A Framework For Action: Data Standards In Scotland's Public Sector

Report to the Data Standards Team, Scottish Government

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Abstract
Consultation activities were undertaken to understand the current context for data standards in Scotland's public sector, the rationale for improvement, and ideas for change. The report concludes with a proposed Framework for Action to improve the adoption and application of data standards in Scotland's public sector. The Framework will be discussed in further consultation activity in March 2021.

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1   Introduction

The Scottish Government commissioned Anderson Solutions to work with the Data Standards Team to support the development of a plan for data standards in Scotland's public sector.

Purpose

The Scottish Government Data Standards Team has identified a model of co-design for the development of public sector data standards in Scotland. The co-design model has been selected to reflect the reality of limited centralised resources and the extensive expertise and activity already underway in the wider public sector. The intention is to build a framework for data standards that can be used by a community of technical and non-technical individuals from across Scotland to implement data standards in Scotland's public sector.

The aim of the commission is to:

- inform an ambition for data standards in Scotland's public sector;
- build a story that describes the current activity around data standards in Scotland's public sector;
- investigate willingness to co-design the approach and implementation of data standards in Scotland's public sector; and
- identify priorities for the development of data standards.

Approach

The methodology used to deliver the aims of the commission evolved in response to Covid-19 and the final agreed methodology included:

- six workshops with representatives from across Scotland's public sector to inform an ambition for data standards and propose next steps, the Covid-19 pandemic meant the majority of workshops were held online;
- the development of case studies representing the story of Scotland's journey around data standards; and
- a survey of individuals identified early in the process to gauge views on data standards and interest in participating in the workshops.

Five workshops have been held at the time of reporting. The intention is to use the report to inform a sixth and final workshop. The purpose of the sixth workshop is to discuss the ambition and priorities for action.

Report Structure

The report provides an overview of the findings from the consultation activity undertaken (workshops, case studies and survey) and proposes a Framework for Action for the Data Standards Team.

- Section 2 describes the current context for data standards in Scotland's public sector, as heard during the consultation activities. The potential value of unlocking the value of Scotland's data assets through data standards, and the challenges associated with more widespread adoption of data standards are described. Examples of projects and initiatives in Scotland's public sector that are

investing in data and data standards are included. More detail on these examples can be found in Annex B.

- Section 3 lists actions that could be taken to address the challenges and improve adoption and application of data standards are. These actions were proposed during the consultation activities for the project.
- Section 4 proposes a Framework for Action for data standards which includes a proposed ambition, principles, three pillars of activity and associated short-term actions for discussion. The Framework for Action is informed by the discussions and actions proposed during the consultation activities and discussion with the Data Standards Team.
- Appendix A provides information on the FAIR principles and their associated implementation framework. FAIR is expected to be adopted as part of the Framework for Action.

The report is accompanied by three annex reports:

- Annex A: a report on the workshops;
- Annex B: a report of the case studies developed; and
- Annex C: a report on the survey findings.

2 Data standards in Scotland's public sector

Digital technologies are a mechanism by which Scotland can pursue its National Outcomes. The importance of effective digital infrastructure and technologies will be at the heart of a new Digital Strategy for Scotland which is due to be launched in March 2021. However, Scotland's digital ambitions are dependent on data; and access to data that is ready for reuse is dependent on data standards.

Scotland's public sector ambitions are currently being pursued in a less than ideal data environment. The public sector in Scotland is structurally fragmented and approaches to data collection, management, and use are diverse. This creates a patchwork of hard to connect, or even find, data assets, which in turn makes data reuse challenging.

Unlocking the potential

Unlocking the potential of Scotland's public sector data is vital if Scotland is to succeed in its economic, social, and environmental ambitions. Widespread adoption of data standards which support the creation and management of high-quality data, and enable public sector data to be reused, is essential to create the environment for success. The cost of not doing so is hinted at in a comment from a survey respondent "Current data practices fail to fully utilise the investment by the taxpayer in the data".

When data standards are applied to data, the standards operate as virtual bridges that can connect disparate data sources together and can connect potential users to the data. These virtual bridges enable the integration of data from different sources and improve access to data for reuse. A survey respondent noted "organisations can't work effectively together if they can't easily share appropriate data". The value of data standards is that they create better and more accessible data which can be reused. If public sector data assets are of sufficient quality and available for appropriate reuse, the following benefits are expected:

- better understanding of a problem or situation which can inform the design of better, quicker, and more effective responses;
- a more informed public sector, and more evidence-based decision-making at a local and national level;
- enhanced digital transformation of public sector services, and consequently a better experience of public services for Scotland's residents;
- greater transparency, accuracy, and value in the delivery of public sector services; and
- more R&D and innovation in the design and delivery of public sector services.

Furthermore, if data standards can simplify the process of access, consent, and interoperability, and create machine-searchable data and metadata, many hours, days, weeks, months of time could be saved across each of Scotland's public sector organisations. Time which is currently deployed in finding, fixing, and manipulating data from diverse sources – a process which may be duplicated several times for similar purposes.

The pursuit of such benefits, and others, is driving the activity described in the various case studies in Annex Report B.

