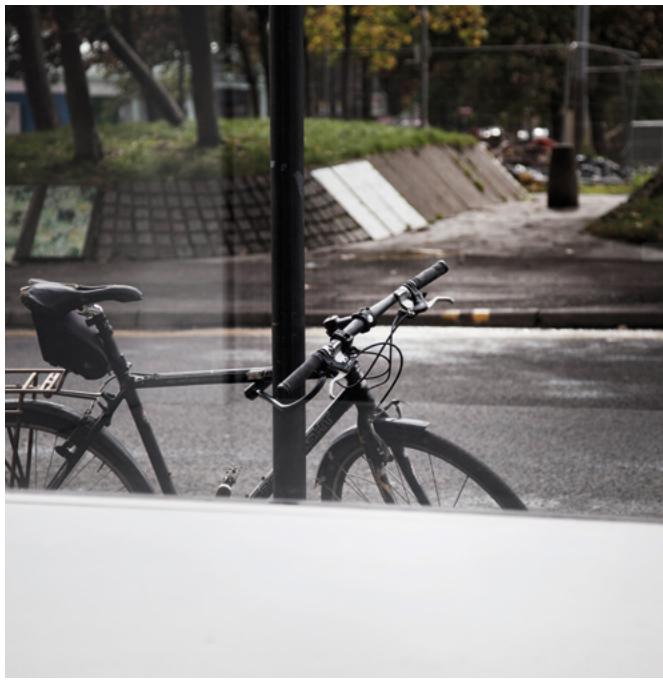
Glasgow City Council has committed to reduce the city's carbon emissions by 30% by 2020. The Energy Efficiency Demonstrator aimed to identify technologies and systems to improve the energy efficiency of buildings and housing in the city.⁵ The Intelligent Street Lighting Demonstrator also explored savings in energy costs and reductions in carbon emissions through replacing existing sodium street lights with LED lighting and development of a controllable system.⁶

Transport

Figures from Scottish Transport Statistics show that between 1999 and 2011 Glasgow had the highest volume of traffic on its roads compared to the other main cities of Scotland.⁷

The 2011 census showed that people of Glasgow are less likely than the Scotland average to travel to work by car or van (50% vs 56% average), and more likely to rely on buses (20% vs 15% average) and trains (8% vs 4% average).⁸





The primary purpose of the Integrated Social Transport project was to develop a scheduling and route optimisation solution to improve fleet utilisation and client/end user services within Glasgow City Council. It aimed to create an online accessible interactive system that would allow robust management of GCC's fleet, and to ensure that assets are scheduled effectively and efficiently in terms of both costs and emissions.⁹

Health

The National Records of Scotland found that the average life expectancy at birth for those in Glasgow City was 78.7 years. Although life expectancy has increased in the last 10 years, it is still lower than the Scotland average (81.1 years).¹⁰

The Scottish Health Survey has shown that 40% of adults in Glasgow achieve the recommended weekly level of physical activity (at least 30 minutes' moderate or vigorous physical activity on at least 5 days a week). Although this is low, it is a similar level to other cities in Scotland.¹¹

The most popular form of sporting activity amongst those in Glasgow is walking, with nearly two out of three (64%) of adults walking for at least 30 minutes for recreational purposes over a four-week period, matching the Scotland average. Cycling is not as popular; in 2014, the Scottish Household Survey found that 8% of Glasgow citizens participated in cycling in a four-week period (compared to the Scotland average of 11%).¹²

The primary purpose of the Active Travel project was to develop an approach to encourage 'active travel' within Glasgow. The focus was on behavioural change encouraging people to walk and cycle.

Background of Future City Glasgow

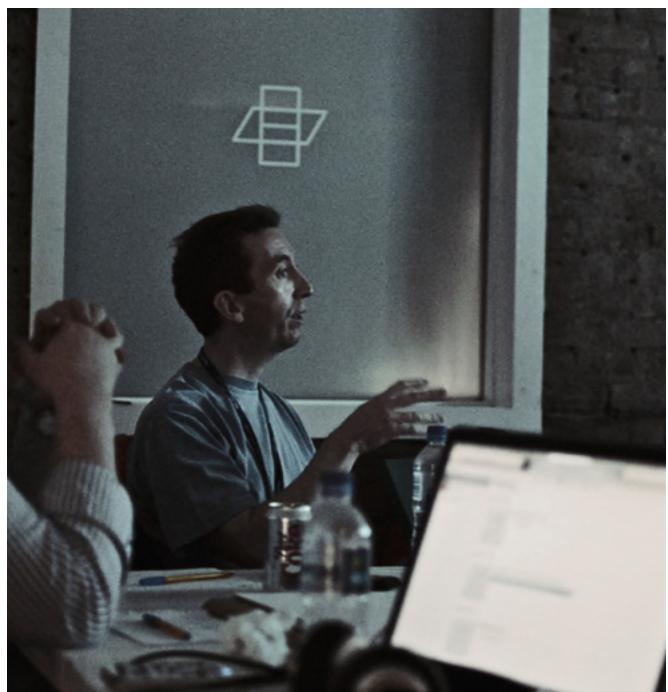
Future City was an ambitious £33 million programme to demonstrate how technology can make life in the city smarter, safer and more sustainable. Four cities were shortlisted for funding by the Technology Strategy Board (TSB) (now known as Innovate UK): Bristol, Glasgow, London and Peterborough. Based on its Feasibility Study, Glasgow was chosen as the winner, receiving £24 million in funding (Bristol, London and Peterborough received £3m each).

Future City Glasgow aimed to illustrate additional value that can be created by next-generation integration of city systems. It aimed to make the most of existing Glasgow City Council partnerships, investments and opportunities, and to address Glasgow's challenges in health, energy, transport and public safety, through a series of five determined projects and the Open Glasgow project.

Objectives of the Evaluation

Based on information given by key stakeholders involved with the Future City Glasgow programme, this evaluation will help determine how the programme and its associated deliverables can best be taken forward, for both Glasgow and other cities embarking on their own future city development. Data was collected between March 2014 and September 2015. Over this period elements of the Demonstrators were developed, implemented and matured, allowing stakeholder feedback on the processes and delivery to be gathered.

This evaluation will be used to inform GCC's reform agenda, as well as to support future strategic decisions and investments.



More specifically, the evaluation aims to:

- Provide a meaningful understanding of each project in terms of initial aims, project challenges, what worked well, what did not work well, shared learning and best practice
- Provide ideas for future improvements and other potential applications
- Provide learning and experiential feedback that can be of use or interest to other local authorities and organisations

This evaluation will also provide GCC with a comprehensive set of independent evidence-based insights into how each of the Future City Glasgow projects were delivered.

Sample

Interviews were conducted amongst stakeholders involved in the delivery of the Future City Glasgow programme, including:

- Internal GCC stakeholders, project leads and delivery teams
- Stakeholders from Glasgow City Council arm's-length external organisations (ALEOs)
- Relevant city partner stakeholders

- Future City Glasgow contracted delivery partners

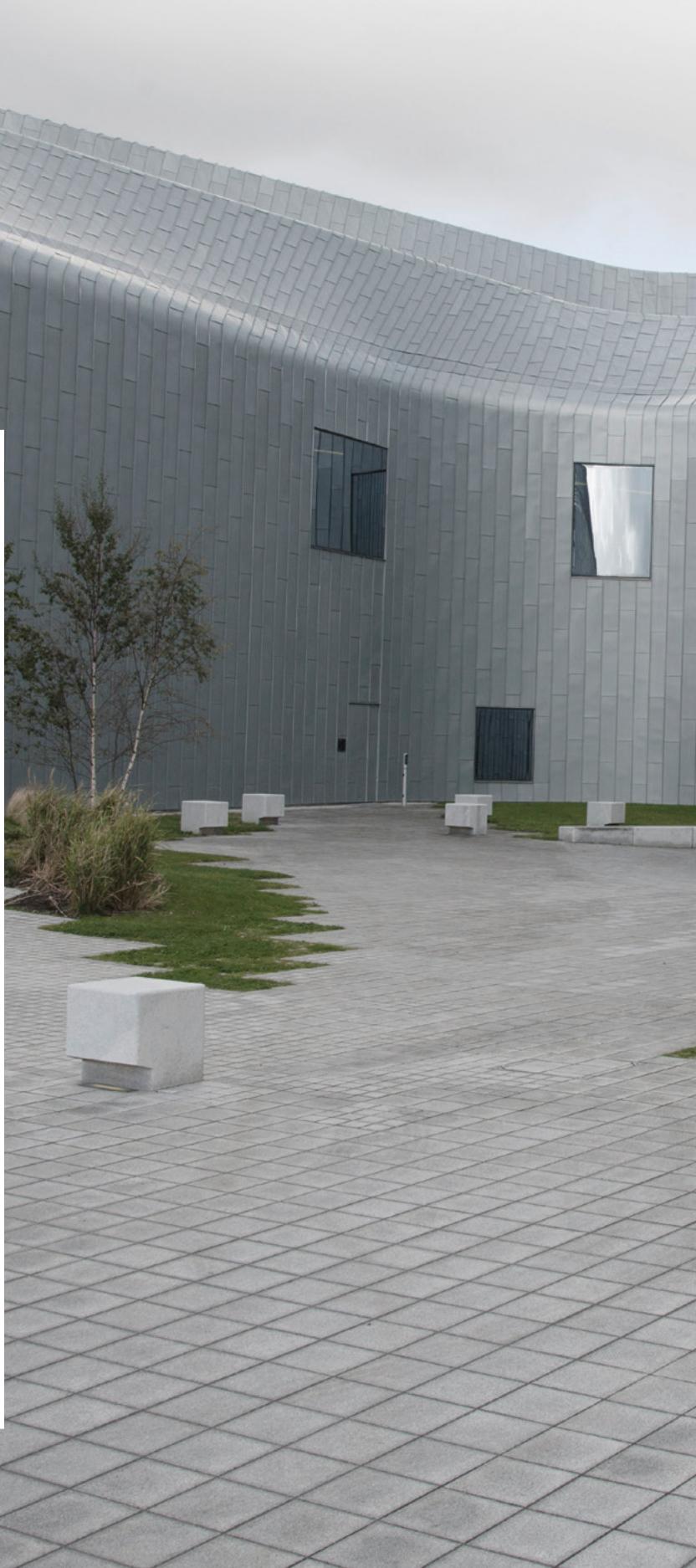
Note: Interviewing internal stakeholders provides a vital yet subjective view of the project, its challenges and outcomes. We are not able to assess if information provided during these interviews is correct, and evaluation based on these interviews is dependent on participants being honest and open.

Methodology

After considering a variety of methods to use as part of this evaluation, the main approach implemented was the collection of primary data through qualitative, semi-structured, face-to-face, in-depth interviews with internal stakeholders. A thematic approach has been used for data analysis and interpretation. Secondary data from desk research is also included in this evaluation, including additional sources of information supplied by GCC (see Appendix).



PROGRAMME OVERVIEW



In January 2013, Glasgow was awarded £24m by The Technology Strategy Board (TSB), now known as Innovate UK, for Future City Glasgow to showcase how the city can grow its local economy and improve the lives of its citizens by making the most of new technologies and integrating and connecting city systems. Led by Glasgow City Council (GCC) in partnership with key public, private and academic organisations, Future City Glasgow initially aimed to run over an 18-month period.¹³

Description

The Future City Glasgow programme aimed to demonstrate the value that can be created by integrating city systems through:

- Innovative and ambitious use of technology
- Testing new solutions across the city and with businesses
- Engagement with citizens

Aims & Overall Goals

The programme comprised three main components in order to deliver a ‘smart city’ that used digital technologies and information effectively, set out as follows:

Glasgow Operations Centre

The GOC intended to integrate systems across the Future City Glasgow programme, primarily the public-realm CCTV systems, Traffic Management Services, and emergency planning and response functions for the city.

Open Glasgow

The Open Glasgow project aimed to improve access to city data and to provide new tools to analyse and visualise city data to deliver improved services and facilitate wider engagement with citizens. It developed a Data Repository, a ‘big data’ store, that integrated a number of datasets. The key goal was to demonstrate the value of a more integrated approach to managing large-scale city-wide data and demonstrating the value of making it more widely accessible.

Demonstrators

The Demonstrators comprised four projects:

- Energy Efficiency: Integration of technology and data to improve energy efficiency, planning and transparency delivered through five individual projects within the broad holistic scope of ‘energy’ (see Energy Efficiency Demonstrator chapter for more detail).
- Integrated Social Transport: an online interactive system to manage resources across a range of transport services such as scheduling and fleet management of GCC’s social-transport fleet.
- Intelligent Street Lighting: development of a safer, cheaper and efficient lighting network, with the aim to be part of a wider network of intelligent data collection assets.
- Active Travel: development of an approach to encourage ‘active travel’ within Glasgow.

Approach

The overall approach for delivering the Future City Glasgow programme was characterised by a particular project management method, as well as specific project planning, governance and procurement processes. In addition, the programme delivery was supported by research, monitoring and evaluation activities that helped develop the programme and maximise opportunities.

Project management

The PRINCE2 project management approach was used to deliver the Future City Glasgow programme. PRINCE2 emphasises high-level management, control and organisation of a project, but not lower-level activities such as scheduling. It is often implemented in projects that incorporate an iterative approach to product or service delivery.

Design Authority

A Design Authority was also put in place as part of the project planning phase. Design Authority processes ensure the technology of the programme is fit for purpose and not missing anything critical.

Agile management

The programme (particularly for Open Glasgow) followed agile methodology which allowed teams to make prototypes and gain feedback from internal and external users. This was felt to be important when exploring new approaches and new technologies.

Procurement

The programme incorporated procurement processes as appropriate which included a study of the supplier marketplace, and an expression of interest and full submission tendering process. As expected for a programme of this scale, procurement was complex and received specialist support and guidance from agencies and departments both within GCC and outside the Future City Glasgow programme.

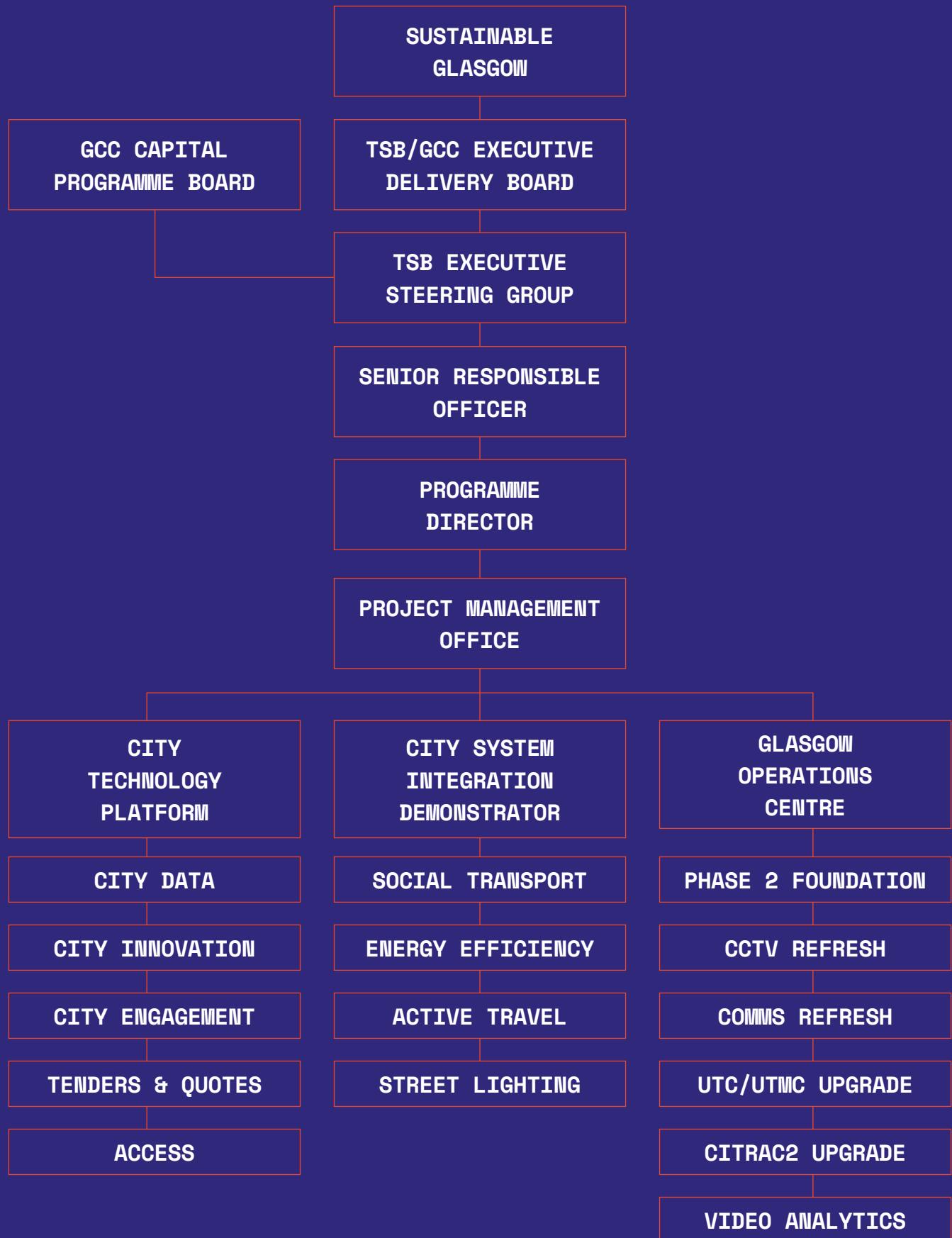
Budget & Staffing

The total budget of the Future City Glasgow programme breaks down as follows¹⁵:

