SCOTTISH LOCAL GOVERNMENT DURING COVID-19: DATA NEEDS, CAPABILITIES, AND USES

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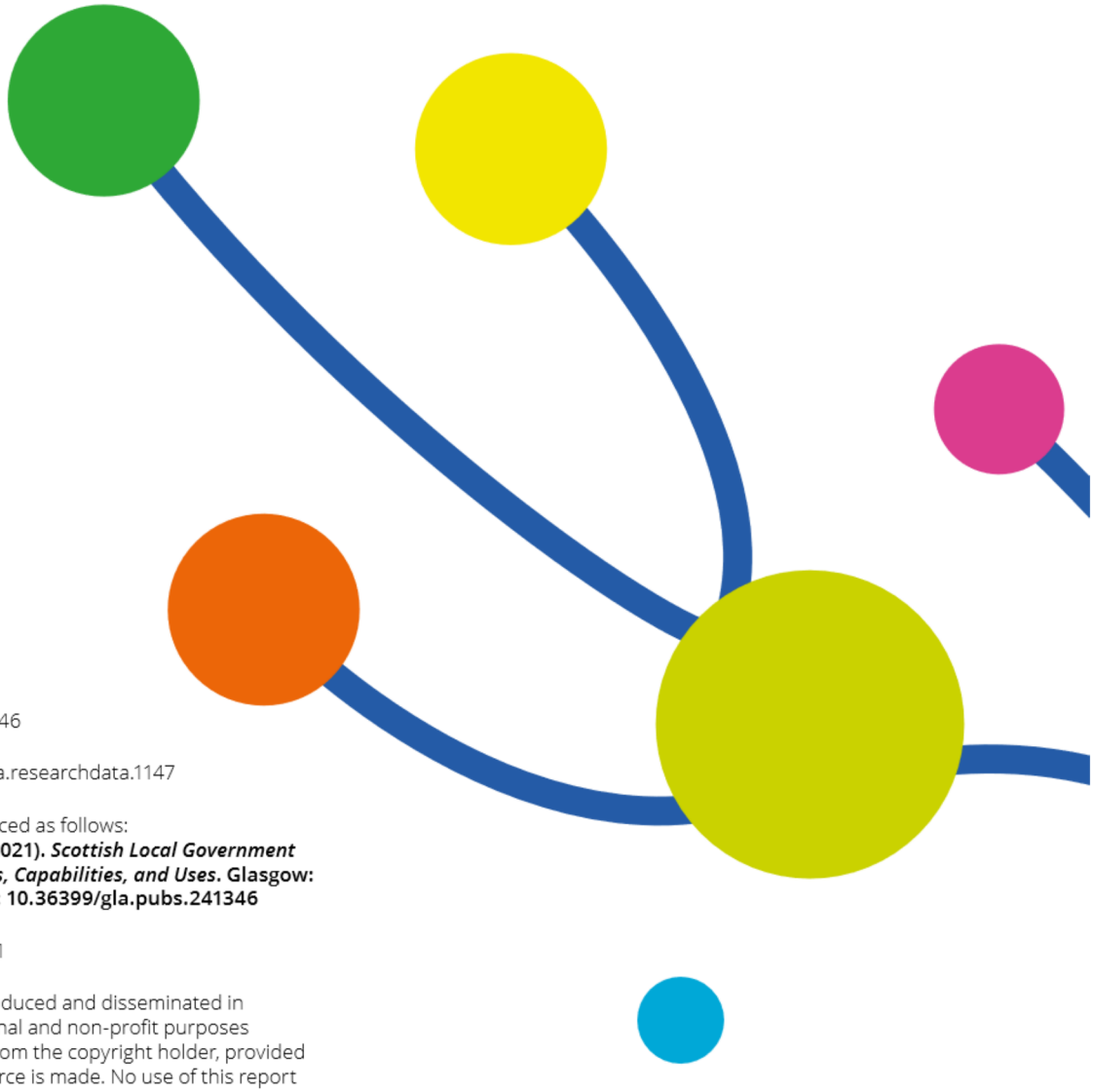

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Executive Summary

Local government across Scotland, as elsewhere, was at the forefront of the rapid response to the COVID-19 pandemic. It delivered essential services to communities, provided support to local businesses, contributed to test, trace and local outbreak monitoring, and furnished central government and public sector organisations with granular information and intelligence. This, and more, put a sudden, great demand on local authorities, forcing them to adapt quickly and engage in innovation.

Gathering information, collecting evidence and generating intelligence have been central to how local governments responded to the COVID-19 crisis. In turn, this has put the spotlight on data, prompting questions about how local authorities have identified and handled arising data needs; how they have used and analysed data; what related challenges they have encountered; and what innovation opportunities they have pursued.

This report provides comprehensive answers to these questions based on a research project conducted between autumn 2020 and spring 2021. The project was led by the University of Glasgow's Urban Big Data Centre (UBDC), which combines a national data service with world-leading research into the social, economic, and environmental well-being of cities. The research was funded by the UK's Economic & Social Research Council and implemented in collaboration with the Digital Office for Scottish Local Government. Its purpose was to generate applied research to help inform policy and practice on how local government across Scotland can optimise data practices as we move through, and out of, the crisis. Beyond Scotland, this report should be of interest to various stakeholders active in data policy, governance, and practice: the issues, challenges, and opportunities identified broadly resonate with data-related developments elsewhere.

Research design and methodology. The research underlying this report was generated using a combination of quantitative and qualitative methods. An online survey, with 20 mainly closed questions, was carried out in November-December 2020 to obtain a systematic picture of local authorities' engagement with various aspects of data (use, needs, capabilities) during the COVID-19 pandemic. Respondents were prompted to comment on different phases: the initial crisis (spring 2020), the ongoing period (late autumn 2020) and the near future (spring-summer 2021). A total of 64 participants were invited to complete the survey, with two people (a data specialist and a recovery specialist) from each local authority being sent the invitation. 45 participants (70.3%) from 31 (out of 32) local authorities completed the survey. Next, three focus groups were carried out in March-April 2021 to elicit complementary qualitative information: one brought together local authority participants in discussion among themselves; another engaged local authority participants in conversation with participants from public sector organisations (NSS NHS Scotland and Police Scotland) and the Scottish government; and a third combined local authority participants with third sector participants. Additionally, individual expert interviews were carried out in spring 2021 with four organisations operating across Scotland: the Improvement Service, the Scottish Cities Alliance, the Society for Innovation, Technology and Modernisation (Scottish branch), and the Digital Office for Scottish Local Government. The research data was examined using descriptive statistics (survey) and quantitative-qualitative textual analysis (focus groups and interviews). The different data outputs were triangulated to ensure validity and align multiple perspectives. Ethical approval for the research was obtained from the University of Glasgow.

The report contains 15 key findings, which are organised in four overarching themes as follows:

Theme 1: Rapid response and innovation with focus on public sector data. The research confirms that local authorities experienced both a sudden increase in data demands and an acute intensification of data use. For example, 83% of survey respondents stated that there was an increase in internal data sharing, 79% indicated the use of new data sources, and 74% confirmed increased data collection. According to one focus group participant, 'there were lots of new reporting requirements and we were also being supplied data from new sources that we hadn't had before'. Significantly, respondents rated the importance of public sector data for managing the pandemic far higher than private sector data and novel (smart) data: 89% of respondents found internal public sector data in the early stage of the pandemic to be 'very important' and a further 17% 'quite important'. In contrast, only 4% of respondents rated private sector data 'very important' and 27% 'quite important', with 13% rating it 'not at all important'. Similarly, only 4% of respondents considered novel data (for example, cellular data, crowdsourced data and IoT data) to have been 'very important' and only 27% 'quite important'; 22% considered novel data to have been 'not at all important'.

That the main focus was on public sector data is largely explained by the nature of the crisis, which created an urgent need for on-the-ground information about local communities (for example, health, social welfare and education) and businesses (for example, rate relief and grants). Nevertheless, the low figures for private sector data and novel data use are remarkable. In the latter case, some participants indicated a relative lack of technical familiarity and queried related benefits. In both cases, however, participants expressed the view that these data sources would gain in importance in the future.

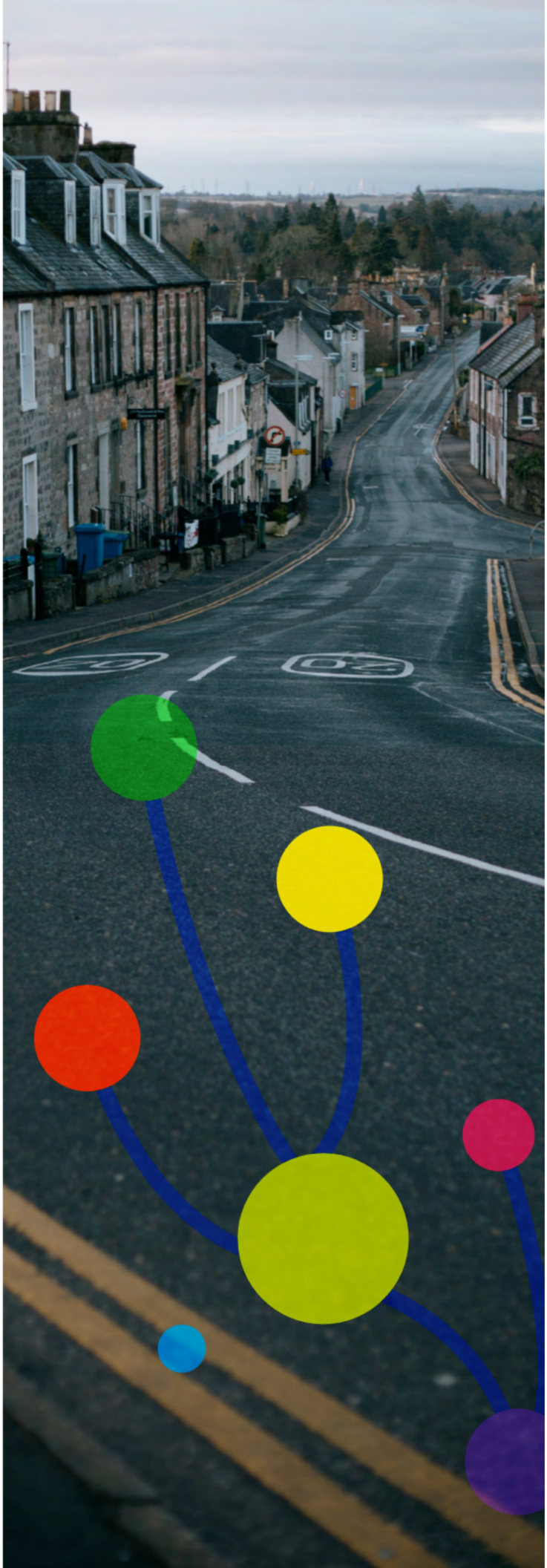
Theme 2: Existing challenges amplified. While local authorities demonstrably immersed themselves in data collection and analysis, they encountered numerous challenges along the way, to do with on the one hand, the quality of data itself and, on the other hand, with the wider complexity of local government structures. One survey respondent summed up the main challenges thus: 'lack of joined-up data; lack of easy access to data; lack of sufficient data analysts'. This was echoed by an average rating of 4 on a scale of 1-5 (5 being the most challenging) for 'ensuring data quality and standards'. More pronounced still, 'data integration', which includes data interoperability and matching, was rated 4.2 by survey participants. These challenges were not new, but the crisis exposed and amplified them significantly. Participants identified in particular the need for agreed data standards and common identifiers if data is to be used and shared effectively, both within and across local authorities. Although considerable progress has been achieved in this respect as a direct result of the pandemic, participants were clear that significant further efforts are required to be able to harness data more fully.

Apart from data quality, participants also highlighted the complexity of local government concerning both internal 'silo' structures (and related questions of data ownership and responsibilities) and the persistence of legacy systems, which render data interoperability and integration difficult. It is also reported that gaps in data skills and data literacy are additional areas of concern: the former encompasses technical and analytical know-how; the latter more broadly capabilities of understanding and using data in support of policy – and decision-making. Not surprisingly, participants flagged up the investment dilemma: if progress achieved with data engagement is to outlast the pandemic, then proper investment will be required to support it, albeit against a background of a continuing funding squeeze on the public sector.

Theme 3: Growing demand for cross-sectoral data sharing. A key aspect of the accelerated data use was the significant increase in data sharing across the public sector, particularly between local authorities and the NHS. 70% of survey respondents stated that data sharing had increased, and 65% reported the use of bespoke data sharing agreements. Participants positively noted the efficiency of data sharing arrangements under time pressure. As one participant put it, 'we could turn something around in a few days that normally would have taken about four or five months'. Another positive outcome of the crisis is the evident commitment to working together across public sector organisations, for example by using common data sharing protocols and, more generally, engaging in knowledge exchange through various networks such as the COVID-19 Data Intelligence Network. That said, participants cautioned against regressing to previous fragmented practice in case the innovative momentum is not maintained. Indeed, they highlighted several areas of cross-sectoral data governance that continue to be disjointed and that need addressing (for example, duplication of efforts and lack of visibility of what data is available), with one participant unfavourably referring to a 'cottage industry' approach to data sharing. A separate, major finding relates to data sharing with the third sector, which participants characterised as very much ad hoc and hyper-local. Third sector participants perceived related data access demands on them as onerous, given limited technical and human resources, and the relationship was often seen as one-sided. On their part, local authority participants explained the difficulties of collating and integrating data from multiple third sector sources. However, both sides agreed that the third sector is an essential source of both quantitative and qualitative data.

Theme 4: Opportunities for joined-up data practices in the public interest. When prompted to consider the future, participants broadly agreed that recent achievements provided opportunities for further innovations in data policy and practice in Scotland. For one thing, there was optimism that the value of data would no longer just be recognised by small teams of data specialists in local authorities, but instead be recognised across the organisations, and become embedded more firmly in policy – and decision-making processes. In the words of one participant, the response to the pandemic has widely demonstrated 'how powerful data can be'. In addition, participants expressed commitment to building on cross-sectoral data sharing by developing stronger collaboration across local government. This would help both to increase efficiencies by reducing duplicate efforts and to nurture a shared learning environment. Participants saw a particular value in strengthening existing cross-national networking arrangements. Last, but not least, participants raised a wider, fundamental issue: namely, how to place the public interest more firmly at the centre of data policy and practice. Participants agreed that to secure public trust in local government's data handling, the purpose of data collection and use needs to be stated clearly, and tangible benefits to the public need to be demonstrated.

Based on these findings, a series of policy and practice recommendations have been distilled, aimed at enhancing data applications, governance, and culture in local government. These are addressed to data specialists as well as wider users of data, both within local government and across public sector organisations and the wider data community. They can be found on pages 27-28.



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The Urban Big Data Centre (UBDC) is a research centre and national data service jointly funded by the University of Glasgow and the Economic and Social Research Council. We promote the use of big data and innovative research methods to improve social, economic and environmental well-being in cities. www.ubdc.ac.uk

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Introduction

Cities and local authorities, already hit hard by a decade of austerity and funding cuts, now face a considerable challenge of managing economic and social recovery in the wake of the COVID-19 pandemic. Some have argued that the urgency of the pandemic would accelerate the adoption of data-driven and smart city technologies [1,2] and push smart city transformations to the forefront of urban policy agendas [3]. Others have suggested that the pandemic could act as a catalyst for change, pushing local councils to rethink how they operate and encouraging collaborations between local authorities, other public sector bodies, citizens, and the third and private sectors [4]. Data intelligence and data-driven innovations, as well as access to real-time big data are seen by many as an important part of managing recovery at a local level [5,6].

Against this background, the present study set out to investigate systematically how local government made use of data during the pandemic. The study examined in detail whether local authorities intensified their data practices, increased their data capabilities, used new sources of data, and identified new data needs in response to the crisis. Given the UK's devolved approach to managing the COVID-19 pandemic, the project focused on Scotland where the Scottish Government devised its own route map out of the crisis [7] and published a blueprint for economic recovery [8].

The research, based on a triangulated design combining quantitative and qualitative methods, generated a comprehensive picture of Scottish local authorities' data responses to COVID-19. It was guided by the following four objectives:

1. To analyse the existing and emerging data uses, capabilities and needs of Scottish local authorities;
2. To investigate whether local government's responses to the pandemic have reshaped data governance, strengthened existing collaborations, or generated new data networks;
3. To identify emerging opportunities for public data collaborations and citizen engagement;
4. To examine whether data applications and practices informed decision-making and improved outcomes concerning the management of COVID-19.

The study generated 15 key findings, which are presented in four overarching themes. These reflect the experiences and views of research participants drawn from across Scottish local authorities, the third sector, and other organisations involved in the data world. As such, the findings are designed to inform local authorities' ongoing recovery management and planning for the post-pandemic period, by highlighting current good data practices as well as areas with scope for improvement, and identifying opportunities for future innovations. Consequently, the report entails a series of recommendations for policy and practice. These should not only be of interest to local authorities and the Scottish government, but more broadly to public bodies, third sector organisations and private organisations involved in collecting, curating, analysing and using data in the public domain.

The research was carried out between September 2020 and April 2021 in collaboration with the Digital Office for Scottish Local Government (hereafter 'Digital Office'). Its involvement was essential in securing the strong participation from across Scottish local government and wider stakeholder groups.

Background

UK and Scottish context

Digital transformation and data-driven innovations have been a policy priority of the UK government for the last couple of decades. This is reflected, for example, in the 2017 UK Digital Strategy[9], which emphasised the importance of data for the UK economy, and set out to develop UK-wide data infrastructure and skills, and build public trust in the use of data. The UK government has also pushed the Open Government agenda [10] since 2011, with a focus on making government data accessible. Internationally, it signed up to the G8 Open Data Charter [11]. These commitments subsequently led to the publication of the UK National Data Strategy [12] in 2020. The strategy comprises four main areas: enhancing data quality, interoperability and standards; developing data skills; increasing data accessibility; and ensuring ethical and responsible use of data.

The Scottish Government and its Digital Directorate [13] have equally been at the forefront of this agenda. In 2017, the government published its own digital strategy to realise Scotland's full potential as a digital nation [14], and to support digital transformation and innovation through the effective use of data. Earlier, the Scottish Government had launched its Open Government Partnership (2011) [15] and published its Open Data Strategy (2015) [16]. Both are part of the Scottish Government's ambition to make public sector data more openly available to others to re-use, and thus create wider societal value, as well as increase accountability and transparency in the delivery of public services.

Other national bodies, funded by central and local government, play a crucial role in the digital landscape in Scotland. This includes the Improvement Service [17], which was established in 2005 as the national improvement organisation for local government in Scotland. It comprises representatives of the 32 Scottish local authorities, the Convention of Scottish Local Authorities (COSLA) and the Society of Local Authority Chief Executives (SOLACE). In particular, the Improvement Service has created spatial information services and resources for local authorities including the Spatial Hub [18] and the One Scotland Gazetteer [19]. More recently, the Scottish Local Government Digital Partnership, a collaboration between all 32 Scottish local authorities, was established by SOLACE and the Local Government Transformation Board to support councils' digital transformations [20]. From this partnership emerged the Digital Office, which engages with all Scottish local authorities in four areas of digital transformation: digital leadership; digital foundations; digital services; and digital telecare [21]. In addition, the Scottish Cities Alliance (SCA) was jointly established by the seven Scottish cities and the Scottish Government in 2011 to progress the Agenda for Cities [22]. The SCA has a programme dedicated to data-driven and smart city initiatives and fosters collaborations between cities on projects such as smart waste management, IoT and open data.