- The National Digital Platform (case study B) is creating a single data repository for core clinical data in Scotland. The ambition is to improve care, reduce cost and mistakes, and support more R&D and innovation in the delivery of health and care services.
- The RESPECT project (case study C) is seeking to significantly improve the end-of-life care provided to Scotland's residents through better information (data) flow.
- Police Scotland (case study D) is using new data management capabilities to drive organisational improvement and support Police Scotland's objectives, creating 'easy access to a single view of trusted, linked data'.
- The Community Data Project (case study E) aims to improve the knowledge and intelligence available in and about a community. The aim is to support community-led service design and engage the community in decision-making, as well as improving the actions and decision-making of the local authority.

The success of these initiatives is dependent on data standards, and many of them are dependent on data standards being consistently deployed across more than one public sector organisation.

Exploring the challenges

Scotland's public sector organisations are aiming to move toward more citizen centric service delivery and combined with increasing deployment of digital tools, the demand for data and data sharing is expected to increase. Therefore, interoperability across multiple public sector data sources will become increasingly important. Furthermore, Covid-19 has increased demand from organisations and individuals for quick access to reliable and meaningful public sector data.

Data standards do exist in Scotland's public sector however the consultation activities have highlighted the lack of a coherent approach across the sector, and a lack of widespread understanding of the potential value that could be generated from the more effective reuse of public sector data assets. Furthermore, survey respondents and workshop attendees have highlighted that the application of existing data standards can be patchy, and the level of data maturity across Scotland's public sector organisations is mixed.

The consultation activities have been undertaken with data literate individuals who already engage to some degree with data standards. Despite consultees being from a diverse range of sectors and roles there was the sense of a common understanding of what should be done. A survey respondent put it as follows:

"It has become clear that there is a pressing requirement for clear, universally adopted standards to enable the re-use of public sector data. In particular, with increasing pressure on resources, there's a need by the public sector to make better use of their own data, as well as that of other agencies - and the adoption of standards is a vital component of this."

If data standards can be used to the unlock the vast potential of Scotland's data, it will provide a significant boost to social, economic, and environmental ambitions. However, consultees have highlighted a number of challenges and dilemmas that affect the adoption and application of data standards and hinder progress. It seems inevitable that

these challenges will have to be addressed or mitigated if substantive progress is to be made. These challenges are described in the remainder of Section 2 and include:

- a lack of strategic leadership on public sector data;
- a fragmented landscape;
- limited learning or sharing of best practice;
- skills gaps;
- data quality (and data maturity);
- legacy systems;
- barriers to data sharing;
- disinterest; and
- investment required.

A lack of strategic leadership on public sector data

There has been no national strategy around public sector data, and this means there has not been a coherent approach or emphasis on the development and use of Scotland's public sector data assets. This strategic gap is recognised by the Scottish Government and is part of the rationale for commissioning this work on data standards. Furthermore, Scotland's forthcoming Digital Strategy (March 2021) is expected to include commitments on data and data standards, including a Data Transformation Framework (DTF), and a new AI strategy for Scotland, also due to be launched in March 2021, is expected to highlight the need for accessible and high-quality data.

Fragmented landscape

Perhaps the most significant consequence of the previous lack of strategic leadership on data, is the fragmented nature of the landscape for data and data standards in Scotland, including within fields that could be considered a single community of interest. A survey respondent noted "Data is still kept in silos where little if any metadata exists to signpost the data". Another noted "In my area there is a lot of duplication of data and a lot of effort being put in by individual organisations to create their own databases of information needlessly".

There are efforts to address this challenge. Examples include initiatives by the Digital Office for Scottish Local Government and the Improvement Service, both of which work with local authorities to develop common approaches to data, and there are national initiatives in health such as the National Digital Platform and the Telecare Minimum Data Set. The consultation for the new Digital Strategy placed significant emphasis on creating more common platforms and practice.

Limited learning or sharing of best practice

The consultation activities provided little evidence of sharing of best practice or learning between Scotland's public sector organisations, which is perhaps a direct consequence of the fragmented landscape described above. Much of the development appears to be occurring in relative isolation. The lack of shared learning and development slows progress in the sector as a whole and enables diversity of approach to become the norm.

Skills gaps

The subject of skills gaps frequently arose in the consultation activities.   Commonly identified issues around skills and expertise are described below.

- If data standards are to support the optimal reuse of data, individuals who make data standards decisions require understanding and knowledge of how the collected data could be used by others. This requires individuals to think beyond the primary purpose for which they might be collecting and storing the data.
- The existence of clear data standards, supported by data experts, in relatively mature systems is not enough to guarantee success as the standards may not be consistently applied. This inevitably reduces data quality and limits the potential value of the data. The value of data standards, and data, is optimised if at point of data capture individuals have the skills to ensure appropriate and consistent application of data standards.
- For the value of data and data standards to be realised, individuals must have the capacity to find appropriate data, and have the skills to handle and interpret it appropriately. There are gaps that need to be addressed in skills for finding, accessing, and interpreting data.
- A further area of concern is that organisations with limited understanding of data security may unintentionally misuse data or increase the risk of data breaches. Skills to ensure the appropriate use of data will be increasingly required.