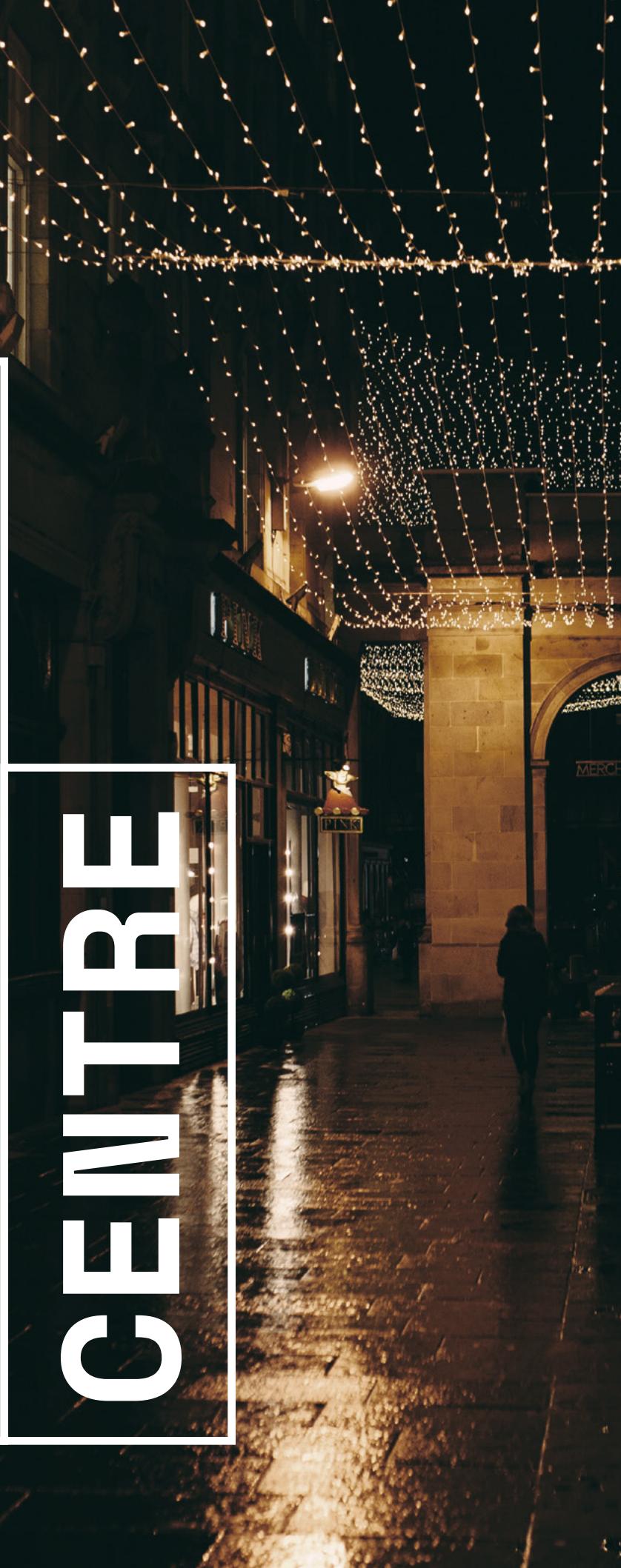
PMO	£1.3m
GOC	£12.7m
OPEN GLASGOW	£6.9m
DEMONSTRATORS	£3.2m
TOTAL COST	£24m

The programme was led by a programme director, supported by three programme managers (for each of the Operations Centre, Open Glasgow and Demonstrators). Each Demonstrator was led by a project manager who reported to the relevant programme manager. Areas of responsibility are broken down further in Fig 1.¹⁵

FIG 1: AREAS OF RESPONSIBILITY



GLASGOW OPERATIONS CENTRE



The background, description, aims, outcomes, and approach sections of this chapter are reflective of the project initiation document, end-stage reports and other sources of information. The outputs, benefits, challenges and legacy of the project capture views and opinions of the stakeholders interviewed.

Background

Operations centres bring together specialist teams in one centralised location. This allows information and intelligence to be assessed, aggregated and responded to quickly, by co-ordinated teams. Glasgow recognised the value of centralised management and control to underpin its aspiration to be a safe and resilient world-class city whilst continuing its evolution towards being a smart city promoting collaborative and cross-sector working across all City partners.

The Future City Glasgow funding supported the decision by Glasgow City Council to co-locate public-space CCTV and Traffic Management, enabling the integration of city systems. This was underpinned by the creation of technological and data infrastructure across multiple agencies for the delivery of improved and responsive city services.

The physical co-location of Community Safety Glasgow (CSG) Public-Space CCTV and Glasgow City Council Traffcom Team aimed to provide a platform to share assets, whilst supplementing the drive to detect and reduce crime in the city. This built upon the existing ethos of cross-boundary working already operating between Community Safety Glasgow, Glasgow City Council City Resilience Team and Police Scotland.

The GOC opened in February 2014, based in Eastgate, in time for the Glasgow Commonwealth Games, and fully supported the city command and control function.

Description

GOC is the single biggest integration of systems within the Future City Glasgow programme, involving the integration of public-space CCTV systems (managed by CSG), Traffic Management Services including CCTV (managed by LES Traffcom), Resilience & Safety (managed by GCC Resilience Team) and Crime Prevention and Detection (managed by Police Scotland).

The Future Cities programme aimed to upgrade the underlying infrastructure including new extensive communications and digital cameras, integrate and enhance the traffic system and demonstrate the use of video analytics. This emerging technology provides Operations Centre operators with alerts as situations and events unfold. This results in improved, more-informed decision-making, and earlier intervention and reaction to events.

The programme managed both the physical co-location of services, creating a central City Control Room with state-of-the-art technology and software, and a City Incident Response Room with a Police Silver Command facility. This was further supplemented by the upgrading of the existing analogue communications circuits and equipment to digital, Internet Protocol (IP) enabled technology. This

helped to enable full-system integration, and to enhance the resilience of GOC.

In addition to the capability detailed above, the technology enhancements provided scope for further expansion of the service, for example: in Housing CCTV, Public Transport CCTV or increasing City Management Command & Control. This helped to create potential opportunities for other private and public service delivery with associated revenue, as well as strategic partnerships.

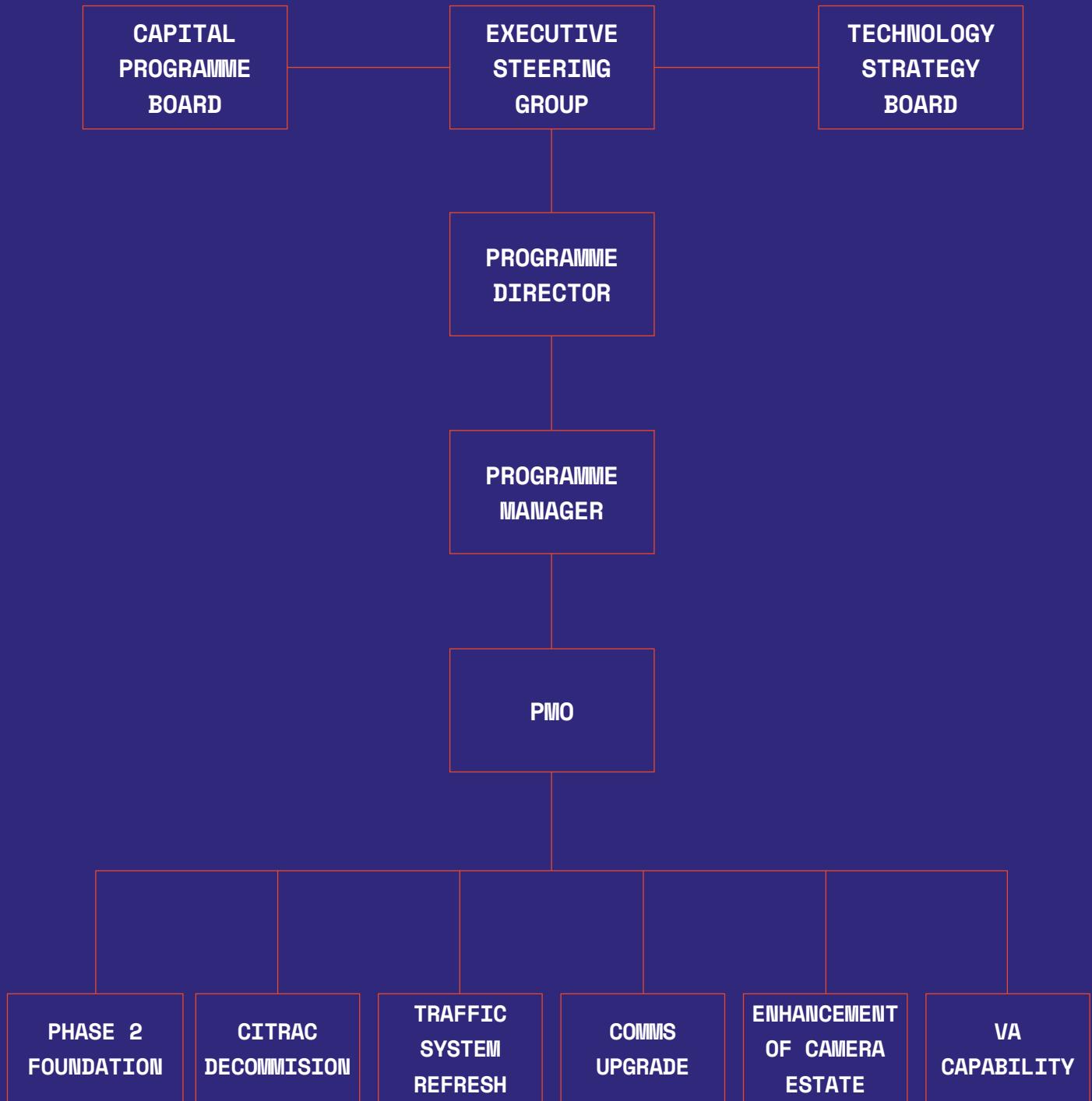
Aims & Overall Goals

The main aim of the Glasgow Operations Centre programme was to create a platform for inter-operability and sharing of resources, enabling Glasgow to leverage technology to meet future needs. For example, a key requirement of the programme was to ensure that public-space cameras and Traffcom cameras were interchangeable in use.

Budget & Staffing

The total project budget was £12.7m. A programme manager was supported by a programme management office (PMO). See Fig 2.

FIG 2: GOC STRUCTURE



OUTCOMES

Migration of technical equipment for both Traffcom and CSG to provide initial resilience and service continuity.

Creation of an integrated approach with operational partners in responding to and managing incidents across the city.

Enhancement of intelligence-led crime reduction and prevention strategies.

Delivery of a fully functional operations centre and incident response room in advance of the Commonwealth Games.

OUTPUTS

An upgraded urban traffic control (UTC) system for the control of traffic signals based on robust technology and modern design and implementation principles. The system has the capacity to integrate to other City Management platforms including the PSIM and the City Data Hub.

A future-proof, on-street traffic control system that can integrate with other systems.

An upgraded urban traffic management and control system that interfaces with the UTC system, the BIAS Automatic Vehicle Location (AVL) system, and the city's variable message signs and fault management systems.

A future-proof and scalable infrastructure foundation to enable smart city management.

The GOC programme focused on enabling integrated, city-wide management with improved quality of service for citizens, through refreshing and enhancing systems to upgrade technology.

Approach



A multidisciplinary team including key partners was created to develop and deliver the six workstreams:

Phase 2 Foundation

The phase 2 foundation workstream built on the design and build work completed during phase 1 co-location. It provided upgrades to obsolete equipment in order to enhance the resilience of the Operations Centre, as well as meeting future operational demands in and around Glasgow for the next 10 years.

Migration and decommissioning of Centrally Integrated Traffic Control (CITRAC) system

The CITRAC traffic management system was over 20 years old and labour intensive in relation to management and control. Traffcom had been undertaking a programme, as funding permitted, to migrate sites from CITRAC2 control to BIAS control.

Furthermore, the hardware and system software underpinning CITRAC was nearing technical obsolescence, rendering maintenance almost impossible and threatening continuity of service.

Traffic systems refresh

Traffcom operated two complementary Urban Traffic Control systems: the Bus Information and Signalling (BIAS) traffic system and the Centrally Integrated Traffic Control 2 (CITRAC2) system. The BIAS system is the more modern of the two systems used. However, it had been in place for 10 years and comprised a software suite that had not been upgraded to take advantage of changes in

technology and new and enhanced functionality.

Taking advantage of the change in technology and negating the issues of aging technology, the programme initiated a process of full modernisation of the BIAS system.

Communications upgrade

The communications upgrade was split into two phases: the design and implementation of the central core network and implementing the communication links out to the cameras from core sites.

The upgrade of the existing analogue circuits included building on some existing assets, new technology and IP technology to provide an optimum infrastructure for the camera estate.

Enhancement of camera estate

The existing, aging camera estate comprised a selection of analogue camera types, most of which were at end of their life: broken or requiring significant regular maintenance. The programme focused on renewing the cameras to improve footage quality and review capabilities.

Introduction of Video Analytics (VA) capability

Video analytics is analysis of recorded video streams which can include detection of events of interest or analysis of footage based on specific parameters. The successful implementation and use of VA is relatively leading edge in the public-space environment but also on 'pan, tilt and zoom' (PTZ) cameras, due to the cameras moving about.

Benefits

The primary data from the qualitative stakeholder interviews identified a number of improvements as a result of the programme:

- Better working partnerships
- System rationalisation
- Improved intelligence to help prevent and detect crime
- Improved access to CCTV information, system resilience and reduced system downtime
- Improved operational effectiveness and response to incidents
- Improved staff engagement
- Increased perceptions of Glasgow as a safe city

Better working partnerships

Teams can work together face to face, quickly and easily and view information together and at the same time. It was believed this fostered partnership working and allowed everyone to have a better understanding of how each team operates. For many the opportunity to learn from others and experience new ways of working was valued highly.

System rationalisation

Many participants felt that there has been financial gain from updating systems and technology: "It was more cost efficient to do them together rather than each team separately"; "In general, sharing resources is better value for money for CSG, partners and ultimately the public".

Improved intelligence to help prevent and detect crime

It was believed that the enhancements and consolidation of the CCTV estate have enabled quicker response times, improved feedback loops to the public and quicker resolution of incidents, all of which saved police investigation time.

Improved access to CCTV information, system resilience and reduced system downtime

For those involved in city resilience systems, a noted benefit was that, as a state-of-the-art secure facility, they felt the GOC can manage any major incident. More-senior stakeholders also noted that learnings from the project have been articulated internationally, with a number of representatives from cities visiting the GOC to understand the benefits of the facility.

Improved operational effectiveness and response to incidents

Operational effectiveness has been improved through the new systems and through partnership working. Partnership

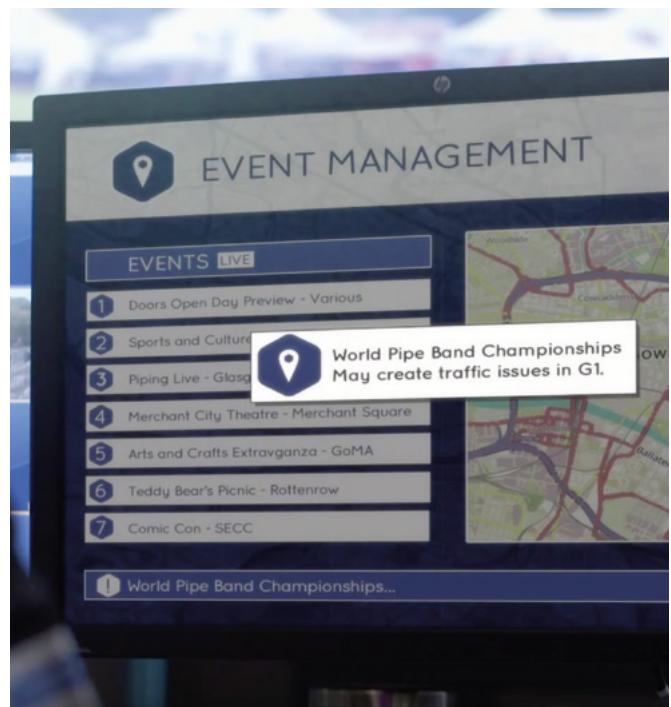
working has allowed sharing of assets, which is more efficient in time and resources. A greater volume of work can now be handled by the GOC, which means it offers more efficient use of personnel across city partners.