Recently, the Scottish Government relaunched its digital strategy, 'A Changing Nation: How Scotland Will Thrive in A Digital World' (Feb 2021) [23]. The strategy was collaboratively produced by the Scottish Government, COSLA, the Digital Office, and the Improvement Service. It puts forward several recommendations in relation to digital transformation, some of which are directly relevant to fostering collaborations and increasing data sharing within the public sector and across sectors. The recommendations include: the development of common platforms to be adopted across the public sector; the adoption of common digital and data standards; greater collaboration with third partners to support a digital third sector; investment in analytical platforms; and the implementation of the Data Transformation Framework [24]. In addition, the Scottish Government's Digital Directorate has also launched Scotland's AI strategy[25], to consolidate leadership in respect of the responsible and ethical use of data and technology.

Data, local government and the promise of the smart city

The collection and use of (administrative) data by local governments has always been part of their activities. However, in the past two decades, it has become the focal point of attention as part of the emergence and implementation of various 'smart city' initiatives across the UK [26]. These initiatives are embedded in a techno-centered vision where data and digital technology enable real time analysis of city flows, in turn making cities more efficient and sustainable, and improving the delivery of government services [27]. This vision is often coupled with the push for open data in local government [28], especially in relation to citizen-centric smart city discourses [29].

Recent studies have examined the use of data in local government and the role it plays in supporting decisions and informing policymaking [30]. Local government mostly uses administrative data that is generated in the 'process of administering services and systems and commonly held by UK government (nationally and locally) and other public sector bodies' [31]. This includes, for example, data relating to social care, social benefit claims, social programmes, or service usage delivered by local government. Administrative datasets can be described as 'big data' insofar as they consist of large volumes of semi-structured or unstructured granular data. They tend to capture an entire system (for example, all recipients of a service) and contain common fields that allow integration with other datasets [32]. In addition to more traditional administrative data, local governments are investing in and exploring new ways to collect and use novel types of data, including social media data, crowdsourced data, CCTV data and sensor data from connected structures [33].

The developing field of data science for local government spans across a wide range of policy domains such as welfare and social care; transportation; waste management; policing and public safety; education; environment; and housing and planning. It entails various activities including data collection, combination, analytics and use [34]. The field is characterised by diverse technologies from predictive analytics and decision support technologies, Artificial Intelligence, data merging technologies, and personalisation to GIS enabled spatial analysis [35]. It is important to note, however, that most data science initiatives in local government in the UK are still nascent, often hindered by financial pressures on local government as well as by technical and legacy barriers [36].

Several studies have examined these barriers, which include: a lack of requisite skills; a lack of clear governance mechanisms especially in relation to data privacy and security; budgetary constraints; the absence of leadership and data culture; the legacy of IT systems; and data silos between services [37]. The extent of these barriers varies across organisations, depending on the levels of investment and the development of data capabilities (skills, tools, infrastructures) and data governance. This, in turn, affects organisations' data maturity, or 'readiness'[38].

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Local government's data responses to COVID-19

From the outset, data has played a central role in the management of the pandemic [39, 40]. This was especially visible in high-profile track and trace initiatives, and daily government briefings. According to a recent Nesta report [41], local government also significantly changed its way of working and data practices in the first six months of the crisis. For example, local authorities collected new types of data to understand the local impacts of the crisis and deliver support, as well as made greater use of mapping and visualisation tools. This was combined with an increase in data sharing across the public sector, and in particular between the NHS and local government to identify patterns of vulnerability [42]. According to the report, the pandemic acted as a catalyst for change, creating a 'shared sense of purpose' in local government and accelerating the adoption of new ways of working and collaborating. This included collaborations between the public, third and private sectors [43]. Importantly, local government's response to the pandemic took place in a challenging and rapidly changing environment, where local government also had to manage remote working and move their services online [44].

The Centre for Data Ethics and Innovation (CDEI), an independent advisory body set up by the UK government, recently published a report on the use of data by local authorities based in England [45]. The report notes that during this period local authorities had more success in 'changing how they deploy existing datasets than in acquiring or sharing data with central government or local service providers' [46]. This was with the notable exception of health data (for example, the NHS shielding patient database), which was shared early on and helped local authorities to target essential support, such as food parcels and pharmacy deliveries. Additionally, the report found that AI and machine learning did not play a substantial role in local authorities' responses to the pandemic. Instead, conventional data analysis based on existing datasets and the repurposing of existing tools were key [47]. The study also showed that data sharing was enabled by the implementation of new methods of data storage, as well as new data sharing agreements [48].

While both the Nesta and CDEI reports provide critical insights into local government's response to the COVID-19 pandemic, they are empirically limited insofar as they mainly address the early response phase and are based on relatively small samples of local authorities across the UK. In contrast, this study systematically analyses three phases of pandemic management based on a comprehensive sample of local authorities, and public and third sector organisations, across Scotland (see next section).

Concerning practice developments, data-driven initiatives by local governments have emerged across the UK, aimed at mitigating the effects of the pandemic. These included new use cases or the repurposing of existing activities such as for example, the integration of several datasets to identify patterns of vulnerability (for example, in Hackney and Oldham), the development of platforms and apps to match volunteers' initiatives with the needs of users (for example, in Adur and Worthing, and Sevenoaks) or the creation of a central data hub for social care providers (for example, in Hertfordshire) [49]. Other initiatives are under development as part of the Local Digital COVID-19 Challenge [50], funded by the UK Ministry of Housing, Communities and Local Government (MHCLG) in England. One project focuses on the development of a modelling system for a post-COVID-19 surge in children's services, in collaboration with the Greater Manchester Combined Authority. Another seeks to improve data exchange between local authorities, partners and the Voluntary Community Services (VCS); it is led by Central Bedfordshire Council, the Greater London Authority, London Borough of Camden, and the London Office of Technology and Innovation (LOTI) [51].

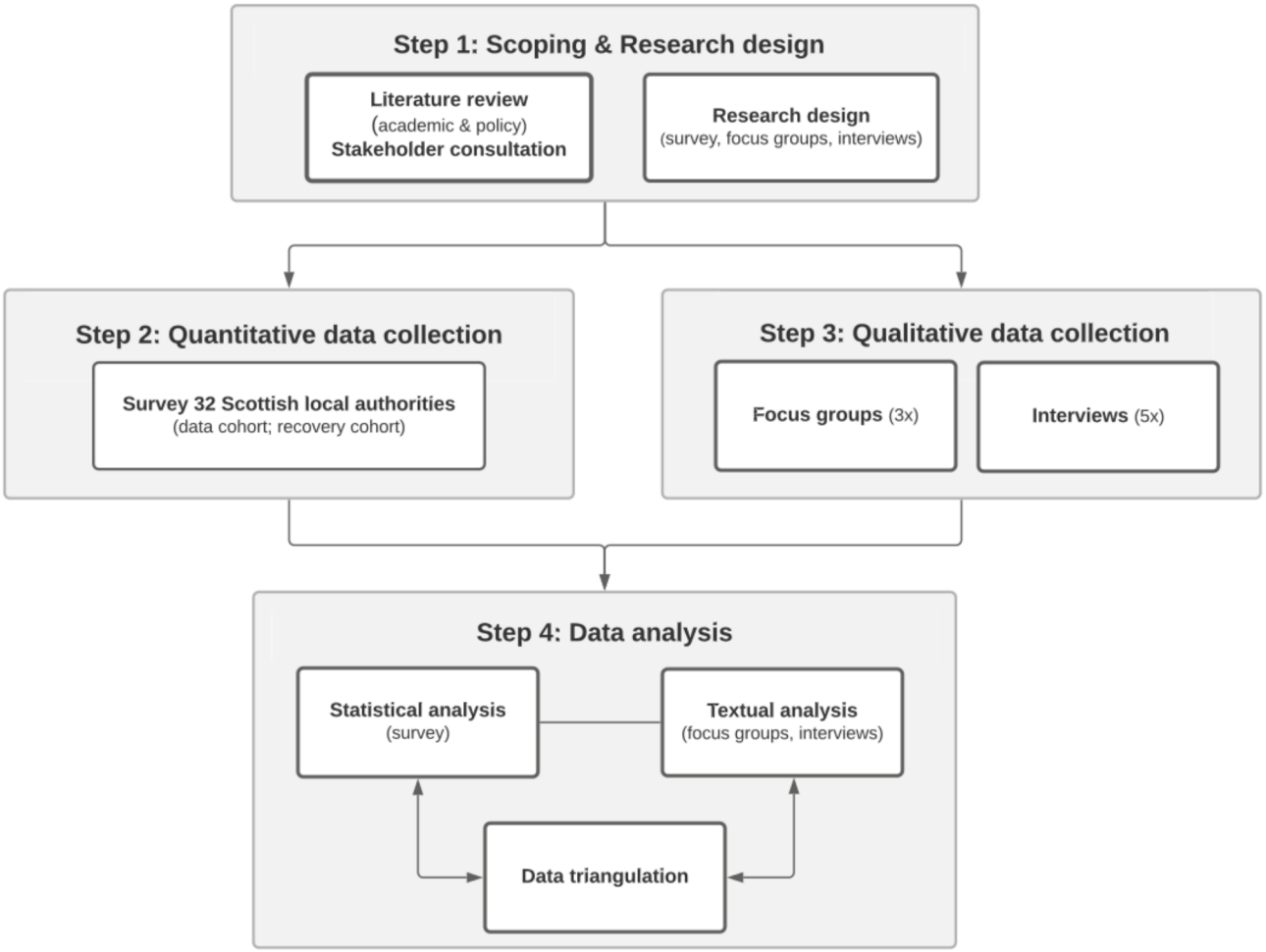
In Scotland, several local authorities adopted 'Helping Hands', a digital system to support communities to identify and provide support to vulnerable people required to shield. The system was designed to manage the different helplines set up by local authorities and to coordinate referrals to other services, including the third sector [52]. Scottish local authorities were also able to draw on the Improvement Services' Spatial Hub [53] and to source and visualise quality spatial data (for example, datasets of distinct property types) essential to support the response to COVID-19. Other examples include the adoption of a commonplace mapping tool by Glasgow City Council and the City of Edinburgh [54, 55]. The tool enabled users to flag points across the city where temporary measures such as new cycle lanes needed to be introduced to maintain physical distancing. In another instance, North Lanarkshire Council has developed an ArcGIS dashboard combining existing datasets about school locations and new data to support the planning of the return of schools [56]. In addition, the Scottish Government rapidly established the COVID-19 Data Intelligence Network, to bring together local and central governments with local and national health bodies, skills and enterprise agencies, academia, and civil society organisations [57]. On its part, the Digital Office set up a Cross-Sector Data Taskforce, comprising the public sector, academia, the third sector and the private sector, to encourage data sharing and collaboration [58]. The Data Taskforce produced collaborative initiatives and tools to respond to the crisis such as for example, the creation of an Online Data Portal to support local authorities to manage COVID-19 data returns [59].

Methodology

The research produced a comprehensive study of Scottish local authorities' data responses to COVID-19, based on a robust research design combining quantitative and qualitative research methods (see Fig. 1). We first conducted **an online survey of all 32 Scottish local authorities**, to collect systematic information about local government's data engagement in response to COVID-19. Subsequently, we conducted **three focus groups** with participants from (a) local authorities, (b) public sector organisations, such as NHS NSS and Police Scotland, and (c) third sector organisations. This was in order to gain in-depth qualitative insights into the different themes that emerged from the survey. Furthermore, we conducted **five semi-structured expert interviews** with participants from organisations that are active in the digital data field at Scottish national level, to obtain additional qualitative information on the development of cross-organisational data collaborations in the wake of COVID-19. We used triangulation [60] between the quantitative data source (survey) and the qualitative data sources (focus groups and interviews), in order to ensure the robustness of the research and cross-examine the validity of our findings.

The fieldwork was carried out between October 2020 and April 2021 with the support of the Digital Office. The collaboration was instrumental to the successful recruitment of participants for both the survey and the focus groups. The research received ethical approval from the College of Social Sciences Research Ethics Committee of the University of Glasgow (application no. 400200002).

Figure 1: Research design



Survey

The survey was designed [61] to collect systematic information about Scottish local authorities' data uses and data sharing practices in response to the pandemic. It aimed to identify arising data needs and gaps in local authorities' data capabilities, as well as explore practices of data sharing and collaborations.

The survey was conducted via the JISC Online Survey platform (hosted by the University of Glasgow) between 21 October and 14 December 2020. A **completion rate of 70.3%** was achieved, with **31 out of 32 local authorities (96.8%)** participating (see Table 1).

The survey used a purposive sampling strategy to identify two survey respondents per local authority (LA) as follows (see Table 1):

- One senior staff member in the IT, data management or data intelligence teams (data cohort)
- One senior staff member with a portfolio relating to post-pandemic recovery management (recovery cohort)

Focusing on these two populations allowed us to gain an overarching view of data uses, capabilities and needs of each LA (data cohort), while also capturing a diversity of data use in response to COVID-19 (recovery cohort).

Table 1: Survey response rates per cohort

	Invited	Completed	Response rate
Data Cohort	32	23	71.8 %
Recovery Cohort	32	22	68.7 %
Total	64	45	70.3 %
Number of local authorities	32	31	96.8%

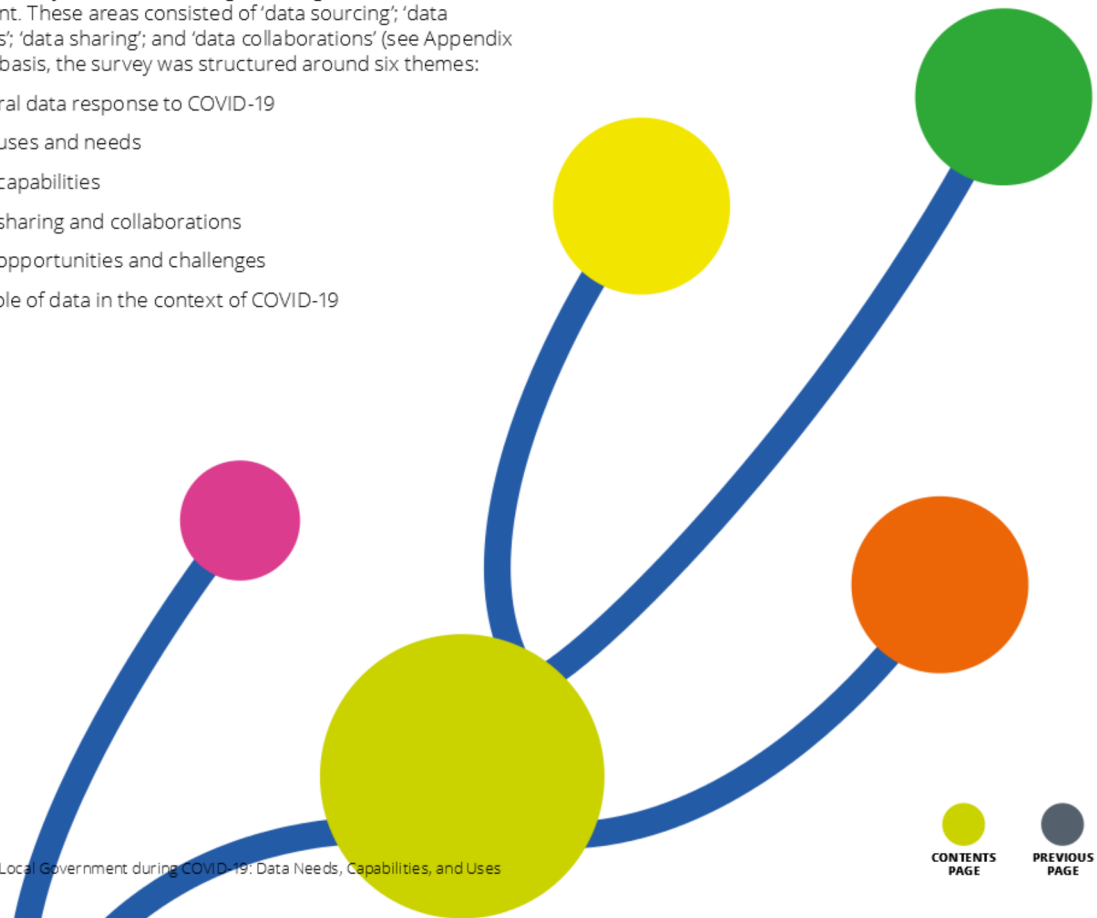
The design of the survey drew on a review of the recent academic and grey literature relating to local government's data use and digital transformation. It was further informed by discussions with relevant stakeholders (for example, data scientists, data practitioners, and the Digital Office). This process allowed us to capture data types used by local government including 'internal public sector data'; 'external public sector data'; 'third sector data'; 'private sector data'; and 'novel data', (see Appendix 1) as well as to identify four areas relating to local government's data engagement. These areas consisted of 'data sourcing'; 'data capabilities'; 'data sharing'; and 'data collaborations' (see Appendix 2). On this basis, the survey was structured around six themes:

1. General data response to COVID-19
2. Data uses and needs
3. Data capabilities
4. Data sharing and collaborations
5. Data opportunities and challenges
6. The role of data in the context of COVID-19

The survey comprised of a series of multiple choice and ranking questions, which produced quantitative data for comparative, aggregate analysis. It also included some open-ended questions allowing participants to provide further contextual information (see Appendix 3c for a full list of the survey questions).

The survey was piloted internally at the Urban Big Data Centre with data scientists and non-experts, as well as with the Digital Office. Based on the feedback received, the number of questions was reduced to 20, all of which were used for the data cohort. The number of questions for the recovery cohort was slightly fewer (18). Both cohorts had 16 questions in common, to ensure comparability of results; the remaining questions were used to obtain additional cohort-specific information (see Appendix 3b).

The Digital Office supported the administration of the survey and acted as gatekeeper. The two researchers did themselves not have any access to prospective participants' names and contacts, thus ensuring their anonymity. The Digital Office identified two contacts following the defined criteria for each cohort, and sent out a jointly-written invitation to the 64 selected participants (32 local authorities; 2 cohorts). The email contained a password-protected link to the survey corresponding to each participant's cohort, as well as a participation information sheet and a privacy notice. Full information about the study was also displayed on the welcome screen and informed consent was obtained via a tick box displayed at the bottom of the screen. To contextualise the survey data, each participant was prompted to identify their local authority (see Appendix 3a), as well as specify their department and job title. The survey took approximately 15 minutes to complete.



Focus Groups

The focus groups [62] enabled us to gain deeper qualitative insights into the preliminary findings of the survey. Data was generated through discussions between participants structured around key themes. We also used the initial survey results as prompts for the discussion, and to corroborate and shed more light on our initial analysis. Focus groups were different in their scope, but used a similar structure to allow for comparison (see Appendix 5).

