Digitalisation Strategy and Action Plan, Supporting Information

Publication date:	28 February 2023	**Contact:**	Liam Bennett, Senior Manager
		Team:	Energy System Data Regulation
		Email:	digitalisation@ofgem.gov.uk

This document provides supporting information to ~~practitioners~~ licensees complying with Digitalisation Strategy and Action Plan (DSAP) Guidance.

Document version	Description	Changes since previous document
Digitalisation Strategy and Action Plan Supporting Information v0.3	Proposed Version May 2021	N/A
Digitalisation Strategy and Action Plan Supporting Information V1.00	Version as a result of consultation May 2021	Minor updates to the Guidance element, as shown in. "Track Changes DSAP Guidance v1.00"
Track Changes Digitalisation Strategy and Action Plan Supporting Information V1.1 for consultation	Proposed version February 2023	Updated to include changes made to Digitalisation Strategy and Action Plan Guidance.

Contents

1. Introduction

1.1. This document restates the principles and explanations in Digitalisation Strategy and Action Plan Guidance and additionally provides supporting information in the form of techniques and examples to help ~~practitioners~~ licensees as they comply with Digitalisation Strategy and Action Plan Guidance.

1.2. The work of the other organisations, such as GO FAIR and Government Digital Service (GDS) have strongly informed ~~our~~the initital development of ~~the~~ DSAP G~~g~~uidance and supporting information. The Government Digital Service (GDS) provides wide-ranging support for topics relating to data and digitalisation; it gives information and methods that span all the principles in the guidance. Of particular relevance are the following:

- GO FAIR and its FAIR data principles[1];
- GDS Service Standard[2];
- GDS Technology Code of Practice[3]; and the
- GDS Service Manual[4].

Updating Digitalisation Strategies and Action Plans for RIIO-2 Licensees

- A Digitalisation Strategy update must be published on or before March 31st 2022 and at least every 2 years after this date.
- A Digitalisation Action Plan update must be published on or before June 30th 2021 and at least every 6 months after this date (i.e. each subsequent 31st December and 30th June).

Schedule for Updating Digitalisation Strategy and Action Plan for RIIO-ED2 Licensees

- The Digitalisation Strategy update must be published on or before 1st April 2023 and at least every 2 years after this date.

[1] https://www.go-fair.org/fair-principles/
[2] https://www.gov.uk/service-manual/service-standard
[3] https://www.gov.uk/government/publications/technology-code-of-practice/technology-code-of-practice
[4] https://www.gov.uk/service-manual

- The Digitalisation Action Plan update must be published on or before 30th June 2023 and at least every 6 months after this date (i.e. each subsequent 31st December and 30th June.

~~**General feedback**~~

~~1.3. We believe that feedback is at the heart of good policy development. We are keen to receive your comments about this supporting information. We'd also like to get your answers to these questions:~~

~~1. Do you have any comments about the overall quality of this supporting information?~~
~~2. Was it easy to read and understand?~~
~~3. Any further comments?~~

~~1.4. Please send any general feedback comments to ofgemdataservices@ofgem.gov.uk.~~

2. Summary

2.1. DSAP Guidance defines regulatory requirements for transparency, stakeholder engagement and coordination with respect to ~~an organisation's~~ a licensee's current and future Products and Services relating to data and digitalisation. These requirements must be complied with when ~~an organisation~~ a licensee publishes its: (1) Digitalisation Strategy and (2) Digitalisation Action Plan. Any ~~organisation~~ licensee working to publish a DSAP should~~, if currently obligated under their licence or not~~, do so using the most recently available DSAP Ggguidance published by the Authority except where the Authority has stated otherwise. The DSAP Guidance is ~~also~~ a principles-based set of guidance~~. and, like the Data Best Practice (DBP) guidance.~~

2.2. The purpose of a Digitalisation Strategy is to share ~~an organisation's~~ a licensee's understanding of its stakeholders' needs and the Products and Services required to meet those needs, all with an ultimate goal of creating consumer and Public Interest benefits. The purpose of a Digitalisation Action Plan is to show that ~~an organisation~~ a licensee is making progress towards delivering the work required to fulfil its Digitalisation Strategy.

DSAP Principles:

1. Prioritise providing benefits to the stakeholders who pay for the Products and Services as well as benefits that are in the Public Interest
2. Ensure Products and Services work towards a defined vision
3. Take full advantage of opportunities to deliver benefits early and to iterate improvements to Products and Services
4. Enable stakeholders to understand the Products and Services, the status of their delivery and how to access them
5. Ensure visibility about the nature and status of actions in the Digitalisation Action Plan
6. Ensure there is shared understanding of how success and performance is measured
7. Coordinate with the wider ecosystem of Products and Services

Definitions

Data Asset: Any entity that is comprised of data. For example, a database is a data asset that is comprised of data records. A data asset may be a system or application output file, database, document, or web page. A data asset also includes a service that may be provided to access data from an application. For example, a service that returns individual records from a database would be a data asset. Similarly, a web site that returns data in response to specific queries (e.g., www.weather.com) would be a data asset.

This definition is taken from National institute of Standards and Technology (NIST).[5]

Data User: An organisation or individual which utilises data held by a Data Custodian for any reason.

Digitalisation: the use of digital technologies to change an organisation's operating model and provide new revenue or equivalent value-creating opportunities; it is the process of moving to a digital business/organisation.

Digitalised: Elements of an organisation's operating model that have been through Digitalisation.

Digitalisation Action Plan: ~~an organisation's~~ a licensee's plan to digitalise its Products and Services prepared and published in accordance with Part B of; Special Condition 9.5 (Digitalisation) of the RIIO-2 price controls for Electricity Transmission, Gas Transmission and Gas Distribution, ~~and Part B of~~ Special Condition 2.11 (Digitalisation) of the RIIO-2 price controls for the Electricity System Operator, and Special Condition 9.5 (Digitalisation) of the RIIO-ED2 price control for Electricity Distribution.

Digitalisation Strategy: the strategic approach taken by ~~an organisation~~ a licensee to digitalise its Products and Services and evidenced by the archive prepared and published by the l~~L~~icensee~~s~~ in accordance with Part A of; Special Condition 9.5 (Digitalisation) of the RIIO-2 price controls for Electricity Transmission, Gas Transmission and Gas Distribution, ~~and Part A of~~ Special Condition 2.11 (Digitalisation) of the RIIO-2 price controls for the Electricity

[5] https://csrc.nist.gov/glossary/term/data_asset

System Operator, and Special Condition 9.5 (Digitalisation) of the RIIO-ED2 price control for Electricity Distribution. ~~.~~

Digitalisation Strategy and Action Plan Guidance: means (1) the guidance document issued by the Authority in accordance with Part C of; Special Condition 9.5 (Digitalisation) of the RIIO-2 price controls for Electricity Transmission, Gas Transmission and Gas Distribution, ~~and~~ Special Condition 2.11 (Digitalisation) of the RIIO-2 price controls for the Electricity System Operator, Special Condition 9.5 (Digitalisation) of the RIIO-ED2 price control for Electricity Distribution and (2) part of Ofgem's standards for data and digitalisation.

DSAP: A combination of both Digitalisation Strategy and Digitalisation Action Plan.

Interoperability-By-Design: Ensuring that the data and digital aspects of Products and Services have the ability to exchange and make use of information between one another throughout their end-to-end lifecycle.

Metadata: a set of data that describes and gives information about other data.

Public Interest: The welfare or well-being of the general public and society

Products and Services: Anything that a ~~party~~ licensee can offer to a market for attention, acquisition, use or consumption that could satisfy a need or want.

Single Provider Product or Service: A product or service among the Products and Services provided by the l~~L~~icensee~~s~~ where no alternative option or provider is available to parties seeking to access that product or service.

the Authority: means the Gas and Electricity Markets Authority that is established under section 1 of the Utilities Act 2000

3. The Digitalisation Strategy and Action Plan Principles

1. Prioritise providing benefits to the stakeholders who pay for the Products and Services as well as benefits that are in the Public Interest

Explanation

3.1. The licensee~~s~~ must identify and clearly set out its Products and Services for its stakeholders. The licensee~~s~~ must also identify and set out the needs of its~~their~~ stakeholders, where meeting these needs will benefit one or both of end-consumers and the Public Interest. The licensee~~s~~ must include details of the benefits which will be generated for the end-consumer and/or Public Interest, through delivery of its~~the~~ DSAP.