Improved staff engagement

It was felt that seeing the GOC develop, especially around the time of the Commonwealth Games 2014, was pivotal in staff engagement. "The buzz" around the time of the Games lifted staff morale and created a focus of purpose for the GOC. It was also thought that the project had successfully challenged negative perceptions of technology: "People promise the world, there is a lot of over-promising [of technology], but the GOC has won people over".

Increased perceptions of Glasgow as a safe city

It was felt that the centre at Eastgate is now a known centre of public safety amongst citizens, and offers the public a feeling of safety walking or travelling around Glasgow. Some mentioned the impact the GOC has had on improving the reputation of Glasgow City as a safe environment.



Challenges

The challenges, risks or barriers to delivery mentioned were as follows:

- Project scale, understanding and defining capabilities
- Procurement process and support
- Working with a range of teams, suppliers and contractors
- Engaging staff in co-location
- Available expertise

Project scale, understanding and defining capabilities

Some admitted they initially found it difficult to translate the project vision into more-detailed user requirements; they were not sure what the new facility would actually be able to deliver. This was resolved by allowing time to review and revise the initial user requirements.

Despite the phased software implementation, the majority of the new hardware and infrastructure was required from the outset.

For most, the project has over-delivered on the initial user requirements and succeeded in introducing new technology and collaborative working. It was recommended at the start of the project to identify the customer base and end user to draft user requirements in full. Any project of this scale is often challenging when new technologies are being developed, and will require a degree of fine-tuning. Another challenge participants mentioned was that technical definitions had to be articulated in a different way to different groups as some audiences interpret language or requirements in different ways to others, particularly if it is not detailed.

Procurement process and support

Public procurement, and the parameters local authorities work within, create an additional challenge for technological programmes that are time restricted. Procurement timescales in general were felt to be limiting due to the innovative nature of the programme. Acknowledging the challenge, Glasgow City Council assigned a public sector procurement specialist to the programme, ensuring that timescales were adhered to.

Working with a range of teams, suppliers and contractors

It was expected that working with contractors would involve different experience, expertise and approaches to working. It was noted that there could have been more time dedicated to clarifying roles between agencies, partners and stakeholders at the start of the project. However, considering the short timescale and the number of partners involved, stakeholders generally agreed that overall working with contractors had gone well.



There was some concern that there would be insufficient time to share knowledge before a contractor left. To mitigate this, it was felt important to map the internal knowledge and expertise in place at the start of such a project, and then identify the gaps that could be filled with external support.



Engaging staff in co-location

Teams from different backgrounds and buildings, and from sometimes isolated environments, were relocated into a shared space. For some this was felt to have generated uncertainty in new procedures, new systems, training and the hierarchy of teams within the partnership. In order to mitigate this barrier, a programme of staff communications was established, resulting in staff being guided through the changes.

Available expertise

The GOC programme was a complex integration that was relatively unprecedented in scale, as well as level of complexity. It was felt by some that there were companies that were experts in comms, video, cameras, ICT infrastructure, ICT security and traffic systems, but there were very few who covered most or all of these domains.

Legacy

Development and enhancement of GOC was a core element of a long-term vision, as outlined in the Future Cities Demonstrator Proposal, to create a technological infrastructure enabling the integration of city systems and data across multiple agencies, for the delivery of improved and responsive city services.

For many this is just the start for the GOC. Glasgow was predicted to take the lead for future/smart/sustainable cities throughout Scotland. Future City Glasgow, as a whole, was said to have pushed technology to the top of the GCC and national agenda.

As part of Future City Glasgow's forward-thinking, future-proofed approach, this project carried out considerable work on IT and related infrastructure and systems. These have been intentionally designed to be adaptable to GCC's and the wider city's future needs. 'Future-proofing' was seen as a key part of the project's legacy. The GOC is a state-of-the-art control centre that was built to an 'open standard' business model, meaning that the chosen systems do not lock you into using any one supplier. This business model was adopted to future-proof the systems chosen.

Many noted that public-space CCTV had suffered from under-investment in the past, and it was believed that in some other cities in the UK CCTV networks have been switched off altogether.

Potential applications

There were various ideas suggested by participants for other applications for the GOC, outside of what is currently planned, including:

- Using GOC services to encourage efficiencies and savings in services delivery by extending its use internally to provide a centralised management and control function for GCC which could include refuse collection, antisocial behaviour services, incident response, etc.
- Using live feeds from the GOC to deliver evidence straight to court to make savings in costs of hardware and delivery.
- Integrating with, and offering services to, other public partners across the city, to expand monitoring beyond traffic and public spaces.
- Exploring opportunities to generate additional revenue from offering services to private sector companies and other local authorities, such as providing services for commercial events, sports, music and training exercises.



KEY POINTS SUMMARY

Key Benefits	Key Challenges	Key Achievements
<ul style="list-style-type: none">- The main benefit from this project was felt to be the transformation of technology that city partners now use, and the innovation this has encouraged.- Another key gain was seen to be the improved operational effectiveness that has come from using new systems, through partnership working and sharing assets.- Co-location of teams has been beneficial in facilitating quicker and easier co-ordination between teams, as well as fostering better understanding and experience of colleagues' roles and ways of working.	<ul style="list-style-type: none">- The biggest challenge was creating a single and meaningful purpose for a programme that covered a number of different projects and a variety of teams and partners.- The next challenge was then in translating this vision into detailed use requirements for each organisation involved. Allowing time and scope to review and revise requirements helped resolve this challenge.- Staff uncertainty resulting from relocation and co-location was identified early on as a challenge that would need to be addressed: questions around new procedures, systems, training, partnership and structuring, as well as concerns about moving away from previous office locations. A comprehensive programme of staff communications and change management was vital in overcoming this challenge.	<ul style="list-style-type: none">- Glasgow was predicted by participants to take the lead for future/smart/sustainable cities throughout Scotland and, through the upgrade in the GOC, is now believed to have the highest-spec CCTV network in Europe.- Being built to an 'open standard' means any future upgrades will be easy and quick to install, and minimise any system downtime.- It was felt that that the project has been instrumental in bringing together people from across a range of city organisations, creating effective and lasting partnerships.



OPEN
GLASGOW

The background, description, aims, outcomes, outputs and approach sections of this chapter are reflective of the project initiation document, end-stage reports and other sources of information. The benefits, challenges and legacy of the project capture views and opinions of the stakeholders interviewed.



Background

Cities generate a wealth of data, but most of it is locked away in silos within local authorities and other service providers in the city. Open Glasgow questions the traditional division of datasets by demonstrating what happens when data is available and connected, and how it could benefit a city.

In addition, the cost savings for organisations could be substantial: "Companies in the top third of their industry in the use of data-driven decision making were, on average, 5% more productive than their competitors."¹⁶

Whilst this may or may not translate directly into the work of local authorities, it indicates that it may be possible to increase productivity across Glasgow and make substantial cost savings.

Description

Open Glasgow is a complex project which has a large number of components and applications. These can be grouped into five broad categories:

- Technology needed to publish and analyse data.
- The City Data Hub platform provides the means by which data can be stored, shared and easily found by people and organisations who might want to make use of it.
- Online tools developed using open data – an open-data catalogue, map portal, city dashboard and MyGlasgow app.
- The programme of promotion and engagement around the data and tools, and around Open Glasgow in general: hackathons, engagement hubs, community workshops and online presence.
- Specific case study projects which demonstrate how the data and tools can be used in real-world situations – five specific use cases covering Freedom of Information Transparency, Community Engagement, Crime & Public Sector Reform, Better Insight for Better Decisions (Strategic Investment), Better Insight for Better Decisions (Market Insight).

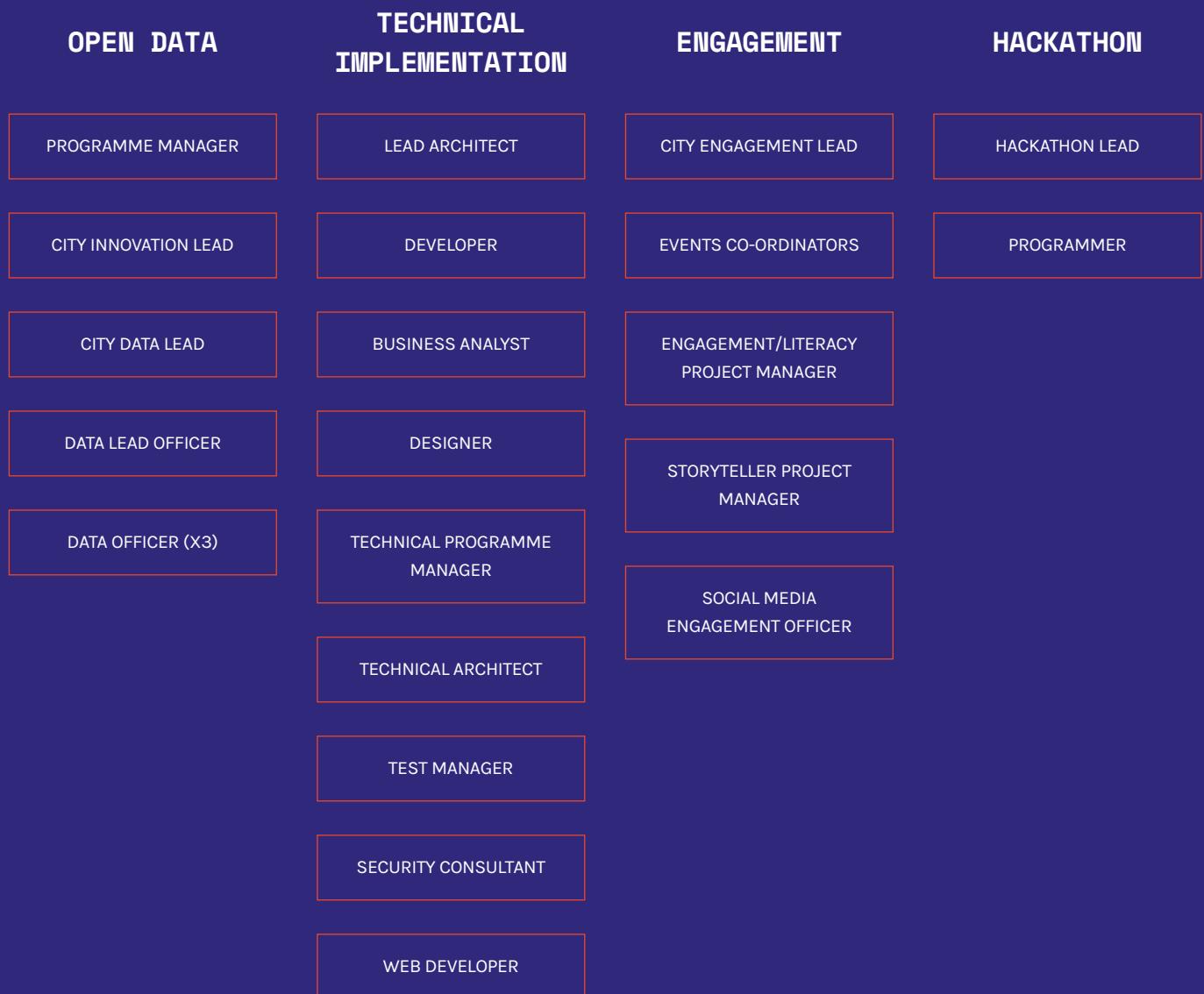
Aims & Overall Goals

The Open Glasgow project aimed to provide a platform for increased transparency, improve the use of data to better inform decision-making, improve community engagement and empowerment, implement service reform and transformation (e.g. targeted and/or proactive service delivery), and enable civic innovation – to encourage third parties such as local entrepreneurs and innovators to solve city challenges. It also aimed to improve and enrich citizens' knowledge of the city, and to improve the city's responsiveness to them, by supporting better decision-making and by providing a foundation for collaborative working across the city.

Budget & Staffing

Open Glasgow had an overall budget of £6.9m. See Fig 3.

FIG 3: OPEN GLASGOW ROLES





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OUTCOMES

Increased transparency.

Better insight to enable better decision-making (for example allowing businesses to better understand footfall).

Targeted community engagement.

Public sector reform (such as using data to target services more effectively or enabling early intervention and proactive service delivery).

Fostering innovation.

OUTPUTS

City Data Hub (a cloud-computing-based big-data platform that can harvest, store and process large complex and real-time datasets from across the city).

A suite of open-source tools that allow people to engage with data: an open-data catalogue, map portal, city dashboard.

Enhancements (including full back-office integration) to the MyGlasgow app to allow citizens to report issues and improve transparency of status/progress.

Promotion and public-engagement activities including Hackathons, general engagement and awareness events, community mapping (citizen-science mapping) events, Coding for Kids, Open Glasgow website, infographics/videos, blogging and social media.

Five ‘use cases’ that demonstrate the value and benefits of what has been built: Freedom of Information Transparency, Community Engagement, Crime & Public Sector Reform, Better Insight for Better Decisions (Strategic Investment), Better Insight for Better Decisions (Market Insight).

CITY DATA HUB

Outputs

The City Data Hub contains 372 datasets.¹⁷ These cover things like counts of cyclists and pedestrians in Glasgow, details of housing stock tenures, information about local authority staffing numbers, and data about Glasgow's bridges, tunnels and aqueducts, as well as real-time (and archived) data on car park availability and traffic volumes. The datasets are hosted on the City Data Hub platform in a number of different formats, and are organised into portfolios of related sets. The scalable platform was created using cloud-computing to allow it to scale to hold a substantial amount of data. It also supports the connection of datasets that were previously housed in distinct locations.

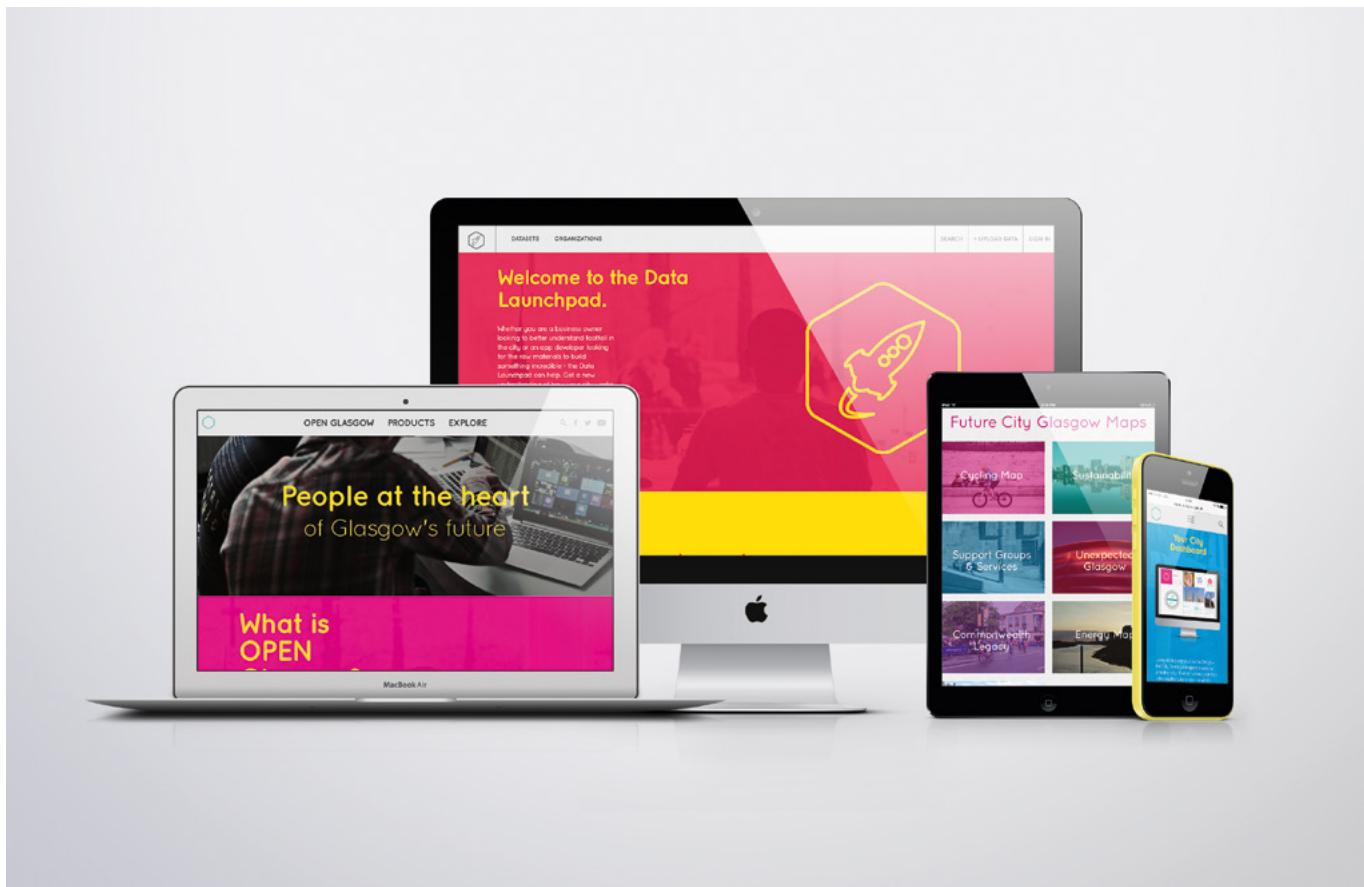
Approach

Although many cities have introduced open-data catalogues and have been publishing open data, there are few in the world (if any) that are designed to process the volume of data that a modern city generates. The Innovate UK competition stated that Glasgow's role was to demonstrate at scale and so the project team set out a vision of what open data would look like when all organisations are publishing open data by default, and where sensors and Internet of Things (IoT) devices are generating large volumes of real-time data.