Focus group 1 (FG1) aimed to further explore local authorities' data needs, capabilities, and uses in the context of COVID-19, as well as to tease out possible urban-rural differences. It was attended by 5 participants working in different local authorities and structured around four themes:

- Overall data response to COVID-19; urban-rural difference?
- Types of data used to respond to COVID-19
- Challenges relating to data use and capabilities
- Future opportunities

The second and third focus groups (FG2, FG3) were designed, respectively, to explore data sharing and collaborations between local authorities and public sector organisations (FG2), and between local authorities and the third sector (FG3). Both focus group discussions followed four key themes:

- Overall data response to COVID-19
- Accessing and sharing external public sector data (FG2) / third sector data (FG3)
- Data collaborations between local authorities and public sector organisations (FG2) / the third sector (FG3)
- Future opportunities

FG2 was attended by 7 participants: 3 from local authorities and 4 from public sector organisations. FG3 was attended by 9 participants: 2 from local authorities and 6 from the third sector (see Table 2).

Table 2: Focus group participants per type of organisations

Local authorities	Public sector organisations	Third sector organisations
City of Edinburgh Council Dundee City Council East Renfrewshire Council Glasgow City Council North Lanarkshire Council Perth and Kinross Council Renfrewshire Council Shetland Islands Council Stirling Council South Lanarkshire Council	NHS National Services Scotland (NSH NSS) Police Scotland Scottish Government (2)	Coalition of Care and Support Providers (CCSP) Edinburgh Community Food The Food Train Scottish Community Development Centre (SCDC) Scottish Council for Voluntary Organisations (SCVO) Volunteer Scotland
Total 10	**Total 4**	**Total 6**

The study used purposive sampling strategy to identify participants for each focus group. Participants from local authorities were identified in discussion with the Digital Office from the original list of survey respondents and contacted via email by the Digital Office and the researchers. Across the three focus groups, we ensured that participants came from a broad range of local authorities. Participants from public sector organisations were selected in discussion with the Digital Office and asked to take part in the research via joint emails. Participants from the third sector were identified via online search and existing networks at the University of Glasgow, and contacted by the researchers via emails. The invitation email provided participants with information about the study and gave them the opportunity to ask questions before returning the consent form. Focus groups took place online via Microsoft Teams and lasted for one hour.

Interviews

We conducted 5 semi-structured interviews [63] to obtain additional qualitative information on cross-organisational efforts to develop and grow data collaborations in Scotland, and the related impact of COVID-19. We selected participants from four organisations who are actively involved in fostering collaborations at the level of local government on data, digital services, digital transformations, and smart cities across Scotland. These were:

- the Digital Office
- the Improvement Service
- the Scottish Cities Alliance
- the Society for Innovation, Technology and Modernisation (SOCITM) (2x)

Participants were contacted via email and provided with information about the study before being asked to take part. Discussions were framed in the context of COVID-19 and focused on the role of the organisation in supporting data collaborations between local authorities. Participants were also prompted to discuss the impacts of the crisis on the data practices of local authorities in Scotland, the main challenges they faced and what opportunities have arisen (see Appendix 6). Interviews took place on Microsoft Teams and lasted from 35 minutes to one hour.

Data Analysis

The survey data was exported from JISC Online Survey to Excel and was aggregated to identify existing and emerging trends and obtain an overview of Scottish local authorities' data practices without singling out specific local authorities. Quantitative data was aggregated in two ways: per cohort (data cohort; recovery cohort; and both cohorts) and per local authority type (mainly rural; mixed; and mainly urban) (see Appendix 4). To identify underlying patterns the results were analysed and compared using Excel analytical tools and visualisations. This process produced five initial key findings and related themes: (1) Importance of public sector data; (2) Intensification of data use mostly relating to delivering essential services; (3) Data harmonisation and quality as main challenges; (4) Significant use of third sector data albeit not fully realised / missed opportunity with private sector; and (5) Limited use of novel data. These initial findings informed the structure of the focus groups and interviews. The survey results can be found in Appendix 3c.

Focus groups and interviews were recorded, transcribed and coded using Nvivo. We applied an iterative thematic analysis approach to coding and analysing the rich qualitative data. A first iteration of our coding matrix was developed, drawing on both the survey results and the summary notes generated after each focus group and interview. In this way, in addition to themes 1-5 (above), five further themes emerged as follows: (6) Inter-organisational multi-layered governance and complexity; (7) Intra-organisational complexity and legacy systems; (8) Data ethics, security and public trust; (9) Opening up of conversations and change of perspective in relation to data; and (10) Defining and aligning the purpose of data use/ collaborations with existing needs. Each theme was colour-coded to signal each type of dataset (for example, green for the survey, blue for interviews, purple for focus groups). This allowed us to triangulate findings and cross-examine the emergence of themes across datasets. Subsequently, we systematically coded the transcripts using Nvivo. The answers from the open-ended survey questions (questions 11a, 17, 18 and 19) were exported and systematically coded. We used analytical tools and visualisations to explore emerging themes across datasets, identify trends and patterns, and corroborate initial findings.

Findings

The combination of findings from the survey, focus groups, and interviews reveal four main themes as set out below.

Theme 1: Rapid response and innovation, with focus on public sector data

The first thematic cluster entails five dimensions concerning: the overall intensification of data demands and uses; the focus on public sector data; emergent innovative practices; the limited use of novel (smart) data; and moderate use of private sector data.

1.1. Rapid increase in data demand, and intensification of data use

The research shows **a significant intensification in Scottish local authorities' data practices** in response to the crisis. This intensification took place both internally and externally in response to **an increase in data demand**. In terms of internal practices, the survey shows that 83% of local authorities experienced an increase in internal data sharing and 70% reported an increase in the integration and analysis of existing internal data. This intensification is also reflected in the acquisition of data: 78% made use of new data sources and 74% of local authorities saw an increase in data collection (see Table 3).

Table 3: Scottish local authorities' data response to COVID-19 (survey Q. 6, data cohort)

Data response to COVID-19	Data cohort (%)
Increasing data sharing internally	83
Using new sources of data (all types)	78
Increasing the use of data visualisation tools (e.g. Tableau, Power BI, ArcGIS)	78
Increasing data collection	74
Integrating and analysing existing internal data	70
Increasing the use of existing data software	70
Increasing data sharing externally	70
Developing data-centred collaborations with external stakeholders	52
Acquiring additional data software	26
Providing data-related training for staff	22
Recruiting additional staff with data expertise	4
None of the above	4
Don't know	4

The survey findings resonate with the qualitative data from the focus groups, where participants described the rapid increase of data demand internally and with external partners, as well as the intensification of data use in response to the pandemic. For example, one participant highlighted how the demand for data intelligence within local authorities and at national levels stepped up very significantly:

> *'Suddenly data became king again. It had kind of gone off the… not off the boil, but it was in the background… Suddenly it was front and centre, suddenly everybody wanted to know everything immediately, and that included our councillors, that included external [stakeholders] as well.' (Focus group, local authority)*

Another participant explained that 'without a doubt, [our] data use intensified almost from day one' while a third characterised the demand for and use of data as effectively 'going through the roof' (focus group, local authority). Participants reported a significant increase in local authorities' day-to-day data needs.

These needs primarily concerned data relating to health and patterns of vulnerability, as well as data on service uptake. Internal and external data needs were combined with the requirement for local authorities to submit data returns to the Scottish Government and COSLA from the outset of the pandemic.

Local authorities **acquired new public sector data, used new sources of data, and integrated and analysed existing datasets in new ways** to respond to specific data intelligence needs. This was clearly shown in the survey results and corroborated in focus groups, with one participant explaining:

> *'What was notable was that it was new data, it was different data, we didn't have the systems to handle this data, so there was a lot of data capture being undertaken. There were lots of new reporting requirements, and we were also being supplied data from new sources that we hadn't had before.' (Focus group, local authority)*

These findings are partly explained by the obvious focus on health triggered by the pandemic: health-related data (for example, shielding data from NHS Boards) – which was not previously shared with local government – suddenly gained critical importance. In addition, local authorities also had to continuously monitor the impacts of service delivery, especially concerning how to reach and provide the right support to local inhabitants. This created a more acute need for immediate (near-)real-time data intelligence. For example, 82% of survey respondents reported using data to evaluate their local authority's response to the pandemic.

In this rapidly changing environment and with an increasing demand for data intelligence, local authorities had to **quickly mobilise and step up their internal data capabilities; they needed to source, integrate and analyse data** to understand how the pandemic was playing out locally and how best to target their responses and resources. The rapid mobilisation of internal capabilities was particularly felt in relation to shielding data:

> *'Shielded list data was being shared by local health board each week, the data from the separate GP practices was initially very difficult to match, we've since implemented a process to sync NHS CHI Numbers with the client records in our social work system.' (Survey, Q. 18)*

Participants emphasised the **technical challenges brought up by collating or matching data manually from different sources**. Similar difficulties surfaced with respect to the regular data returns required by the Scottish Government and COSLA. The matching of shielding data with existing datasets and the regular production of data returns generated a **heavy workload for local authorities' staff** who dedicated a substantial amount of time to it, especially at the beginning of the pandemic. These resource and time-consuming tasks were further compounded by changes in data reporting requirements and multiple demands to feed into different national and regional data dashboards (focus groups and survey Q. 17, recovery cohort).

The acute demand for data intelligence and reporting accelerated the adoption and use of data tools that had begun to be implemented before the pandemic hit. 70% of Scottish local authorities reported an increase in their use of existing data software; 78 % reported an increase in the use of data visualisation tools such as Tableau or Power BI (survey Q. 6). Another example of this acceleration can be seen with Customer Relationship Management (CRM) systems used by local authorities internally. This was discussed in one focus group, where two participants explained that the increased demand for data about vulnerable groups accelerated the process of revisiting their CRM systems.

While data demand and use within the public sector certainly intensified, it is important to see this development relative to other priorities triggered by the pandemic. According to the survey (Q. 20), the provision of emergency funding; the coordination with other public organisations, existing local knowledge and connections; and collaboration with the third sector were all considered more important than data-related interventions. This is particularly true for the provision of emergency funding, which 64% of respondents considered more important.

Our research **does not indicate any substantial differences between different types of local authorities** concerning data use during the pandemic. The survey drew on the Scottish Government's urban/rural classification (see Appendix 4) to tease out differences but did not reveal any significant ones. Anecdotal evidence emerged from the focus groups and interviews suggesting that largely urban local authorities were further ahead in terms of using visualisation tools and in implementing business intelligence programmes, whereas largely rural local authorities had possibly experienced lesser needs for data due to their smaller size.

1.2. Mobilisation of existing public sector data for essential services

Another key finding is the **preponderance of public sector data:** it became crucial to meet local authorities' needs for intelligence on rapidly changing local circumstances and on the delivery and uptake of their services. This prevalence can partly be explained by the health nature of the crisis: to support their response, local government needed immediate information about the users and employees of their services.

In their initial responses, local authorities used data to identify vulnerable groups and their needs, and to monitor and adapt service provision and delivery as required. This was characterised **by a fast pace and an alignment of purpose towards delivering essential services and supporting vulnerable groups:**

> *'Initially, we needed to get off the ground data in terms of how did we record what people were requiring. Obviously, it was the responsibility of the local authority to set up a helpline, so then it became what did we record on that helpline to enable us to provide the services that were required? Particularly in relation to food and pharmacy and medicine and any other needs.' (Focus group, local authority)*

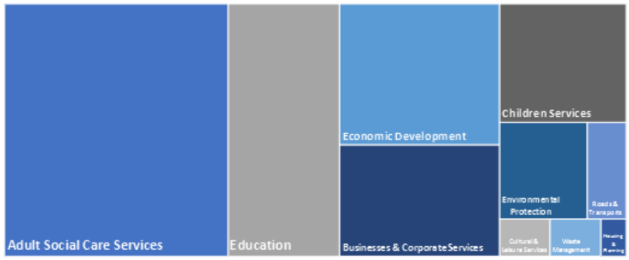
The data collected in the survey corroborate the qualitative insights and show that local authorities' data responses have centred on essential services and local support. 91% of local authorities used data to tailor local support (for example, digital services and the delivery of food parcels); 87% to prioritise essential services; and 80% to coordinate volunteering and community responses. 84 % reported having used data to support local businesses and the economic recovery (see Table 4).

Table 4: Activities informed by data (survey Q. 7)

Activities informed by data	Total sample %
Tailor local support (e.g. digital services, delivery of food parcels)	91
Prioritise essential services	87
Support local businesses and economic recovery (e.g. emergency grants)	84
Evaluate your local authority's response to the crisis	82
Coordinate volunteering and community responses (e.g. mutual aid groups)	80
Maintain safety in public spaces	47
Adapt public transport (e.g. adding cycle lanes, reduced timetables)	44
Measure public compliance with COVID-19 related rules (e.g. lockdown, social distancing)	22
Other	4
None of the above	4

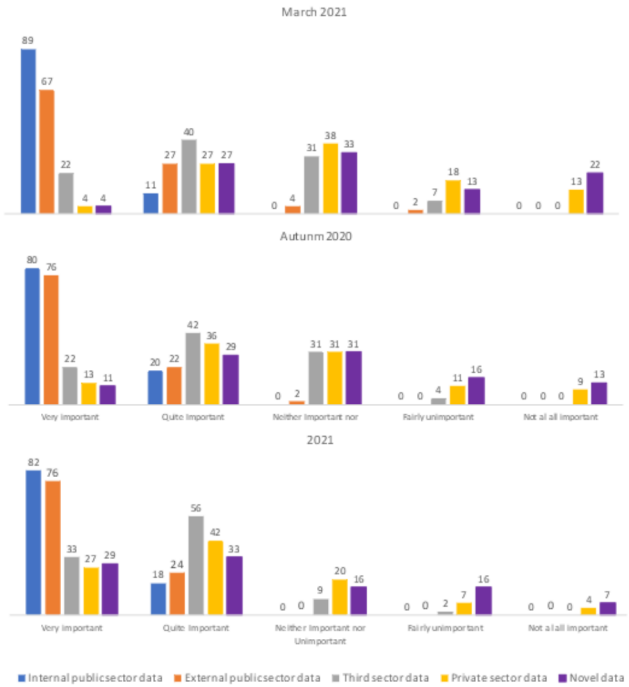
The focus on delivering essential services was also captured in the ranking of policy areas that had seen an increase in terms of data needs as a result of the pandemic. Adult social care services and education were on average, ranked first and second. This was followed by economic-related policy areas (economic development, and business and corporate services), suggesting that local authorities also continuously evaluated the impact of the crisis on local businesses and on their income (see Fig. 2).

Figure 2: Increased data needs in different policy area (ranking weighted mean values, survey Q. 8) [CLICK FOR BIGGER IMAGE]



In addition, survey respondents identified internal and external public sector data as the most important type of data to manage the initial and current response to COVID-19 (89% and 67% respectively during the first months of the lockdown, 80% and 76% in the period October-November 2020). **Public sector data scored consistently and significantly higher than other types of data throughout the period** (see Fig. 3).

Figure 3: Perceived importance of data types at different periods of the pandemic (%, survey Q's 3-5) [CLICK FOR BIGGER IMAGE]



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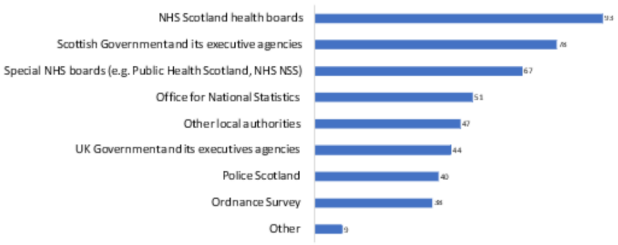
Concerning internal data, more than 80% of survey respondents indicated using data relating to customers' contacts, adults in social care and recipients of social benefits. More than half of respondents also reported using data about social demographics, homelessness, children in care and council taxes (survey Q. 9, see Fig. 4). This demonstrates the importance of public sector data that was key to identify vulnerable groups. It also shows the breadth and variety of data collected and administrated by local authorities. 69% of survey respondents also reported using human resources' operational data. This likely reflects the rapid move to remote working and the need for staff redeployment [64].

Figure 4 : Internal public sector data used in response to COVID-19 (%, survey Q. 9) [CLICK FOR BIGGER IMAGE]

As shown above (Fig. 2), some policy areas were less prominent in responding to the crisis. This is further evidenced by the lesser use of public sector data relating to transportation (29% road traffic, 29% public transport) (survey Q. 9, Fig. 4) and with fewer than half of survey respondents (44%) indicating using data to adapt public transport provision (survey Q. 7, see Table 4). Additionally, fewer than a third of respondents reported using data relating to anti-social behaviours, waste and footfall, while only a few participants reported using CCTV or air quality data (see Fig. 4).

The research also reveals a strong reliance on public sector organisations for sourcing data, including NHS Health Boards (93%), the Scottish Government and its agencies (78%), and Special NHS Boards (67%). 47% of local authorities also reported 'other local authorities' as their sources of external public sector data, suggesting significant data exchanges across local government (see Fig. 5).

Figure 5: Sources of external public sector data for local authorities (%, survey Q. 10) [CLICK FOR BIGGER IMAGE]



1.3. Innovative data use and integration by local government

Local authorities rapidly set up **innovative solutions to integrate and analyse data from multiple datasets** to meet new informational needs raised by the pandemic. Half of survey respondents (49%) reported **data-related initiatives** (survey Q. 19). These centred on the delivery of essential services to support the local population. Participants especially mentioned the initiative 'Helping Hands', which was rapidly deployed to identify vulnerable people, and manage contact and service provision for individuals who needed to shield. This initiative was described as an example of positive data use and collaborations across the public sector and with the third sector.

The solution that was adopted by eight local authorities was procured by Agilisys and was negotiated by the Digital Office on behalf of local government [65]. Other local authorities deployed systems and solutions to manage helplines and customers' contacts (for example, Oracle Service Cloud and Verint CRM).

Local authorities also quickly developed initiatives to match and integrate data from both internal and external sources. Often, these initiatives started with the shielding data shared by NHS Boards and expanded to other local and national datasets relating to various indicators of vulnerability (for example, food poverty, social benefits recipients, and community data).

> *'Our resilience management team and our chief executive realised that there were lots of different datasets coming at us about the nature of the pandemic in our area. Some of that was open data that we were consuming; some of it was local datasets; some of it was the Public Health Scotland test and protect data at different levels of sort of anonymisation. And we pulled that into a dashboard hub of the corporate view of [Council] in terms of trying to understand where the epidemic was playing out and what kinds of impacts that was having.' (Focus group, local authority)*

While characterised as a significant and complex undertaking by participants, these **data-matching initiatives had a considerable impact and played a positive role** in local authorities' ability to respond to the crisis. For example, one participant described how the matching between data coming from local government, health bodies and the third sector allowed them to identify and reach 100,000 people who needed support on top of the original shielding list shared by Health Boards.