3.2. For each Product and Service or action described within its~~the~~ DSAP, the licensee~~s~~ must be clear about which stakeholder needs it will meet and what benefits it will deliver to end-consumers and/or for the Public Interest. The licensee~~s~~ must include the needs of those stakeholders who may not have digital access to its Products and Services and set out alternative ways for them to access information on its available Products and Services.

3.3. The licensee~~s~~ must gain stakeholder validation and assurance that the Products and Services to be delivered as described by its~~the~~ DSAP are correct to ensure the targeted benefits of its~~the~~ DSAP are met. The licensee~~s~~ must include in the DSAP a summary of stakeholder feedback and how it is responding to or including this as part of its DSAP~~their strategy~~.

Techniques

Stakeholder identification and characterisation

3.4. To prioritise stakeholders' needs effectively there must first be an understanding of who the stakeholders are, what they want, what they need and what is important to them. There are wide ranging established techniques for carrying out research on these topics. Common methods are listed in the table below. For these methods source material describing good practices can readily be found through many channels (eg

internet searches), we have selected a few examples of such material to help characterise it in this context.

Table 1: Stakeholder identification and characterisation techniques

Technique	Comment
Interviews	A good general guide to practices when conducting interviews can be found in the in-depth interviews[6] section of the GDS service manual[7] user research section.
Surveys & questionnaires	For advice on best practice approaches to survey design, Imperial College London[8] provides valuable questionnaire design best practice guidance[9]. Survey software providers also often give guidance to support their customers, such as the Survey Monkey 101 on survey design[10].
Workshops	Approaches to running small group workshops[11] are described in the GDS service manual[12], the links found within this GDS guidance include an insightful video provided by The Conference[13]. The video showcases one type of risk: the possibility of stakeholders being pigeon-holed and potentially driven to becoming digitally excluded.
Digital forums	Digital forums have been a feature of internet technology since near its invention; They are used to communicate and engage with stakeholders virtually in an asynchronous way. This allows stakeholders and researchers to raise and respond to topics at their convenience and in the open by default. The use and benefits of current day digital forums are well described in this *Discussion Board* article of the Digital

[6] https://www.gov.uk/service-manual/user-research/using-in-depth-interviews
[7] https://www.gov.uk/service-manual/user-research
[8] https://www.imperial.ac.uk/
[9] https://www.imperial.ac.uk/education-research/evaluation/tools-and-resources-for-evaluation/questionnaires/best-practice-in-questionnaire-design/
[10] https://www.surveymonkey.co.uk/mp/survey-guidelines/
[11] https://www.gov.uk/service-manual/user-research/research-small-group-workshops
[12] https://www.gov.uk/service-manual/user-research
[13] http://videos.theconference.se/clara-gaggero-westaway-merging-physical-and

	Practice handbook[14] from the University of Derby.
Customer engagement metrics	Monitoring customer engagement with your products and services can provide valuable insight into your stakeholder needs. This Zendesk blog[15] gives a useful general explanation for how they can be used. This technique has particular value in the context of complying with the Ofgem Data Best Practice guidance[16], which includes a requirement for data to be made available and shared, as doing so presents many opportunities to gather information and statistics about the usage of this data to learn about and improve data sharing services.
Experience maps	Experience maps provide a visual representation of what users do, think and feel over time, from the point they start needing a service to when they stop using it. This technique is well explained by Think With Google[17], who provide marketing resources for digital innovation. The GDS service manual also provides helpful information on Creating an experience map[18]. Spotless, a service design agency, provide a helpful contextualised explanation for developing customer experience maps in their article[19]. They apply the technique to visualise the user journey of booking train tickets online.
Webinars	These live or pre-recorded media are opportunities to broadcast your knowledge and seek feedback, an example of this is demonstrated by the work of Icebreaker One and their development of the Open Energy platform[20]. Webinars offer an excellent opportunity to engage stakeholders and generate questions.
Contacting similar organisations	Learning can be gained through sharing with equivalent organisations about

[14] https://digitalhandbook.wp.derby.ac.uk/menu/toolbox/blackboard-course-resources/discussion-board/
[15] https://www.zendesk.co.uk/blog/4-customer-engagement-metrics-measure/
[16] https://ofgem.gov.uk/publications-and-updates/data-best-practice-and-digitalisation-strategy-and-action-plan-consultation
[17] https://www.thinkwithgoogle.com/consumer-insights/consumer-journey/customer-journey-mapping/
[18] https://www.gov.uk/service-manual/user-research/creating-an-experience-map
[19] https://www.spotless.co.uk/insights/8-things-you-should-include-in-your-customer-experience-map/
[20] https://energydata.org.uk/2021/02/16/webinar-meda3-summary-16-feb/

	understanding of stakeholders, particularly where those stakeholders overlap and there is no direct competition for products/services. This can help socialise knowledge and best practices to ultimately better inform your understanding of the stakeholders to your organisation. This can also be beneficial as part of coordination with the wider ecosystem of products and services.

Digital Inclusion

3.5. The digital world is relevant to our lives and is growing more important. It is vital that data and digitalisation works for everybody, including those stakeholders who for whatever reason face greater barriers to benefiting from digital and data services. For inclusive digitalisation to succeed it is vital that providers of services understand the sheer diversity of views, perceptions and circumstances of their stakeholders.

3.6. The 2015 explorative research by the Royal College of Art as part of the European SuslabNWE project have demonstrated the complexity of capturing the range and divergence and commonality of peoples' perceptions through their research and publication Drawing Energy: Exploring Perceptions of the Invisible[21]. Works such as this demonstrates the complexity of articulating and understanding peoples' needs and perspectives on intangible subject matter, such as energy and such as data and the digitalisation of products and services. The challenge of capturing, understanding and integrating the needs of all stakeholders into DSAPs must not be underestimated; if stakeholders are not properly understood, a DSAP is unlikely to be successful.

3.7. The British Standards Institution has highlighted the importance of digital inclusion in its guide[22] to managing to inclusive design. The GDS Technology Code of Practice and its information on Making things Accessible and inclusive[23] provides expectations on government services that are readily applicable to other organisations. In particular, it specifies recognised standards for digital services to comply with to ensure their accessibility and inclusivity.

[21] http://www.drawingenergy.com/
[22] https://www.bsigroup.com/en-GB/about-bsi/media-centre/press-releases/2005/2/New-British-Standard-addresses-the-need-for-inclusive-design/
[23] https://www.gov.uk/guidance/make-things-accessible

3.8. It is important that DSAPs take steps to ensure that those who are are or who at risk of being digitally excluded / disengaged are represented. This need is well illustrated by the Government Digital Inclusion Strategy[24], which has lots of information on the types of groups that face these challenges in its section called People who are digitally excluded[25]. They also have some advice on how digital inclusion can be defined and measured as well as how to support excluded groups in its sections: Checklist for Getting People Online and Measuring Digital Exclusion[26].

3.9. The below table characterises some specific techniques for helping ensure digital inclusion is delivered, however, the challenge of ensuring digital inclusion must not be underestimated. This is a topic that the whole energy sector and economy in general will have to continue learning about and improving its capability at delivering.

Table 2: Digital inclusion techniques

Technique	Comment
Popup research	This Government article[27] explains how setting up popup research in locations where people with low digital skills already go for support can help you capture opinions of these groups. For example libraries, day centres or education centres. The Scottish government has used popup research for its online services[28] to learn how stakeholders engage with them. Similarly, the UK government has used pop-up research for its online Register to vote service[29] to see if this meets the needs of voter groups that are under-represented.
Stakeholder Pairing	In this context a "pair" is often a user with few digital skills and a friend, relative or another person they trust to help them. Recruiting pairs can be easier than participants with low digital skills on their own.