Data Quality

The quality of data collected, and any data standards deployed, may be sufficient for the primary purpose for which the dataset was created for, but it may not be good enough for wider application and reuse. Consultees view data quality as a necessary partner to data standards. There is work underway by the UK Government Data Quality Hub to create a data quality framework that will provide guidance on how to assess, manage and improve the quality of data to ensure the best outcome possible. There is also work underway in Scottish Government on implementation of a data maturity assessment model, which is part of a wider piece of work on a data transformation framework.

Legacy systems

Another challenge highlighted in the consultation activities is that legacy systems can 'trap' public sector data and hinder new, open, and more flexible approaches to data and data standards. The trap may be created by financial constraints that make replacing or updating a system difficult, contractual issues, and/or issues around data ownership. These challenges may be particularly challenging if the data is held in a third-party system as demonstrated in the Telecare Minimum Data Set case study.

However, it is also clear from the consultation activities that legacy systems or fragmented data sources need not act as an absolute barrier to better data or data sharing. Where legacy or difficult to change systems create a barrier, pragmatic solutions may be available. A long-running example of addressing the challenge of fragmented data sources is One Scotland Gazetteer (case study F). The One Scotland Gazetteer collates data from Scotland's 32 local authorities and uses data standards to create a single consistent and accurate land and property dataset. The Police Scotland case study (case study D) also highlighted that when dealing with legacy systems,

pragmatism may be required and a cost benefit assessment can help to decide between investing in securing the 'ideal' data standard, which may require complex and therefore expensive changes to an existing system or accepting a modified standard so that it can be more easily adopted into a legacy system.

Consultees highlighted that the challenge of updating systems and data standards should be a key consideration when undertaking procurement or development exercises. Embedding data standards and flexibility at the point of procurement is considered vital to ensuring the system remains fit for purpose and will support data reuse over the long-term. The Digital First Service Standard is an example of how to approach design and use considerations before the procurement or development process begins.

Barriers to data sharing

Regulation is important to protect personal data and there needs to be a legal mechanism to enable the appropriate sharing of data. However, consultees report that barriers to sharing data include the lack of understanding of the legal mechanism, and data controllers, who may recognise the value of sharing data, but err on the side of caution in data sharing. In response to this challenge, a survey respondent stated "There are risks around the publication of public sector data for reuse that need to be considered when applying standards. However, with the appropriate level of scrutiny and consultation with the data owners and data protection officers within organisations, I feel these risks can be largely mitigated." Another stated "Decent and caveated metadata should guard against misuse of data".

Disinterest

The role and nature of data standards are not well understood. There is a sense among those consulted that 'we've been speaking about this for ages', and there is frustration that more progress has not been made. Consultees report there has been historic disinterest in data and data standards outside of the data community. Consultees believe data standards is seen as a niche technical issue, and its importance and potential value to frontline service provision is not understood. The Improvement Service shared the poll to the right which indicates that respondents believe the biggest issues faced around data are a lack of understanding at senior levels about its importance, and a disconnect between policy making and data experts.

However, there is a sense that this may be shifting as a broader range of stakeholders are slowly but increasingly recognising the potential value of data. In the survey conducted for this project, 83% of respondents believe that responding to the economic and social challenges of Covid-19 will increase the demand for data standards in Scotland's public sector. When asked to explain their answer, respondents supported their view with statements around a growing understanding of the value of data and therefore data standards in Scotland's recovery, the importance of reliable data in answering difficult questions, and an increasing need to share reliable data between organisations.

Investment required

Rapidly rising demand for public sector data reuse appears inevitable. The workshops, case studies and survey have highlighted multiple pathways for the development of data and data standards in Scotland's public sector. In some spheres of Scotland's public sector, the business case for investment has been made. However, the scale of investment for many of Scotland's public sector organisations may be substantial and the potential return on investment poorly understood.

Poor investment decisions around data and data standards can be costly, both in terms of lost opportunity, and in financial terms if future 'fixes' are complex. Furthermore, investment in data and data standards is unlikely to be a one-off investment and instead will require ongoing investment to ensure the optimal value is secured from the investment. Investment can be expected to include digital infrastructure, workforce skills development, and ongoing review and development of data standards to optimise interoperability and accessibility.   However, to understand the value of investing in data standards, the potential value of the organisation's data must first be understood. This means the disinterest and lack of understanding described in the previous paragraphs are a challenge that must be overcome.

The Police Scotland case study is an example of how substantive progress requires substantive commitment and several interconnected initiatives in order to achieve 'easy access to a single view of trusted, linked data'. Police Scotland has initiatives on data and data standards governance, data ethics, co-production of data standards, a central data warehouse, and skills development, and this is all supported by a newly created Police Scotland Data Office. The significant investment has been justified by Police Scotland in order to support organisational change, improve and enhance day-to-day

policing activities, enable new predictive services, and support better partnership working.