Several participants also reported the **creation of dashboards** (mirroring the related survey findings on increased data visualisation), which were used for day-to-day operations and strategic leadership. These included, for example, dashboards combining health and council data to track the prevalence and impact of the virus; dashboards to support the redeployment of staff and remote working; dashboards monitoring school absences and educational capacity; and economic-related dashboards. The need for geospatial data and visualisations accelerated the use of ArcGIS technology by many local authorities, drawing on existing internal expertise and prior experience with this technology, and other sources of data such as the Improvement Service's Spatial Hub. Innovation and data initiatives were undertaken at individual local authority level, as well as supported and driven by collaborations and cross-local government networks led by the Digital Office and by the Scottish Government (see section 3.1).

Furthermore, national organisations, set up to support local authorities' digitalisations and smart city initiatives, repurposed their work to respond to the increased demand for data (sharing). For example, one interviewee explained that they had to adapt their business cases in response to COVID-19, to provide support on emerging issues around collaboration tools, digital skills, and supporting staff remotely (interview). Similarly, another participant explained that COVID-19 disrupted their organisation's focus on non-essential data collection and open data, pushing back related initiatives to focus on the demands of COVID-19 on essential services. internal data needs and capability-building (interview).

DATA-MATCHING INITIATIVES HAD A CONSIDERABLE IMPACT AND PLAYED A POSITIVE ROLE IN LOCAL AUTHORITIES' ABILITY TO RESPOND TO THE CRISIS

62% OF RESPONDENTS STATED THAT NOVEL DATA WOULD BECOME 'QUITE IMPORTANT' OR 'VERY IMPORTANT' IN THE PERIOD AHEAD (2021)

1.4. Limited use of novel data, but expected future relevance

While public sector data use intensified significantly, the same cannot be said about novel types of data. Novel data here refers to digital data collected via connected infrastructures and sensors, and/or generated by users via applications and platforms (for example, sensors data, IoT, social media, and crowdsourced data).

One in three survey respondents considered novel data as 'not at all important/fairly unimportant', and another third as 'neither important nor unimportant'. Thus, only one-third of respondents reported novel data as being 'quite important' or 'very important' (see Fig. 3). This was further reflected in **limited reported use of specific novel data types**: 24% of local authorities reported using social media data, 18% using data from connected infrastructures (IoT), and 4% respectively using cellular and Wi-Fi, and crowdsourced data. Significantly, 36% of survey respondents reported that their local authority had not used any of these novel data types (see Table 5). In addition, only a limited number of participants reported initiatives centred on novel data (survey Q. 19 & FGs). This included the rollout of the Integrated Transport Spaces for People app, which collected crowdsourced citizen data on an interactive map (see background section). It also included the use of street sensors data to monitor activity such as traffic sensors and CCTV object detection as well as manage public facilities (for example, reopening of public toilets). The research found anecdotal evidence of the use of Google mobility data (focus group).

Table 5: Types of novel data used in response to COVID-19 (%, survey, Q. 15)

Types of novel data used in response to COVID-19	Total Sample (%)
None of the above	36
Don't know	27
Social media data	24
Data from connected infrastructures	18
Cellular and Wi-Fi data	4
Crowdsourced data	4

The limited use of novel data contrasts with several national media reports, especially in the early stages of the pandemic, discussing the opportunity for novel data use and 'smart city' innovation, particularly in relation to mobility [66]. Focus group discussions shed more light on this:

> *'I think it [novel data] is not an area we did a lot of analytics in. I will say that we did, and had as part of our dashboard, analytics on our street sensors, for example, the traffic flow centres. […] When I looked at the traffic data, it was interesting about the flows of how it fell off a cliff in March [2020] and how it trended up or down over time. I'm not sure it drove any decisions per se.' (Focus group, local authority)*

Sensor data relating to mobility was used by some local authorities, often in a dashboard, but the value of it was not immediately clear. While providing information about mobility trends, traffic flow data was not necessarily further integrated into analytical models. Participants noted that there was a lack of awareness about the utility and potential of novel data, which prevented their uptake. This was further compounded, they observed, by a need for dedicated infrastructures and skills.

Notably, however, survey participants did indicate an **expected increase in novel data use in the future** (see Fig. 3): 62% of respondents stated that novel data would become 'quite important' or 'very important' in the period ahead (2021). This is double the percentage of respondents giving the same answer for the initial period of lockdown (spring 2020) (survey Qs.3-5). There is therefore **recognition of the future potential of novel data**, even if actual use during the first year of the pandemic was limited. This was illustrated by some focus group participants highlighting the potential for sensor data as well as referring to specific initiatives.

> *'We've started to look at this and part of it is through our 'smart homes' initiative, so we're looking at sensors in our housing stock and in our new housing stock. […] I suppose we're just dipping our toe in the water around some of this as well. So, I don't think that we don't necessarily want to do it. I think it's that sometimes we don't necessarily fully understand its uses for us.' (Focus group, local authority)*

It was clear from discussions that participants thought that local authorities needed to define a clear purpose for the collection of this type of data and understand how novel data could inform decision-making before a broader take-up could take place. As one participant put it 'what does that [novel data analytics] actually tell us and of what use is it to us?' (Focus group, local authority). In other words, participants perceived the potential of novel data, but could only see the potential being achieved if it was informed by emerging needs, rather than by the technology itself.

1.5. Moderate use of private sector data

The research found comparatively **moderate use of private** sector data. One-third of survey respondents (27%) reported using any such data to respond to the pandemic (survey, Q. 11). Additionally, half of survey respondents (51%) reported data-related collaborations with local businesses and a quarter (24%) with private corporations (survey, Q. 16).

Respondents indicated using data concerning private retail and local businesses' activities to manage emergency grants and monitor the economic impacts of the pandemic. This is reflected by 49% of survey participants reporting that they used data relating to business rates (survey, Q. 9). Economic data was also sourced nationally, via the Office for National Statistics (see Fig. 5). Survey respondents also mentioned private sector datasets they obtained relating to their customer management systems (for example, Experian data and Acron datasets) (survey, Q. 11).

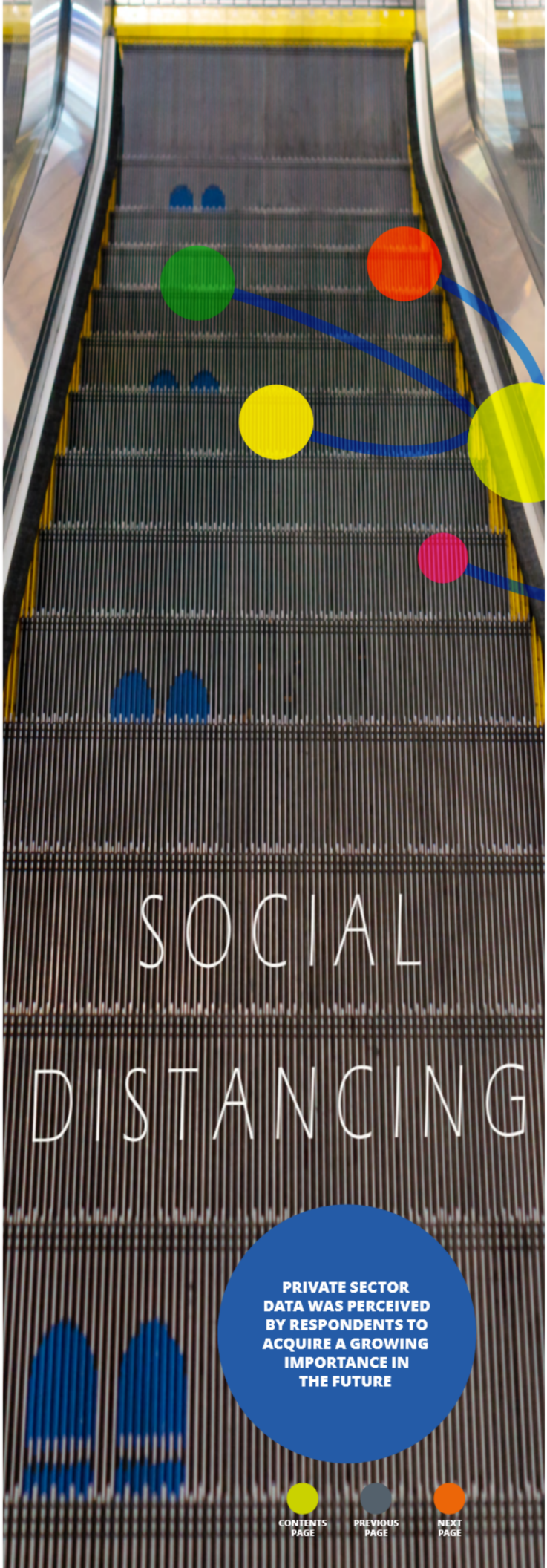
Accordingly, private sector data was not identified as key in the initial and current responses, with two-thirds of respondents perceiving it as 'unimportant', 'fairly unimportant' or 'neither important nor unimportant' (survey Qs. 3-4, see Fig. 3). This can, of course, partly be explained by the fact that the crisis was centred on health and health-related data, owned by NHS Scotland. However, private sector data was perceived by respondents to acquire a growing importance in the future, evidenced by a doubling of respondents identifying it as 'quite/very important' between the first period (31% regarding the initial response in March 2020) and the third period (69% in 2021).

These findings were corroborated in the interviews and focus groups, where the private sector was largely absent in discussions, though mentioned as an opportunity for collaborations in the future.

> ***'I do think there's a real opportunity for authorities to look and come together as one, and say, where are the things that we could focus and do something together, and maybe chip in our pennies and have a much stronger position with private sector companies or private sector resources.' (Focus group, local authority)***

At the same time, participants also emphasised the need to negotiate better accords and contracts with private sector companies, allowing local authorities to get data from external systems and use it.

Private sector data and novel types of data often overlap in the field of smart cities and IoT where private providers have a big share of the market (for example, Cisco, Siemens and IBM). According to a study by the Open Data Institute [67], COVID-19 has increased the use of private sector data and opened previously inaccessible private sector datasets relating to mobility (for example, Strava Metro [68] and Google Mobility). While our research only shows a moderate use of private sector data and a limited use of novel data, both were seen by participants as increasingly important in the future.



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Theme 2: Existing challenges amplified

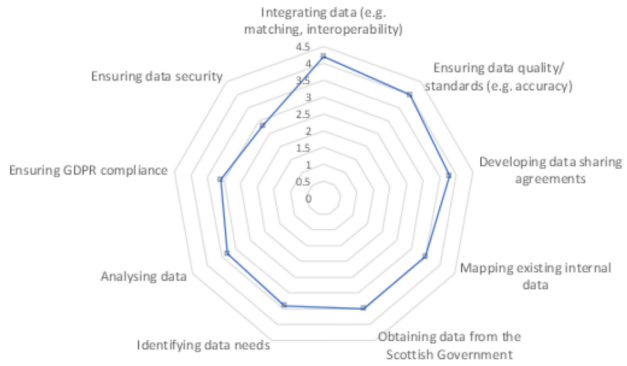
The second broad theme relates to the range of challenges faced by local government, including: issues with data quality and integration; persistent legacy systems and organisational complexity; the scope for improved technical skills and data literacy; and the need for investment in data capabilities.

2.1. Patchy data quality and integration

Another key finding is the significant operational challenges that local authorities have faced when deploying data in response to COVID-19. These challenges were not new, but were exacerbated by the rapid pace of the initial response and by the increasing demands for data and data intelligence. Two stand out in particular: **data quality** and **data integration**.

In the survey, respondents identified 'ensuring data quality/ standards' and 'integrating data' as particularly significant challenges, as shown in Fig. 6. Both these categories have a mean of 4 or above (on a scale 1-5, where 1 is 'not at all challenging' and 5 'very challenging'). Following closely are 'mapping existing internal data' (3.5) and 'analysing data' (3.3). These quantitative findings were echoed by the qualitative data captured in the open-ended questions of the survey as well as in focus groups and interviews. For example (survey Q. 17, recovery cohort), respondents described encountering obstacles to identify, access, integrate and use available data (both internal and external to the organisation). Participants also particularly highlighted the lack of data standards and standardised approaches to data sharing, which generated high levels of complexity. Practically, it led to difficulties in integrating data generated internally and data sourced from a range of partners; in turn, this caused patchy data quality.

Figure 6: Data related challenges (mean values, data cohort, survey Q. 17) [CLICK FOR BIGGER IMAGE]



Research participants repeatedly discussed the need to develop and adopt **common identifiers and data standards** to support the collation and integration of data across systems internally as well as with external sources. While this need predated the pandemic, the rapid response required from local government amplified it.

> *'We were being asked to match together data from discrete sources, where there was a degree of uncertainty as to what we were doing because we were having to use dates of birth, etc. If only we had common identifiers for people and property, for our employees internally, for our citizens externally, and for the properties that our citizens live at.' (Focus group, local authority)*

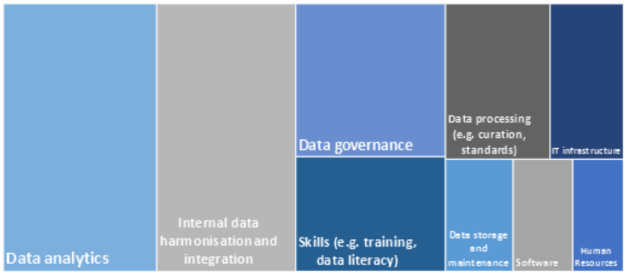
As shown above, the lack of standards resulted in difficulties matching and integrating data, which ultimately led to poorer **data quality**. This was compounded by issues of data unevenness (relating to completeness, timeliness and reliability) across different sources. These factors created an extra burden on local authorities to cleanse and match data, and ensure data quality:

> *'The other challenge I would suggest is data quality. Even in the collaborations through COVID, one serious issue was how did we know the provenance of data that we were receiving from multiple sources? So, was it right, did we have to validate it against other data sources, did we have to cleanse it?' (Focus group, local authority)*

Further, focus group participants raised concerns relating to data security and data protection compliance. This was also reflected in the survey (survey Q. 18, data cohort), with the category 'ensuring GDPR compliance' ranked 3.1 (on a scale 1-5) and 'data security' ranked 2.8 (see Fig. 6). Both aspects were seen as key to moving forward and essential to gaining public confidence and providing reassurance to citizens about how public organisations use and share their data (see section 4.3).

In summary, the need for data standards and common identifiers, particularly regarding customer and property data, were highlighted as pivotal for advancing data use and integration by local government. While recognising that adopting data standards was a complex task for local government to undertake, participants saw it as an important opportunity to seize.. This was also reflected in the survey (Q. 18): 70% of respondents identified 'harmonisation and integration of internal data' and 'increase of data sharing internally' as main opportunities (see Fig. 7).

Figure 7: Data related opportunities (%, data cohort, survey Q. 18) [CLICK FOR BIGGER IMAGE]



2.2. Legacy systems and organisational complexity

The research shows that data quality and integration were closely related to, and exacerbated by, persistent **legacy systems** and related **lack of interoperability**. These became exposed during the rapid response that local authorities had to mount to manage the pandemic. Focus group discussions captured the considerable challenges brought up by multiple legacies of systems. These included the variety of past and existing IT systems and software used within local authorities and between individual departments; the absence of systematic documentation of these systems; and uncoordinated data management protocols for data and metadata within local government.

The integration of existing, and adoption of new, systems and the related development data standards were described by participants as very burdensome and technically difficult. This was particularly apparent in relation to CRM, as local authorities used different systems internally that were based on dissimilar customer identifiers.

Participants identified ongoing efforts to deal with complex legacy systems, and in particular the development of common internal data warehouse and CRM systems. They experienced this as a lengthy and often difficult process. Thus, addressing legacy systems requires not only appropriate investment in technology and resources, but also very considerable person efforts and time commitments. Linked to this, participants noted that the cost-benefit analysis in respect of redressing legacy systems and implementing data standards does not necessarily add up for local government: doing so incurs considerable costs in the short term with the benefits only felt in the midterm, or realised elsewhere.

Participants also flagged up **the organisational complexity and siloed nature of local authorities**. This complexity can partly be explained by the breadth of services that local government provides and the wide range of policy domains under its responsibility. However, participants agreed that the siloed nature of local authorities frequently impedes effective internal data use and sharing. At the same time, data portfolios and responsibilities are often spread across internal service boundaries. For example, one focus group participant explained that, although they had centralised IT and data governance teams, data was still ultimately owned and administered by individual service managers. These issues were further compounded by a variation in terms of digital transformation and data maturity across and within local authorities (across teams and departments).

In short, the complexity of local government concerning internal 'silo' structures (and related questions of data ownership and responsibilities), combined with the persistence of legacy systems, poses a significant challenge for achieving data interoperability and integration within local authorities and across sectors.

2.3. Scope for improving technical skills and data literacy

The lack of data-related skills strongly emerged as an area where participants identified a scope for improvement. Participants noted two overlapping gaps: the first concerns **technical skills and data know-how**, including analytical skills, technical skills to integrate data, and experience with using technical software; the second concerns **data literacy** in the broader sense of awareness of data, its potential, and its value.

Survey respondents clearly identified these two skills gaps when asked about particular challenges (survey Q. 17, recovery cohort). This included 'data literacy', 'lack of sufficient data analysts', 'analytical capabilities, mindsets and skills', 'data skills' and 'staff who can undertake the technical work to connect to sources and integrate data, and staff who can analyse the data'. The skills gaps were also discussed in focus groups: for example, one participant explained that it was difficult to secure the 'relevant software and the skills around publishing the data in particular formats' (focus group, local authority), and another stating:

> *'Having to rely on very basic tools to process things rapidly, that was a particular feature and focus which also illuminated data literacy and skills issues, along the way.' (Focus group, local authority)*

Interviewees also identified gaps in data skills and staff capacity as a key area to address:

> *'I think the missing ingredient has been staff capacity both in terms of time and experience, and knowledge of how to use a lot of these new systems.' (Interview)*

These issues were exacerbated by difficulties concerning the recruitment and resourcing of staff with appropriate skills, including data scientists and business analysts.

PARTICIPANTS DISCUSSED THE NEED TO ADOPT COMMON IDENTIFIERS AND DATA STANDARDS TO SUPPORT THE COLLATION AND INTEGRATION OF DATA ACROSS SYSTEMS

2.4. Case for investment in data capabilities

The survey shows that the intensification of data use and rapid improvement of data capabilities were not typically supplemented with significant additional resources: only 26% of respondents reported the acquisition of additional data software, 22% the provision of data-related training to staff, and a mere 4% the recruitment of additional staff with data expertise (survey Q. 6, see Table 3).

Focus group discussions and interviews echoed these findings. Participants saw **appropriate investment** as vital for the development and sustaining of data capabilities and infrastructure in the short and long term:

> *'The immediate issues for us is to get investment, sustained investment, to standardise as much as possible, where viable, across our own organisation. But it's just the cost of all this, and you have to be able to resource it, and that really is a major concern.' (Interview)*

Participants discussed the lack of resourcing and investment in respect of, for example, addressing legacy systems, implementing data standards, providing adequate training to staff, and purchasing software and tools. That said, two focus group participants reported investment in specific areas, such as ArcGIS systems and related analytics tools, and Power BI, suggesting some differences between local authorities.