[24] https://www.gov.uk/government/publications/government-digital-inclusion-strategy/government-digital-inclusion-strategy
[25] https://www.gov.uk/government/publications/government-digital-inclusion-strategy/government-digital-inclusion-strategy#people-who-are-digitally-excluded
[26] https://www.gov.uk/government/publications/government-digital-inclusion-strategy/government-digital-inclusion-strategy#checklist-for-getting-people-online
[27] https://userresearch.blog.gov.uk/2014/08/20/including-users-with-low-digital-skills-in-user-research/
[28] https://blogs.gov.scot/digital/2017/01/26/pop-up-study-taking-research-to-where-our-users-are/
[29] https://gds.blog.gov.uk/2013/11/22/reaching-all-our-users/

	Through pairing it can be made easier to reach out to and learn from hard to reach stakeholders. The Lambeth Digital Buddies[30] scheme exemplifies this approach, it organises volunteers to give support to other people in the local area to help them engage with digital services.
Targeted support	Offering targeted engagement, products and services for stakeholders can mitigate the risk of their becoming digitally excluded. Age UK provides services and digital guides targeted for older people on their website[31]. Dedicated business solutions are available for ensuring the availability of targeted services too. Oscar senior[32] is one such example which provides video calling solutions for the elderly. ProjectsByIf[33] publishes its Data Patterns Catalogue[34]. This information usefully showcases the wide range of service methods available through which stakeholders can choose their preferred method of access to data products (and also permissions for how (or not) their data can be used). Different stakeholder prefer different types of service this demonstrates an array of practical opportunities available for meeting those needs.

[30] https://love.lambeth.gov.uk/lambeth-digi-buddies-2016/
[31] https://www.ageuk.org.uk/information-advice/work-learning/technology-internet/
[32] https://www.oscarsenior.com/blog/video-calling-solutions-for-tech-challenged-seniors
[33] https://www.projectsbyif.com/
[34] https://catalogue.projectsbyif.com/

2. Ensure Products and Services work towards a defined vision

Explanation

3.10. In its Digitalisation Strategy, the licensee~~s~~ must include a vision and associated objectives. These objectives must describe the outcomes that successful delivery of its~~the~~ DSAP will achieve for the benefit of end-consumers, stakeholders and the Public Interest. The licensee~~s~~ must describe the solutions it will provide that will deliver the vision and its associated objectives, by describing these in terms of a collection of Products and Services that, once they exist, will deliver the vision and its associated objectives.

3.11. In its Digitalisation Action Plan, the licensee~~s~~ must specify the actions it is taking to adapt and change its Products and Services, so that they remain relevant and deliver the vision of its DSAP~~the strategy~~. ~~Only i~~In cases where stakeholders express a need for the information, the licensee~~s~~ must include any enabling Products and Services that facilitate or are a precondition for the delivery of end-user Products and Services.

3.12. The licensee~~s~~ must, in its Digitalisation Strategy, make clear how its~~the~~ DSAP integrates with and enables the licensee~~s~~ to meet its responsibilities as it exercises its rights and obligations under a licence granted under section 6 (1) or (1A) of the Electricity Act 1989 or section 7, 7ZA, 7A or 7AB of the Gas Act 1986.

Techniques

3.13. The objective of this principle is to ensure there is clear traceability (a "golden thread") throughout the DSAP, whereby: it is always clear what practical and deliverable plans exist to realise the strategy from its top-down and there is a clearly understandable basis why from the bottom-up each element of the DSAP has been included and how it fits into the bigger picture of the DSAP. The DSAP must form one whole and cohesive story and not include work other than that which has been evidenced as required.

3.14. Although we consider ensuring clear traceability is vital to delivering a high-quality DSAP, this is a well-established concept for organisations when creating effective

strategies and their action plans and so we have not provided detailed regulatory guidance for how to do this.

Integration of DSAPs into the wider organisation

3.15. Activities that involve data and digitalisation have a tendency to be diffuse and pervasive throughout an organisation, particularly in economic sectors where many people/assets communicate, such as infrastructure sectors. Also, data and digitalisation needs are almost exclusively only means to greater ends.

3.16. Due to these features, effective data and digitalisation work is usually better positioned in service of greater goals, rather than treated as an end goal itself. The most effective DSAPs are not standalone programmes of work instead, the DSAP actions, Products and Services serve as enablers to enhance the wider work of an organisation, for example as part of decarbonisation efforts or improving workforce data literacy. This leads to data and digitalisation (and ultimately digital transformation) being better suited to integration "horizontally" across all programmes and operations in an organisation, rather than as a singular "vertical" programme of work among an organisation's portfolio of programmes.

3.17. Communication about the DSAP, its purpose and role in an organisation can be improved by demonstrating not only how the DSAP is delivering the direct data and digitalisation needs of its Stakeholders, but how doing this improves the delivery of the organisation's other programmes of work and strategies.

Additional Examples

3.18. Below are examples showcasing ways in which digitalisation is and has been integrated into organisations' wider operations.

Table 6: Principle 2 – additional examples

Example	Details

World Economic forum[35]	The world economic forum has carried out a Digital transformation of industries project. Among their research and findings is a section on digitalisation case studies[36], this includes dozens of examples of global brands that have each made significant accomplishments at improving their business, products and services through various digital transformations.
Zigurat Innovation and technology business school[37]	This business school has published case studies of organisations that have integrated digitalisation across their business and who are using digitalisation interwoven into their organisation's traditional product and service offerings. The site, and more links therein, include a high-level summary of organisations, for example: • Starbucks. Includes a news interview with the CEO about how digitalisation and better use of data, AI and machine learning have improved company returns. • IKEA. Showcases how the types of service they offer are being augmented with digital capability, allowing people to visualise IKEA products in their home before making a purchase • Lego. Showing their extensive use of digital tools to refresh their business and change how customers interact with the company, enabling the crowdsourcing of ideas for new Lego products. The wider Zigurat website provides other potentially useful information, such as in the form of blogs about digital transformation more generally[38].
Centre for Digital Built Britain (CDBB) case studies[39]	The CDBB publishes case studies describing how it has worked with organisations operating in different sectors to bring about transformations to products and services. The brief reports they publish on their work provide useful insights about how to integrate digitalisation activities into an organisation's operations.

[35] http://reports.weforum.org/digital-transformation/
[36] http://reports.weforum.org/digital-transformation/go-to-the-case-studies/
[37] https://www.e-zigurat.com/innovation-school/blog/companies-digital-transformation-strategies/
[38] https://www.e-zigurat.com/innovation-school/blog/
[39] https://www.cdbb.cam.ac.uk/resources/casestudies

3. Take full advantage of opportunities to deliver benefits early and to iterate improvements to Products and Services

Explanation

3.19. The licensee's delivery of Products and Services described in itsthe DSAP must take advantage of opportunities to deliver benefits to consumers, stakeholders, and the Public Interest as early as practicable. This includes, where opportunities exist to do so, the licensees delivering improvements to the Products and Services described in itsthe DSAP incrementally throughout the development and end-to-end lifecycle of the Products and Services.

3.20. As improvements are made to the Products and Services described in itsthe DSAP, the licensees must make clear within the DSAP how these improvements are adapting the licensee's current Products and Services to become the Products and Services required to deliver itsthe Digitalisation Strategy vision and associated objectives.

Techniques

The Agile Framework

3.21. Agile working is a framework approach that encompasses different methods, tools, and techniques for incremental and iterative product development. While it is a modern software development approach, it builds on the engineering concepts of iterative and incremental development developed in the mid-twentieth century[40]. Agile originated as a direct response to then-traditional "waterfall" methods of delivery characterised by long wait times until software delivers any benefit, tackling evolving requirements that lead to cost overruns and delays and by ensuring greater targeting of products/services to the needs of the the software user/customer.

[40] https://www.craiglarman.com/wiki/downloads/misc/history-of-iterative-larman-and-basili-ieee-computer.pdf

3.22. Over recent decades, Agile working frameworks have become mature, tried and tested approaches to working that are specifically designed to ensure investments into Products and Services deliver benefits early and with frequent iteration. Agile working frameworks are particularly suited to data and digital topics.

3.23. The Agile Manifesto[41] describes the guiding values and principles for Agile programme delivery. Its twelve principles[42] provide a vital guidance that, when followed, ensure full advantage is taken of opportunities to deliver benefits early and that product and service improvements are gained incrementally through iteration.

3.24. The GDS Service Manual[43] provides robust guidance to support the implementation of an Agile approach to delivery. This manual is the preferred programme management method of the UK government for when it is delivering digital/data Products and Services. Its manual is available in the public domain and is widely re-used by other non-government organisations.

Specific Agile Working Methods

3.25. There are many Agile working methods that can be used when building products and services, and each has its own set of tools and techniques. These working methods can also be of benefit to helping comply with the other principles of this Digitalisation Strategy & Action Plan guidance.

3.26. The below list is not exhaustive but provides a brief explanation of commonly used methods. There are countless resources on how to implement Agile working and many of these are available as open-source best practice advice such as from the Agile Alliance[44], the Association for Project Management[45], and many other organisations.