Diversity of approach

The diverse and fragmented characteristics of Scotland's public sector means that different approaches to data and data standards are being pursued.   In some cases, a centralised system is being pursued to collate data that is currently held in multiple data sources onto a single platform or system to better support reuse, for example the National Digital Platform. In other cases, a federated system can be used whereby the data owners maintain responsibility for their data source and data reuse. A federated system collates and manipulates data from multiple data sources into a form that enables reuse of the data, for example the One Scotland Gazetteer.

The presence of alternative approaches may not be problematic in itself. However, data standards for Scotland's public sector will have to be sufficiently flexible to respond to the circumstances within a particular community of interest or use case, and ultimately enable the optimal reuse of Scotland's public sector data, regardless of the system from which the data originates.

3   Proposals from the consultation activities

Section 3 collates ideas that were proposed during the workshops and matches them to the challenges identified in Section 2. The workshops were the primary source of proposed actions but are augmented with others made by survey respondents, and examples of action identified in the case studies.   Not all proposals for action are included in Section 3, please see Annex Report A for further detail on the workshops, and Annex Reports B and C for the case studies and findings from the survey.

The challenges described in Section 2 are:

- a lack of strategic leadership on public sector data;
- a fragmented landscape;
- limited learning or sharing of best practice;
- skills gaps;
- data quality (and data maturity);
- legacy systems;
- barriers to data sharing;
- disinterest; and
- investment required.

The proposals collated below were not provided in direct response to a specific challenge, they have been allocated to a challenge subsequently during the reporting process. Some proposals will be capable of responding to more than one challenge.

Providing strategic leadership on public sector data

The work being undertaken by the Data Standards Team and the development of a new Digital Strategy for Scotland by the Scottish Government are significant steps toward addressing a lack of strategic leadership. Proposals for action put forward by consultees include:

- Put someone, or an organisation, in place to take overall control of data standards. For example:
  o Create a Data Conduct Authority to take responsibility for data regulation.
  o Appoint a data Tzar.
  o Pass the 'Data Scotland' Act.
  o Create a group that can review data standards through Data Dictionaries, seek improvement where appropriate and discuss the way forward.
- Develop a national Scottish vision for public sector data, including a clear ambition around interoperability.
  o Create a shared intent for collaboration and define the differences between what is required to make the intent happen locally versus making it happen nationally.
- Scottish Government participates as a full voting member of global standards organisations.
- Strengthen cross-Government working.
- Establish effective governance of data gathering and sharing.

Connecting the landscape

Proposals that respond to issues associated with reducing fragmentation in the public sector data landscape include:

- We need to deepen our understanding of the existing landscape. Audit/map existing data standards.
- Develop data custodian posts in public sector organisations to be a catalyst to create and support good governance, and to be a gateway between individual organisations and collaborative efforts.
- Create central infrastructure, for example:
  o Create national data registers.
  o Establish a properly resourced data warehouse for the public sector from where metrics can be calculated centrally and not left to local councils to complete and return.
  o Develop unique identifiers for all organisations in Scotland.
  o For specific topics, develop centralised datasets that Councils can access. This would support consistency and good governance.
- Ensure Scotland has comprehensive and good quality metadata within a dedicated metadata catalogue to facilitate data discovery reuse. For example:
  o Agree a metadata standard within Scotland, reusing what already exists, and adopt the standard into existing frameworks, for example Digital First.
  o Openly license metadata.
- Increase alignment. For example:
  o Identify must use data standards and define minimum standards.
  o Create a controlled register of vocabularies.
  o Agree consistent definitions and recording to allow disaggregation of datasets by protected characteristics, including impairment. Begin by auditing the different definitions already in use with the aim of integration.
  o Go FAIR.
  o Join – fully align with – the EU programme on digital standardisation.
  o Invest in technology systems so that different organisations can speak to each other (co design shared/compatible systems).
  o Seek opportunities to rationalise data standards.
- Be a pathfinder for AI based services.

Increasing learning and sharing of best practice

Proposals that focus on expanding and enhancing learning and the sharing of best practice include:

- Provide guidance and create a common approach to implementation. For example:
  - o Customise the process so that whatever anyone needs is provided for them. Build in feedback loops and make this a learning system.
  - o Develop guidance to support better quality specification of systems and datasets before implementation.
  - o Develop guidelines to support understanding and use of data standards.
- Conduct a knowledge mapping exercise to identify use cases and help the audience to select appropriate standards.
- Create a learning culture. For example:
  - o Establish a culture where different partners work together to help each other out.
  - o Learn from existing examples of good practice. Some of what is already happening in Scotland (health and care) is ground-breaking.
  - o Create a directory of who can be contacted to provide support for data sharing.
- Create a data standards community that can be tapped into to help organisations without enough capacity to extend the reach of their datasets and access other data sources.
- Create linkages between health and social care and other public service providers and third sector providers.

Developing skills

Proposals from the consultees that seek to support skills development include:

- Action needs to be taken to address the following skills gaps:
  - o How to use and interpret data wisely.
  - o Data capture, data entry and the application of data standards.
  - o Ethical data management.
- Develop systems that are simple and fit for purpose to improve engagement and support for their use.
- Support the development of data analytical skills across partners to ensure evidence-based policy making is built on a shared capability to analyse and report on data sets.
- Educate citizens to expect data portability.
- Establish rules and norms for best practice use of data sets from an information governance perspective. This may require policing.
- Fix the skills gap in social care that means data is still being issued in Excel.
- Bring two disparate organisations together work to develop common data standards (for example, the Judiciary and Tourism Scotland). Pull people who do

not yet have the skills into this process and ensure necessary skills are developed as part of it.