Participants also noted that their success in meeting demanding data requests and rapidly delivering data intelligence, increased internal demands for this type of work; it therefore requires appropriate resourcing in the future.

> *'For me, it's raised the profile of data within the organisation, which is a good thing, and therefore the capabilities of the team, but also recognition that that was always a very small team and still is a very small team. So, it's what [Participant] said, people have suddenly thought, oh, can I get this, can I get that? Well, yes, you can, but we've got a very limited resource.' (Focus group, local authority)*

Consequently, the intensification of data demand and use were not perceived as sustainable in the long run without appropriate and targeted investment to continue to 'meet that kind of demand' (focus group, local authority).

Participants also indicated the need to **clearly identify and articulate needs** to be able to invest in data capabilities in a targeted way. For example, one participant explained that Power BI suited their needs for rapid analytics and visualisations, and investing in the service would be beneficial to the council. Another participant noted that moving forward with their open data project, they needed to map the existing tools, data analytics capabilities and in-house skills and literacy to be able to identify targeted investment (focus group, local authority). More broadly, as one participant indicated, it is about 'understanding the broader implications and wider uses' of data and therefore the merit of investing in it. (Focus group, local authority)

Survey respondents were asked to identify priorities for developing data capabilities and related investment efforts. 51% and 40% of respondents ranked 'data analytics' and 'internal data harmonisation' respectively as first or second priority. A further 24% ranked 'data processing' as first or second choice. 'Data governance' and 'data skills' scored 25% and 24% respectively. Figure 8 shows the proportional ranking of priorities, using a weighted average.

Figure 8: Priorities for developing data capabilities (weighted mean values, survey Q. 13) [CLICK FOR BIGGER IMAGE]

Participants described the development of data capabilities as extending beyond technical staff to senior managers and leaders in charge of developing policy and executing decisions. This was perceived as key to ensuring that investment in data solutions and capabilities inform policy – and decision-making. As one participant put it:

> *'We equally need to invest to make sure that people who are making decisions, policy decisions and operational decisions, are able to use that data, and know how it can be used and manipulated. So, it's not just a technology platform driven solution, but it actually impacts on policy.' (Focus group, local authority)*

Overall, achieving an optimal mix of skills and capabilities was perceived as a challenge in itself, particularly in the context of austerity and funding cuts.

Theme 3: Growing demand for cross-sectoral data sharing

This theme addresses the issue of data sharing within the public sector and with other organisations. It examines the growing demand, underlining challenges and emerging opportunities for data sharing brought by the crisis.

3.1. Increased data sharing within the public sector

The research evidences the **intensification of data sharing between public sector organisations**, especially between local authorities, NHS Boards, and the Scottish Government. This is explained by the public health nature of the pandemic and related demands for health data.

70% of survey respondents indicated an increase in external data sharing broadly (survey Q. 6, see Table 3), and 65% reported the implementation of data sharing agreements in response to COVID-19 (survey Q. 15, data cohort, see Table 6). External data sharing was perceived by respondents as essential in the context of COVID-19, with 67% and 31% assessing it as 'very important' or 'quite important' respectively (survey Q. 14).

Initially, efforts were directed towards sharing data between NHS bodies and local authorities, to identify vulnerable groups (see also section 1.2):

> ***'At the start of the pandemic, a lot of work went into establishing the data sharing to allow the NHS to tell local government who were being shielded. And we've had subsequent sharing agreements. The sharing agreements have been very point to point, as you'd expect, and that requires a lot of effort because every time you got a new requirement, a new DPIA [Data Protection Impact Assessment], you had to do a new data sharing agreement etc.' (Focus group, local authority)***

The initial first response centred on **a case-by-case approach to arranging data sharing agreements to meet pressing demand**. Such an approach was described as a resource and time-consuming process. Similarly, survey respondents identified 'developing data sharing agreements' as a major task (mean of 3.8 on a scale 1-5, from least to most challenging) (survey Q. 17, data cohort, see Fig. 6).

Nevertheless, the pandemic has accelerated data sharing across the public sector and removed some of the existing barriers to developing agreements. This included significantly **speeding up processes**, as one participant reflected:

> ***'I found it interesting how we could turn something around in a few days that normally would have taken about four or five months with several meetings involved and in-depth looks into why we needed the data and what we were going to do with it. And all of a sudden we were able to share data within four or five days, particularly with partner organisations.' (Focus group, local authority)***

The pandemic also encouraged local authorities and other public sector organisations to **collaborate and share experiences and learning**. This more collective and collaborative approach started in an ad hoc manner, initially involving relatively few people in local authorities and other public organisations with the support of the Digital Office and the Scottish Government, and then **expanded** throughout the pandemic.

THE PANDEMIC ENCOURAGED LOCAL AUTHORITIES AND OTHER PUBLIC SECTOR ORGANISATIONS TO COLLABORATE AND SHARE EXPERIENCES AND LEARNING

A participant, for example, described an initiative led by another local authority in collaboration with NHS NSS; the initiative subsequently encouraged a joint approach to 'sharing data sharing' and the related development of common data sharing templates. This involved information governance teams from different local authorities looking through data sharing agreements together and sharing their experience.

The sharing of learning and best practices between local authorities helped to speed up processes and gave them more confidence to move forward with data sharing. This work ultimately led to the development and implementation of a new Data Sharing Framework between local government and NHS NSS. This accord involved collaborations between local government and NHS NSS, as well as with Public Health Scotland and Health Boards.

The survey echoes these findings, showing that data sharing was the dominant aspect of collaborative efforts within the public sector. More broadly, 67% of survey respondents rated data sharing (for example, developing data sharing agreements and exchanging data) with non-public sector organisations as 'very important'. In comparison, data collaborations – defined more specifically as partnering with other organisations to collect, use, or analyse data – were not perceived to be quite as important (only 42% rating it 'very important') (survey Q. 14). Nevertheless, 84% of respondents reported actual data collaborations with public sector organisations, and a further 78% with other Scottish local authorities (survey Q. 16). These encompass the joint development of data sharing agreements and more generally, engaging shared learning and knowledge exchange.

Qualitative insights shed more light on this. The qualitative results (focus groups and interviews) point to the emergence and cementing of collaborations, aimed at fostering greater data sharing between public sector organisations and developing data sharing agreements. In addition, several existing and newly-created **networks and collaborative spaces** were repeatedly mentioned by survey and focus group participants as positive examples of collaborations within the public sector. These included the COVID-19 Data and Intelligence Network which was established by the Scottish Government, and the Digital Office's Data Taskforce. Participants also indicated other coordinated efforts driven by the Digital Office to support them to feed data into various national dashboards and to the Scottish Government (survey, Q. 19, open-ended). These initiatives built on pre-existing work carried out by the Digital Office (for example, its workstream 'Driven by Data [69]'), the Improvement Service, and the Scottish Government.

Participants understood the increased data sharing and collaborative work across the public sector to be a positive as well as pragmatic response to the pandemic. At the same time, they highlighted the related challenge of **sustaining these new practices over time**. Some participants expressed concern about the risk of reverting to pre-pandemic data practices. They therefore suggested that time be taken to reflect on what had, and had not, worked and to draw lessons from this. One participant warned against the **risk of regressing to previous practice**; similarly, another flagged up the risk of re-establishing some of the barriers that were brought down by the pandemic:

> *'And these artificial barriers that we had created, and there was a reason for them, and now we're wondering why it was ever like that. I'm sure some of them were justified, but what I would be hoping is that we don't regress, that we don't go back to where we were previously [..] So hopefully some of that learning moving forward. '(Focus group, local authority)*

The crisis has been a catalyst in advancing data sharing and collaborative working across public sector organisations. That said, participants cautioned against reverting to the pre-COVID status quo, in case the momentum is not maintained.

3.2. Disjointed data governance across public sector

The pandemic exposed a frequently **disjointed approach to data sharing** across the public sector. This was expressed by a lack of standardisation and coordination of data requests, as well as by high variety in existing data sharing mechanisms between public organisations. In the words of one participant, it effectively created a 'cottage industry' where:

> *'[You've got] different parties, especially health, [social] care, education. You've got different groups, Education Scotland, Scottish Government, COSLA, all asking the same questions in round about ways. So, you're basically breaking down stuff into different Excel spreadsheets which is taking more time. And effectively you've created a cottage industry rather than saying right, okay, that standardised report I can send to four different people because it's the same data.' (Interview)*

These issues were laid bare during the rapid early response to COVID-19, with local authorities experiencing **uneven access to data** requested from other public sector organisations. For example, some local authorities were able to access data from Police Scotland, whereas others struggled to access the same data.

Focus group participants indicated an issue of **reciprocity**: local authorities were expected to provide significant amounts of data at short notice to the Scottish Government and COSLA (see section 1.1) without necessarily receiving data information in return. As one local authority participant put it:

> *'At that national level, we've all freed up a bit of shared information, but the nut that's still to crack is the national datasets that sit within Scottish Government and the agencies that are linked to them, and getting access to some of that data and information which would be useful for us.' (Focus group, local authority)*

The survey echoes this, with respondents scoring 'obtaining data from the Scottish Government' as quite challenging (mean value 3.5 on scale 1-5; survey Q. 17, data cohort, see Fig. 6).

A disjointed approach to data sharing also meant that the types of datasets already available, and their characteristics, were occasionally **indiscernible, resulting in duplication** of efforts. In response, a move towards greater visibility of existing data was seen as important:

> *'The biggest development I think we can make is much better visibility of the data and the data services that we have, not just the fact that they exist, but their quality, their provenance, the ability for others to consume them based on existing agreements.' (Focus group, public sector organisation)*

Most participants underlined the need to adopt a **more coordinated, national approach to data sharing**, to look at the picture more holistically rather than through the lens of individual local authorities or public sector organisations. For example, one participant called for 'shared language and thinking about all the different kinds of data that is involved in the wider system'. Similarly, another participant called for a view beyond 'local authority context' to include a cross-public sector perspective 'as a totality' (focus group, local authority).

Participants therefore recommended a more coordinated approach to reduce the burden on individual local authorities and to avoid unnecessary duplication of efforts. In turn, this would increase the efficiency of public sector data sharing. This was perceived as particularly important in relation **to collectively developing and adopting common data sharing agreements**:

> *'I've lost count of how many data sharing agreements we've looked at over the last twelve months. There are definitely efficiencies that could have been brought in by, let's say, a uniform data sharing agreement, especially when trying to access some of the health data.' (Focus group, local authority)*

Numerous times, participants referred to the need for 'common data sharing agreements', 'uniform data sharing agreements', 'sharing agreements templates', 'single federated sharing agreements', 'coordinated data sharing across local government and central government', and so on. Some participants also discussed the development of a 'central repository for data' or 'common data platforms' as a way of improving data sharing.

The topics of public sector data standards and data sharing predate the pandemic (see background section). COVID-19, then, was seen as **an opportunity to redress existing data challenges and engage in innovation in this field**. One participant, for example, noted that the pandemic had 'solidified relationships across the public sector' (interview), while another explained that the need to respond at national level has become much more apparent:

> *'I think there's an opportunity at a national level as well to respond. And perhaps there's going to be that imperative and drive there that there wasn't previously. We've all seen at a national level the importance of data. […] As practitioners we have talked about some of the data management principles and approaches and methods we should be using, but it needs to be adopted at the national level. It needs to be driven through at the national level.' (Focus group, local authority)*

There was recognition that **Scotland is well-positioned** to develop a coordinated approach to public sector data practice. This was attributed partly to its advantageous geographic size, and partly to its comparatively advanced engagement with digital innovation at national level. Some participants noted that Scotland had allowed organisations with a national and/or digital portfolio in Scotland to be more cohesive and come together as a whole to respond to the crisis. The leadership and thriving digital landscape that have emerged in Scotland were also perceived as an asset in developing a more joined-up data approach across sectors, as discussed in Theme 4.

3.3. Ad hoc data sharing with third sector

Participants emphasised that working and sharing data with the third sector were an important part of managing the pandemic. However, the research shows that in practice data sharing between local government and third sector organisations was largely **ad hoc and non-formalised** which, in turn, resulted in somewhat patchy engagement between these stakeholders.

Two-thirds of survey respondents considered third sector data 'quite/very important' in the initial and current pandemic period (survey Qs.3-4; Fig. 3). 80% reported using data to coordinate volunteering and community responses (survey Q. 7; Table 4), and 56% reported collaborating with third sector organisations (survey Q. 16). This, then, confirms **strong engagement by local authorities with the third sector**.

However, data sharing between local authorities and the third sector was **not yet fully realised**, with fewer than half of respondents (44%) reporting actual use of third sector data in the context of COVID-19. Where data use did occur, this included data from community and voluntary groups used to assemble information about vulnerable groups and the support that they required concerning emergency food needs, medicine prescriptions, dog walking, and electronic equipment requirements etc. Significantly, the perceived importance of third sector data increased even further for the forthcoming period (2021), with 89% of respondents describing it as 'quite important/very important' (an increase of 43.5% from the initial period). Clearly, local authorities are keen to further develop and sustain data sharing with the third sector (survey Q. 5, see Fig. 3).

From the perspective of the third sector, participants presented a mixed picture: some described data sharing practices with local authorities as 'the same' as before the pandemic, while others reported an increase. As one participant explained, requests for data sharing were often tied to grants and commissioned services paid by local authorities to third sector organisations:

> *'Some of the expectations around data sharing have increased throughout COVID. This is because there have been various kinds of sustainability payments made available to providers. But to access these payments, there has been quite a high requirement for significant levels of data to be shared from third sector organisations, back to local authorities, to enable them to access these additional funds.' (Focus group, third sector organisation)*

Third sector participants noted that this generated a **data sharing asymmetry** in favour of local authorities. They also highlighted a missed opportunity insofar as third sector organisations hold relevant qualitative data which was not requested/used by local authorities. Overall, participants from the third sector felt that data sharing was a 'one-way system' where 'the third sector shares a lot of the data and information they have, but they're not getting much back in return from local authorities' (focus group, third sector organisation).

They also emphasised the **significant burden** that data requests and reporting put on their organisations. Data sharing was described as 'time-intensive', as 'everybody asks for it in a different way' (focus group, third sector organisation). Another participant elaborated:

> *'It's quite onerous requests for high levels of information, often duplicated requests. And it's just caused quite an additional administrative burden, you know, on organisations that are already super-stretched at this time. So, I think, yeah, that's kind of grown during COVID-19.' (Focus group, third sector organisation)*

In addition, some third sector participants expressed some **concerns and nervousness** about handling and sharing personal and often sensitive data.

For their part, local government participants also described data sharing with the third sector as challenging, especially concerning the lack of data standards and difficulties in matching and integrating different datasets. This common issue was further exacerbated by the diversity and multiplicity of third sector organisations operating in local areas and emerging in response to COVID-19. For example, one participant explained that they had to manually collate data on food and medicine distribution from third sector organisations, as it was not possible to automate the process.

Alongside these important resourcing and technical issues faced by both the third sector and local authorities, participants strongly spoke to the **ad hoc and informal character** of the data sharing that took place between them. One of the third sector participants described the process as 'hyper-local, very informal, very ad hoc, and very sporadic' with no formal system to share data with local authorities. It was, however, precisely this hyper-local character and the trust built through personal relationships developed over years that allowed data to flow from the third sector to local government. Participants from local authorities likewise described data sharing with the third sector as informal and hyper-local:

> *'A lot of informal data sharing goes on, a lot of that is on a case-by-case basis: this person needs food, or this person has got a referral, etc. And that's done very much at the kind of frontline worker's point of view. What I'm not so aware of is larger scale sharing of data. […] I think it is kind of hyper local, on a case-by-case basis. I don't think there is a data infrastructure there as such.' (Focus group, local authority)*

Because there were no systematic processes of data sharing, local authorities had to rapidly develop strategies and flexible processes to ensure that third sector intelligence and local provision were incorporated in the response to the pandemic. Third sector participants echoed the informal nature of response, necessitated by capacity limits and the fast-evolving crisis. As such, data sharing did occur between local government and the third sector; however, it was the product of informal networks and ad hoc processes which, in turn, resulted in case-by-case data requests and exchanges.

DATA SHARING BETWEEN LOCAL AUTHORITIES AND THE THIRD SECTOR WAS NOT YET FULLY REALISED

Theme 4: Opportunities for joined-up data practices in the public interest

This theme is future-oriented, by discussing participants' views on how recent achievements in data practices can be sustained and more firmly centred upon public benefits. Issues covered include recognising the value of data beyond data specialists; nurturing shared learning and collaborations across local government; and putting forward a national approach to fostering public trust and benefits.

4.1. Recognition of the value of data beyond data specialists

One emergent finding from the research is that the pandemic had **opened up conversations about data and broadened the recognition of its value beyond the realm of data specialists**. This was apparent across both focus groups and interviews. As one participant put it:

> *'It [the pandemic] has brought data back to the forefront again, and suddenly people recognise the value of data and the reason for having data and using it, particularly in a proactive way.' (Focus group, local authority)*

A survey respondent noted that the pandemic had highlighted the importance of data and 'how powerful data can be' (survey Q. 18, recovery cohort). From being the preserve of data practitioners, interest in and engagement with data extended to a much broader audience within local government, notably including senior management. One participant observed that the pandemic had visibly reduced the gap between management and staff working with data on the ground.