Table 7: Specific agile working methods

Agile Method	Comment
Scrum	Scrum is an agile methodology best suited to addressing complex problems that require regular

[41] http://agilemanifesto.org/
[42] http://agilemanifesto.org/principles.html
[43] https://www.gov.uk/service-manual/agile-delivery
[44] https://www.agilealliance.org/
[45] https://www.apm.org.uk/resources/find-a-resource/agile-project-management/

	adaptation, while productively and creatively delivering products of the highest possible value. It is best suited for iterative and incremental knowledge transfer; development and delivery of complex work and; solving problems, where the end-solution is not knowable at the outset. The main feature of scrum working is that work is planned in set increments known as sprints, typically 2-4 weeks in duration. There is helpful information on the scrum method online.[46] [47]
Kanban	Kanban is a methodology to manage and prioritise workflow. It visualises both the process (the workflow) and the actual work passing through that process. It focuses on tightly limiting work that is actively in progress to enable teams to optimise flow, finish what they start and to not commit too much work at once. This working technique is suited to identifying potential bottlenecks to delivery and fix them quickly. It is not necessarily iterative, but it is incremental. Kanban is best suited to where work is comprised of small urgent tasks, where requirements change often and fast, and/or where sequencing is complicated. More information can be found from Kanbanzie[48] and the article on Kanban from Atlassian[49].
Agile Portfolio Management	Agile Portfolio Management applies "test, learn and adapt" principles and a decentralised control concept at a portfolio level. Product increments and value propositions are broken down into small chunks and resource is allocated for specific value-adding components rather than at project level. This technique promotes flexibility and enables portfolio managers to reallocate funds to emerging priorities based on changing customer requirements or new ideas that can be more valuable than the old ones. Additional information can be found in the Agile Portfolio Management article from Kanbanzie[50].

[46] https://www.scrum.org/
[47] https://www.scrumguides.org/scrum-guide.html
[48] https://kanbanize.com/kanban-resources/getting-started/what-is-kanban
[49] https://www.atlassian.com/agile/kanban
[50] https://kanbanize.com/agile/scaled-agile/portfolio-management

SAFe (Scaled Agile Framework)	Scaled Agile is a leading framework for scaling Agile working across a whole enterprise/organisation, this provides a mechanism for organisations to structurally organise themselves in a manner that enables them to sustainably meet the goals of agile working in a large organisation. This method is well described by Scaled Agile Framework[51].
LeSS (Large-scale Scrum)	Large-scale Scrum is applying the principles, purpose, elements, and elegance of Scrum working in a large-scale context, as simply as possible. LeSS is offering a deliberately "barely sufficient" methodology for scaling beyond a single-team Scrum allowing for efficient delivery of high-impact results. More information on this can be found on this interactive webpage by Less[52].

3.27. Going beyond the scope of incremental and iterative delivery, other modern methods of achieving effective delivery include Lean Software Development[53], Extreme Programming (XP)[54] and Crystal[55], these can be useful for the delivery of certain types of products, services and projects.

Innovation of online banking

3.28. Iterative development and delivery is commonplace for when providing mobile applications (apps). The Royal Bank of Scotland led the world at providing online banking apps. In 2009 RBS's first banking app only offered users a view of their statements and recent transactions[56]. Despite this being a limited service compared to in-branch banking, it was helpful and useful. Instead of waiting until the app was the equivalent of in-branch services, RBS chose to deliver a simple service early, providing valuable feedback and some end-user benefits while more advanced services were developed. Banking apps now offer transaction services and online chat functions, and although the use of these apps still do not offer all of the benefits of in-branch services, they fill a large fraction of customers' needs and in certain areas they

[51] https://www.scaledagileframework.com/
[52] https://less.works/
[53] https://airfocus.com/glossary/what-is-lean-software-development/
[54] https://www.agilealliance.org/glossary/xp
[55] https://www.toolsqa.com/agile/crystal-method/
[56] https://www.natwestgroup.com/heritage/history-100/objects-by-theme/going-the-extra-mile/banking-app-2011.html#:~:text=Customers%20were%20asked%20what%20they,to%20BlackBerry%20and%20Android%20users.

outperform in-branch services, such as with respect to the 24-7 availability of app-based services compared to physical branches.

Iterative product and software development

3.29. Companies who develop computer operating systems follow iterative processes to updating their operating systems product platform. They provide staggered updates for smaller changes and at less regular intervals offer significant updates to operating systems. Preferring iterative design means that users can make use of the benefits from new updates without waiting for a completely new operating system or product to be developed.

3.30. A specific example of this is how Apple has approached the development of the iPhone and its operating system, the iOS. Apple introduced iPhone in 2007[57] as a revolutionary new product, however, the first model was still very basic in terms of functionality. Apple has been evolving the product continuously, adding new features and specifications with each iteration of the device, eg introducing its App Store in 2008, video recording capabilities in 2009, a front-facing camera in 2010, Siri voice assistant in 2011, etc. In-between product iterations, Apple released versions of both annual operating system upgrades as well as in-year upgrades[58].

Additional Examples

3.31. Below are a variety of additional specific examples of where the above techniques have been used to practical effect for the benefit of stakeholders. These provide useful insight that can serve as an aid to the development and updates to a DSAP on the theme of providing benefits to stakeholders and the Public Interest.

Table 8: Principle 3 – additional examples

Example	Details
John Deere and adoption of agile	John Deere[59] (a tractor manufacturer) has carried out an IT transformation programme that in 2017. This has shifted the organisation to focus on products and delivering thin slices of value at short intervals[60], and

[57] https://en.wikipedia.org/wiki/IPhone_(1st_generation)
[58] https://en.wikipedia.org/wiki/IOS_version_history
[59] https://www.deere.co.uk/en/index.html
[60] https://www.bain.com/insights/doing-agile-right-inside-john-deeres-it-transformation-video/

	iterating quickly based on customer feedback, while addressing technical debt. This has resulted both in improved time to market and improved customer satisfaction scores.
Google, on failing	Google embraces failure as an essential component of innovation and has a structured process[61] in place to include learnings from failure into future product and features developments
Video games, iterative features updates	It is now commonplace for popular video games (such as Fortnite by Epic Games[62] and Apex Legends by Electronic Arts[63]) to provide iterative updates to content via a 'seasonal' updates format, this is used both to help set subscribers' expectations about changes, while also serving as marketing opportunities.
BETA releases	Many companies use either open or invitation-only private BETA[64] releases to gather feedback and test products and new features before releasing public versions of their products and services. Examples include: • Disney Plus used both public and private beta to launch their service[65] • A popular video game from 2020 is Fall Guys by Mediatonic games[66], it used an invitation-key only open beta before launching[67], allowing for engaged customers to participate early and for product and service feedback to be gained, allowing for improvements to be made. • Ordnance Survey[68] uses beta releases to gather feedback about their Surface and Terrain products[69] *(this link requires you to register).*
Transitioning from Waterfall to Agile mid-way through a programme	The Danish Business Authority provides an excellent case study[70], they started developing their digital-registration system using "waterfall" methods but faced difficulties and, after two years of development, switched to Agile to complete the delivery.
Spotify, on product oriented multidisciplinary teams	The Spotify Model (or Spotify Engineering Culture[71]), is an example of agile organisational design where autonomous multidisciplinary teams are organised around specific products, always aligned to values and mission, and empowered to make decisions.

[61] https://rework.withgoogle.com/blog/postmortem-culture-how-you-can-learn-from-failure/
[62] https://www.epicgames.com/fortnite/en-US/home
[63] https://www.ea.com/games/apex-legends
[64] https://www.gov.uk/service-manual/agile-delivery/how-the-beta-phase-works
[65] https://whatsondisneyplus.com/tag/beta/
[66] https://www.mediatonicgames.com/game/fall-guys
[67] https://www.forbes.com/sites/davidthier/2020/07/30/fall-guys-is-dropping-codes-for-another-beta-ahead-of-its-release-date/?sh=4ed04b44542d
[68] https://www.ordnancesurvey.co.uk/
[69] https://www.ordnancesurvey.co.uk/search?term=beta
[70] https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/from-waterfall-to-agile-how-a-public-agency-launched-new-digital-services
[71] https://engineering.atspotify.com/2014/03/27/spotify-engineering-culture-part-1/

4. Enable stakeholders to understand the Products and Services, the status of their delivery and how to access them

Explanation

3.32. The licensees must clearly set out in its the DSAP the Products and Services that stakeholders can currently benefit from and provide information about how to access them. In its the DSAP the licensees must enable stakeholders to understand the specific Products and Services that will be available in the next 12 months and indicate what Products and Services it is considering making available in the future. This must include any improvements to or decommissioning of existing Products and Services.