The City Data Hub project was run using a hybrid Agile/traditional development method given the scale of the underlying platform and the innovative nature of the project.

Benefits

The City Data Hub provides a city-wide scalable means of collecting (including the automation of data collection), storing and analysing large complex and real-time datasets from multiple sources (including partner organisations).



Challenges

The main challenge faced by the City Data Hub was convincing people about the positive implications of opening, sharing and aggregating data. Open Glasgow's initial approach was to present open data as an intrinsically good thing. However, data holders were not always convinced by this, in part because many organisations like local authorities have data that is sensitive and so there are strict controls in place to protect all data, so they tend to take the view that sharing it can expose them to risks.

Responding to these initial concerns and barriers, the City Data Hub team adopted an evidence-based approach and combined it with a strategic programme of stakeholder engagement. Key stakeholders were identified, and a number of use cases that would be of interest were used to visualise the benefits of the programme. Key to this was the Agile methodology used to develop the City Data Hub and its applications. It meant stakeholders could be frequently and regularly shown examples of applications and the progress that was being made towards them. Articulating benefits to stakeholders through the benefits model was seen as another way to mitigate this challenge.

The team also used this evidence to highlight that non-sensitive data does not need to be controlled the same way as sensitive data. Publishing datasets as early as possible was also recommended. It was felt that some datasets that were easily available could be used to demonstrate the controls that are in place when data is published, and this would help to reassure people who were concerned about data protection and confidentiality.

Many participants also felt that GCC and external contractors had different ideas, approaches and working cultures. GCC was viewed by some of the external contractors as slow to make decisions, risk averse and very bureaucratic. However, people within GCC described this as the result of having to follow particular procedures and regulations and be continually aware of GCC's public position. Getting the right balance between these two perspectives was key to balancing good governance and innovation.

Legacy

A key legacy of the City Data Hub project is the City Data Hub itself. It easily makes available datasets that were hard to obtain before in large quantities. However, the City Data Hub was also assembled in a particular way in order to maximise its usefulness in the future. Glasgow's City Data Hub has been designed as a more general tool, which can be used to deploy many specific applications. As it was designed in a modular and adaptable way, it is flexible and scalable. Projects can be developed and tested quickly to show proof of concept, and can be scaled up to meet the requirements of a large city as needed.

The main legacy, however, is that the benefits of better access to (and use of) data have been recognised as a major enabler for the Council's transformation programme. The Council's Strategic Plan has recently been updated and now states:

"Through our Future City Demonstrator we have developed digital and data expertise, information assets and also a Glasgow Operations Centre. As part of the legacy of the Demonstrator, big data and data analytics will support and inform our Transformation Strategy and Programme."

TOOLS DEVELOPED

Outputs

A number of tools were developed to showcase and facilitate the use of the data made available via the City Data Hub. They were as follows:

City dashboard

The city dashboard was intended to allow the datasets hosted on the Data Hub platform to be used online in an accessible way which users could tailor to their needs. It currently allows users to select from a range of information, and to tailor the dashboard to their requirements. At the time of this study, the dashboard allows users to select from the following:

River level	Cycling map	Pollution
Seasonal foods	Hay fever alert	Gritting updates
Traffic alerts	CCTV map	Mountain conditions
Accident map	Glasgow visitors	Glasgow tweets
Weather	Glasgow today	Fuel prices

Map portal

A map portal was developed in order to support the development and use of online maps showing, for example, particular kinds of community or city assets in particular locations. The locations of assets and services are clearly displayed by markers which can be filtered by asset type. It also contains information about libraries, homelessness, health and wellbeing, creating a total of 15 different categories.

MyGlasgow app

The MyGlasgow app had already been developed to allow citizens of Glasgow to report, via their smartphone and other similar devices, 20 different types of problems to GCC, including potholes, fly tipping, graffiti and other issues. The project delivered a redesign of the user experience of the app to make it easier to use, back-office integration and compatibility to remove re-keying of information, and providing real-time status updates back to citizens to keep them informed of progress.

Approach

The tools were developed by a combination of prototyping and Agile development. This allowed them to be developed in short, iterative steps that could be shown to stakeholders and then revised for the next iteration.



Benefits

Map portal

The online map portal allowed users to engage with data in a much more accessible way than would be possible with a spreadsheet or similar source; people are more likely to be familiar with maps of their local area than with spreadsheets. The map portal was straightforward to develop, and remains easy to update and maintain.

City dashboard

The city dashboard allowed citizens to tailor the information they receive on their computer or mobile device about what is happening in the city. Its design meant that it looked good, and felt engaging and accessible. Its open-source design also meant that third-party developers could easily add new features to it.

MyGlasgow app

The MyGlasgow app has provided Glasgow's citizens with a more transparent means of contacting GCC, and of seeing the progress that is made with the issues that they raise. This could help to raise GCC's performance, but could also help to reduce repeat contacts to GCC, as citizens are more informed in relation to their query or complaint. It also improves the quality of the data provided to GCC by allowing, for example, citizens to specify a broken streetlight exactly on a map, rather than by postcode or other means. This fits in with GCC's ongoing enhancements to its customer service via its 'Customer First' programme.



Challenges

Map portal

The map portal was straightforward to deliver, due to its separation from GCC's existing systems and its use of existing technologies so no challenges were indicated.

City dashboard

It has proven to be difficult to encourage citizens to use the dashboard and to encourage developers to develop new features for it. It was assumed initially that a general purpose app would be of interest to citizens and developers in Glasgow, but as the concept of the dashboard had not been tried and tested, it was difficult to get buy-in to a new way of interacting with a local authority. Understanding users' needs more thoroughly at the outset, and promoting the app more once it was developed, may have helped to avoid this.

MyGlasgow app

Integrating the MyGlasgow app with GCC's existing systems proved to be much more of a challenge than was originally anticipated. In the early stages of the project, the wrong balance was struck between developing something innovative and its operational impact, with more emphasis on the former than the latter. A subsequent decision was made to change this balance, and to focus more on the value of the automation of the process and integration with GCC's systems than designing the ideal app.

Legacy

Map portal

The maps provide Glasgow's citizens with information about assets in their area and across the city, which can be added to in the future. GCC will be taking this development forward as part of its digital community engagement strategy, with the aim of increasing the extent to which users can add to and comment on others' contributions.

City dashboard

Although the dashboard itself did not prove to be as popular as anticipated, elements of it are likely to be included in other online and mobile applications for GCC. The city dashboard's good design generates interest, but it needs an appropriate context, either in whole or in part, and it was felt that embedding it elsewhere might help with this.

MyGlasgow app

The MyGlasgow app has provided Glasgow's citizens with a more transparent means of contacting GCC, and of seeing the progress that is made with the issues that they raise. This could help to raise GCC's performance, but could also help to reduce repeat contacts to GCC, as citizens are more informed in relation to their query or complaint. It also improves the quality of the data provided to GCC by allowing, for example, citizens to specify a broken streetlight exactly on a map, rather than by postcode or other means. This fits in with GCC's ongoing enhancements to its customer service via its 'Customer First' programme.

PUBLIC ENGAGEMENT

Outputs

GCC also carried out a programme of public events in order to engage people in the Future City Glasgow project. Citizen engagement was at the heart of the engagement programme. The programme framework was developed following public consultation and involved the following:

Engagement events

Five different types of engagement were undertaken – engagement hubs, mapping events with communities, coding events with children and young people, hackathons and a programme of online marketing.

Engagement hubs were positioned at various locations around the city. These were temporary structures at which specially trained staff could provide information about Future City Glasgow to interested citizens and visitors. Hands-on engagement events of two different types also took place:

1. The Future Makers events involved children and young people, aged 5–17, in which they experienced different aspects of computers and computer programming. Acknowledging that technology is a big part of children's lives already, with smartphones and tablets being highly accessible, the events encouraged children to participate in the developments and understand how the technology worked. The purpose of the events was to create an environment where coding was fun and engaging, providing the children with the confidence to participate. These events had a variety of different formats, including walk-in sessions, one-day workshops and five-day workshops.

2. The Future Maps events invited people from across the city, of all ages, to come together and contribute to creating a detailed, interactive and accessible online map of assets and places of interest in Glasgow. These events removed the barrier of technology at first instance, starting with a large paper map and gradually moving attendees from paper to a digital map. One event mapped out the relationships between green spaces and related organisations (for example, community gardens, food producers, florists, stalled spaces, cafes, fruit and vegetable shops) in Glasgow. Another planned out 'the perfect day in Dennistoun', in that part of the east end of the city.

Hackathons

Hackathons, in general terms, are events where people meet for a short period of time (one to seven days usually)

to solve a challenge. As part of Open Glasgow, four 48-hour hackathons took place focused on the themes of public safety, health, energy and transport. These events were open to everyone. Attendees were not only from the IT/Technology community in Glasgow but from a range of backgrounds. Participants were tasked with solving a challenge focused on the theme of the hackathon which resulted in the teams developing and pitching an idea that could resolve the challenge. They were organised as judged competitions, with the winner of each receiving £20,000.

Website/infographics/social media

In order to promote Open Glasgow overall, and each of the elements of it individually, an online presence was developed. This included a website, films/videos, infographic, blogs and presence on social media.



Approach

- Development of an online social media user base
- Data stories to explain the value of data
- Multimedia to explain the value of data (including videos, infographics, etc.)
- Organisation, marketing and implementation of mapping events with communities
- Organisation, marketing and implementation of Future Makers initiative for school children
- Organisation, marketing and implementation of four hackathon events
- Design and build of a physical engagement hub complete with audio, video and multimedia



Benefits

Engagement events

The series of coding events for children and young people (Future Makers) were thought to be of benefit to the young people involved. They had a chance to learn new skills, at no cost, that could be beneficial to them in the future. The external organisation brought in to run these events noticed higher than usual levels of interest around the time that the events occurred, indicating that their profile had been raised.

The Future Maps events provided a new way for citizens to engage with GCC, and led to the use of the well-received open-suggestion map, in the public consultation on the regeneration of the Sauchiehall Street area of the city. Both the Future Makers and Future Maps events provided the external organisations involved in their delivery with positive and empowering experiences to drive forward their area of business.

Hackathons

The hackathons had a number of benefits. They supported interaction between the teams involved in the competition, GCC members and other people across the public sector. They supported a creative environment where new ideas were generated and where GCC was able to explore in a less risk-averse way than they might do normally. They also supported enhanced interaction between GCC and the IT/Technology community in Glasgow.

Website/Infographics/Social Media

Those involved in the creation and design of the website and online presence were very satisfied with them, and felt they met the required expectations for a branded consumer product and had a clear identity.

The layout and design of the open-data portal were also praised for presenting data in an accessible way, encouraging people to use the portal and the data.

PUBLIC ENGAGEMENT

Challenges

Engagement hubs

The engagement hubs were not viewed as mobile and could only be used once. This limited the number of times they could be used to promote and support the programme. It was felt that something more nimble and adaptable would have been more appropriate and reusable.

The hubs were located in areas of high footfall and tactically positioned throughout the city to ensure full city coverage. However, the organisers of the hubs found it tricky to obtain permission to site them in some locations initially suggested, which was partly due to event compliance requirements.

It was felt that any public-engagement activities should be timed to happen only once certain milestones in the project had been reached. Deploying them too early meant that there was an insufficient amount of detail to provide to people to help them envisage what Open Glasgow was going to achieve.

Engagement events

Those involved in the Future Makers events felt that, although attendance at them was high, they could have been promoted more effectively beforehand.

The scope of the development of the mapping tools changed due to unforeseen circumstances, resulting in a change in delivery. The solution implemented was felt by some to be less adaptable than the one that had been previously planned. This meant that at the end of the programme, the full aspirations for the maps were not quite achieved.

Hackathons

The hackathons faced some logistical challenges. One was ensuring that the venues were able to accommodate large amounts of IT equipment and internet traffic. Another was ensuring that the venues understood that the hackathons would go on all weekend, and that they needed to be able to support this in terms of access to the building, catering and their public liability insurance.

It was recommended that timing is important in the context of a programme like Future City Glasgow. It was felt that the hackathons had occurred at a stage that was too early and that may have limited their effectiveness.

It was also noted by participants that it would have been good if there had been a prebuilt network of support to help guide participants of the hackathons to develop their idea.

Website/infographics/social media

There was a feeling that, although there were good relationships between staff at GCC and external contractors overall, it was sometimes hard to achieve consensus around what was and was not appropriate. This meant that getting things approved and signed off took longer than anticipated because policy had to be complied with.



Legacy

Engagement events

The maps developed as part of the Future Maps events were considered to be of use to communities now and into the future, and were recognised to be a powerful community engagement tool.

The children and young people who attended the Future Makers workshops were able to playfully explore different aspects of IT and computer programming. This may have been an opportunity that they might not otherwise have had.

Hackathons

The main identified legacy of the hackathons was the impact they were felt to have had on the IT/Technology start-up and student community in Glasgow. It was felt that

they had inspired real momentum in the teams that had been involved.

It was also thought that the hackathons had a positive influence on GCC. They demonstrated both new ideas and a new approach to generating new ideas that could be useful in future exercises.

Website/infographics/social media

The main legacy of the website and design work was the opportunity to articulate the benefits of a large technological programme in a playful and engaging manner. This approach to design along with the open typeface adopted was not one that would have naturally been adopted by GCC.

USE CASES

Outputs

Five ‘use cases’ were developed and implemented to demonstrate how open data and the tools developed from it can be used in real-world situations, in order to show how open data can add value to the lives of people and businesses in Glasgow. They were as follows:

Transparency (Freedom of Information (FOI))

This use case was intended to show how open data could be used to streamline GCC’s processes for dealing with Freedom of Information (FOI) requests within the Land and Environmental Services (LES) department of GCC. The top 10 most frequently requested datasets were identified, collected and prepared for public use, and then were shared online via the portal, with a view to reducing the extent to which people at GCC had to spend resources on FOI requests. A publicity programme was undertaken, focusing on touchpoints where members of the public would be likely to look for information online about requesting information under FOI from GCC.

Better Insight for Better Decisions (Market Insight)

This use case involved Glasgow City Marketing Bureau (GCMB) and city centre retailers. Open data was used to attempt to demonstrate deeper insights into retail-related activity in the city centre, in order to help to inform decision-making by GCMB and the retailers. Open data, events data, and retailers’ footfall data were aggregated to create an index which retailers and GCMB could use to predict when the city centre would be busy, often in response to events organised by GCMB. An index of this type would be of benefit to optimise event selection and planning, directly impacting the retail sector.

Better Insight for Better Decisions (Strategic Investment)

The Strategic Investment use case was developed to demonstrate how better access to data can help inform planning and enhance decision-making within the city’s regeneration strategy decisions. The project focused on a key strategic initiative under the city centre strategy. A pilot project to develop a new regeneration framework for one of nine new city centre districts was chosen as a test case. A portfolio of data relating to regeneration was created, containing 70 datasets, including information about active travel, energy, environment, health, education, economics, transport, tourism, numbers of people on benefits, train station usage and housing stock details. Re-using the lessons from Future Maps, the project also used paper and interactive maps as part of the engagement and consultation with the local community.

Community Engagement

The Community Engagement use case was intended to facilitate communities’ use of the online mapping tools, allowing them to curate and to both use data published by the public sector and also share their local information about assets in their local area with others. Communities were shown how to map key assets that they identified in their area and how to develop the maps themselves, embedding this knowledge in the community in a transferable way. Communities in three areas of Glasgow participated – Easterhouse, Drumchapel/Anniesland and The Gorbals. For example, in Easterhouse a map was created showing local services that might be of benefit to people recovering from addictions. These asset and service maps can be used for signposting services for members of the community or community and service planning.

Service Reform

(Proactive Service Delivery (Crime & Community Safety))

Community Safety Glasgow (CSG) analyses large volumes of data to understand crime and public safety. The aim of this project was to demonstrate how this could be improved using advanced analytics so that it could become more predictive. Work was carried out with CSG to establish how open data could be used to uncover new insights about crime and community safety in Glasgow. Rather than analysing where the current hotspots are, we can use data to predict where future hotspots might be.

Approach

The responsible officers in each of the use cases were recent graduates, some of whom had been involved in earlier engagement work, in the engagement hubs, for example. Their work on the use cases provided them with early-career experience.

Benefits

Transparency (Freedom of Information (FOI))

It was indicated that this process of opening data had helped make new contacts across different, disconnected, parts of GCC, and would lead to some tangible benefits in the future, specifically:

- As a proof of concept and to convince other departments that opening data in this way would be worthwhile.
- Automated data that is frequently requested would be made open by default, reducing the cost of FoI requests.
- The lessons and practices learned as a result of this use case are transferable to other local authorities and public bodies, as they share the same obligations under the FoI legislation.