Other participants noted that the pandemic has put a spotlight on data and demonstrated to senior management and councillors the benefits and value of data, thus making a strong case for related investment. One survey respondent explained that one benefit coming out of the pandemic was the 'realisation that we can utilise data in better ways and reduce the data burden for councils'. Another commented that it has 'demonstrated the benefits of combining data from multiple sources to provide insight that can inform decision-making, and target resources.' (Survey Q. 18, recovery cohort)

The widening of engagement beyond data specialists and the recognition of the value of data were seen as **an opportunity to be seized upon**, also described by participants as a 'turning point', allowing local authorities and the wider public sector to rethink and improve the ways in which they share data and how they use it to make decisions and inform policy. One participant characterised the pandemic as 'a flash of data maturity modelling' (focus group, local authority), while another suggested that the pandemic had pushed local authorities to go further than they would have done in ten years in terms of digital transformation:

> *'I think there's been considerable changes to local government because of the COVID pandemic. [...] In the last year we've gone further than we probably would have done in ten years if it hadn't occurred. So, it's taken something positive out of it.' (Interview)*

These broader conversations about data were made possible by the need to work together across the public sector towards a common purpose and to meet a sudden and rapid demand for data. This, in turn, demonstrated not only the value of data, but also what it was possible to achieve when organisations collaborated. It also brought about changes of attitudes towards data sharing and collaborations:

> *'I think there's been more openness in sharing than we probably had previously and our willingness to sit round a table and share and discuss.' (Focus group, local authority)*

This change of attitude was described by another participant as 'refreshing' while another talked encouragingly about increasing local authorities' 'risk appetite' for data use and sharing, suggesting that different governance layers be carefully (re)considered to improve data use and sharing. Participants noted that risk aversion had been an obstacle prior to the pandemic and that it was important **to better understand the benefits of data use and sharing versus risks**. This was discussed in the context of the increased publication of open data, which has potential to benefit not only citizens and communities, but also the public and third sectors:

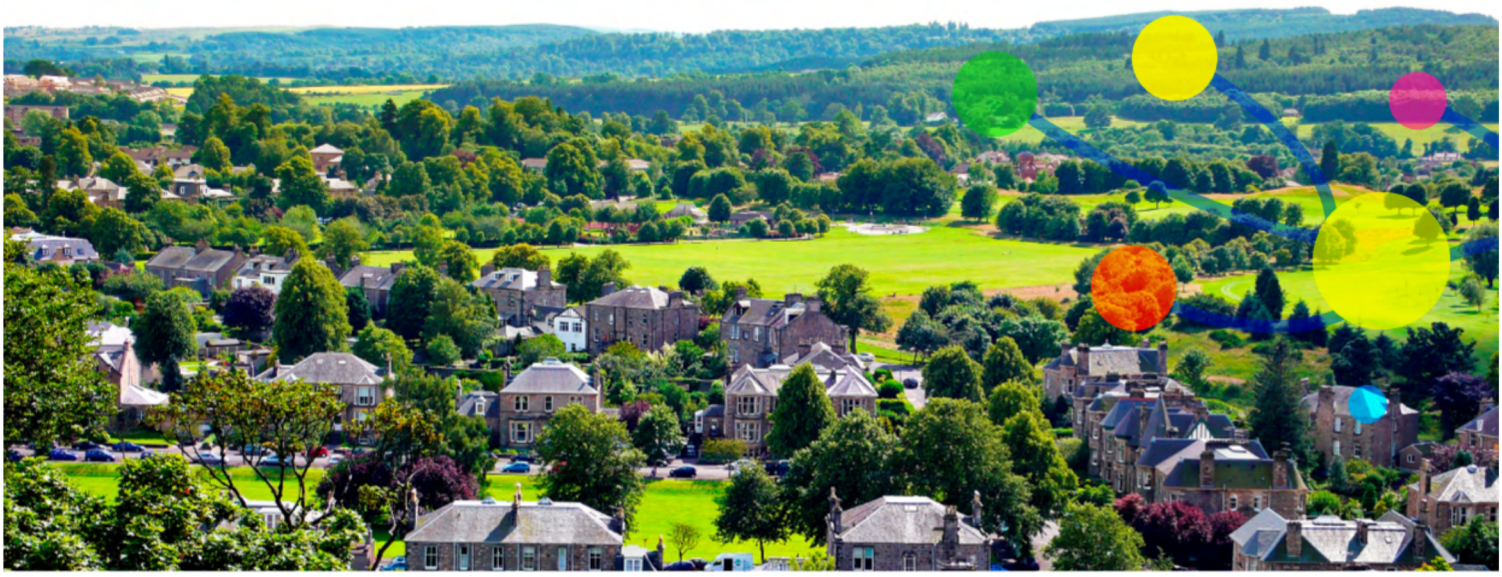
> *'We've done a little bit in open data, not a huge amount [...] I do think there's potential there for us being a bit more clever about making data open and looking to work with other partners on our data and tooling out the data. So, whilst we need to be cognisant, of course, of GDPR and make sure anything we release is okay, I think we need to have a little bit of check and balance on our risk appetite and look at the potential benefits that could come out of that.' (Focus group, local authority)*

The research also provided some evidence (from two largely urban local authorities) of the impacts that the discussions conducted in response to COVID-19 had on local government's digital transformation strategies. For example, one participant described the doubling of efforts in the digital transformation programme in their council to centralise data, as well as draw more proactively on external sources of data.

Data innovation and digital transformation have been on the strategic agendas of local and central governments for some time. However, the achievements during the pandemic demonstrated a new recognition of the value of data; this gave a renewed importance to these agendas, in particular **in the context of the recovery**. As one participant described it, 'now we're starting to look forward and we need to produce the analytical products to support that recovery and renewal process' (interview). Another put it similarly:

> *'There's a real opportunity for data to play a role in the recovery and renewal journey, and the delivery of outcomes, so that there's a clear line of sight there about what we're trying to achieve coming out of the pandemic, and how data is a key enabler of helping us progress that journey.' (Focus group, local authority)*

Participants emphasised the value and potential of sustained data engagement in the recovery process and the delivery of outcomes, especially in relation to education and the economy, as well as care and wellbeing.



4.2. Shared learning and collaborations across local government

Participants considered shared learning critical to facilitate data use in local government and foster data sharing. 43% of survey respondents identified **collaborating with other stakeholders to collect, use and/or analyse data** as a significant opportunity (survey, Q. 18, data cohort). This was also reflected in the survey's qualitative data where respondents listed working together, sharing insights and best practices, and collaborating as significant data opportunities (survey Q. 18, recovery cohort).

A main benefit of collaboration between local authorities was thought to be the reduction of duplicate efforts and, therefore, the improvement of resource efficiencies overall. Participants mentioned different ways of collaborating, including knowledge exchange, practice sharing, and jointly developing data sharing agreements for use with external partners (see section 3.1 and 3.2).

Participants highlighted the need for **strengthening existing collaborative networks and developing collaborative spaces to foster learning and create a safe environment** where people can share their experience, support one another and freely discuss data-related solutions, issues and opportunities. As noted in section 3.1., the pandemic accelerated the formation and expansion of networks to support local authorities in using and sharing data. This collaborative moment was seen as a promising basis for future data engagement:

> *'It's what we can do together, as opposed to what we do individually, if we can build on the collaboration that we have had during this crisis, and building some of that openness.' (Focus group, local authority)*

Collaboration was seen as iterative and involving various phases and steps, ultimately leading to more in-depth joint working:

> *'I've seen generally across the collaborations that you often start just with the knowledge sharing and community building piece, knowing what data is out there and these sorts of things. You then get into how do we actually share data, and then you get into, how do we share people's skills and experience and platforms and bring people together to collaborate. And that journey is a pattern that I've seen. I think the sharing of those patterns and approaches is as important as anything else.' (Focus group, public sector organisation)*

Several participants also discussed the need for some **common collaborative tools and a working environment** to facilitate the sharing of resources and workspaces. For example, one participant explained that Microsoft Teams and related protocols around secure guest access sometimes created barriers to external organisations. Similarly, one survey respondent flagged up ongoing collaborative work with Scottish authorities taking place through Microsoft Dynamics CRM, noting that their council could not take part in it as 'there was a cost associated, which for an authority of our size was not justifiable' (survey, Q. 17, local authority).

Participants also noted that, by encouraging local authorities to collaborate and 'come together as one' (focus group, local authority), it would allow them to be in a stronger position to develop data sharing agreements and more broadly define and **develop partnerships with different sectors, in particular the private sector and academia**. Partnering with external organisations was also seen as an opportunity to develop skills and capabilities that individual local authorities would not be able to afford.

While presenting it as an opportunity, the same participant also strongly emphasised the need for this type of work to be supported at national level. They suggested this could, for example, be driven by COSLA or the Digital Office. Some participants thought, however, that there was a **risk of overlaps between different cross-national efforts** to support local authorities. This also became apparent in the interviews where participants remarked that the strategic roles and remits of the Improvement Service and the Digital Office were not always clearly delineated.

PARTICIPANTS HIGHLIGHTED THE NEED FOR STRENGTHENING EXISTING COLLABORATIVE NETWORKS AND DEVELOPING COLLABORATIVE SPACES TO FOSTER LEARNING

4.3. A national approach fostering public trust and benefits

Participants discussed the **scope for greater public engagement** in relation to local government's data use and sharing. Our research reveals limited wider public engagement by local authorities around data, with only 27% and 24% of survey participants, respectively, reporting that they collaborated with grassroots organisations, and citizens (survey Q. 16). The survey also shows a limited use of public-facing data sharing mechanisms, with only 22% reporting the use of APIs and public interfaces (for example, dashboards), while only 17% published open datasets (survey Q. 15, see Table 6).

Table 6: Data sharing measures in response to COVID-19 (%, data cohort, survey Q. 15)

Data Sharing measures in response to COVID-19	Data cohort (%)
Data sharing agreements	65
Use of open licenses (e.g. Open Government License)	30
Use of Application Programming Interfaces (APIs)	22
Public-facing interfaces (e.g. dashboards)	22
Publication of open datasets	17
None of the above	13
Don't know	9

While not yet widespread, engagement with citizens was perceived to be an important area for development. When asked about future plans for data-related collaborations, 'citizens' and 'grassroots organisations' scored highest (38%) (survey, Q. 16).

To achieve greater public engagement and advance data practices centred on the public benefit, participants argued that organisations across sectors needed **to work together around this shared goal**. This was seen as part of a broader national strategy, with citizens at its centre:

> *'At the end of the day, it's about citizen-centric service delivery, and if we want to be truly joined up then a single strategy that we all buy into, and we all adhere to the principles of, is the way forward.' (Interview)*

The **adoption of common standards as well as of a common language at national level** was identified as a critical part in engaging with the third sector, communities and sustaining public engagement.

> *'I'm really looking to government, and local authorities, and my sector, like intermediary bodies, to work together to create common standards. So that irrespective of what system we use, we all speak the same language. And for me, that is a key steppingstone into a place where citizen is at the centre.' (Focus group, third sector organisation)*

The adoption of common data protocols was also considered as an important way to **establish and sustain public trust**. This was particularly the case in relation to mechanisms to ensure data protection and security. For example, one participant highlighted that it was crucial to have 'the correct protocols' to ensure that data about citizens can be anonymised, used and shared in 'a safe manner' (focus group, local authority). These protocols were seen as key to 'provide the reassurance to the public that we're using data responsibly and effectively' (focus group, local authority) and, in turn, to strengthen trust in the public sector's use and sharing of data.

Participants spoke to the **need for more transparency, open-data and engagement of communities and citizens** in the handling of their own data. However, these were still largely aspirational, at very early stages:

> *'The thing that we've all been striving for, is how do we get to the point where we're passing much more control of how data is shared back to citizens in terms of their informed ability. I think we can make all sorts of assumptions about what's good for people and our communities, but the ability to cede some of that control back to say, well actually this is your data, these are the benefits to sharing it in different ways, and allowing and enabling that to happen.' (Focus group, public sector organisation)*

Finally, participants stressed the importance of having a **clear purpose for data collection and use, with tangible benefits to the public**. One participant, for example, noted that each organisation needed to think carefully and **articulate to citizens the positive impacts** that collecting and using data have on service delivery and on their lives more broadly. Similarly, another participant stated that one of the biggest challenges was 'defining the problem that we're trying to solve through the provision of a data collaboration, or data insight, or reporting' (focus group, local authority), as well as how this would positively benefit citizens. This was further echoed by a participant from the Scottish Government, who emphasised the need to be clear about 'why and how we're doing these things [data sharing], and how that does meet the public benefit test' (focus group, public sector organisation).

PARTICIPANTS STRESSED THE IMPORTANCE OF HAVING A CLEAR PURPOSE FOR DATA COLLECTION AND USE, WITH TANGIBLE BENEFITS TO THE PUBLIC

Recommendations for policy and practice

The following recommendations for policy and practice build upon the research findings set out in the preceding sections. They aim to help inform Scottish local and central governments' ongoing practices in, and future planning for, digital transformation and data innovation. Beyond Scotland, these recommendations are relevant to policymakers and practitioners at the forefront of data engagement by providing directions for future developments.

Building on recent achievements

As evidenced in the report, the pandemic has demonstrated the importance of data to local government and public organisations and accelerated data use and innovation. Making these achievements last requires:

1. **Sustaining, and building on, newly-gained data practices** (re: findings 1.1 and 1.3): Local authorities should be supported to sustain their efforts and avoid reverting to pre-COVID-19 data practices. This can be achieved by investing in newly-gained data practices and data-driven initiatives, as well as by strengthening data networks and collaborations to reflect on lessons learnt and share best practices.
2. **Recognising the importance of public sector data** (re: finding 1.2): Local and national public sector data has played a key role in managing the crisis. Therefore, accessibility and usability of this type of data need to be placed at the forefront of local and national policy agendas. This can be achieved through the implementation and strengthening of open-data initiatives across the public sector, and addressing issues relating to data re-use and sharing (see also recommendation 5).
3. **Harnessing the potential of novel data** (re: finding 1.4): While the use of novel data by local authorities is still at an early stage, to seize this opportunity, central and local government should foster data skills as well as provide successful use case examples of novel data applications to address operational needs and inform decision-making. Successful examples include: the work undertaken by the Scottish Cities Alliance [70], and the collaborative work undertaken by Glasgow City Council and the Urban Big Data Centre on creating anonymised open data counts of pedestrians and vehicles using CCTV [71].
4. **Coordinating private sector data procurement** (re: finding 1.5): Local authorities can increase the use of and access to private sector data by jointly devising guidance and templates for private sector data procurement. One successful example is the development of collaborative procurements by Excel Scotland [72].

Addressing persistent challenges

The pandemic exposed urgent challenges relating to data quality, integration and sharing across local government and the public sector. Addressing these challenges will allow local authorities to be more resilient and efficient, thereby reducing expenses and the use of resources. This can be achieved by targeted local and national investment in:

5. **Developing and adopting data standards** (re: finding 2.1): Local authorities, with the support and lead of the Scottish Government, should adopt common digital and data standards. This will reduce resource intensive data matching and integration, and facilitate data interoperability within local government and across sectors.
6. **Conducting data maturity assessments** (re: finding 2.1): Data maturity assessments [73] should be conducted across local government with the support of the Digital Office. These will enable local authorities to identify data gaps and challenges, and establish strategies and targeted investment to meet their specific data needs.
7. **Addressing legacy systems** (re: finding 2.2): Legacies of systems are a major obstacle to data use and sharing within local authorities. Local government, supported by central government, needs to map existing systems, assess needs and develop a strategy to address legacy. This can be supported by the Digital Office and via the Scottish Digital Academy [74].
8. **Providing staff training** (re: finding 2.3): Developing and strengthening local government's in-house data skills are essential. Training includes the acquisition of technical skills (for example, data analytics, data integration, and database creation), the use of software (for example, ArcGIS Desktop, Power BI, and Tableau) and the enhancement of data literacy within local authorities. Such training can be delivered in partnership with the Scottish Digital Academy or academic organisations such as the Data Lab, and the Urban Big Data Centre.
9. **Investing in greater data capabilities** (re: finding 2.4): To ensure successful digital transformation and reap the benefits of data within local government and across the public sector, targeted investment is needed in data infrastructure (for example, system management and analytical tools) and capacity development (for example, staff). Case examples of successful investments should be shared to demonstrate positive cost-benefit outcomes.

Enhancing cross-sectoral data sharing

Local government had to rapidly acquire and share data with a range of cross-sector organisations, in particular NHS Health Boards, central government and the third sector, to manage and coordinate a local response to the pandemic. Moving forward, it is essential to support cross-sectoral data sharing practices by:

10. **Consolidating data sharing protocols across the public sector** (re: finding 3.1): The Scottish Government and national organisations with a digital portfolio should support and consolidate the achievements made during the pandemic. This can be accomplished by using collective data sharing agreements (for example, Data Sharing Framework between local government and NHS), as well as developing and adopting common platforms within the public sector.

11. **Developing data sharing protocols with the third sector** (re: finding 3.3): Data sharing between local authorities and the third sector, while critical, is not yet properly supported. Better outcomes can be achieved by developing data sharing protocols, thus significantly reducing duplicate information requests and the burden put on the third sector and local government. This should be actively supported by central government and national organisations with a digital portfolio.

12. **Investing in a national data ecosystem** (re: findings 3.2 and 3.3): Cross-sectoral data sharing needs to be supported by nurturing a viable national data ecosystem. This requires strategic and financial investment and structural support (for example, streamlining and coordination), directed at local government and the third sector. These efforts should be overseen at national level.

Innovating in joined-up data practices with focus on public benefits

Looking ahead, there is a strong case for local and central governments – as well as wider public, private and third sector organisations involved in digital transformation and data innovation – to work towards a joined-up approach to data focused on public benefits. Such an aspiration can be realised by:

13. **Embedding data perspectives throughout local government processes** (re: finding 4.1): Data has played a pivotal role in the management of the crisis and its value has been recognised beyond the remit of data specialists. Local and central governments should entrench this by consistently considering the value and contribution of data at various stages of policy and decisions.

14. **Facilitating shared learning and data collaborations across local government** (re: finding 4.2): Central government and other organisations at the forefront of data engagement should support and strengthen existing spaces and networks dedicated to data collaboration and shared learning (for example, cross-sector data taskforce, and data and intelligence network).

15. **Promoting a national approach to data as public good** (re: finding 4.3): Those wishing to advance the digital agenda in Scotland should demonstrate the value and potential of data to citizens. This can be achieved by clearly articulating the public benefits in using and sharing their data, as well as by increasing transparency of these processes to build public trust. This needs to be combined with greater consultation and participation of citizens in data initiatives and innovations.

Appendices

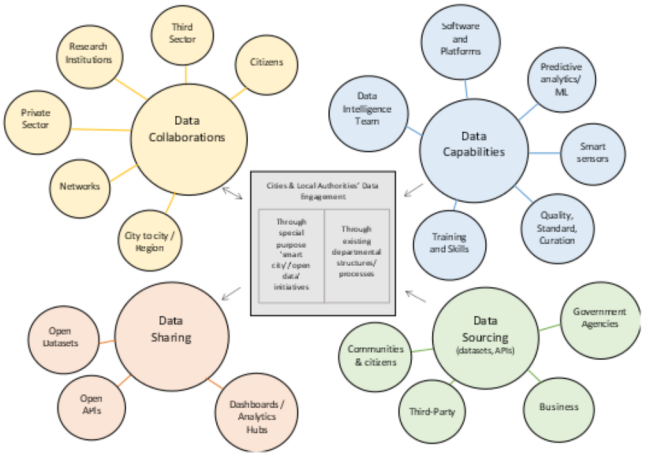
Appendix 1: Definitions of data types

The following distinctions were made when discussing different data types with research participants:

- **Internal public sector data:** Data collected/ used by local government (e.g. adults in social care, business rates, customer contacts)
- **External public sector data:** Data provided by the Scottish/UK government and agencies(e.g. tax records, educational attainment, health records)
- **Third sector data:** Data provided by charities, voluntary organisations, community groups and social enterprises (e.g. community services, service users)
- **Private sector data:** Data provided commercially by private companies and brokers (e.g. retail data, business activity, customer data)
- **Novel date:** New types of digital data generated via connected infrastructure and sensors and/ or via applications and platforms (e.g. real time traffic data, Internet of Things, social media)

Appendix 2: Diagram of local government's data engagements

Based on an initial review of the literature and consultation with data specialists, four domains of data engagement by local government and related characteristics were identified, as shown below.