3.33. The licensees must include information that describes the nature and status of each of the Products and Services included in its the DSAP and in a way that is accessible to stakeholders. These descriptions must be concise, and the presentation of Products and Services must make it easy for stakeholders to compare them with the Product and Services included in other licensees' DSAPs. The licensees must provide opportunities for stakeholders to obtain more detailed information about each Product and Service.

Techniques

3.34. Making an organisation's currently available and forthcoming products and services transparent and clear to stakeholders is achievable through routine methods, such as providing discrete lists in tables and/or through structuring of documentation or as part of graphics. These basic methods will not be discussed further here. While the basic methods are beneficial, on their own they do not reflect a high-quality modern approach to creating transparency about products/services.

3.35. Greater clarity about the portfolio of products and services can be achieved through other methods, such as interactive product/service catalogues, timelines and roadmaps. Best practice approaches and solutions for how to deliver these is an evolving field, ongoing technological progress is leading to increasingly powerful opportunities to succinctly indicate when and what products and services will be available to end-users.

3.36. The GDS Service Manual provides valuable information and guidance on roadmaps[72]. Another readily available resource is the University of Cambridge Institute for Manufacturing, who provide expert advice on roadmaps[73], this is a particularly in-depth source, their work includes many practical case studies that are available in the public domain.

3.37. Today's technology solutions make it possible to produce interactive media, allowing stakeholders access to tailored levels of information about products/services. This is being made possible through behind the scenes work that treats roadmap artefacts and information about products/service as a Data Asset themselves. Providing a data model about business plans is allowing for more advanced front-end services to be made available, such as data drilling[74] capabilities. Enabling audiences with data models and front-end services empowers them to determine for themselves the information and perspective they most desire and to freely navigate based on their personal preference.

3.38. Giving people the power of navigation allows them self-service answers to their own questions and so builds up a personalised understanding of an organisation's suite of products and services. Numerous methods for giving navigating power to an audience exist, what the best feature in common is that information of interest is easily available with minimum effort, "at the click of a mouse" (or equivalent).

Methods and examples of navigation and presentation

Table 9: Methods and examples of navigation and presentation

Technique	Comment
Structured documents[75]	This traditional presentation method provides a written document with sectioning of material by theme. It has limited opportunity for tailored experiences for its audience. On its own this does not take full advantage of modern methods for making products and services understandable and accessible. For certain subject matters this method still has a role; it is effective at ensuring the same message is received by all audience members, this can be beneficial for

[72] https://www.gov.uk/service-manual/agile-delivery/developing-a-roadmap
[73] https://engage.ifm.eng.cam.ac.uk/roadmapping/
[74] https://en.wikipedia.org/wiki/Data_drilling
[75] https://en.wikipedia.org/wiki/Structured_document

	coordinating understanding. For example, an organisation might want to be more rigid when sharing its headline objectives that its products and services will deliver to.
Drilldown capability[76]	This is a method that can be incorporate into numerous presentation techniques. It features in many of the examples given throughout this table and was explained in the body text, above.
Searchable product / service lists	Machine-readable structured data tables are valuable at providing lists that their audience can interact with, such as through sorting and filtering information to find what they are looking for. These are particularly beneficial for large/granular lists of products/services. This approach to managing product/service information has direct benefits to the organisation providing them too, it allows for easy synchronisation of internal programme management and external stakeholder information as well as better enabling a sustainable approach to managing the portfolio of product/services. East Lancashire Hospitals provide a comprehensive catalogue of their patient services[77]. The Apple Accessories page[78] allows you to search their catalogue by keywords or filter by category or product type.
Static roadmaps	Images are powerful tools for explaining to people what products/services they can expect from people and by when. Traditional non-interactable roadmaps are a tried and tested approach to sharing information. A handful of good examples have been picked out, below: • NHS North Bristol (page 35) spider diagram approach[79] • Royal National Lifeboat Institution (RNLI) (page 13)[80] • Centre for Digital Built Britain[81] (includes some drilldown capability)
Interactive and dynamic roadmaps	Cutting edge approaches to giving more inciteful roadmap information blend the above methods together and open up information to empower the audience both to explore plans and provide feedback as part of the roadmap. Providers of collaborative project management software tools are regularly innovating better methods of sharing digital service roadmaps and catalogues openly with customers.

[76] https://en.wikipedia.org/wiki/Data_drilling
[77] https://elht.nhs.uk/services
[78] https://www.apple.com/uk/shop/accessories/all
[79] https://www.nbt.nhs.uk/sites/default/files/North%20Bristol%20NHS%20Trust%20Digital%20Vision.pdf (Page 35)
[80] https://www.ifm.eng.cam.ac.uk/uploads/Roadmapping/RNLI_Report_-_The_Third_Dimension_for_Search_and_Rescue.pdf (page 13)
[81] https://www.cdbb.cam.ac.uk/DFTG/DFTGRoadmap

	Examples of this include: • Atlassian's release schedule roadmap[82] • The Trello roadmap[83] and accompanying instructions for how to repeat this[84] • Roadmap.Space and their public roadmap[85] Other organisations that offer digital services also make interactive and dynamic roadmaps available that give clarity about the status of products and services: • GitHub public roadmap[86] • Microsoft Office365 product release schedule[87] • Amazon Elastic Container Services roadmap[88] (see roadmaps for their other services within)
Publishing a standardised taxonomy of products and services	This method offers advanced treatment of data as an asset to the point that an organisation has a curated taxonomy that describes its end-to-end products and services. This is best carried out through the use of recognised standard methods of creating a taxonomy. The Technology Business Management (TBM)[89] is an example of one such standard. Approaches such as the TBM provide a detailed yet clear and structured approach to comprehensively describing products and services and providing a repeatable and sustainable method both of allowing the audience to explore Products/Services and for the host organisation to manage the information. The use of this as a standard practice is readily extensible and so also makes it easy for multiple organisations to deliver a common approach to describing their Products/Services. Compliance with standards such as this is beneficial to improving the interoperability of data and digital/data services. Many organisations put this approach to working into practice, one example is the National Institute of Standards and Technology (NIST)[90] in the USA. They have published information about how NIST are using the TBM[91]. Support for this planning Data Asset management is also available from centres of excellence, such as the TBM Council[92].

[82] https://www.atlassian.com/roadmap/cloud
[83] https://trello.com/b/nC8QJJoZ/trello-development
[84] https://blog.trello.com/going-public-roadmapping-with-a-public-trello-board
[85] https://roadmap.space/public-roadmap/
[86] https://github.com/github/roadmap
[87] https://www.microsoft.com/en-gb/microsoft-365/roadmap?filters=
[88] https://github.com/aws/containers-roadmap
[89] https://www.apptio.com/blog/what-is-tbm-technology-business-management-explained/
[90] https://www.nist.gov/
[91] https://www.nist.gov/system/files/documents/2017/05/12/doc2017financialmanagementconference-tbm.pdf
[92] https://www.tbmcouncil.org/

Additional **Examples**

Table 10: Principle 4 – additional examples

Example	Details
Pharmaceutical product pipelines	Updated on a quarterly basis pharmaceutical product pipelines give clarity about updates and changes to external-facing products and include information such as removed / failed / discontinued products. Examples include: • Glaxo Smith Kline's pipeline[93] this additionally includes alignment to different strategic areas for development, multiple filters can be applied, and the source data is also downloadable. • AstraZeneca's pipeline[94] is structured based on delivery phase and also has drilldown capability. They also make available the AstraZeneca existing product catalogue[95], which provides an alternative perspective on those products, allowing for stakeholders to better understand how they relate to one another. • Pfizer's pipeline[96] includes a table with summary of key projects, and an advanced search function. The underlying data is also available to download as a presentation.
BAE Systems products and service catalogue[97]	This catalogue offers filtering and search capabilities, much as is normal practice in the retail sector for when people are doing their online shopping. Readers can click into the catalogue to learn more about the products that they are particularly interested in.
General Electric and product / service tagging[98]	This example showcases the use of digital tagging of Data Assets, enabling stakeholders to filter efficiently to find the information that they personally want to see.
UK National Action Plan for Open Government 2019-2021[99]	Department for Digital, Culture, Media & Sport (DCMS)provides visibility of actions being taken across government in their. Actions are tubulised and include indication of whether they are new initiatives, their start date and their end date.
US Federal Data Strategy[100]	This example includes a succinct summary of their strategy in one interactive graphic, with a clear relationship between activities and themes. A dedicated