Improving data quality and data maturity

Proposals that seek to improve data quality and address the variation in data maturity across the Scottish public sector include:

- Be draconian about implementation of data standards before we worry about data sharing. If data sharing happens first and it is not good quality data, then criticism stops good things happening.
- Ensure data standards are mutually understood and consistently applied. For example:
  - Clearly define data to enable comparison and reuse.
  - Help people understand the need for data definitions.
  - Create unambiguous standards.
- With a huge range of organisations with varying data standards and levels of data maturity; it may be better to have standards as an element of a data maturity model which gives organisations a framework with key elements (standards, governance, quality, analytics, management etc.) to assess the maturity of its data. This will help organisations see where they need to focus effort to improve data maturity. This makes it about fit for purpose, managed data.

Legacy systems

Proposals that respond to issues associated with legacy systems include:

- Develop use cases to inform solutions.

Breaking down barriers to data sharing

Proposals from participants that aim to reduce barriers to data sharing include:

- All data standards are open by default. Closed practices (licensing, non-interoperability, cost) no longer exist.
- Create a common approach. For example:
  - Establish commonly applied unique identifiers.
  - Establish unique referencing in data sets.
  - Draw up, agree, and work to guidelines that ensure consistency for shared and open data sets.
  - Start with statutory datasets and develop standards around those and then umbrella the standards across all sub-set datasets.
- Put the technical infrastructure in place to be able to share data.
- Ensure users know what data is out there.
- Ensure appropriate use of data.
  - Data security is the primary priority area of any form of data standards.

o   Scotland needs effective governance with the correct balance between data protection and data reuse/interoperability.

o   Give all professionals a level of permission about what they can and cannot access. Securing access to be a one off/on demand approach.

o   Reflect on [and consider how to ameliorate] conflict between guardians of data and demands for information

o   Create a secure approach that allays concerns about data sharing.

Increasing awareness and understanding

Proposals that focus on improving awareness and a better understanding of the value associated with reusable data and data standards include:

- Promotion of the value and need for reusable data and data standards, to Chief Executives, middle management, and operational staff. For example:
  o   Share clear examples of how data standards create benefit.
  o   Create a persuasive use case that demonstrates value and helps local organisations see value when contributing towards national datasets.
  o   Secure cultural buy-in.
- Deploy both carrot and stick incentives:
  o   Carrot: Demonstrate the benefits – and ease of change - of applying data standards; and
  o   Stick: Mandatory requirements to apply data standards (e.g. INSPIRE). This requires policing or people do not do it.

Supporting investment

Proposals from consultees that seek to improve investment in data standards include:

- Reuse existing standards first before investing in new ones.
- Create a model for data standards and pilot the approach to evaluate success and build a case to encourage investment.
- Invest in definitions, infrastructure, and skills.
- Lower the cost of compliance where possible.
- Work out [and agree] funding arrangements to stay at the leading edge of the technology.
- Ring-fence investment for data standards in organisations.
- Increase awareness of the need for ongoing investment in good data and data standards.

Further proposals

During the allocation of actions to challenges in the reporting process, there were proposals made by consultees that focus on different ambitions. These additional areas are:

- Creating fit for purpose data standards; and

- Engaging the citizen.

These are both described below.

Creating fit for purpose data standards

In addition to proposals that respond to existing challenges, there were several proposals around the need to incorporate flexibility into the development of data standards so that the data standards are appropriate:

- Develop future focused data standards that do not limit opportunities for the present or for the future:
  o Constantly review tools and processes. Make the review process responsive to changing need and adapt standards in real time. Learn from the openEHR process of review.
  o Develop agility to make standards responsive (use AI).
  o Predict future standards requirements. Use AI alongside human perspectives to predict trends and changes required.
- Identify what we really want to use the data for. For example, is it to measure change, support implementation of measures, to predict need, support innovation, answer specific questions?
- Be prepared to stop collecting data that does not serve a need or cannot be objectively described.

Engaging the citizen

There were several discussions around the rights of the citizen to access or hold data that relates to them. This is a topic that goes beyond data standards but does have implications for data standards, the following comments relate to data standards.

- Develop a data app to let citizens access metadata catalogues to see what data is held on them or on wider society. Use this to drive up interest and participation in data standards.
- Ensure people can see or access the data that is held about them.
- Allow individuals to be able to identify themselves online through an attribute store.
- Make it a requirement that individuals give their consent for use of their data. Consent can be removed if data are not held or used appropriately.
- Engage widely with the population of Scotland around their health and social care data. Use CPPs to have this discussion.
- Include individuals where possible to develop systems that align with their needs.

The next section of the report brings forward key concepts from the proposals listed above and develops them into a proposed Framework for Action for data standards in Scotland's public sector.

4   Framework for Action

Section 4 proposes a Framework for Action that builds on the consultation activities undertaken and the ideas for change proposed or demonstrated by those involved in the workshops, case studies, and survey.