Appendix 3: Online Survey

3a. Survey sample

Question 2 – Which of the following local authorities do you work for?			
Local authorities	Data cohort	Recovery cohort	Total
Aberdeen City Council	1	0	1
Aberdeenshire Council	1	0	1
Angus Council	0	2	2
Argyll and Bute Council	1	1	2
City of Edinburgh Council	1	1	2
Clackmannanshire Council	0	0	0
Comhairle nan Eilean Siar (Western Isles)	0	1	1
Dumfries and Galloway Council	1	0	1
Dundee City Council	1	0	1
East Ayrshire Council	1	1	2
East Dunbartonshire Council	1	1	2
East Lothian Council	1	0	1
East Renfrewshire Council	0	1	1
Falkirk Council	1	0	1
Fife Council	1	1	2
Glasgow City Council	1	1	2
Highland Council	1	0	1
Inverclyde Council	0	1	1
Midlothian Council	1	1	2
Moray Council	1	0	1
North Ayrshire Council	0	1	1
North Lanarkshire Council	2	1	3
Orkney Islands Council	1	1	2
Perth and Kinross Council	1	1	2
Renfrewshire Council	1	0	1
Scottish Borders Council	0	1	1
Shetland Islands Council	1	1	2
South Ayrshire Council	0	1	1
South Lanarkshire Council	0	1	1
Stirling Council	1	0	1
West Dunbartonshire Council	0	1	1
West Lothian Council	1	1	2
Total	23	22	45

3b. Survey questions: types; and per cohort

Question types per cohort		
Qs	Data Cohort	Recovery cohort
1	Multiple choice (single answer)	
2	Multiple choice (single answer)	
2a	Open-ended	
3	Likert scale	
4	Likert scale	
5	Likert scale	
6	Multiple choice (12 answers)	NO QUESTION
7	Multiple choice (10 answers)	
7a	Open-ended (optional)	
8	Ranking (3 answers out of 10)	
9	Multiple choice (17 answers)	
9a	Open-ended (optional)	
10	Multiple choice (10 answers)	
10a	Open-ended (optional)	
11	Multiple choice (single answer)	
11a	Open-ended (optional)	
12	Multiple choice (6 answers)	
13	Ranking (3 out of 9)	
14	Scale	
15	Multiple choice (8 answers)	NO QUESTION
15a	Open-ended (optional)	NO QUESTION
16	Multiple choice/grid (20 answers)	
17	Scale (from 1 to 5, 9 answers)	Open-ended
18	Multiple choice answer (4 answers out of 11)	Open-ended
18a	Open-ended (optional)	NO QUESTION
19	Multiple choice (single answer)	
19a	Open-ended (optional)	
20	Scale	

3c. Survey results

All results are presented in raw numbers.
N= 45
n (data cohort) = 23
n (recovery cohort) = 22

Question 3

Thinking back to the first month of the lockdown, how important to your work were the following types of data for managing the COVID-19 crisis?

Data cohort

Types of data (data cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal public sector data	0	0	0	3	20
External public sector data	0	1	1	4	17
Third sector data	0	2	6	9	6
Private sector data	3	5	8	6	1
Novel data	6	2	7	7	1

Recovery cohort

Types of data (recovery cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal public sector data	0	0	0	2	20
External public sector data	0	0	1	8	13
Third sector data	0	1	8	9	4
Private sector data	3	3	9	6	1
Novel data	4	4	8	5	1

Question 4

Thinking about the last few weeks, how important to your work have the following types of data been for managing the COVID-19 crisis?

Data cohort

Types of data (data cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal public sector data	0	0	0	6	17
External public sector data	0	0	1	4	18
Third sector data	0	2	8	10	3
Private sector data	1	4	7	9	2
Novel data	4	5	5	6	3

Recovery cohort

Types of data (recovery cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal public sector data	0	0	0	3	19
External public sector data	0	0	0	6	16
Third sector data	0	0	6	9	7
Private sector data	3	1	7	7	4
Novel data	2	2	9	7	2

Question 5

Looking ahead to next year, how important to your work do you expect the following types of data to be for managing the COVID-19 crisis?

Data cohort

Types of data (data cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal public sector data	0	0	0	5	18
External public sector data	0	0	0	6	17
Third sector data	0	1	2	16	4
Private sector data	1	2	4	11	5
Novel data	1	5	4	7	6

Recovery cohort

Types of data (recovery cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal public sector data	0	0	0	3	19
External public sector data	0	0	0	5	17
Third sector data	0	0	2	9	11
Private sector data	1	1	5	8	7
Novel data	2	2	3	8	7

Question 6

Data cohort: Are you aware of your local authority having so far implemented any of the following actions in response to COVID-19? (Please select all that apply)

Data response to Covid-19	Data cohort
Increasing data sharing internally	19
Using new sources of data (all types)	18
Increasing the use of data visualisation tools (e.g. Tableau, Power BI, ArcGIS)	18
Increasing data collection	17
Integrating and analysing existing internal data	16
Increasing the use of existing data software	16
Increasing data sharing externally	16
Developing data-centred collaborations with external stakeholders	12
Acquiring additional data software	6
Providing data-related training for staff	5
Recruiting additional staff with data expertise	1
None of the above	1
Don't know	1

Question 7

Please indicate if so far you have used data (all types) to do any of the following: (Please select all that apply)

Domains informed by data	Data cohort	Recovery cohort
Tailor local support (e.g. digital services, delivery of food parcels)	20	21
Prioritise essential services	19	20
Support local businesses and economic recovery (e.g. emergency grants)	17	21
Evaluate your local authority's response to the crisis	16	20
Coordinate volunteering and community responses (e.g. mutual aid groups)	8	12
Maintain safety in public spaces	8	13
Adapt public transport (e.g. adding cycle lanes, reduced timetables)	4	6
Measure public compliance with Covid-19 related rules (e.g. lockdown, social distancing)	16	21
Other	0	2
None of the above	2	0

If you selected Other, please specify:

Other	Free text
1	Workforce re-deployment to Covid-19 related duties
2	Organise childcare for key workers

Question 8

In ranking order, in which of the following policy areas have you so far seen an increased need for data (all types) in response to COVID-19? (Please select and rank up to three areas)

Data cohort

Policy domains (data cohort)	Rank 1	Rank 2	Rank 3
Adult Social Care Services	10	4	2
Businesses and Corporate Services	3	0	3
Children Services	1	6	1
Cultural and Leisure Services	0	0	1
Economic Development	2	3	4
Education	3	5	2
Environmental Protection	2	1	2
Housing and Planning	0	0	0
Roads and Transports	0	1	3
Waste Management	0	0	2
Don't know	2		

Recovery Cohort

Policy domains (recovery cohort)	Rank 1	Rank 2	Rank 3
Adult Social Care Services	12	4	1
Businesses and Corporate Services	3	2	1
Children Services	0	3	4
Cultural and Leisure Services	0	1	0
Economic Development	2	4	6
Education	4	6	4
Environmental Protection	0	0	3
Housing and Planning	0	0	1
Roads and Transports	0	1	0
Waste Management	0	0	1
Don't know	1		

Question 9

In response to COVID-19 so far, have you used internal public sector data in relation to... (Please select all that apply)

Internal public sector data	Data cohort	Recovery cohort
Adults in social care	18	22
Customers contacts with local authority	1	1
Social benefit recipients	4	8
Human resources / operational data	11	11
Social demographics	13	13
Children in care	11	13
Homelessness	19	21
Council taxes	11	15
Business Rates	14	17
Public transport	3	4
Road traffic	1	4
Anti-social behaviour & Reported crime	6	7
Waste	6	7
Pedestrian footfall	18	19
Public CCTV	15	12
Air quality	4	7
Other	1	1

If you selected Other, please specify:

Free text (both cohorts)
As a part of my role within the council did not have the need to use COVID 19 data
Shielding & Self-Isolation

Question 10

Please indicate if so far you have used any of the following sources of external public sector data in response to COVID-19. (Please select all that apply)

External public sector data sources	Data cohort	Recovery cohort
NHS Scotland Health Boards	20	22
Scottish Government and its executive agencies	17	18
Special NHS Boards (e.g. Public Health Scotland)	13	17
Office for National Statistics	12	11
Other local authorities	9	12
UK Government and its executive agencies	10	10
Police Scotland	9	9
Ordnance Survey	8	9
Other	2	2

If you selected Other, please specify:

Free text (both cohorts)
NOMIS
As a part of my role within the council did not have the need to use COVID 19 data
National Records of Scotland ScotPHO – specifically the Covid19 Vulnerability work
GIS provider – Esri(UK)

Question 11

So far, have you used the following types of data in response to COVID-19?

	Data cohort	Recovery cohort
Third sector data		
Yes	8	12
No	6	4
Don't know	9	6
Private sector data		
Yes	5	7
No	8	5
Don't know	10	10

If 'Yes', could you give some examples?

Cohort	Free text
Data	Economic data has come from national rather than private sectors – local govt not in a position to pay for additional data sources unless emerges business critical
Data	In order to provide/ coordinate food, medication, and mental health support during lockdown.
Data	Experian data
Data	Details of families that required electronic equipment
Data	Lists of community groups loaded into the systems supporting the work of the Grampian Covid Assistance Hub
Data	I don't have the details, but I know third sector partners were important to the initial response.
Data	Data on support delivered to individuals in the community – emergency food, befriending, dog walking etc
Data	Co-ordinating support services through neighbourhood hubs
Data	I believe WLC might have used the above data types however, I did not
Data	Ordnance survey and Housing agencies
Data	We have used some limited data on food bank use from the third sector
Recovery	Third sector data around supporting people with digital needs and Connecting Scotland Programme Private Sector data to assess impact on businesses, particularly retail
Recovery	Combining intelligence with third sector to identify vulnerable individuals Sharing service delivery information to co-ordinate responses
Recovery	Third sector have supported community response and provided data on uptake and need
Recovery	Connecting Scotland project – sharing data with the SCVO and numerous community groups. Food distribution
Recovery	From Community Groups and from FareShare partners
Recovery	Data for Shielding & Vulnerable groups, Business Activity to manage grants, council tax, parking, rates etc Monitoring usage of services to review income and travel into the City Centre. Data around construction and social media
Recovery	From partners in VASLAN – network of charities/voluntary organisations
Recovery	Information from Voluntary Action Angus (VAA) Local Business organisation
Recovery	We have used volunteer numbers and humanitarian/food task activity data to track end-to-end partnership work around shielding etc.
Recovery	Yes , associated with Economic development impact on Midlothian Businesses
Recovery	Uptake of volunteering opportunities Community resilience support Community food provision and other shielding supports Private retail data
Recovery	Information from Community groups on shielding and hard to reach vulnerable groups
Recovery	Local communities set up their own group to manage local rural covid19 requirement, e.g. collecting shopping, medicine etc etc. We therefore could only report on requests that came through the Council. In hindsight it would have been best if Council centrally managed the requests and propagate to the local groups.
Recovery	Acorn dataset
Recovery	Third sector data to help support shielding community for delivery of food parcels, medical supplies and social inclusion. Private sector data in relation to business grants and rate relief etc

Question 12

Please indicate if so far you have used any of the following types of novel data in response to COVID-19. (Please select all that apply)

Types of novel data used in response to Covid-19	Data cohort	Recovery cohort
Cellular and Wi-Fi data	2	0
Crowdsourced data	0	2
Data from connected infrastructures	4	4
Social media data	3	8
None of the above	7	9
Don't know	9	3

Question 13

In ranking order, which of the following data capabilities would you like your local authority to develop in the wake of COVID-19? (Please select and rank the three most important areas)

Data cohort

Development areas in data capabilities (data cohort)	Rank 1	Rank 2	Rank 3
IT Infrastructure	1	1	1
Data Software	0	1	2
Internal data harmonisation and integration	9	2	5
Data processing (e.g. quality, curation, standards)	2	8	3
Data analytics	5	3	3
Data storage and maintenance	0	2	1
Data Governance	4	2	2
Skills (e.g. training, data literacy)	1	4	5
Human resources (e.g. data scientists)	1	0	1

Recovery Cohort

Development areas in data capabilities (recovery cohort)	Rank 1	Rank 2	Rank 3
IT Infrastructure	3	1	1
Data Software	1	2	0
Internal data harmonisation and integration	4	3	4
Data processing (e.g. quality, curation, standards)	0	1	1
Data analytics	7	8	5
Data storage and maintenance	1	1	3
Data Governance	4	1	4
Skills (e.g. training, data literacy)	1	5	2
Human resources (e.g. data scientists)	1	0	2

Question 14

How important have data sharing and collaborations been to your work in the context of COVID-19?

Data cohort

Types of sharing/ collaborations (data cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal data sharing	0	0	0	2	21
External data sharing	0	0	0	10	13
Data collaborations	0	0	5	9	9

Recovery Cohort

Types of sharing/ collaborations (recovery cohort)	Not at all important	Fairly unimportant	Neither Important nor Unimportant	Quite important	Very important
Internal data sharing	0	0	0	2	20
External data sharing	0	1	0	4	17
Data collaborations	0	2	1	9	10

Question 15

Data cohort: Are you aware of your local authority having so far implemented any of the following data sharing measures in response to COVID-19? (Please select all that apply)

Data Sharing measures in response to Covid-19	Data cohort
Data sharing agreements	15
Use of open licenses (e.g. Open Government License)	7
Use of Application Programming Interfaces (APIs)	5
Public-facing interfaces (e.g. dashboards)	5
Publication of open datasets	4
None of the above	3
Don't know	2
Other	0

Question 16

Are you aware of your local authority having so far collaborated / planning to collaborate in the future with any of the following stakeholders in response to COVID-19? (Please select all that apply)

Data cohort

Types of collaborators (data cohort)	Collaborations to date	Collaborations planned
Other Scottish local authorities	18	1
Other UK local authorities	1	3
Public sector organisations (e.g. NHS Scotland Health Boards, Police Scotland)	20	2
Scottish Government	17	2
Local businesses	13	3
Private Corporations (e.g. BT Group, Cisco, Agilisys)	7	4
Third sector organisations (e.g. charities, voluntary organisations, community groups, social enterprises)	12	2
Research institutions (e.g. universities)	5	3
Grassroots organisations (e.g. mutual aid groups, residents' groups)	5	5
Citizens	6	5

Recovery Cohort

Types of collaborators (recovery cohort)	Collaborations to date	Collaborations planned
Other Scottish local authorities	17	2
Other UK local authorities	4	2
Public sector organisations (e.g. NHS Scotland Health Boards, Police Scotland)	18	3
Scottish Government	18	1
Local businesses	10	4
Private Corporations (e.g. BT Group, Cisco, Agilisys)	4	1
Third sector organisations (e.g. charities, voluntary organisations, community groups, social enterprises)	13	4
Research institutions (e.g. universities)	3	3
Grassroots organisations (e.g. mutual aid groups, residents' groups)	7	3
Citizens	3	4

Question 17

Data cohort: On a scale from 1 to 5, how challenging to your work have the following areas of data engagement been in the context of COVID-19?

Challenges (data cohort)	1 (Not at all challenging)	2	3	4	5 (Very challenging)	N/A
Identifying data needs	0	3	9	8	2	1
Mapping existing internal data	0	5	7	4	6	1
Ensuring data quality/ standards (e.g. accuracy)	0	0	2	14	6	1
Integrating data (e.g. matching, interoperability)	0	0	5	6	10	2
Analysing data	0	5	7	9	1	1
Ensuring GDPR compliance	0	5	10	5	1	2
Ensuring data security	1	8	7	6	0	1
Developing data sharing agreements	0	0	8	5	4	6
Obtaining data from the Scottish Government	1	0	11	2	5	4

Recovery cohort: What would you say are the main data-centered challenges for your local authority that have emerged from the COVID-19 crisis? (Open-ended)

Free text (Recovery cohort)
Lack of internal capacity
Lack of joined up data; Lack of easy access to data; Lack of sufficient data analysts.
Analytical capabilities, mindsets and skills Integration of data sets Quality of source data Need to integrate novel and other agency data.
Ensuring access to real time data on need and uptake of services
Sparse data means not able to use for extrapolation.
Data governance Master data management Reference data management Data literacy
The crisis has accelerated our need to provide insight from across multiple different data sources from within the council, and with partner organisations. The key challenges that this has presented include lack of data standards and lack of data integration technology
Our ability to integrate fully with NHS colleagues has been hampered by the different operational security standards in use across the public sector. The PSN and CE+ compliance regimes make it easier to partner with other like-minded organisations when looking for innovative ways to share data. Without such regimes we are constantly dealing with additional security challenges. We need a consistent approach across Scotland
The amount of data / information needed and having it timely.
Complexity created by the complex the number of data sets, often from many different sources
Ensuring data is centralised, co-ordinated in the one central repository, cleansed and meaningful, one version of events that depicts the end to end journey (golden record)
Data in silos, poor data quality, lack of awareness in value of data and how to exploit it, data skills
The volume of and different types of data returns required by Scottish Government and the speed of change in requirements
Staff who can undertake the technical work to connect to sources and integrate data and staff who can analyse the data. It goes without saying there have to be usable, configured tools that support the end to end process.
Awareness of the data we have/collect and how it can/could be used
The main challenge has been identifying the main sources of data , and being able to use it in an effective manner to monitoring and review the Covid response and actions taken by the Council.
Infrastructure Feeding multiple national/regional data dashboards Using data to inform decision-making
Data security. Accuracy of shared data and potential for Data breaches
Implementing a system from scratch register volunteers and then record client requests and them match them with nearest volunteer. We did this using the Verint CRM. Issues with Scottish Gov continually modifying the twice weekly statistics we report. Some of the stats they requested we hadn't captured in our initial process.
Co-coordinating data in appropriate formats and systems. Data integrations, system capabilities and access for all.
Collating and analysing data dispersed across a range of systems.
Siloed data

Question 18

Data cohort: What would you say are the main data-centered opportunities for your local authority that have emerged from the COVID-19 crisis? (Please select up to four)

Data related opportunities	Data cohort
Increasing the use of data to inform decision and policy making	17
Increasing data sharing internally	16
Harmonising and integrating internal data	16
Collaborating with other stakeholders to collect, use and/or analyse data	10
Providing data training to staff	5
Adopting shared data standards	4
Developing external data sharing agreements	4
Accessing/using novel data	3
Investing in data software	2
Other	2

If you selected Other, please specify:

Free text (data cohort)
Increasing the use of data to inform decision and policy making (again)!
realising the potential of data and how powerful data can be

Recovery cohort: What would you say are the main data-centered opportunities for your local authority that have emerged from the COVID-19 crisis? (Open-ended)

Free Text (recovery cohort)
Collaboration
Drive for better data management; more possibilities to share data within and across councils; realization that we can utilize data in better ways and reduce the data burden for councils
Greater awareness of the power and importance of data Desire to develop insight Shared insight and collaboration
Realignment of data collation, recording and storage
N/a
No specific opportunity – more a matter of using the crisis to illustrate 'data as an asset' principle
The crisis has provided an opportunity to demonstrate the benefits of combining data from multiple sources to provide insight that can inform decision-making, and target resources. It is likely that this focus on the use of data will continue through recovery and renewal and therefore provides an opportunity for improved investment in our data capabilities.
We need centralised health and social care systems – and to apply the same data management standards across the Scottish public sector. High quality public health data and systems must be available and operate throughout the country. Stop the numerous local implementations and give us a national patient and community management system and make it available to all health care professionals.
Better data sharing and partnership working – working together. Able to co-ordinate data from several sources using analytical / data share tools. Using tools to digitally collect information from service users.
Opportunity to further re-enforce the key role that data analytics can play
Recognition on the importance of meaningful data that drives action and outcomes worth investing in
Partnership with other public sector bodies, particularly NHS
Collaboration with Community Planning Partners and other institutions including colleges, universities, chamber of commerce
Demonstrating the value of an agile, corporate approach to data analysis, dashboarding and the rapid deployment of low code minimum viable products to successfully respond to clear, urgent business requirements. Rethinking and resetting the balance of governance in order to reduce bureaucracy and achieve objectives quickly.
Improved decision making
There needs to be greater emphasis placed on the management of key data sources to help plan and prepare for the future with the correct balance of skills and capabilities enhanced and developed across the organisation
Strengthened collaboration between partners Investment in infrastructure and resources
Increased awareness of data sharing opportunities. availability of data. Willingness to cooperate across all sectors
Shielded list data was being shared by local health board each week, the data from the separate GP practices was initially very difficult to match, we've since implemented a process to sync NHS CHI Numbers with the client records in our social work system. The NHS shielded list dataset was managed in an Office 365 team spreadsheet, if we were to revisit we would probably import the new shielded clients direct into our CRM and initiate and manage contact with them from there. This would also make it easier to report. We have an improved process which is not currently implemented as we don't currently process many help requests. We should have defined a better future proof dataset at start, but the process was rushed. There was a process developed with Microsoft Dynamics CRM for Scottish authorities but there was a cost associated, which for authority of our size was not justifiable. Rather than local groups managing their own covid19 responses we should have taken the lead and manage the response centrally.
Share and collaborate on evidence-based practices
Better sharing of data with external public sector partners such as the NHS to support more effective decision making. Data standards across public sector partners.
Holistically understand requirements and use

Question 19

Are you aware of any specific data-centered initiatives / projects in which your local authority has been involved in response to COVID-19?