[93] https://www.gsk.com/en-gb/research-and-development/our-pipeline/
[94] https://www.astrazeneca.com/our-therapy-areas/pipeline.html
[95] https://www.astrazeneca.com/our-therapy-areas/medicines.html
[96] https://www.pfizer.com/science/drug-product-pipeline
[97] https://www.baesystems.com/en/what-we-do/products-and-services
[98] https://www.ge.com/digital/applications
[99] https://www.gov.uk/government/publications/uk-national-action-plan-for-open-government-2019-2021/uk-national-action-plan-for-open-government-2019-2021
[100] https://strategy.data.gov/overview/

	detailed page provides additional information[101]. This including action milestones, measurements and expected completion date. Any revisions are also publicised and noted as they happen.
Cocoa and Forest Initiative & Nestle's action plan[102]	While not technologically advanced, this example shows very clear structure, demonstrating alignment with commitments, and providing a clear list of deliverables to be in place by a specific date for each commitment. The strength of this example is that the relationship between commitments (ie products and services) and the actions being undertaken to get there is very easy to understand, including very specific timing information.
Wider ways of communicating progress	Keeping stakeholders appraised of updates and progress can happen outside of a DSAP itself. Announcements made about the completion of actions / collections of actions that now mean product/service improvements are newly available. For example, Slack uses webinars[103] to give details on upcoming and delivered updates and features relating to its products and services.
Citymapper[104] service improvement blog updates	The travel app Citymapper posts regular updates and new features to its products and services via its News blog[105]. For example, when Citymapper enhanced user capabilities for filtering and searching through transport its provided an approachable blog its New Routing Power - FAST features[106]. In the post they succinctly describe the new feature, where it sits within the product, how to navigate through it and where to go to find out more.

[101] https://strategy.data.gov/action-plan/
[102] https://www.nestle.com/sites/default/files/asset-library/documents/library/documents/corporate_social_responsibility/cocoa-and-forests-initiative-nestle-initial-action-plan.pdf
[103] https://slack.com/intl/en-gb/events/webinars?geocode=en-gb
[104] https://citymapper.com/london?lang=en
[105] https://citymapper.com/news
[106] https://citymapper.com/news/2329/new-routing-power-fast

5. Ensure visibility about the nature and status of actions in the Digitalisation Action Plan

Explanation

3.39. The Digitalisation Action Plan must state the collection of actions the licensees is undertaking or will undertake to adapt it Products and Services from those currently available to those required to deliver itsthe DSAP vision. The licensees must provide a concise description of each action and this must include:

- the current progress status of the action;
- how successful delivery of this action will adapt current Products and Services to become the Products and Services required to deliver itsthe DSAP vision and;
- details on how stakeholders can gain more detailed information about the actions.

3.40. The licensees must include in the collection of actions; the current actions, planned future actions, and successfully completed actions. For actions that have either been completed, or are no longer relevant, the licensees must provide access to the archived collection. The licensees must provide stakeholders with a clear explanation on the progress and delivery between publication of updates to itsthe DSAP.

3.41. When the licensees publishes updates to itsthe Digitalisation Action Plan, it must provide clear updates for stakeholders on the status of its actions including timescales and reasons why actions have been added, changed, or removed.

3.42. The licensees must provide stakeholders with details on the actions that must be delivered before new Products and Services and Products and Service improvements will become available.

3.43. The licensees must make clear the priority of each action by setting out clear timelines that show when it will expect to start and complete. The licensees must prioritise the delivery of the actions it needs to complete to deliver the target Products and Services based on the projected benefits for the end-consumers who pay for the Products and Services and/or for the Public Interest.

Techniques

3.44. A Digitalisation Action Plan is publicly available and so presents an opportunity to make the status and direction of Products and Services visible and accessible to stakeholders. The public nature of this information allows for the contents of the Action Plan and so the ongoing improvements to an organisations Products and Services to be promoted as part of a wider ecosystem of an organisation's communications.

3.45. From a practical perspective, the act of providing a list of actions and information about them involves the same work as providing a list of the Products and Services an organisation offers/plans to make available. Therefore, the techniques and examples given for Principle 4 are applicable for helping comply with this current principle as well. The suggested techniques and examples are not repeated here.

3.46. For clarity, just as for Principle 4, achieving advanced performance at complying with this principle will require treating information about actions as a Data Asset in its own right. This is an enabler to achieving engaging, sustainable and low-burden approach to ensuring visibility about past, ongoing and planned activities for Stakeholders relating to the pipeline of digitalisation activities and associated Products and Services.

6. Ensure there is shared understanding of how success and performance is measured

Explanation

3.47. The definition of successful delivery of the licensee's DSAP must be unambiguous. For each objective of itsthe Licensees DSAP and associatedhthe Products and Services, the licensees must use and include at least one performance measure and its definition must be available to stakeholders.

3.48. The licensees must validate its measures and definitions of success with relevant stakeholders before delivery of all new products/services/actions as soon as reasonably practicable. The licensees must include performance reporting against these measures when updates are made to itsthe DSAP. The licensees must gain stakeholder feedback for any changes to the definition of success and/or measures in advance of making these changes and must keep records to show how the process was cascaded and if feedback was received.

Techniques

3.49. Traditional financial measures of performance can play an important role, for example by carrying out a Cost-Benefit-Analysis (CBA) for a product or service. Insights about financial performance can also provide useful information into product/service planning and how costs and benefits will distributed amongst Stakeholders. We will not describe established financial measures further in this guidance.

3.50. There is useful high-level guidance on measuring performance in the GDS Service manual[107]. This includes measurements that are mandatory for government departments as they invest in and operates services. The government's guidance has

[107] https://www.gov.uk/service-manual/measuring-success/how-to-set-performance-metrics-for-your-service

four mandatory Key Performance Indicators[108] (cost per transaction, user satisfaction, completion rate and digital take-up).

Consider perspectives

3.51. There is no one best method for defining and measuring success. One way of demonstrating this is to consider the different perspectives of measuring: outcomes, outputs, means and inputs. Below is a fictitious example of how a service can be defined and measured differently depending on perspective. This fictitious example is contextualised using a real-world data service (the Office for National Statistics (ONS) publishes inflation and price indices[109]). Although the service is real, the example given in the table is not and is not from the ONS.

Table 11: Measures of success

Perspective	A definition of success	Measures of success
Outcomes	Stakeholders can use inflation and price data without complaint	• Validate that it is easy for stakeholders to complain • Monitor the number of complaints received
Outputs	Stakeholders are successfully collecting data products from the inflation and price data service	• Number of views and downloads • Number and types of error(s) • Ratio of views compared to downloads
Means	The inflation and price data service has been tested with stakeholders and it meets their needs	• Positive User Experience (UX) and User Acceptance Testing (UAT) results • Ongoing user research finds the inflation and price data products being is being used successfully by stakeholders
Inputs	The inflation and price data service is designed upfront with stakeholders	• The index calculation methodology and selected underlying data are agreed stakeholders (surveys and inclusive governing groups give approval)

[108] https://www.gov.uk/service-manual/measuring-success/data-you-must-publish#what-data-you-have-to-report
[109] https://www.ons.gov.uk/economy/inflationandpriceindices

3.52. All the above approaches have the same intention and in their own way they each help define success and offer methods for measurement, but there are shortcomings to each method too:

- The outcome is comprehensive, but it might be hard to demonstrate regular improvement. There is a strong dependency on a complaints service being in place, but defining its performance may be challenging too. If the service were in early development it may not be realistic for a complaints service to have sufficient stakeholder engagement to have complaints raised or to establish the service.
- the outputs provide a useful characterisation of Stakeholders' usage of the service and this is easy to measure, but this may struggle to deliver in-depth insight about experiences and whether problems are being solved;
- the measurement of the means will provide deep and reliable insight, but the effort to carry out this measure is comparatively time and costs intensive, it is not easily scalable and requires high engagement from stakeholders;
- the inputs approach provides a strong and assured basis for Stakeholders' understandings of their needs, but it does not test whether agreed theory is put into effective practice or whether reality diverges from theoretical expectations.