The expectation is the Framework for Action could be extracted from the report and developed iteratively by the client and stakeholders working together to secure transformational change in the use of data standards. The Framework for Action has benefitted from discussions with the client. The expectation is that the proposals will be taken to a further workshop for discussion.

The development of the framework has been undertaken alongside other complementary initiatives. The emergent ambitions and actions in support of public sector data reuse have been promoted by the Data Standards Team and incorporated into the consultation document for a new Digital Strategy for Scotland. Particularly relevant excerpts from the consultation document for the Digital Strategy are:

Adopt common digital and data standards*:* We will develop and accelerate the use of common digital and data standards across the public sector. This will make it easier to join up services for the benefit of the people who use them. We will embed the Scottish Approach to Service Design, and ensure that users are involved in all design decisions, data can be shared where appropriate, teams are resourced and skilled appropriately and that common services and platforms are used as the default. To aid this, a Data Standards community of practice will be formed to develop the ambition, build a roadmap of key steps to be taken and processes to help organisations improve. We will develop a public sector data catalogue, which will make it easier for everyone to see what data is held and to understand how to access it.

Protect and create value from Scotland's data: We will develop a Data Transformation Framework to improve data reuse in the Scottish Public Sector. This will enable our organisations to understand their data maturity with steps and support to improve. Central elements of the Framework will include Data Standards, Ethics and Social Responsibility, Skills and Data Management. We will more of our data available openly, renewing our focus on data which will improve transparency.

Pooling digital and data expertise: High quality digital and data skills have been in short supply in the public sector for some time. Alongside our plans to expand our training capability, we will therefore establish a new, pooled resource of digital and data experts that public sector organisations can call upon to help them transform the way they work. We will also work with partners across the public sector, including the Civil Service Commission, to explore how we can radically overhaul our approach to digital talent recruitment in the Civil Service in Scotland and the wider public sector, in recognition that the current recruitment process is based on siloed ways of working and historical organisational arrangements.

In addition to the development of an ambition and potential actions, a key question for the study was to assess whether there is a willingness to engage in co-design of data standards for Scotland's public sector. Whilst it was initially challenging to identify those interested, presumably due to the fragmented and diverse nature of public sector activity

in this space, the enthusiasm with which people provided their experience and ideas for the future suggests a strong foundation upon which to build ongoing engagement.

The Framework for Action includes:

- an ambition reflecting a more strategic approach to data standards in Scotland's public sector;
- key features and conditions that are required to realise the ambition;
- a set of principles to be followed in pursuit of the ambition; and
- three key pillars of activity and associated actions that will support the ambition to be realised.

Ambition

Our ambition is to have widely adopted and well applied data standards that enable the reuse of Scotland's public sector data assets.

Digital technologies are a mechanism by which Scotland can pursue its National Outcomes. However, Scotland's digital ambitions are dependent on data; and access to data that is ready for reuse is dependent on data standards.

Well applied data standards operate as virtual bridges connecting disparate data sources together and connecting potential users to valuable data. By providing vital bridges across a fragmented landscape, data standards will raise the quality of and access to Scotland's public sector data assets.

The capacity to reuse a wider range of data assets more rapidly and more easily will provide multiple benefits, including but not limited to:

- better understanding of a problem or situation which can inform the design of better, quicker, and more effective responses;
- a more informed public sector, and more evidence-based decision-making at a local and national level;
- enhanced digital transformation of public sector services, and consequently a better experience of public services for Scotland's residents;
- greater transparency, accuracy, and value in the delivery of public sector services;
- more R&D and innovation in the design and delivery of public sector services; and
- cost reduction through improved efficiency and avoidance of duplication.

Connected and reusable public sector data assets will support Scotland to achieve local and national economic, social, and environmental objectives.

Realising our Ambition

Our ambition to enable reuse of Scotland's public sector data assets will best be realised in an environment that supports and enables:

- widely shared understanding of the value of reusable public sector data assets, and the key role of data standards in enabling reuse;

- communities of interest working together to create FAIR (Findable, Accessible, Interoperable and Reusable) data assets (data and metadata) which are machine searchable;
- rich interconnected data infrastructure across the public sector in Scotland;
- open access to data standards;
- a focus on the quality of public sector data; and
- a learning and improvement culture in the data community.

Principles

In pursuing the ambition for data standards, the following principles are proposed:

- Enabling the **appropriate reuse** of public sector data is the target outcome for all activity, the creation of data standards is a means to an end.
- Scotland's public sector data standards will support **ethical practice, equality, and non-discrimination**.
- Scotland's public sector will seek to **adopt and apply existing standards before considering 'new'** standards.
- The **sharing of learning** will be a key thread running through all data standards activity.
- The development of data standards will **work hand in hand with efforts to improve data quality**.
- **Data standards will be flexible** to different circumstances and potential pathways for data reuse. For example, the role of data standards is not to dictate whether data assets should be stored in a centralised system or channelled through federated systems. This decision sits with the community of interest.