Awareness of data initiatives	Data cohort	Recovery cohort
Yes	12	10
No	6	7
Don't know	5	5

If 'Yes', could you specify what these are?

Cohort	Free text
Data	To my knowledge, my own involvement with the Digital Office for Scottish Local Authorities is the only example.
Data	Digital Office on a shared data hub for Scottish Local Authorities to submit data return. Collaboration of software to manage humanitarian aid requirements.
Data	Helping hands
Data	Food and medical deliveries
Data	Providing care to vulnerable people / Improving school meal deliveries.
Data	COVID dashboard – combining health and council data – Integrated Transport Spaces for People App – CCTV object detection supporting activity monitoring – Public facing COVID facilities App – Employee mgmt dashboard – Economic Recovery dashboard
Data	Scottish Data Taskforce – Development of a Data Ecosystem
Data	"Helping Hands" system to track and manage contact and service requirements and provision for individuals in shielding.
Data	Our Digital Team rapidly deployed a workflow/case management system in Oracle Service Cloud to support the council's Caring for People Helpline
Data	COVID dashboard GIS mapping – Shielding individuals GIS mapping – Education capacity & availability
Data	Many. e.g. We have amended and improved our "tracking" of staff to report on absences for Covid-19 related reasons; working at home; criticality of role.
Data	Work through the Digital Office on the Covid response generally and on a specific project looking at data on vulnerable people
Recovery	Driven by Data project with the Digital Office
Recovery	Vulnerable people and shielding Social Care Insight
Recovery	School absence monitoring School meals analysis Shielding/ vulnerable people support Employee re-tasking
Recovery	Digital Office for Scottish Local Government's "Local Government" Covid-19 Data Task Force"It Scottish Government's "Data and Intelligence Network"
Recovery	Response to shielding and the need the provision of Scottish Government Returns
Recovery	Covid App gathering city centric data in collaboration with NSS. Vulnerable & Shielding data projects, smart city initiatives around smart waste and smart housing
Recovery	Collaboration with voluntary/third sector organisations and community planning partners. Tayside LRP
Recovery	Standing up end-to-end humanitarian integrated corporate, multi-agency/ third sector partnership response to supporting shielding clients by creating integrated single view of vulnerable, low code automated business process, reports and dashboards. Standing up end-to-end humanitarian integrated corporate, multi-agency/third sector partnership response to food needs/financial poverty by creating integrated single view of vulnerable, low code automated business process, reports and dashboards. Standing up end-to-end integrated corporate, multi-agency/third sector partnership response to isolation & support (test & protect) linked to proactive outbound calling for £500 grant by creating integrated single view of vulnerable, low code automated business process app, reports and dashboards. Standing up integrated COVID dashboard hub drawing on local, national/open data to track prevalence and impact of the virus.
Recovery	National approach to shared data dashboard with Cosla, Improvement Service, Scot Gov, NHS. Development of 4-Harms measures beyond core PHS, NRS data
Recovery	Data coordination in understanding COVID-19 outbreaks and data dashboard developments

Question 20

Thinking about your experience of your local authority's response to COVID-19, how important have data-focused interventions been relative to other approaches to managing the pandemic?

Data cohort

Types of interventions (data cohort)	Less important than data-focused interventions	About the same	More important than data-focused interventions
Provision of emergency funding	0	9	14
Collaboration with third sector organisations	4	14	5
Coordination with other public institutions	0	17	6
Local knowledge and connections	1	13	9

Recovery Cohort

Types of interventions (recovery cohort)	Less important than data-focused interventions	About the same	More important than data-focused interventions
Provision of emergency funding	0	7	15
Collaboration with third sector organisations	5	12	5
Coordination with other public institutions	2	13	7
Local knowledge and connections	3	9	10

Appendix 4: Typology of Scottish local authorities

Drawing on the '6-fold Urban/Rural category classification' by the Scottish Government (2016) [75], Scottish local authorities were clustered into three categories as follows:

- **Largely urban** (more than 66% in three first tiers: 'large urban areas', 'other urban areas', 'small accessible towns')
- **Mixed** (within ratio 33% – 65% either way)
- **Largely rural** (more than 66% in three last tiers: 'remote small towns', 'accessible rural', 'remote rural')

Local Authority	Largely urban (three first, %)	Largely rural (three last, %)	Category
Aberdeen City	99	1	Urban
Aberdeenshire	45	55	Mixed
Angus	73	27	Urban
Argyll & Bute	22	78	Rural
Clackmannanshire	85	15	Urban
Dumfries & Galloway	47	53	Mixed
Dundee City	99	1	Urban
East Ayrshire	61	39	Mixed
East Dunbartonshire	95	5	Urban
East Lothian	59	41	Mixed
East Renfrewshire	97	4	Urban
Edinburgh, City of	99	1	Urban
Falkirk	92	8	Urban
Fife	83	18	Urban
Glasgow City	100	0	Urban
Highland	36	64	Rural
Inverclyde	98	2	Urban
Midlothian	86	14	Urban
Moray	45	56	Mixed
Na h-Eileanan Siar	0	100	Rural
North Ayrshire	91	9	Urban
North Lanarkshire	92	8	Urban
Orkney Islands	0	100	Rural
Perth & Kinross	43	57	Mixed
Renfrewshire	95	5	Urban
Scottish Borders	47	53	Mixed
Shetland Islands	0	100	Rural
South Ayrshire	73	27	Urban
South Lanarkshire	89	11	Urban
Stirling	67	34	Urban
West Dunbartonshire	99	1	Urban
West Lothian	92	8	Urban

Appendix 5: Focus groups

5.a Questions Focus Group 1

Focus Group 1 – February 23, 2021

Theme 1: Overall data response to Covid-19; urban/rural difference
- What has your experience of data been in the era of Covid-19?
- Have LAs' data uses intensified in response to Covid-19 or have they remained the same as before? Could you provide some examples?
- One of our interests is to explore whether there have been differences between rural/mixed/urban LAs in their data responses to the crisis, what do you think?

Theme 2: Types of data used to response to Covid-19
- Our survey shows that LAs have used public sector data (internal and external) to manage Covid-19, and to a lesser extent but still significantly third sector data; does this resonate with your experience?
- What about private sector/novel data?

Theme 3: Challenges related to data use & capabilities
- In your experience, what would you say are the main challenges for LAs of using data?
- What about capabilities, do you think that you are well-equipped/ resourced? What would you say are the strengths? Where do the gap lie? (e.g. infrastructure, software, data integration, data analytics, skills).

Theme 4: Future opportunities
- What opportunities for LAs would you say have emerged from the crisis in relation to data use?
- How can it be achieved? What would you say is LAs' main challenge in realising these opportunities?
- Is there anything that you wanted to highlight that we haven't covered?

5b. Questions Focus Group 2

Focus Group 2 – February 24, 2021

Theme 1: Overall data response to Covid-19
- Has data sharing between LAs and third sector organisations intensified in response to Covid-19 or have they remained the same as before/decreased?
- What about data collaborations? Have they intensified in response to Covid-19?

Theme 2: Accessing & sharing external public sector data
Our survey shows that the main sources of external public sector data for LAs are NHS Health boards, Scottish government and its agencies, and Special NHS boards.
Questions:
- [Perspective of LAs] What has your experience of accessing external public sector data been? Has it been easy/ Is this a straightforward process or is it quite a complicated one?
- [Perspective of public sector institutions], And what about your experience of sharing data with LAs?

Data aspects covered:
- Technical/data: What types of data do you need/use? Are you able to use data directly or do you have to transform it? (ask for specific examples)
- Organisational: How does it work? Is data available or do you have to request it? How easy is it? What are the challenges? (ask for specific examples)

Theme 3: Data collaborations between local authorities and public sector institutions
- What is your experience of data collaborations?
- What works? What doesn't work? (ask for specific examples)

Theme 4: Future opportunities
- Looking ahead, where/what are the future opportunities in terms of data sharing and collaborations between LAs and public institutions?
- How can it be achieved?
- Is there a need for a coordinating role?
- Is there anything that you wanted to highlight that we haven't covered?

5c. Questions Focus Group 3

Focus Group 3 – February 25, 2021

Theme 1: Overall data response to Covid-19
- Has data sharing between LAs and third sector organisations intensified in response to Covid-19 or have they remained the same as before/decreased?
- What about data collaborations? Have they intensified in response to Covid-19?

Theme 2: Accessing & sharing third sector data
Our survey shows that third sector data has been important to respond to the crisis and that its importance is expected to increase.
Questions:
- [Perspective of LAs] What has your experience of accessing and sharing third sector data been? Has it been easy/ Is this a straightforward process or is it quite a complicated one?
- [Perspective of the third sector], and what about your experience/ perspective?

Data aspects covered:
- Technical/data: What types of data do you need/use? Are you able to use data directly or do you have to transform it? (ask for specific examples)
- Organisational: How does it work? Is data available or do you have to request it? How easy is it? What are the challenges? (ask for specific examples)

Theme 3: Data collaborations between local authorities and the third sector
- What is your experience of data collaborations?
- What works? What doesn't work? (ask for specific examples)

Theme 4: Future opportunities
- Looking ahead, what would you like to see happening in terms of data sharing and collaboration between LAs and third sector organisations?
- How can it be achieved?
- How would you engage communities and citizens in the process? How can this engagement be sustained?
- Is there anything that you wanted to highlight that we haven't covered?

Appendix 6: Interview questions

Interview questions	
1.	Could you briefly introduce [Organisation], and your role in the organisation?
2.	[Organisation] has a workstream on [smart cities/ digital transformation], what is the role/significance of data in this work?
3.	From your perspective, how has Covid – 19 impacted on the ways in which Scottish cities approach and use data?
4.	(Follow up from 3): Would you say that there has been a significant intensification of data use, or has this been more incremental?
5.	From your perspective, what is the nature of data sharing and collaborations between local authorities, and how if anything has this changed in relation to Covid-19? Could you give us an example or two?
6.	What role did [Organisation] play if any in supporting collaborations between local authorities in relation to data in the context of Covid-19? What types of challenges do [Organisation] encounter in its efforts to support collaborations between local authorities in relation to data more broadly?
7.	What arising opportunities do you see in terms of data sharing and/ or collaborations between Scottish cities? What are the main challenges that Scottish cities face in realising these opportunities?
8.	What policy developments and practical innovations would you like to see happen concerning local authorities' engagement with data in the post-Covid era?
9.	Is there anything that we missed out?

Figures

Figure 2: Increased data needs in different policy area (ranking weighted mean values, survey Q. 8)

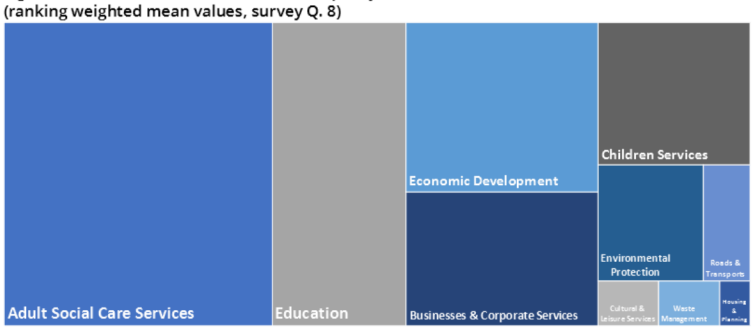


Figure 4 : Internal public sector data used in response to COVID-19 (%, survey Q. 9)

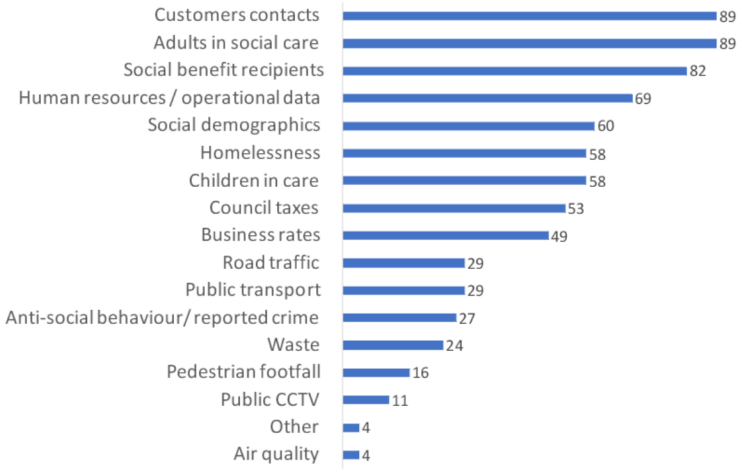


Figure 3: Perceived importance of data types at different periods of the pandemic (%, survey Q's 3-5)

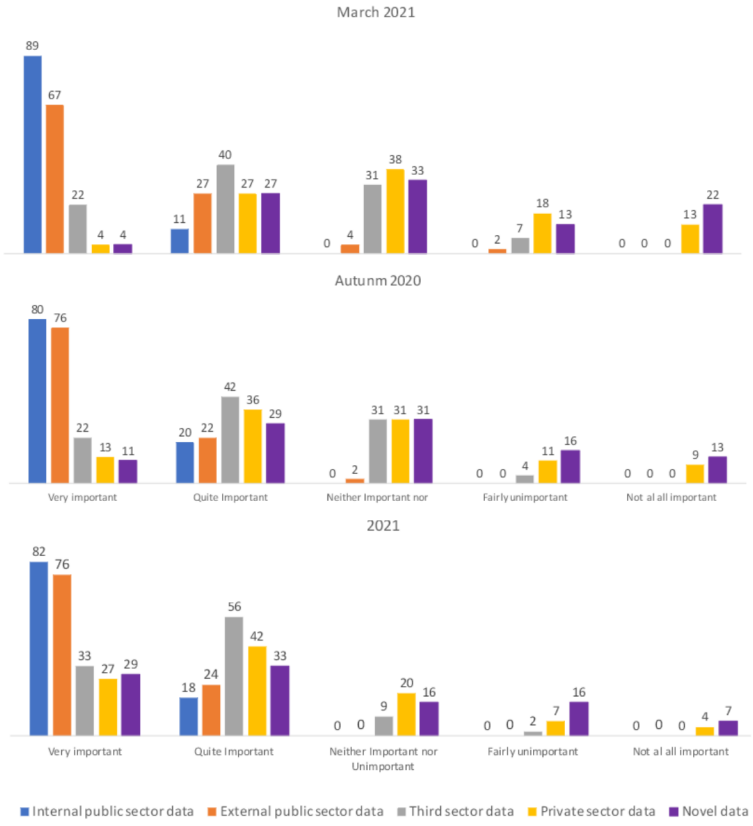


Figure 5: Sources of external public sector data for local authorities (%, survey Q. 10)

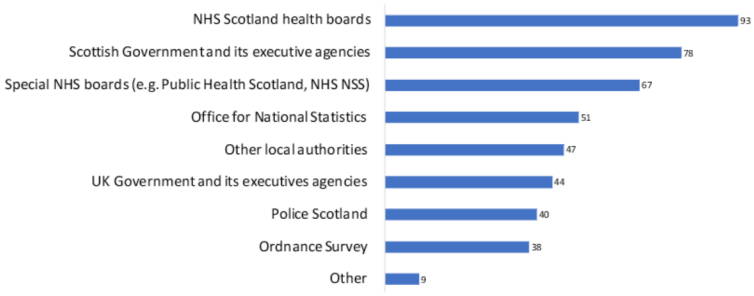


Figure 6: Data related challenges (mean values, data cohort, survey Q. 17)

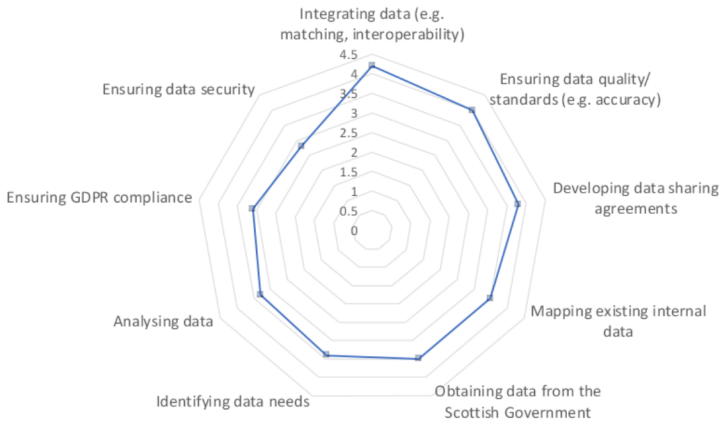


Figure 7: Data related opportunities (%, data cohort, survey Q. 18)

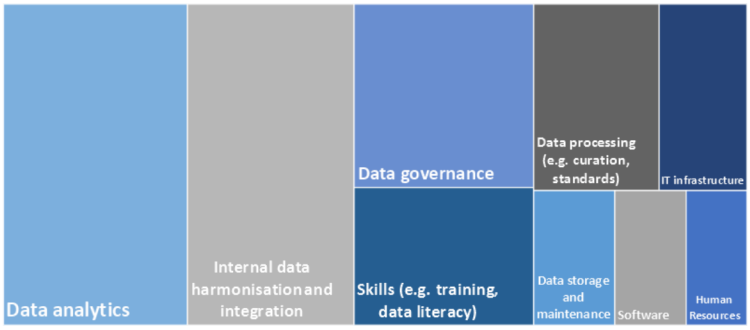


Figure 8: Priorities for developing data capabilities (weighted mean values, survey Q. 13)

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Appendix 4

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