Better Insight for Better Decisions (Market Insight)

The Busyness Index produced by the Market Insight use case provided a tool that can be used by Glasgow City Marketing Bureau (GCMB) and city centre retailers to predict how busy the city centre is going to be in response to particular events. It is a more sophisticated and accessible tool than previously, and aggregates data from a number of different sources and produces a single figure as a measure of 'busyness'. Previously, each organisation had to rely on its own internal datasets (and any others they may have been able to access) which they would have had to analyse themselves.

GCMB has also benefitted as it is now able to draw on more information when making applications to GCC for funding to support planned events.

Better Insight for Better Decisions (Strategic Investment)

The public consultation process for the city centre regeneration exercise was enhanced by the addition of an open-suggestion map. This provided citizens with alternative and innovative means of responding to the consultation.

The portfolio of data relevant to this area, which was created from datasets available on the open-data portal, can be used for other regeneration activities in this area. This could save time and effort in the future.

Community Engagement

There were three levels of benefit seen to have come from the Community Engagement use case:

1. Access to local information on assets, services, demographics and statistics has helped to inform community planning
2. Better signposting of services and events
3. Increase in use of community assets and services

Two maps were created as a result of this use case, and a number of people were trained on how to develop the maps. It was felt that the map in Easterhouse helped GCC support vulnerable people in the city and ensure that they are accessing services that they feel can help their recovery. Some of the people who worked on the map, and who learned how to create them, have learned new skills and obtained paid employment as a result. As community members have the skills to develop new maps, and because the mapping tool is very adaptable, it is possible that it will continue to be used for a variety of different projects in the future. The heritage walking map in the Gorbals also provided people with insights into their local area that they may not have had before, as it relates images of what the area used to look like to how it appears now. It could also encourage people to walk more and so get more exercise.

Crime & Community Safety

It was acknowledged that CSG and Police Scotland currently use data analytics to make earlier interventions. However, the programme worked closely with the team to identify approaches that would enrich the analysis.

USE CASES

Challenges

Transparency (Freedom of Information (FOI))

The main challenge reported on this use case was the result of there being a 'hub and spoke' FOI department within GCC: each department deals with FOI requests independently.

It was felt very strongly that the approach adopted provided a model that could be used by other local authorities to make the FOI processes cheaper and more efficient. It was also thought that, in retrospect, more could have been done earlier to engage with and develop key stakeholder contacts.

Better Insight for Better Decisions (Market Insight)

The main challenge faced by this use case was obtaining data from retailers which could be used to inform the Business Index. In addition, some of the larger high street retailers could not see initially how this use case would do anything that they were not able to do already. As with all of the Open Glasgow projects it was important to prototype to demonstrate the value that the data would provide.

Better Insight for Better Decisions (Strategic Investment)

Given the success of the open-suggestion map, to help people contribute to the regeneration consultation, it is recommended doing this for future, similar consultations. It is also recommended the user-centred design process should be implemented in similar situations in the future.

Community Engagement

The main challenge in this use case was the amount of time it took to establish connections with the communities involved. Building trust and good relationships with community members took longer than anticipated; some community members were sceptical of big organisations generally, and so their trust cannot necessarily be taken for granted from the outset.

It is recommended to start engaging with communities at an early stage of such a project, as early as possible. Having someone on the ground, getting involved earlier, would have helped to move things forward more quickly.

Service Reform (Crime & Community Safety)

In this use case, it proved not possible to obtain some of the data that the project depended upon within the timescale of the project. For example, it was only possible to use crime-related data gathered by GCC (e.g. noise complaint numbers) and not from Police Scotland due to data protection. In addition, Strathclyde Passenger Transport (SPT) indicated that information relating to the number of people travelling in and out of the city centre was

commercially sensitive. This meant that the data was less accessible than had been anticipated.

The key lesson arising from this use case was that, in contrast to expectations, datasets are often unavailable. It is therefore recommended establishing availability at as early a stage as possible.

Legacy

Transparency (Freedom of Information (FOI))

There is potential that an open-data approach to FOI helps in saving money across many departments in GCC. If each were to identify their most frequently requested datasets, and make them freely available via the data portal, then more efficient use of staff time could possibly be made.

Community Engagement

The asset and service mapping undertaken by Open Glasgow is expected to underpin the following principles of partnership and place-based solutions set out in the Council's Strategic Plan.

There are a number of specific legacies resulting from this use case. The maps of community assets can be used and updated in future by communities. New maps can also be created as communities identify the need for them, as the platform for creating them is very flexible and easy to use. Communities have not only learned how to add details to the maps, but have also learned how to create the maps themselves. This has left a legacy of transferable skills within those communities.

Better Insight for Better Decisions (Market Insight)

The main legacy of the Market Insight use case is the Business Index. It can be used on an ongoing basis by GCMB and retailers to inform their investment decision-making. Opportunities to use the Index for transport planning and scheduling council staff will also be explored.

Better Insight for Better Decisions (Strategic Investment)

The general approach of increasing access to more contextual data associated with the area of a regeneration project has been adopted for other city centre strategy projects.

Another legacy from this use case is the open-suggestion map that was used to enable people to participate in the public consultation. This provided an alternative means of engaging with the public and gathering information and views. This approach could be used in other similar consultations in the future.



OVERALL BENEFITS

The Open Glasgow project is very much in keeping with the broadly experimental nature of the Future City project, and shows how the programme operated as a proof of the concept that opening data and using it in the right ways, in a local authority context, is worthwhile.

In addition, the Open Glasgow project, and the awards GCC has won for its work on it, reflects well on Glasgow and enhances its reputation internationally as a major, forward-thinking, world-class city. At the onset it was difficult to articulate the benefits of the Open Glasgow project or fully realise the potential, and the use cases have helped to tell this story.

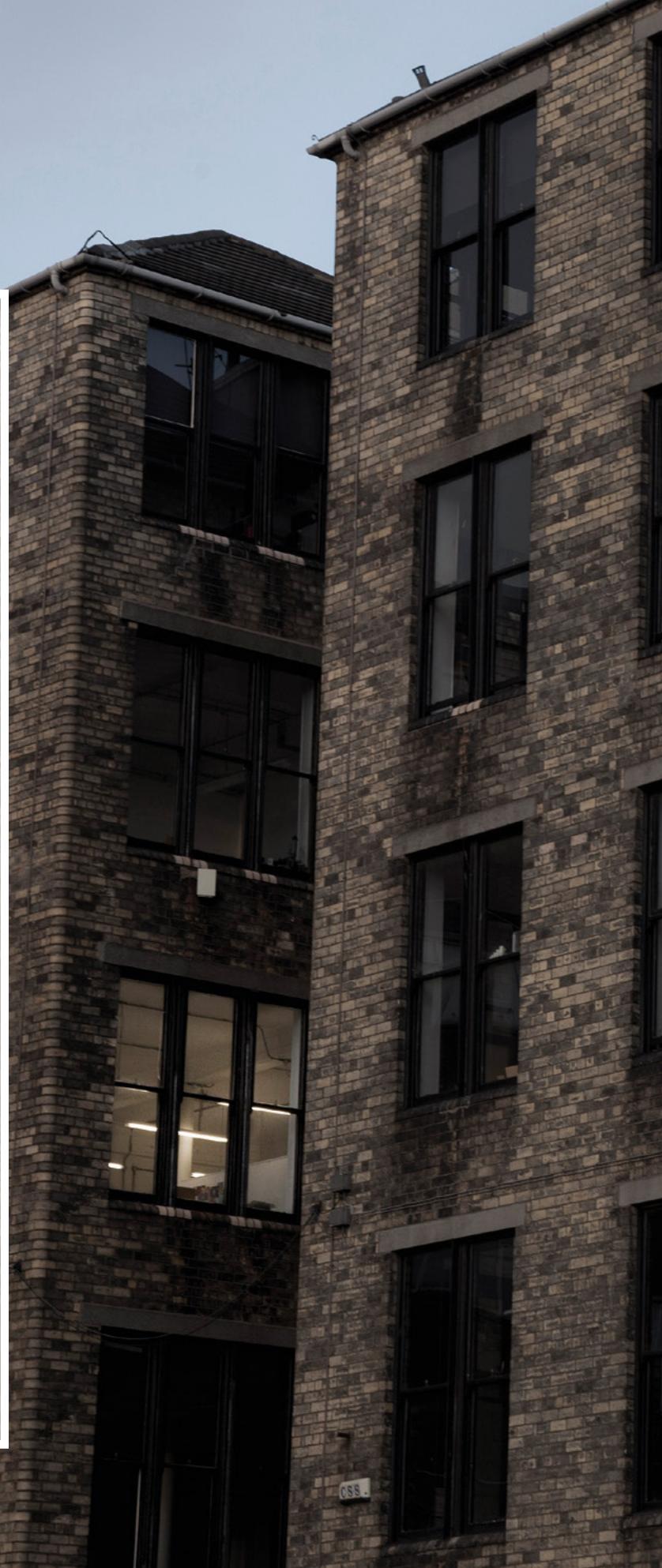
There has been a positive cultural change within GCC as a result of Open Glasgow. Lessons have been learned from it and GCC is looking to embed these in the heart of its ongoing work, possibly involving a shared service for data analytics and using data within the context of community engagement. This was not anticipated as an outcome, even within the most positive expectations. This overall enhancement in the credibility of open data may mean that it becomes easier, over time, to open up more sensitive datasets and expand its use within GCC.

Open Glasgow has seen GCC work with a range of organisations that they might not have worked with had the project not happened. This has brought new people into GCC, either as employees or as external contractors, many of whom were small, local businesses. This has been a disruptive influence on both GCC and on the external contractors, but many of the people we spoke to felt that it had been positive overall. They felt that GCC had benefitted from new approaches and new ideas, and the businesses had benefitted from paid work, being involved in a high-profile project, and from having a substantial case study to which they could refer in the future to win new business. People

generally felt that this had had a lasting positive impact on GCC and on the businesses in Glasgow, particularly within the IT/Technology sector.

KEY POINTS SUMMARY

Key Benefits	Key Challenges	Key Achievements
<ul style="list-style-type: none">- GCC is looking to embed open data approaches more broadly within its work, demonstrating that it perceives the value of this approach.- The value of increased access to data and data analytics for enabling services to be redesigned and enabling better outcomes has been recognised and now sits at the heart of GCC's Council Strategic Plan.- Open Glasgow has brought new people into contact with GCC, either as employees or as external contractors, many of whom were small, local businesses.- Open Glasgow has allowed GCC to begin to articulate the benefits of open data. For example, the Market Insight use case built on the relationship of GCMB and city centre businesses and focused on understanding movement when events are taking place encouraging GCMB to effectively plan events for the benefit of the city.- Glasgow's citizens now have tools at their disposal which they can use to find out about assets in their local area, and across the city, and which they can use to conveniently submit their views on consultations. This can be used to empower communities and enable more place-based solutions.- GCC has enhanced its public reputation as a result of having won awards for its work on Open Glasgow.	<ul style="list-style-type: none">- Convincing people to share and open their data was the main challenge faced by Open Glasgow. People and organisations were often initially unconvinced about the positive implications of opening, sharing and aggregating data. Early, strategic and evidence-based stakeholder engagement was one key solution to this.- The timing and co-ordination of some public-facing aspects of Open Glasgow proved to be a challenge. Some were felt to have occurred too early, before they could properly reflect or be integrated with other parts of Open Glasgow.	<ul style="list-style-type: none">- One of the main legacies of Open Glasgow is the City Data Hub. It is a modular and scalable tool which can be used to make better use of data generated across the city and deploy a wide variety of applications.- The maps of community assets across Glasgow are another key legacy, as was providing the communities themselves with the skills to develop and update the maps. This will maximise the chances that they continue to be used in the future.- The children and young people who attended the Future Makers workshops and who learned about IT and computer programming are also a legacy; they have learned new skills and may have developed an interest in something that could be useful for future careers.



The background, description, aims, outcomes, outputs and approach sections of this Demonstrator chapter are reflective of the project initiation document, end-stage reports and other sources of information. As with previous chapters, the benefits, challenges and legacy of the project capture views and opinions of the stakeholders interviewed.

Background

Being more energy efficient does not only provide a financial and carbon reduction benefit, it also acts as a means to reduce peak electricity demand on the electricity network. The World Health Organization (WHO) trends show that urban populations are expected to grow approximately 1.84% per year between 2015 and 2020, 1.63% per year between 2020 and 2025, and 1.44% per year between 2025 and 2030. Addressing this potential demand now is a challenge for cities across the world.¹⁸

In addition to the increasing demand on the network nationally, the Scottish Government has committed to a 42% emission reduction by 2020, as legislated by the Climate Change (Scotland) Act 2009. Glasgow has also set targets to reduce carbon emissions (by 30%), whilst also promoting sustainable energy, underlining Glasgow's aspirations to become one of Europe's most-sustainable cities.

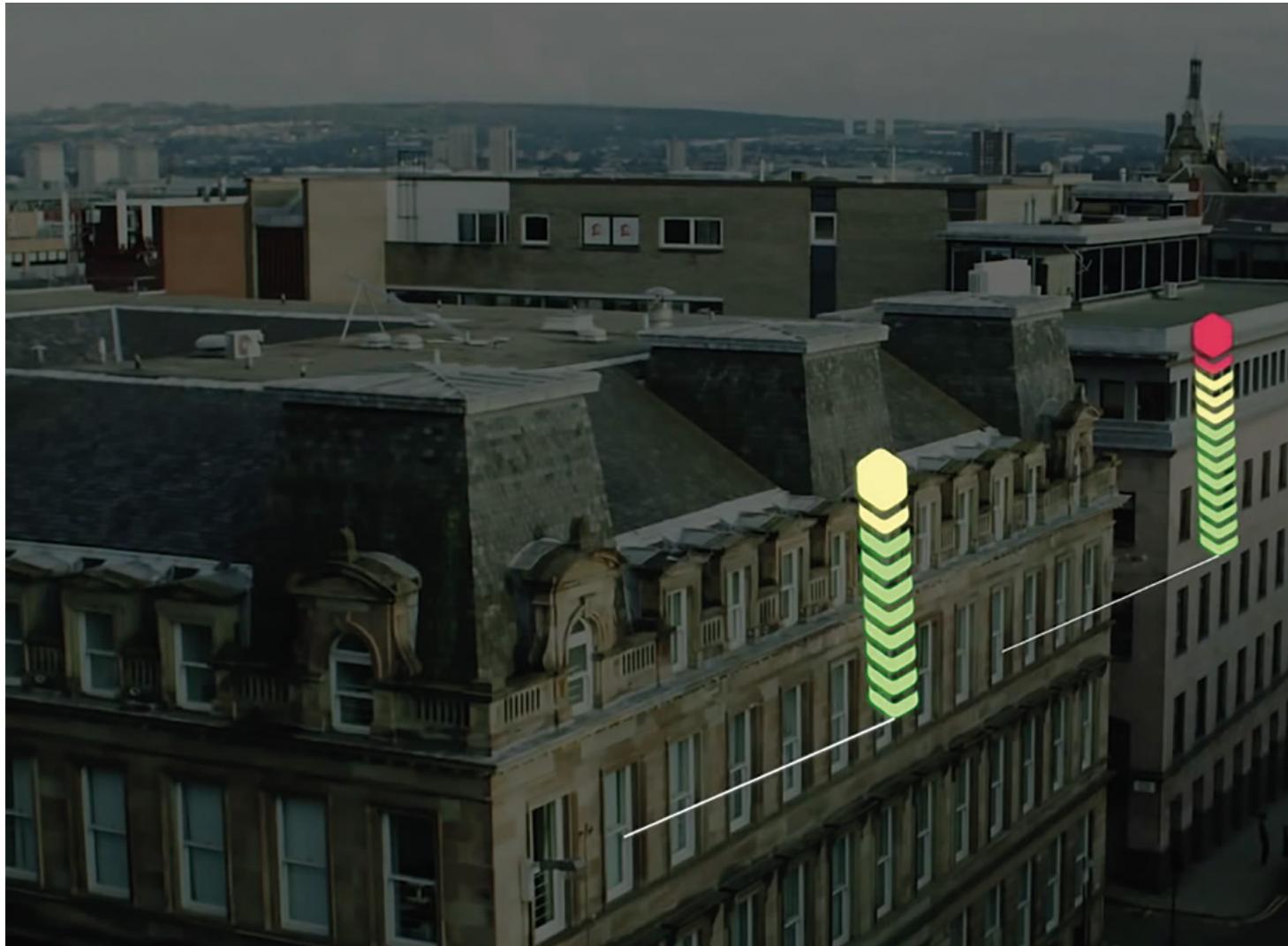
Description

The Energy Efficiency Demonstrator aimed to show how Glasgow can improve energy efficiency, planning and transparency through the use of integrated technology and data to promote and enhance energy efficiency in buildings and housing.

In recognition of the holistic scope of energy, the programme was broken into five separate projects: Virtual Building Modelling/City Energy Model, Demand-side Management, Housing Tenement Retrofit, Renewables (PV) Mapping and Behavioural Change.