Three pillars of activity

Scottish Government, in association with partners, will drive the adoption and application of data standards in Scotland's public sector. To progress toward the ambition for data standards in Scotland's public sector, action is proposed under three pillars:

- **Governance** – activity to provide oversight, planning, and coordination.
- **Adoption** – activity to persuade and support public sector organisations to adopt and apply data standards.
- **Improvement** – activity to provide guidance, share best practice, and support continuous improvement in the application of data standards.

The remainder of Section 4 proposes a short-term programme of action under each pillar.

Pillar One: Governance
The role of the governance pillar is to create a strategic response to the development of data standards across Scotland's public sector. Governance activities will provide oversight, planning, and coordination.

	Proposed Actions
1.1	Create an advisory/oversight body made up of cross public sector subject matter experts. The advisory body will contribute to governance in the following ways: • It will be a vital sounding board and source of advice with oversight on the development and delivery of the data standards ambition and work plan. • It will be a source of knowledge on relevant activity in the wider landscape, including but not limited to the Local Government Data Champions and UK Data Standards Authority. • It will be influential in engaging others in the discussion on data standards including promoting data standards and encouraging adoption and investment in data standards. • It will support coordination activities across Scotland's public sector. Coordinated activities are expected to target widespread data improvement and the adoption of data maturity assessment as a mechanism to achieve this. • It will consider how Scotland can overcome data standards challenges. • It will report into existing data governance (i.e. DDG, Data and Intelligence Group and/or Design Authority)
1.2	Scottish Government will adopt, and promote to the rest of Scotland's public sector, a common and adaptable framework for data standards, alongside national guidelines. This will create a shared foundation and offer a common point of reference for those engaged in the adoption and application of data standards. The FAIR principles and Implementation Framework will be the framework adopted (see Appendix A) and The Data Transformation Framework will act as a wrapper for enabling this adoption.
1.3	Options for a public sector data portal to support reuse of public sector data will be considered and appraised.

Role of the Data Standards Team in Governance:

• To ensure the proposed actions occur and that actions retain a focus on the reuse of public sector data assets and align with the ambition and principles described above.

• The DST will drive the formation of the Advisory Group and provide it with secretariat services.

• The DST will develop the national guidelines and framework in partnership with the Advisory Group and the wider data community.

Pillar Two: Adoption
The role of the adoption pillar is to encourage adoption of data standards in Scotland's public sector organisations. Adoption activities will focus on: • promoting understanding of the role of data standards to those who can influence success, and those who are not currently engaged in the adoption and application of data standards; • encouraging investment in data standards; and • supporting adoption activities.

Proposed Actions	
2.1	Clearly describe the role of data standards and how data standards connect to other key pieces of national data infrastructure.
2.2	Create and publicise a persuasive use case(s) to promote the investment in and adoption of data standards. Identify a thematic area (e.g. planning) with which a common framework for data standards can be pursued and construct a business test case by monitoring progress, recording learning, and measuring impact and value.
2.3	Create a community of practice for data standards from across Scotland's public sector, including both local and national organisations. The community of practice will act as a catalyst for more widespread adoption of data standards and support the development of communities of interest within Scotland's public sector. The community of practice will facilitate a process to connect individuals to evidence, support, and advice. This action is echoed in the consultation document for the Digital Strategy.
2.4	*(Linked to Action 1.2)* Design the Data Transformation Framework for adoption to provide guidance and to reduce the investment required from individual organisations or communities of interest seeking to adopt data standards. Build in flexibility to enable the aim of the Framework to be matched to the data maturity of the organisation. This action is echoed in the consultation document for the Digital Strategy and the activity of the UK Government Data Quality Hub. Ensure all developments that can be are based on open data standards.
2.5	Work with partners to identify potential resources from national or international sources that can be used by organisations or communities seeking to adopt data standards. Sources may include FAIR Implementation Profiles developed by others and the UK's open data standards adoption process.
2.6	Undertake research to understand why current standards are not well used and build-in responses to these barriers in future activity.

Role of the Data Standards Team in Adoption:

• To ensure the proposed actions occur and that actions retain a focus on the reuse of public sector data assets and align with the ambition and principles described above.

• The DST will coordinate the collation and development of materials that can promote the use of data standards.

• The DST will facilitate the development of the community of practice.

• The DST will, in partnership with others, build a framework for adoption that works alongside or embeds similar initiatives at a UK level.

- The DST will undertake research and work with partners from across the public sector in Scotland to support adoption.
- The DST will engage with key partners outside of Scotland.

Pillar Three: Improvement	
The role of the improvement pillar is to create a culture of learning around data standards in Scotland's public sector and to support continuous improvement in the application of data standards. Improvement activities will include supporting channels of communication between stakeholders, development of guidance, skills development, and sharing of good practice and experience.	
Proposed Actions	
3.1	Nurture the community of practice developed in pillar two (2.3) to mature into a community that facilitates continuous improvement in the development and application of data standards across Scotland's public sector. In particular this community is expected to support the ongoing development of the Data Transformation Framework and improved awareness and development of data maturity. A process will also be developed to easily share, and access good practice and lessons learned.
3.2	Promote and support the creation of Data Champion roles in Scotland's public sector organisations.
3.3	Monitor and engage with communities of practice and relevant organisations outside of Scotland, including the GOFAIR network and the UK Data Standards Authority, to inform practice in Scotland.
3.4	Connect data standards activity to activities that pursue higher quality data.
3.5	Identify the different roles and associated skills required to implement data standards and reuse public sector data assets.
3.6	Develop and provide guidance to those dealing with impending contractual renewal of legacy systems to support improved access and interoperability.
3.7	Contribute to national discussions on digital transformation in the public sector, and digital, AI and data skills development, to ensure data standards are prominently featured in development plans.
3.8	Provide improvement support to others who are developing data infrastructure across Scotland's public sector.