3.53. Dedicated data/digital maturity assessments and audits can play a role when benchmarking and measuring progress, including having independent third party opinions. There are also public resources available and useful examples that can aid an organisation's assessment.

Table 12: Techniques for measuring digital maturity

Technique	Comment
Joint Information Systems Committee (JISC)[110]	For higher education this not-for-profit organisation provides a suite of digital capability support information. They have a framework for describing organisational digital capability[111] and their Discovery Tool[112] is targeted at helping organisations

[110] https://www.jisc.ac.uk/about
[111] https://www.jisc.ac.uk/rd/projects/building-digital-capability
[112] https://digitalcapability.jisc.ac.uk/our-service/discovery-tool/

	reflect on and benchmark their current capability.
Higher Education Statistics Agency (HESA)[113]	This is another higher-education resource supporting digital maturity. They provide a Data Capability Toolkit[114], this is a detailed 8-step publicly available resource with explanations, assessment structures and templates for organisations.
NHS Digital Maturity self-assessments[115]	As part of its overall Digital Transformation the NHS has conducted self-assessments for NHS local providers. This information has been beneficial for characterising performance, such as through an assessment carried out by the National Audit office (NAO)[116] (see page 25).
Skills Framework for the Information Age (SFIA) self-assessment framework for individuals[117]	This resource has support for individuals as they measure their personal strengths and capability with respect to data and digital literacy and skills. SFIA is a not-for-profit global initiative that has worked in collaboration with the UK GDS[118]. They provide wider useful support beyond only self-assessments.
UK government Essential Digital Skills Framework[119]	This allows for qualitative measurement for supporting understanding of digital inclusion for external stakeholders and its people, internally.
Enterprise Data Management (EDM) Council[120]	The EDM Council represents over 200 organisations, its work includes a knowledge portal[121] and a Data Management Capability Assessment Model[122] for its members, these provide structure for when assessing digital and data maturity.
The Data Management Association (DAMA)[123]	DAMA is a not-for-profit organisation that provides a wealth of resources and practices that help with data management in general, while also being beneficial to organisations' ability to measure their own performance, and additionally it provides certification

[113] https://www.hesa.ac.uk/
[114] https://www.hesa.ac.uk/support/tools/data-capability/full
[115] https://www.england.nhs.uk/digitaltechnology/connecteddigitalsystems/maturity-index/
[116] https://www.nao.org.uk/wp-content/uploads/2019/05/Digital-transformation-in-the-NHS.pdf
[117] https://sfia-online.org/en
[118] https://www.gov.uk/government/organisations/government-digital-service
[119] https://www.gov.uk/government/publications/essential-digital-skills-framework/essential-digital-skills-framework
[120] https://edmcouncil.org/
[121] https://www.dcamportal.org/
[122] https://www.dcamportal.org/dcam_framework/
[123] https://www.dama.org/cpages/mission-vision-purpose-and-goals

	processes that help individuals understand and progress their own data capability.

Operational product/service metrics

3.54. Digitally enabled services, particularly those that involve many autonomous transactions create plentiful data that can be used to calculate service metrics and gain insight. This data is particularly suited to the creation of personalised performance information, both for customers service providers to understand performance. Below are examples of these kinds of personalised and highly automated metrics applications.

Table 13: Operational product/service metrics

Technique	Comment
Ebay and transaction dashboards	In this case the performance metrics are not for ebay employees, but for buyers and sellers who transact using their services. The ebay digital platform provides personalised information to buyers and dashboard of service metrics for sellers[124], all with minimal effort on the part of those individuals.
Uber's freight services definition of success and transparency about measurement method[125]	This is transparent a exercise in expectation management. It both better informs customers of Uber's service quality and ensures Uber employees share a common understanding of service quality requirements. As well as stating the measure that Uber use to define service quality, the exact algebraic definition of how metric scores are calculated is included.
YouTube metrics data model	Google have published their metrics data model[126], providing explanations and definitions about YouTube metric data. This supports user experiences of the YouTube Analytics API[127] that provides access to the metrics in an automatable and machine-readable format. This method of making metrics available allows stakeholders greater optionality for how they integrate metric

[124] https://www.ebay.co.uk/help/selling/selling/monitor-service-metrics?id=4785
[125] https://help.uber.com/freight/carrier/article/service-metrics-and-expectations?nodeId=524442fc-3b8c-4594-8937-7de2bfe6311a
[126] https://developers.google.com/youtube/analytics/data_model
[127] https://developers.google.com/youtube/analytics

	data into their wider work with data (such as an organisation's business planning).

Additional Examples

Table 14: Principle 6 – additional examples

Example	Details
Data Science Project Management guidance[128]	This guidance outlines how to approach measuring products and services that are driven by data science methods.
National Cyber Security Centre (NCSC) advice on Penetration Testing[129]	In particular, see the Common Vulnerability Scoring System[130] that is recommended by NCSC as a structured and repeatable measurement method to asses the security performance of IT systems.
Web Content Accessibility Guidelines (WCAG 2.1 AA)[131]	Performance on the theme of inclusive design can be measured through testing compliance with accessibility standards, for example with the WCAG 2.1 AA.
Green House Gas Protocol Product Standard	The Green House Gas Protocol has developed a standard for implementing carbon accounting[132] as a metric in product design. Recognising this potential kind of role for measuring emissions and using standards such as this, companies can take a broader approach to assuring they are genuinely delivering to the full range of stakeholder needs through the full life cycle of products and services including raw materials, manufacturing, transportation, storage, use and disposal.
Ofgem Consumer Perceptions of the Energy Market Survey[133]	Ofgem and Citizens Advice conduct a quarterly consumer survey on the current view of the Energy Market. Information from this research is used as a metric measure the performance of market participants and different market designs.

[128] https://www.datascience-pm.com/9-ways-to-measure-data-science-project-performance/
[129] https://www.ncsc.gov.uk/guidance/penetration-testing
[130] https://www.first.org/cvss/calculator/3.1
[131] https://www.w3.org/TR/WCAG21/
[132] https://ghgprotocol.org/product-standard
[133] https://www.ofgem.gov.uk/publications-and-updates/consumer-perceptions-energy-market-q4-2020

7. Coordinate with the wider ecosystem of Products and Services

Explanation

3.55. Where Single Provider Products or Services are or will be provided by the licensee~~s~~ as part of the Products and Services included in its~~their~~ DSAP, the licensee~~s~~ must ensure that the Single Provider Product or Service is developed in a way that achieves Interoperability-By-Design throughout its end-to-end lifecycle, enabling the integration of the product or service with other Single Provider Product or Services, including those provided by other organisations.

3.56. Where the licensee~~s~~ provides Single Provider Products or Services, the delivery of these must be carried out in a way that prioritises whole system benefits to end-consumers and/or the Public Interest.

Techniques

Interoperability, additional context

3.57. Interoperability spans the people, practice and technology needs of two or more products/services, its primary focus is ensuring harmonious interactions between these products/services, for example the needs for data exchange or communication between them. This applies both in terms of their technology and their governance. Interoperability-by-design takes this concept into account throughout the entire lifecycle of a Product or Service, and this is required to be included in all DSAP actions that invest in new or improved products and services.

3.58. The objective of this principle is to avoid a culture of single-provider products/services being optimised in isolation. This is particularly important where multiple single providers operate at different stages of a supply chain. In cases where a supply chain features one or more single-provider organisations, the requirement for interoperability-by-design ensures their data/digital products and services are delivered effectively for the supply chain as a whole and with clear accountability for doing so.

Taking advantage of other DSAPs and complying with other DSAP principles

3.59. Achieving interoperability is by its nature a two-way street, following this DSAP Guidance both enhances an organisation's own ability to ensure interoperability of products/services and in return, this lowers barriers to other relevant organisations identifying opportunities for interoperability. The DSAP principles - and therefore effective adherence to them - help with this in a number of ways:

- Visibility and availability of stakeholder engagement and research provide excellent opportunity for both parties to learn about common stakeholder needs and to identify products/service solutions that will benefit from coordination.
- Research activities themselves can be enhanced by including enquiries with stakeholders, such as asking them about any other products/services they use/need/provide during their own life/work. This will help identify other products/services that might need to benefit from interoperability.
- Iterative and incremental product/service improvements allow for small-scale investment decisions and therefore this approach can lower the cost of refactoring technology/governance as interoperability requirements are emergently learned throughout product/service lifecycles.
- Other organisations will find it easier to identify coordination opportunities and deliver interoperability if a DSAP includes clear information on topics such as: understanding of who stakeholders are; a digitalisation vision and a discrete list of the collection of products/services an organisation does or will offer to stakeholders.