Focusing on Glasgow's challenges, and building on the foundation of how to inform or influence behavioural change, each project presented different opportunities, and included both domestic residency and commercial aspects.

A collaborative city partner network was created to drive the projects, striving to understand the market failures for energy efficiency through data analysis, and provide a demonstration of how the proposed projects could influence the transformation to an energy-efficient city.



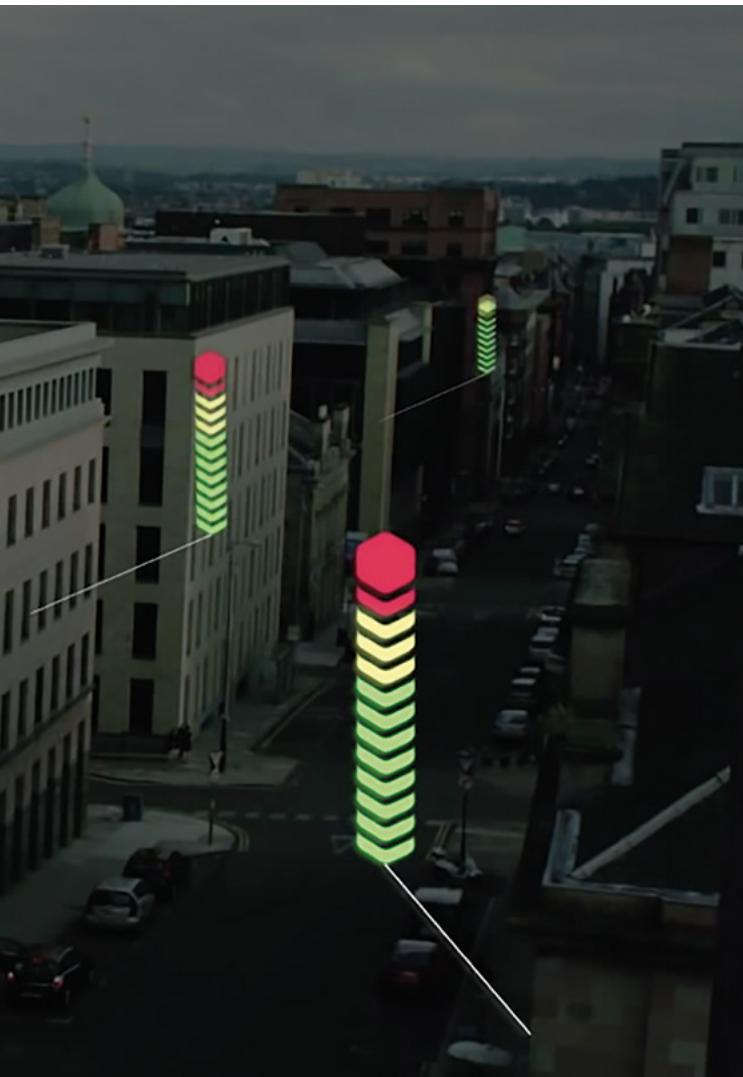
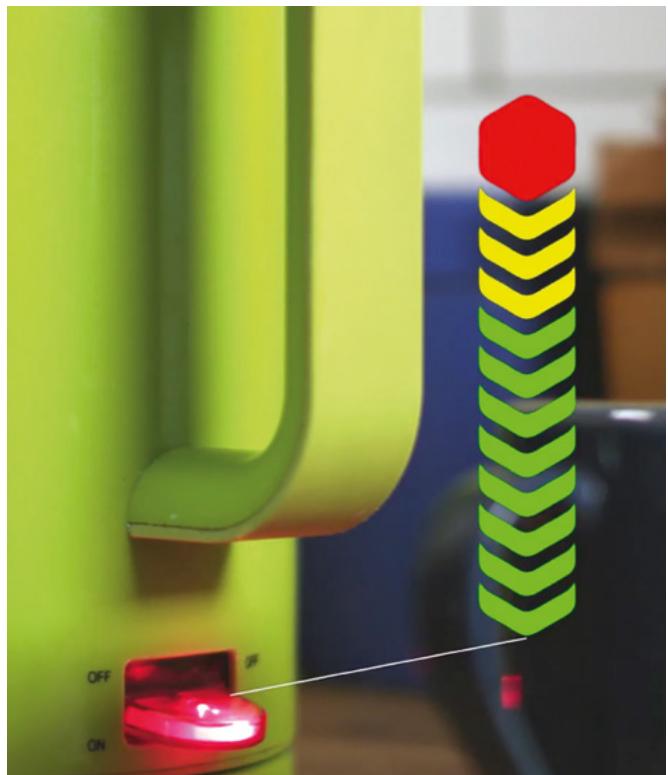
Aims & Overall Goals

The Energy Efficiency Demonstrator aimed to identify technologies and systems to improve energy efficiency in Glasgow. The five work streams set out to identify replicable Demonstrator projects for further energy efficiency and 'smart grid' applications, promote and enhance energy efficiency across the city, and capture energy-related data which could then be published for city use.

Budget & Staffing

At project initiation stage the budget was £1,000,000.

The programme officer and Demonstrator leads were responsible for creating weekly plan updates, status reports and workstream risks, and issues and dependencies reviews. All governance was controlled and monitored through the programme PMO. Monthly finance reviews were held with the Demonstrator's programme manager and a finance representative.



"Fuel poverty is increasing rather than decreasing but the wider realisation for Glasgow is that there are an increasing number of people impacted by rising energy prices and the lack of efficient energy usage, so this is actually a problem for the wider population of Glasgow and not just those who spend more than 10% of their household income on fuel. Significant investment is being made to improve energy efficiency in homes."¹⁹

OUTCOMES

Improved energy efficiency through integrated technology to promote and enhance energy efficiency in buildings and housing in Glasgow.

Improved energy planning data: opened up actual consumption information for buildings across Glasgow for energy planning purposes; enhanced GIS mapping and online mapping tools to enable better energy planning in the city.

Increased transparency of energy data: opened up GCC energy data produced via half-hourly meters, automatic meter readers (AMR), building management systems and buildings sensors; ensured all data produced via the Demonstrator project is integrated with the City Data Hub and, where applicable, the Glasgow Operations Centre.

Identified replicable Demonstrator projects for energy efficiency: engaged with partner organisations through the Sustainable Glasgow network to identify replicable Demonstrator projects for energy efficiency and smart-grid applications.

Increased opportunities to secure energy efficiencies: utilised and analysed the data outputs and other materials to generate a wider understanding of energy and the opportunities to secure efficiencies at macro and micro levels.

Identified research opportunities: linked with the city's universities to identify research opportunities that will support the energy efficiency objectives of the Demonstrator.

OUTPUTS

Virtual Building Modelling /City Energy Model

- Development of an energy app.
 - Enhanced understanding of energy consumption of homes and business across the city.
 - Access to detailed consumption information.
-

Demand-side Management

- Installation of demand-side equipment in 10 Glasgow City Council buildings.
 - Improved understanding of potential to use demand-side management both for energy efficiency improvements in buildings and to support the electrical network through load shifting, peak shaving and emergency response.
 - Development of a third-party-hosted software interface that allows demand-side events to be scheduled remotely.
-

Housing Tenement Retrofit

- Installation of sensors in 60 homes, of diverse building types, across Glasgow.
- Understanding of the impact of retrofit insulation to each property, both positive (energy savings) and negative (potentially increased moisture levels).
- Development of a database of building types and insulation systems which have been demonstrated to work.
- Extrapolation of the database to identify similar properties across Glasgow that proven insulation systems can be applied to.

Renewables (PV) Mapping

- Development of a renewables opportunity map.
 - Identification of vacant and derelict land sites suitable for renewables (photovoltaic (PV)) deployments.
 - Improved understanding of renewables opportunity and likely constraints to developments within the council planning department.
-

Behavioural Change

- Understanding the views and concerns of citizens around energy.
- Understanding of the ways in which the people of Glasgow are most likely to be influenced to change their energy behaviour.
- Development of media material (video) that highlights those issues most likely to affect change in the context of energy reduction
- Development of a 'gamified' engagement tool that will be used to influence the behaviour of the people of Glasgow to reduce energy usage.

Approach

The project team worked collaboratively with partners in the Glasgow area to explore opportunities for improving energy efficiency. The programme was broken into five workstreams which focused on the delivery of integrated improvements as follows:

1. Virtual Building Modelling/City Energy Model

The National Records of Scotland population projections forecast that Glasgow's population will grow by 15% between 2012 and 2037, an increase of 90,000.²⁰ The strain on the network therefore has to be managed and controlled, increasing the need for urban energy analysis.

Addressing this situation, Glasgow developed an online virtual building tool and energy app to assist businesses and residents in the city to obtain bespoke advice on actions they could take to make their buildings more efficient.

The data presented in the tool also provided a platform to understand the energy consumption across the city to inform city energy plans whilst working with Open Glasgow to anonymise data and, where appropriate, publish on the City Data Hub.

2. Demand-side Management

Demand-side management is the controlling of electrical demand through energy-efficient methods. Building management systems provide a valuable platform to understand and support the electrical network through load shifting, peak shaving and emergency response.

GCC, as part of the Demonstrator, installed demand-side equipment in 10 locations whilst developing a third-party-hosted software interface to allow scheduling of demand-side events remotely.

3. Housing Tenement Retrofit

There are many diverse building types in Glasgow from Victorian buildings to modern new builds. In many instances retrofit installation is used for energy savings without understanding the positive (potential energy savings) and negative (potential increase in moisture levels) reactions to this course of action.

The Energy Efficiency Demonstrator installed sensors in varying building types to monitor the action of retrofit installation. A database was developed detailing the building types, insulation systems used and results, to inform future insulation choices per building types.

4. Renewables (PV) Mapping

Renewable energy is a valuable commodity, and is vital in addressing the additional demand on the system that increased urban living will cause.

Glasgow recognised that there are a number of vacant and derelict land sites throughout the city, some of which

are suitable locations for hosting renewables such as photovoltaic (PV). The renewable opportunity map presented a chance to fuse the available land with opportunities and likely constraints to inform applicants to use the vacant and derelict land.

5. Behavioural Change

Being energy efficient involves individuals taking practical steps to reduce energy consumption. Providing accessible and engaging platforms to access information may encourage citizens to make changes.

Understanding the views and concerns of Glasgow citizens around energy provided an awareness of how citizens are most likely to be influenced to change their energy behaviour.

This awareness informed the development of platforms to interact with and understand energy efficiencies in the home. It also led to the development of a 'gamified' engagement tool specifically aimed at school children.

Benefits

Energy efficiency in individual homes and businesses is integral to reductions in carbon emission and energy consumption, and it was believed the virtual building model, and the data gathered from the Demonstrator, would support stakeholders in taking ownership of their own energy usage.

From primary interviews conducted, it was felt that housing associations, the Scottish Government and Council family would be able to use the evidence/tools produced by this Demonstrator project to be more cost efficient and to evaluate energy streams. Participants also mentioned long-term benefits, such as there being a more energy-efficient future for Glasgow and over time being able to demonstrate the power of data.

The programme findings around data led to revised methodology which was proposed to the UK Government through the Smart Cities Forum as an improvement to publishing historical energy data.

It was clear those involved in this project were pleased with the personal benefits the project offered them and were proud of what the project had achieved. Examples include having been able to demonstrate how to get and use data for local authorities and communities through different tools and models that were developed for the projects, and that specifically the city model has produced something very tangible that GCC can now benefit from.

In addition, the work conducted for the Energy Efficiency Demonstrator was seen to benefit employees in GCC, as working in multidisciplinary teams provided opportunities for learning amongst all staff involved. It was noted that this has moved staff out of silo working and that it has given staff hands-on experience of new ways of working.

Challenges

A number of challenges were faced over the course of the project, some expected and some unexpected. Challenges were grouped into three main areas:

- Technical know-how and data privacy requirements
- Collaboration
- Future challenges

Technical know-how and data privacy requirements

There was an expectation that there would be technical issues with the work to be carried out. Several of the projects within the Energy Efficiency Demonstrator included at least some work which required a considerable amount of technical know-how. It was felt that if this was anticipated early enough in the process, the team could forward plan and recruit the right people with the right skills.

Within some projects there were requirements around data privacy: a privacy impact assessment was carried out with the help of the legal team; a data protection statement was required for housing associations; and a brochure for owner-occupiers covering liability for any potential damage, access to properties and health and safety issues was created.

It was noted that it would be vital to consider any legal aspects early on in the project life cycle and to start the process to sort these out as early as possible.

Collaboration

In certain cases it was felt there was a challenge in the differing approaches to working between academics and GCC. It was recommended that setting out an agreed approach to working with partners in the future would be beneficial. The development of collaboration agreements between all partners helped this good working relationship, by framing each project and the attendant responsibilities prior to each project commencing.

In other parts of this Demonstrator project legal arrangements needed to be put in place. This was often seen as time-consuming but necessary to ensure the projects were operating within the correct legal frameworks, and that all parties involved (GCC, external partners and housing associations/citizens) were duly protected.

With regards to the housing insulation project, the main challenge was participation and encouraging citizens to sign up to the project. However, working in partnership with the local Housing Associations helped to mitigate this challenge. After speaking with residents regarding the project, it was felt most were keen to take part.

Future challenges

One of the most immediate concerns raised was project follow-through due to changes in the amount of time key people were spending working on the project. These changes in project staffing meant that more co-ordination



was required to ensure that what was done within the project would actually be used and that it moved to business as usual.

There was agreement that progress in terms of a move towards energy efficiency was positive. Projects conducted in schools used 'gamified' products to make school children more aware of how to be more energy efficient so the effects could trickle through to parents and the rest of the family. Determining the impact of these kinds of interventions is typically more difficult to measure in the short term.

More targeted communication was recommended to increase uptake of the tool, whilst at the same time improving the data that can be collected so it becomes a more valuable tool for GCC.

Legacy

Demand-side management has many proven benefits, including the potential for financial savings due to better management of energy use, and the potential to switch off some unnecessary energy streams.

The virtual mapping project holds vital city information; however, this information needs to be updated to ensure that it is an accurate and true reflection of the city.

The Sustainable Glasgow initiative has committed to reduce the city's carbon emissions by 30% by 2020, and this was seen as a challenge. However, it was believed that the lessons learned through this Demonstrator will contribute to delivering this commitment.

A considerable knowledge base specialising in energy efficiency has been developed which can be built upon in the future for the promotion and endorsement of energy efficiency.

KEY POINTS SUMMARY

Key Benefits	Key Challenges	Key Achievements
<ul style="list-style-type: none">- Virtual building modelling/city energy model provides Glasgow with additional information that local authorities do not typically hold.- Development of the city model was seen to be a real benefit of the project, as it has given GCC something tangible to demonstrate to the public and other local authorities.- Through working on this project many members of staff within GCC were exposed to working across multidisciplinary teams, and thus were able to experience working in new areas and in different ways – this was also viewed as a great benefit of the Energy Efficiency Demonstrator.- The tools developed and additional data collected provide a platform for change and encourage Glasgow and beyond to build on the work completed.	<ul style="list-style-type: none">- Dealing with any data privacy issues arising from the different sub-projects. A privacy impact assessment early on helped to understand how to address these challenges and led to a smoother delivery.- Encouraging citizens to use the apps and tools developed.- Establishing the full benefit of tools within the restricted timelines.	<ul style="list-style-type: none">- This project has provided early indications that there will be financial saving from the reduction of energy use and scope to manage the increased demand on the network.- Extensive background work to map the whole city in the virtual mapping tool has proved incremental in understanding the benefits of the tool. There is a vital need to keep the information up to date to be able to use it to its full potential.



INTEGRATED SOCIAL TRANSPORT

The background, description, aims, outcomes, outputs and approach sections of this Demonstrator chapter are reflective of the project initiation document, end-stage reports and other sources of information. As with other chapters, the benefits, challenges and legacy of the project capture views and opinions of the stakeholders interviewed.



Background

The Integrated Social Transport Demonstrator focused on social transport within GCC. Glasgow identified high-level challenges within the themes of transport, health, energy and public safety. Following consultation, the Integrated Social Transport Demonstrator project focused on improving scheduling and fleet management through effective use of innovative technology. GCC operates 204 additional support for learning transport vehicles across the city, servicing both Education Services and Social Work Services in the City. The project offered an opportunity to show how sharing technology would allow transport operators to schedule and manage their vehicles more effectively, identifying fleet downtime whilst also reducing costs of service and reducing fleet CO₂ emissions.

Description

The Integrated Social Transport Demonstrator focused on delivering an enhanced integrated system for GCC and its transport partners. The project aimed to use 'big data', asset management and operations systems to create an accessible and interactive system. This system would manage the council's fleet services to improve schedules, route planning and availability of information.

Aims & Overall Goals

The goal of the project was to create a scheduling and route optimisation solution to improve fleet utilisation and end-user services in Glasgow. It was hoped that as a result of this project GCC would easily be able to:

- Manage demand, end to end
- Replace manual, paper-based planning with new technologies, and thus make the management of processes across all services easier
- Reduce the fleet's carbon footprint
- Increase operational efficiency
- Manage volume of traffic and traffic-related pollution

The project's goals were to find innovative ways of delivering GCC fleet services which are integrated and fit for purpose, and to make the best use of the workforce, assets and resources within Glasgow that would deliver a service that is responsive to the demand.