Role of the Data Standards Team in Improvement:

- To ensure the proposed actions occur and that actions retain a focus on the reuse of public sector data assets.
- The DST will create the community of practice and develop a process that supports ongoing engagement.
- The DST will work with the community of practice to undertake research and development activities and coordinate all improvement actions.
- The DST will encourage the community of practice to engage with governance and adoption activities as appropriate.

Appendix A: FAIR Principles and FAIR Implementation Profiles

Appendix A presents information on the FAIR Principles and FAIR Implementation Profiles. This is informed by discussions with Erik Schultes, International Science Coordinator, GOFAIR Initiative, information from the GOFAIR website (https://www.go-fair.org/) and papers provided by Erik Schultes.

FAIR Principles

The 15 FAIR Principles specify that, to truly benefit from existing data, data and metadata must be machine actionable, and for that the data must be Findable, Accessible, Interoperable and Reusable, i.e. FAIR.

The principles refer to three types of entities: data (or any digital object), metadata (information about that digital object), and infrastructure. For instance, principle F4 defines that both metadata and data are registered or indexed in a searchable resource (the infrastructure component).

Findable
The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services and the associated principles are:

F1. (Meta)data are assigned a globally unique and persistent identifier

F2. Data are described with rich metadata (defined by R1 below)

F3. Metadata clearly and explicitly include the identifier of the data they describe

F4. (Meta)data are registered or indexed in a searchable resource

Accessible
Once the user finds the required data, she/he needs to know how can they be accessed, possibly including authentication and authorisation. The accessible principles are that:

A1. (Meta)data are retrievable by their identifier using a standardised communications protocol

A1.1 The protocol is open, free, and universally implementable

A1.2 The protocol allows for an authentication and authorisation procedure, where necessary

A2. Metadata are accessible, even when the data are no longer available

Interoperable
Data often needs to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing. The interoperable principles are that:

I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2. (Meta)data use vocabularies that follow FAIR principles

I3. (Meta)data include qualified references to other (meta)data

Reusable

The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings. The reusable principles are that:

R1. (Meta)data are richly described with a plurality of accurate and relevant attributes

R1.1. (Meta)data are released with a clear and accessible data usage license

R1.2. (Meta)data are associated with detailed provenance

R1.3. (Meta)data meet domain-relevant community standards

FAIR Implementation Profiles (FIPs)

However, the FAIR principles do not explicitly consider the implementation choices that have to be made in support of FAIR data and metadata. This has led to the development of FAIR Implementation Profiles (FIPs) and a FAIR Wizard that records and compares the FIPs created by different communities.

The development of a FIP is undertaken by a community of interest. The community might be complex or simple and could be single organisation or a collaboration of organisations in a specific field of interest. The community will work together to define the data standards they will use as a group.

When a community comes together there are two possible approaches. In many cases, the community may need to find an optimal balance between the two approaches:

- Community declares a commitment to defining the data standards they will work with and will all use; and/or
- Community commits to create a map (interoperation) between systems/standards they use. In this case the community is committing to understanding the map and to make sure that the different systems can interoperate.

The core requirements of a community are:

- It is a well-described community;
- It has a commitment to FAIR principles; and
- It develops a shared FIP.

A FIP is a framework within which the negotiations around a common approach to data can occur. A FIP is a list of implementation choices that have been made on behalf of well-described community. To complete a FIP, the FAIR convergence matrix platform (questions to answer) is one step, it has 15 questions, however they are complicated to answer. The answers are technical and describe the algorithms and platforms selected by the community.

The development of a FIP from scratch will require substantial investment. However, FIPS can be shared with others and reused. As more FIPs are created, it is increasingly likely that a community will be able to adopt the FIP, and the standards developed, by

another community with potentially only a few modifications to make it fit their characteristics and requirements. The FAIR Wizard and FAIR Sharing tools mean that some elements of FIP can be auto completed and a FIP report produced, the FIP is also designed to form a substantial part of an organisations' data management plan. The degree to which common FIPS can be developed and reused will drive the speed of convergence around data standards. The reusability of a FIP is likely to offer an attractive proposition to those who find the challenge of developing common standards overwhelming.

FIPs have been developed, however, the FIP concept is still in an emergent phase. There is work underway internationally in the late-summer and Autumn of 2020 to develop a guide for potential users and developers of FAIR and FIPs.

Further information on how to Go Fair can be found at **How to go Fair** At the time of interview, it is understood that Denmark and Ireland were considering the development of FIPs in support of the response to Covid-19.

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