Budget & Staffing

The cost of implementing the Integrated Social Transport Demonstrator project was estimated at £630,000. The project was staffed with a project manager, a business analyst and a system architect.

OUTCOMES

Improved schedules to show how technology can improve the scheduling of workflow for the fleet.

Improved route planning to show how technology can improve route planning by utilising route optimisation software.

Improved availability of information to identify assets to augment service delivery and client services.

Improved data collection to generate data to be utilised for future development, and also as a basis for option appraisal in terms of future investment within the fleet.

Improved resource use to have data-driven investment in order that resources within the fleet can be utilised to the benefit of GCC and its service users.

OUTPUTS

Investment in leading edge in-cab Mobile Data Terminal (MDT) devices and route scheduling software to enhance journey and workforce scheduling effectiveness and maximise route optimisation.

Improved workforce efficiency by reducing fleet operational costs and creating further capacity.

Maximised efficiency of the fleet whilst maintaining a high-quality responsive service by improving utilisation of the fleet.

Approach

The main ambition was to work collaboratively with transport partners to explore opportunities on how technology applications could encourage more efficient scheduling and resource management for social transport. An assessment of current systems of transport was completed, across various stakeholders, to understand the opportunities and determine the best fit for the service.

A number of project inception analyses were conducted for the project: definition of project scope; data gathering of processes already in place across the transport partners; assessment of what services would be needed. This was followed by a design phase to optimise routes and find ways to track vehicles which were to be used. Furthermore, it was necessary to find out if GCC could build on any existing platforms or if new platforms would be required. Finally, there was an implementation phase to track solutions and evaluate how they were working.

Benefits

Benefits identified in the stakeholder interviews fell into three categories:

- Efficiency savings
- Improved use of technology
- Increased reporting capability

Efficiency savings

One central benefit for GCC has been the ability to make efficiency savings through route scheduling. The project was seen as proof that technology can be used to reduce transport demand and has resulted in a higher-quality service being delivered to education and social work clients. Furthermore it was noted that the use of technology has played a part in increasing services, demonstrated by the fact that the social transport provision for education has increased from 27 to 46 additional support for learning schools over the course of the Demonstrator project.

Improved use of technology

It was highlighted that drivers have been able to benefit from the work carried out on this Demonstrator project as new technology has removed the need to manually plan routes or maintain hard copies on paper; now it is all digital. The new system also provides quicker ways of accessing and generating management information to inform decision-making.

It was also thought that there were benefits in having more precise bus arrival times, service user numbers and evidence of 'no shows', particularly in cases when a client make a complaint about the service. For example, this data can provide evidence of bus arrival times should a client complain it did not arrive.

Increased reporting capability

Some specific organisations were also seen to have benefitted from the project, particularly because of the ability to run reports which give detailed information about service user pick-up numbers, no shows etc. This kind of reporting was also viewed as beneficial for senior managers when generating insight about their businesses.

Challenges

Most of the challenges in this project were around:

- Technical issues
- Procurement process
- Communication and buy-in

Technical issues

The fact that some routes were not covered by the mobile network (meaning drivers would experience down-time) was an initial challenge. At the same time there were software and limited battery life issues. Previously route planning/optimisation and scheduling were manual and therefore much more time-consuming – the move towards automated planning was perceived as positive and a welcome development.

Procurement process

In terms of procurement, it was a challenge to obtain the mobile data terminal (MDTs) and it took longer than was originally expected. But overall procurement was not viewed as a significant issue in this project.

Communication and buy-in

When working with other organisations, maintaining effective communication between different partners was sometimes difficult, primarily between internal and external stakeholders. This was resolved by maintaining a programme of regular meetings to build trust between partners and create a stronger working relationship. Relationships also needed to be built with social work and education clients as they would be using the new service. There was also some initial concern amongst Social and Education clients; as they felt their service users were more vulnerable than other groups, they were reluctant to let their users travel on buses rather than in taxis as they had been before.

Legacy

It was felt that GCC has improved the ways in which data is gathered with improved communication with drivers, moving from manual to digital data processing, and by gathering more accurate and real-time data. At the same time GCC has developed ways to be able to access information quicker than before, and developed better ways to communicate with drivers. Overall this has allowed GCC to increase efficiency within their social transport fleet by going from a manual to electronic planning system and real-time messaging.

As the system is set up there was a feeling that it could be transferred elsewhere, but "the Council would need to commit to standardisation for this system to be rolled out Council-wide and this [would be] funding dependent".



KEY POINTS SUMMARY

Key Benefits	Key Challenges	Key Achievements
<ul style="list-style-type: none">- As a result of route scheduling and tracking, GCC's social transport fleet offers an improved, more efficient service for users.- The upgrade in technology used in GCC's social transport fleet has been a benefit to bus drivers and management in terms of planning and tracking more direct routes.- The new technology developed and implemented has also led to being able to keep more accurate records which helps when following up any passenger complaints.	<ul style="list-style-type: none">- There were a number of technical issues which had to be overcome: routes not covered by the mobile network, software and battery issues.- Developing strong working relationships between GCC and city partners as well as GCC's Social Work Services and Education Services clients helped ensure smooth delivery and implementation of the project.	<ul style="list-style-type: none">- By introducing new technology and optimising transport routes across Glasgow, GCC has been able to demonstrate the use of demand-responsive technology within the transport environment. The project has also enabled GCC to gather and access data more effectively and efficiently than before.

INTELLIGENT
STREETS

SMART
LIGHTING

The background, description, aims, outcomes, outputs and approach sections of this Demonstrator chapter are reflective of the project initiation document, end-stage reports and other sources of information. As with other chapters, the benefits, challenges and legacy of the project capture views and opinions of the stakeholders interviewed.

Background

The Glasgow street lighting network is a massive asset of 72,000 street lights. The Intelligent Street Lighting Demonstrator project was designed to build on research that showed LED lights provide better visual conditions for motorists and improved visibility at lower lighting levels when compared to existing low/high pressure sodium lights. Initially two areas were chosen to pilot intelligent street lighting: Riverside Walkway, a key route for cyclists and Gordon Street, due to the high volume of footfall that passes through it. A third was later added: Merchant City, a more residential and commercial area of the city. Three sites were set to be fitted with controlled, energy-efficient LED lights as well as sensors and an integrated Wi-Fi system for the city (meaning an internal Wi-Fi communications tool to enable GCC to control the lights and to transmit and collate data from sensors, not a public Wi-Fi network). By installing these new street lights it would be possible to demonstrate improved lighting quality in the city, improved public safety in the city, improved efficiency of lighting maintenance, and improved energy efficiency and data collection.

Description

Recent developments in the lighting sector, particularly in the area of LED technology, have meant that city-wide lighting systems are more sustainable and efficient than ever. A switch to LED technology in Glasgow's street lights was seen to offer significant savings in energy costs and help Glasgow achieve its ambitious targets in the reduction of carbon emissions. Building on the existing lighting network would also be more cost effective than installing an entirely new network. A system was set up to respond to 'real time' road usage, feedback and interact with other city systems. The intelligent street lighting system collected information on how people move around the city, and provides 'smart' lighting which would be controlled according to usage of streets, cycle paths, parks and open spaces.

Aims & Overall Goals

The project aimed to look at how to develop a lighting network to produce data for collection and use. The project explored how to share data and make information accessible.

The main objectives for the Intelligent Street Lighting project were to:²¹

- Develop a lighting network that employs an open central maintenance system to allow the network to be controlled automatically and manually to reflect pedestrian and cycle path usage
- Create a 'smart grid' through wireless mesh to connect the lighting network
- Develop sensors to react to road conditions and collect data for the data team
- Encourage use of cycle paths, parks and open spaces

Budget & Staffing

The cost of installing the intelligent lighting network was £600,000. A project manager, a technical and design lead, and a solution architect worked on this project.



OUTCOMES

Improved lighting quality in the city:

The ability to optimise street lighting according to ambient lighting, and the use of intelligent lighting to expand lighting to areas of the city that are not currently lit to encourage more active travel.

Improved public safety in the city:

The ability to adjust lighting in response to events such as public safety incidents.

Improved efficiency of lighting maintenance:

The use of alerts from lighting equipment to improve the efficiency and effectiveness of lighting maintenance resources.

Improved energy efficiency:

The use of energy-efficient lighting to reduce costs and carbon emissions and to leverage this through variable lighting to deliver further energy reductions.

Improved data collection:

The ability to gather data about the city (e.g. footfall, noise and air quality) and to integrate this data within a wider systemic city model.

OUTPUTS

Secured delivery and installation of three dynamic and sustainable street lighting installations (Merchant City, Riverside Walkway and Gordon Street).

Successful installation and integration of an 'open standard' lighting central-management system (CMS).

Employing an internal system that communicates with the Glasgow Operations Centre, supporting installation of sensors on the street lighting network to collect and deliver data.

Provided information to the City Data Hub.

Production of network lighting data, visible in both a raw format, in the data observatory, and in a pre-scripted format, on the city dashboard.

Developed a CMS that can send real-time fault alerts for predictive maintenance.

Approach

The project started with research to understand any technological innovations related to the project, what technology was already in use in other cities around the world and what would be appropriate for Glasgow. The team also explored whether it would be feasible to fit the new intelligent system to the existing lighting network in the city. The ultimate plan for this Demonstrator project was to install two pilots within the network, one in the city centre and another one on a cycle path.

During the Demonstrator phase of the project, a decision was taken to include a third site – Merchant City. This particular site was selected as it would add a different dimension to the use of intelligent street lighting. The neighbourhood had a combination of both commercial and residential properties, which meant that it had different lighting requirements at particular points in the evening/night time.

It was important to the Future City Glasgow programme as a whole that the Intelligent Street Lighting Demonstrator worked closely with the City Data team, to integrate the observatory and with the operations platform to provide ‘real time’ information.

Benefits

Stakeholders identified three groups of people who benefitted from the Intelligent Street Lighting Demonstrator:

- GCC
- Suppliers
- The City of Glasgow, including businesses and citizens

Benefits for GCC

These were primarily seen to be energy savings that were delivered by the project and the energy savings GCC can expect in the future: energy savings coming from the reduction in light used and its cost and carbon emissions. There have also been great benefits for the people who worked on different elements of this project. Participants noted they have been able to gain new skill sets which they can build on in the future, such as working with new technology and understanding more about data gathering.

Benefits for suppliers involved

Through working on the project, suppliers were able to develop a solution that could potentially be rolled out to other local authorities in Scotland and the UK. By developing this new lighting system, it was also believed that suppliers have overtaken other lighting providers in terms of experience and skills gained, which will help the suppliers involved in delivering Intelligent Street Lighting secure future work with other clients.

Benefits for citizens and businesses

It was thought that this project also brought a number of benefits to the businesses and citizens of the city. The lighting Demonstrator areas of Merchant City, Riverside Walkway and Gordon Street were upgraded and fitted with technology to create flexible and more responsive lighting conditions. This included demonstrating the benefit of using the infrastructure as a platform to gather sensor information about the city. It was also believed that the new lighting network will make parts of journeys much more pleasant for citizens throughout the year.

Challenges

Stakeholders commented on both expected and unexpected challenges whilst working on this project:

- Supplier deliverables
- Internal expectations
- Installation practicalities

Supplier deliverables

The relative inexperience of the external 'smart' supplier marketplace was noted as an expected but constant challenge; people talked about 'smart' cities but in practice it was found that experience was limited. At the beginning of the project it was anticipated that suppliers would be more advanced in terms of dynamic lighting technology, but they were found not to be at the level anticipated.

There was an expectation that large well-known suppliers in the market would support the project, but they were found not to be interested as the project was considered too small to attract development partnerships with larger suppliers.

It was felt important to consider a wide list of suppliers that may be suitable as many may choose not to be involved. It might have been possible to engage more effectively with bigger suppliers of lighting technology by making more information available about what impact this work could have and how widely the technology could be scaled up at the time of procurement.

Internal expectations

It was felt that managing the internal expectations of this project was difficult, particularly due to the fact that many people in GCC were expecting the project to be able to do much more in terms of the kinds of developments that could be achieved. This was partly attributed to the language used in framing the overall project – using the word 'future' brought with it somewhat unrealistic expectations of highly advanced technological developments.

Communication around projects of this size is recommended to be positive and optimistic to maintain momentum and support within the teams, but should also be realistic to ensure all involved in projects of this scale will get the support they need at the right time.

Installation practicalities

There were a number of other challenges which had to be overcome over the course of the project:

- Cobble-stoned walkways (Riverside Walkway) meant more work to dig up and then replace the cobble stones. It was also discovered that the structure underneath the cobble stones was different to what was expected and thus it took much longer than originally planned to set up the network in this area.
- Installation encountered issues relating to the architecture of the city (Central Station on Gordon Street having been built on hidden streets of a Victorian village²²).
- Underestimation of the size of materials used meant some were much larger than expected, which had an impact on the installation of the network in more-public areas (Gordon Street and Merchant City).
- Supplier delivery times for parts were often much longer than expected with lead times for delivery of new street lights being around 12–20 weeks.
- The number of component parts to be integrated into the intelligent system (3G cards, modems, lighting, etc.) had been underestimated.

Legacy

From a senior management perspective, the Intelligent Street Lighting project was seen as providing ‘building blocks’ for the city in assets such as a data platform, Wi-Fi in different sites, high spec operations centre, etc. The potential to collect non-GCC data through the ‘open data’ network established was mentioned as a way to build a network of connectivity and data exchange. This network could help drive service reform through supporting development of real time services such as reactive bin collection services, public space grass cutting, etc. It was also thought that GCC could build on the underlying systems and organisation set out as part of this Demonstrator and expand to other parts of Glasgow, and other local authority areas in Scotland.



KEY POINTS SUMMARY

Key Benefits	Key Challenges	Key Achievements
<ul style="list-style-type: none">- The greatest benefit from the Intelligent Street Lighting project was the opportunity to create a platform for increased control of the lights resulting in energy savings, reduced maintenance costs and the possibility of integrating with other city systems. These benefits would be extended in the future by switching more street lights in the city to more efficient lighting technology.	<ul style="list-style-type: none">- Larger suppliers of lighting technology did not show as much interest in the project as anticipated so the beginning stages were not as smooth as they could have been. As a result, a much wider group of suppliers was approached.	<ul style="list-style-type: none">- There is huge potential in the developments that have been achieved in advanced lighting and network technology. GCC will be able to build on these going forward.
<ul style="list-style-type: none">- Working on the project meant that a number of suppliers have been able to develop new solutions which could potentially be beneficial to other local authorities in Scotland and across the UK.	<ul style="list-style-type: none">- The language used in framing the project, such as 'future', led to a number of people within GCC having much higher expectations of the kinds of technological advancements that could be achieved.	<ul style="list-style-type: none">- Not only has this project led to improved street lighting being used in Glasgow, but it has also helped GCC establish an open-data network and disseminate data.
<ul style="list-style-type: none">- The redevelopments that were carried out at the three sites in Glasgow were felt to have benefitted citizens, as the new lighting network has potential to make journeys across Glasgow more pleasant.		<ul style="list-style-type: none">- The infrastructure that has already been developed can be built upon and potentially expanded to other parts of Glasgow, but also across Scotland and the rest of the UK.
<ul style="list-style-type: none">- Being involved in the Intelligent Street Lighting project has been a benefit to those that worked on the project by helping them to develop skills they can build on in the future.		

ACTIVE TRAVEL



The background, description, aims, outcomes, outputs and approach sections of this Demonstrator chapter are reflective of the project initiation document, end-stage reports and other sources of information. As with other chapters, the benefits, challenges and legacy of the project capture views and opinions of the stakeholders interviewed.

Background

The primary purpose of the Active Travel Demonstrator was to develop an approach to encourage active travel amongst citizens. The focus was on health and wellbeing, quality of life and encouraging people to get active for their own benefit. The Active Travel project focused on current challenges and how people could be encouraged to walk or cycle, thus having a knock-on effect on their health.

Description

Health benefits, both mental and physical, led to the development of the walking and cycling focus, along with ways to use technology to engage and empower active travellers, and potentially inform changes to infrastructure. Two apps, one for walking and one for cycling, as well as an education website tool, were developed as part of this project. At time of interviews with stakeholders, the walking app included versions for Green Glasgow, Doors Open Day 2014/15 and Glasgow Women's Library.

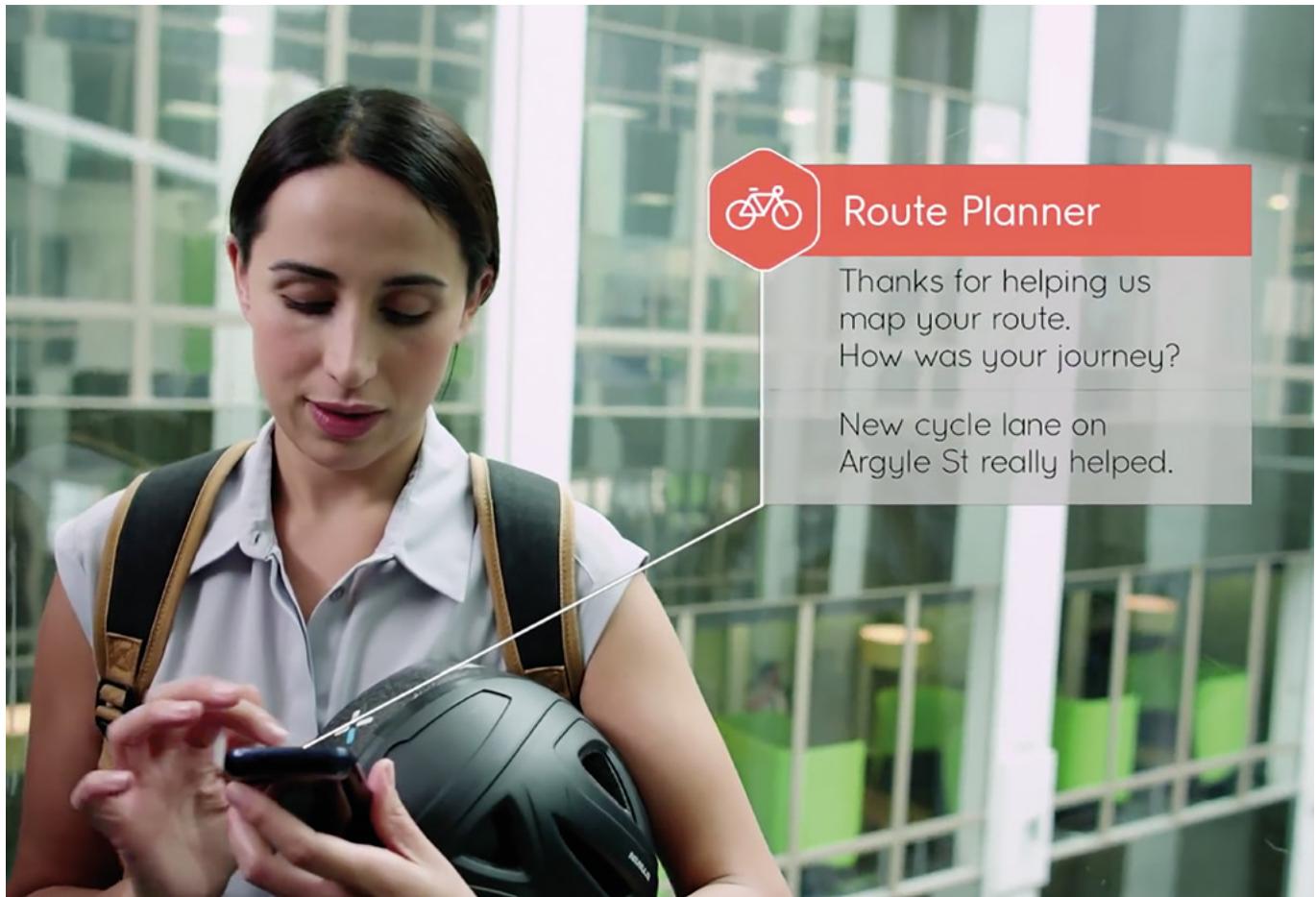
Aims & Overall Goals

The main objectives for this project strand were to:

- Make data available to users via a user-friendly and accessible map
- Engage with stakeholders to understand current behaviour, and prototype potential ways for behavioural change
- Develop active-travel smartphone apps to allow users to decide what factors are most important to them (e.g. speed, gradient, safety, etc.)
- Develop a framework to engage with active travellers, and discuss barriers and opportunities around the city
- Encourage walking and cycling around the city

Budget & Staffing

The budget allocated to the Active Travel Demonstrator was £248,000. The project was staffed with a project manager and a web developer for this project. GCC contracted an external firm of app developers to specifically support the development of the smartphone applications.



OUTCOMES

Improved health quality in the city, demonstrating how technology can encourage the use of cycle and walking routes to promote healthier lifestyles, and improved quality of life for its citizens.

Demonstration of how technology can make the city more cyclist and pedestrian friendly, encouraging the use of sustainable travel.

Identification and mapping of the current infrastructure for active and sustainable modes of travel in Glasgow on a city-wide basis.

Data collected for application development, and to inform future investment in development in the city, and development of cycle and walking paths.

OUTPUTS

Identified and mapped the current infrastructure for active and sustainable modes of travel in Glasgow on a city-wide basis, using spatial analysis.

Development of a Glasgow walking app and Glasgow cycling app with existing geographical information.

Creation and development of an administration portal to allow groups to upload and edit content for the apps.

Integration of online mapping tools and sources of active travel information to the developed apps.

Creation of an administration platform for the apps to act as an asset for innovative app development with IOS and Android.

Approach

The approach to delivering the Active Travel project was to investigate the technological innovations available, what technology other cities around the world are using and what would be appropriate for Glasgow. The team engaged with key stakeholders throughout the city, such as walking groups, cycling groups, NHS, Glasgow Community Health Partnership, city universities and colleges, schools and SPT, and trialled a number of approaches using different technologies. The project then piloted an interdisciplinary mapping project with secondary schools in Glasgow.

Benefits

A number of benefits were identified from the stakeholder interviews for this part of the evaluation:

- Supporting development of local businesses
- Ongoing research for wider investigation
- New ways of working for GCC

Supporting development of local businesses

The project has also benefitted local businesses and the digital economy. For example, it was noted how involvement in the project has allowed the app developers to start up their own company through "a stable, ongoing contract and networking opportunities in the Glasgow area".

Ongoing research for wider investigation

The data from the apps has greatly benefitted communities by gathering and providing information about cycle routes, specifically safe cycle routes to school. In addition, the open data collected through the platforms has been used for academic and public health studies. A team at Aberdeen University has conducted research into the impact of app data on rural vs. urban areas, whilst at Glasgow University research was carried out into the impact of weather and news on decisions to cycle or walk.

New ways of working for GCC

Internally, it was felt members of staff within GCC have benefitted hugely from this project by having been exposed to new technologies. Through working with a range of people and skills on the project, people have shared different ways of working from the developer community, such as Agile working and using 'hacks'. At the same time the project has led to consideration being given to more modern ways of working. In particular, GCC is giving more thought to cloud technology and how to work with open data. This has helped develop new in-house skills, and brought about an increased level of confidence in identifying and implementing new initiatives that could be applied throughout GCC. Finally, it has made staff consider how they can develop science, technology, engineering and mathematics (STEM) skills, both within GCC and on a wider scale.

Challenges

There were both expected and unexpected challenges which needed to be overcome as part of this project:

- Access to stakeholder data
- Privacy impact assessment (PIA) processes
- Communication
- Handover and maintenance

Access to stakeholder data

Some participants felt there was an issue with accessing data from both internal and external stakeholders in that data was delivered too slowly. The request for data often required escalation to senior levels to progress.

Privacy Impact Assessment (PIA) processes

A challenge in development of the apps was the PIA, a methodology to identify, assess, mitigate or avoid privacy risks. Due to underestimating how long it would take to complete a PIA the project was put on hold for three months. This led to an interruption to the iterative development process.

The iteration process of the apps posed another challenge, as there was little opportunity available for development following the first version. This meant that not as many improvements were made to apps as would have been liked.

It was recommended that future projects consider how additional requirements or assessments (such as the PIA) could impact on timelines and what can be delivered.

Development of new technologies usually involves a number of iterations and feedback from users. This is an important aspect of development and it was recommended to schedule time for gathering and responding to feedback.

Communication

Some felt team 'show and tell' sessions did not happen as often as originally planned and other ways of communication became sporadic (e.g. Basecamp – an online project management tool – was not used for the whole project, Yammer – a social network for enterprises – was not accessed by enough people) so it was difficult to keep the wider team up to date on developments.

Within the delivery team, some found it difficult to reach stakeholders outside of the Active Travel team, and to share knowledge between the development team and wider Future City teams.

It was recommended to consider how to best reach all parties involved in a project, this being particularly important where both internal and external partners are involved. Regular update meetings helping to ensure buy-in and support, and keeping all teams up to date on the status of the project were suggested.

Handover and maintenance

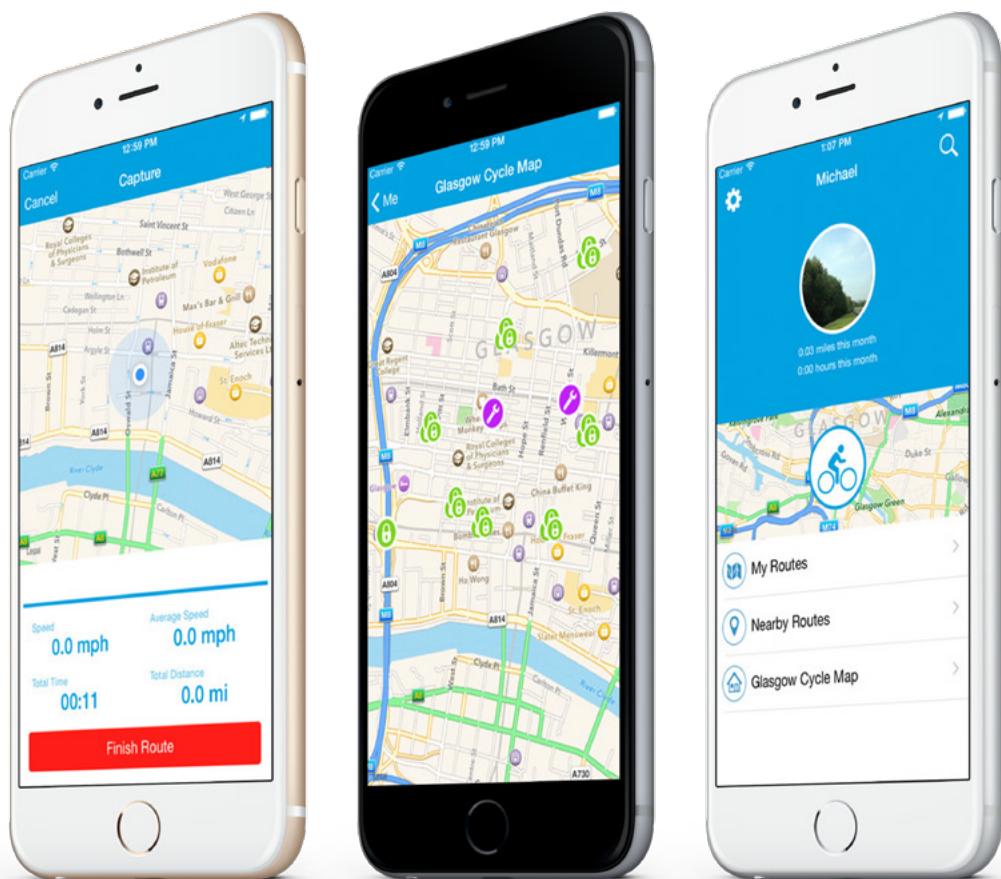
Some expressed concern over whether updating and maintenance of the apps would be able to be resourced by the team within GCC after the project was completed. Although maintenance of the apps is specialised, all application information and data have been made open in order for the legacy of the project to continue.

Legacy

There was a perception that the technology developed for this project is of an excellent standard, and has demonstrated GCC's ability to deliver this kind of project. It has also helped develop a business case for sustaining and expanding the project across the city, to maximise the benefits for Glasgow and the investigation of innovative new business models.

There are now an app platform and templates that can be built on further, not only by GCC, but other organisations as well. It was believed that creating an app is more cost effective than producing a leaflet, for instance in producing a guided walk or other public information.

The apps developed for this project could be used, and built on, by community groups. The content (i.e. the walks and cycle routes) could be extended to other areas of Scotland, the UK and other parts of the world. The cycling app could be extended to include other modes of transport, such as running or driving.



KEY POINTS SUMMARY

Key Benefits	Key Challenges	Key Achievements
<ul style="list-style-type: none">- Being exposed to new technologies, discovering new ways of working and a deeper consideration for how to develop science, technology engineering and mathematics (STEM) skills.- The wealth of data collated, and made open and available, has been a key benefit to the wider community<ul style="list-style-type: none">- those interested in cycling/walking- as well as the academic community who have been able to use the data for in-depth studies on public health.	<ul style="list-style-type: none">- Receiving data in a timely manner was one of the main challenges in the delivery of this project – having to wait for data from both internal and external stakeholders.- The privacy impact assessment had an impact on project timings.- Keeping everyone involved in the project up to date on developments was sometimes a challenge, especially due to the fact that both internal and external parties were involved in the project. Planning regular meetings and update emails to the entire team helped ensure that everyone was informed of important delivery milestones in the project.	<ul style="list-style-type: none">- The app platform and the apps developed for this project have great potential to be built upon in the future, by extending the content of the apps to cover more parts of Scotland, the UK and other parts of the world.

RECOMMENDATIONS

CONCLUSIONS

at



This evaluation considered the views and experiences of key stakeholders within Glasgow City Council and associated stakeholders who were involved in the design and delivery of the Future City Glasgow project. Based on the evidence they shared, we present a set of conclusions in this final chapter.



Future City Glasgow has been a positive experience overall, according to key stakeholders, who spoke about a series of benefits it delivered for citizens, communities, the local authority and businesses.

A POST EXPERT

The deliberately innovative, exploratory and experimental approach has resulted in a number of projects which exceeded expectations, some of which are being transformed into business-as-usual practices for the council. Considering other projects, where perhaps less immediate or tangible progress has been made, there

are a variety of useful and important lessons, techniques, approaches and connections that benefit the council and potentially other local authorities who wish to learn from this experience.



Future-Proofing Smart-City Projects

FUTURE

ENCE

In a considerable number of Future City Glasgow's projects, a forward-thinking, future-proofed approach was taken. This means that, in addition to the tangible projects demonstrating real-world impacts, a huge amount of work has been carried out in the background, on IT and related infrastructure and systems. These have been deliberately designed to be adaptable to GCC's and the wider city's future needs. This approach separates Future City Glasgow out from many other smart-city projects, which are often undertaken on a project-by-project basis, rather than a part of a whole-city approach. Taking a well-funded, whole-city approach means that a city is able to develop infrastructure in addition to individual projects, and this can give it more scope for adapting its systems to future requirements. In particular, developing systems which are modular, scalable, and which encourage third parties to enhance and develop these systems, for example by using open platforms, are key aspects of this approach.

SMART & DISRUPTIVE CHANGE

Communicating

Future City Glasgow was a deliberately disruptive programme of smart-city developments. It succeeded in introducing new technologies, new projects, new ways of working and new collaborations to GCC, and to communities and business in Glasgow. Any programme of change on this scale will require a degree of adjustment from the people involved, and will often require convincing people and organisations that doing things differently is in their interest. Communicating with the right people in the right way and at the right times is therefore crucial. However, this is often challenging when new technologies are being developed, when clear, comprehensible visions of outcomes and outputs are unavailable at early project stages.

Reflecting on the Future City Glasgow experience, we can extract a number of key principles for communicating with stakeholders, key audiences, staff and contractors about disruptive changes, initiatives or programmes:

- Engaging as early as possible with key audiences and taking them along on the development journey helps to convince them of a project's purpose and value.

- Providing key audiences with frequently updated evidence, focused on their needs and how they might benefit, can bring them along more effectively compared to providing information which is infrequent and abstract.

- Some audiences may interpret the language used in particular ways, particularly if it is technical or vague. 'Future', for example, is a loaded word and can create particular expectations.

Project Managing

Choosing the right project management approach, depending on whether the project was exploratory or aimed at defined outcomes, was a key component in the success of some aspects of Future City Glasgow. Some projects or components appropriately took a more formal, traditional approach to project management, particularly where they had clearly defined objectives at the outset. Taking an Agile-development approach was key to the success of the more experimental and exploratory projects, those with less clearly defined outcomes and a lot of scope for adaptation and experimentation. It allowed frequent demonstrations of



progress to stakeholders and audiences, and for changes to be made to projects more easily as they were being developed.

Working with Contractors and External Providers

In order to ensure that the right skills were available for Future City Glasgow, GCC worked with a wide variety of external providers, providing a boost to Glasgow's IT communities. Many of the external providers were small, local businesses, as the projects were often too small to interest larger providers. The smaller businesses were used to a high degree of autonomy, flexibility and creativity. GCC by contrast is a large, bureaucratic organisation, which has to operate within strict regulatory parameters and which has a prominent public position. Integration between two cultures as different as these can be aided by embedding external staff in GCC project teams and by providing clear job descriptions for them. In addition, introducing providers to GCC's culture and regulatory requirements during the procurement process could help providers to more easily understand the speed at which decisions are made in GCC and the constraints that apply to them.

Timing and Funding

Funding for Future City Glasgow had to be spent by GCC within a particular time period. This meant that some aspects of the project had to be carefully co-ordinated, particularly when communicating and engaging with the public. In order to maximise the chances that public-facing and engagement events happen at the right time, flexibility should be built into scheduling from the outset, and into any infrastructure or facilities that will be used. In addition, working to limited timescales can also have an impact on developing projects which take longer than expected to deliver, which require many iterations to get right, or where the external contracts end before knowledge can be transferred internally. This can have an effect on their overall success and subsequent deployment into business-as-usual operations.

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