3.60. An organisation's ability to deliver interoperability-by-design is improved through its taking the time to review other organisations' DSAPs to identify common stakeholder needs as well as overlapping themes/products/services. m - help with this in a number of ways:

Working with and learning from wider initiatives

3.61. Another avenue for ensuring interoperability is participation with and taking advantage of strategic initiatives. Self-regulated industry initiatives, research programmes and government interventions are types of activity that provide focal points and frameworks that allow for this and so for product/service decisions to be made with greater confidence that interoperability will be achieved. Working with these initiatives also helps with macro sector and cross-sector challenges, such as shared digital architecture needs and the identification of novel and shared product/service requirements for economic sectors.

3.62. Important to the actual delivery of the interoperability of products and services is to go further than simple engagement with strategic initiatives, but to actively promote and support them as an efficient method of assuring effective interoperability. The work of these strategic initiatives can influence and adapt the goals and objectives of the DSAP and demonstrating adherence to their work/guidance can provide a practical means of showing that interoperability of products and services has been achieved.

Additional examples

3.63. Below is a list of opportunities and initiatives that present avenues for enhancing coordination and interoperability-by-design for an organisation's DSAP and its products and services.

Table 15: Principle 7 – additional examples

Example	Details
Energy Network companies' DSAPs [134]	Energy network companies regulated by Ofgem's RIIO price controls are required to publish a DSAP. These publications provide an exhaustive list of all the digital products and services these organisations offer and plan to offer in future. This information is therefore an excellent structured resource for identifying single-provider products/services from a significant economic sector. Comparing their products, services and actions to your own organisation's products, services and actions is a practical method and opportunity for determining coordination and interoperability needs.
Icebreaker One's OpenEnergy[135] platform	This is an energy sector project that has benefitted from funding through an Innovate UK[136] competition called Modernising Energy Data Access (MEDA)[137]. The purpose of this competition is to improve the interoperability of data in the energy sector and it is supported by The Department for Business, Energy, Innovation and Skills (BEIS)[138] and Ofgem[139].

[134] https://www.ofgem.gov.uk/publications-and-updates/digitalisation-strategies-modernising-energy-data
[135] https://icebreakerone.org/energy/
[136] https://www.ukri.org/
[137] https://innovateuk.blog.gov.uk/2020/05/29/modernising-energy-data-access-and-the-winners-are/
[138] https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy
[139] https://www.ofgem.gov.uk/

	The winners of the competition are a not-for-profit company called Icebreaker One[140]. Their work is ensuring solutions are in place to ensure the interoperability of data services. Learning from their work, following technical practices they are devising and engaging with their community is a practical way for energy companies to improve their data product/service interoperability.
National Underground Asset Register (NUAR)[141]	This is a project being led by the Geospatial Commission[142]. It is delivering an integrated digital map of underground infrastructure (such as electricity, water, telecoms and gas pipes). It involves working with geospatial data across sectors and therefore is requiring organisations to learn how to more easily exchange data (both technically and in terms of governance). This initiative is therefore an excellent and important opportunity to learn how to achieve interoperability between data and digital products/services and is likely to provide learnings for interoperability more widely.
Centre for Digital Built Britain (CDBB)[143]	The CDBB is a partnership between BEIS and the University of Cambridge[144]. It brings together government, industry and academia and is linked to wider coordinating initiatives, such as the Construction Innovation Hub[145], the Building Research Establishment (BRE)[146] and the Manufacturing Technology Centre (MTC)[147]. The CDBB includes a number of initiatives that are very important to providers of digital and physical infrastructure, these include guiding information such as the Information Management Framework (IMF) [148]and its Gemini Principles[149]. Its Digital Twin Hub (DTHub)[150] is a community-based webservice with over 700 organisations represented (accurate as of February 2021). Through a simple and free registration process access can be gained to valuable information, such as the Digital Twin Toolkit[151].

[140] https://icebreakerone.org/
[141] https://www.gov.uk/government/news/national-underground-asset-register-project-update
[142] https://www.gov.uk/government/organisations/geospatial-commission
[143] https://www.cdbb.cam.ac.uk/
[144] https://www.cam.ac.uk/
[145] https://constructioninnovationhub.org.uk/
[146] https://www.bregroup.com/
[147] http://www.the-mtc.org/
[148] https://www.cdbb.cam.ac.uk/what-we-do/national-digital-twin-programme/explaining-information-management-framework-imf
[149] https://www.cdbb.cam.ac.uk/DFTG/GeminiPrinciples
[150] https://digitaltwinhub.co.uk/
[151] https://digitaltwinhub.co.uk/apply/

	Using tools such as this and ensuring products and services align to guidance like the IMF and Gemini Principles help assure interoperability and wider coordination by your organisation.
Independent Task Forces	Independent Task Forces are a common method used by government to convene and coordinate a wide breadth of stakeholders around a particularly important topic. These can provide valuable learning opportunities, help with stakeholder identification and often create solutions to shared challenges that have direct ramifications for an organisation's products and services. A relevant example is the Energy Data Taskforce[152]. Its recommendation for improving the visibility of data has highlighted needs for energy organisations to improve their management and publishing of Metadata, but of particular relevance to this principle, it has shown the need for that Metadata management to be coordinated for the overall benefit of energy data stakeholders who typically seek data from among numerous single-providers in supply chains and therefore desire consistent approaches to Metadata management. Examples of other Task Forces that include learning about data and digital services include: • Green Jobs Taskforce[153] • Telecoms Diversification Task Force[154] • Water Task Force[155] • Electric Vehicle Task Force: The Road to Electric Vehicles[156]
The UK's National Data Strategy[157]	Department for Digital, Culture, Media & Sport (DCMS)[158] is responsible for government's national-level strategy for data. In its Data Opportunity [159]section are outlined five themes for how better advantage can be taken of data to positively transform the UK. Information such as found in this strategy is beneficial to coordination as it helps highlight common and shared challenges across organisations and people in the economy and the culmination of thought on

[152] https://es.catapult.org.uk/reports/energy-data-taskforce-report/
[153] https://www.gov.uk/government/groups/green-jobs-taskforce
[154] https://www.techuk.org/resource/dcms-announces-telecoms-diversification-task-force.html
[155] https://www.bitc.org.uk/leadership-teams/water-taskforce/
[156] https://es.catapult.org.uk/impact/specialisms/ev-energy-taskforce/
[157] https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy#the-data-opportunity
[158] https://www.gov.uk/government/organisations/department-for-digital-culture-media-sport
[159] https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy#the-data-opportunity

	solutions to these challenges. This information helps guide priorities for DSAPs and ensures coordination. A related piece of work is by the Centre for Data Ethics and Innovation (CDEI), a devolved organisation from DCMS. The CDEI's 2020 report, the AI Barometer[160], highlights common AI challenges that span economic sectors.
Smart Meter Energy Data: Public Interest Advisory Group (PIAG)[161]	This initiative is an example of organisations who represent consumers' interests who work to conduct research and policy development. In this case two charities, Sustainability First and the Centre for Sustainable Energy. Their work has learned needs many of which are shared in nature and therefore require coordination to be resolved. PIAG have made a number of recommendations about how smart meter data can be used to improve consumer outcomes. Work like this can have important implications for operators in a marketplace.
Engineering Standards Review[162]	Specific Engineering Matter (SEM) 5 of the Electrical Engineering: Standards Independent Review[163] is both a valuable focal point for coordination in general, but it also draws out the importance of interoperability for smart system flexibility in the energy sector to minimise the costs to the energy system whilst maintaining system resilience. SEM 5a similarly identifies full coordination in the development of all interoperability standards to simplify the landscape for existing market participants and new market entrants. By engaging with this work, the BSI164 and BEIS[165] energy companies can ensure coordination with the wider energy system and other sectors affected by this work such as transport and telecoms.
Open Banking[166]	Open Banking is a secure way for consumers to give permission for their financial information to be shared in a way that they want, often with merchants or service providers who can authorize a payment directly from their bank account. This has been achieved through coordination of data sharing agreements and standards across financial

[160] https://www.gov.uk/government/publications/cdei-ai-barometer
[161] https://www.smartenergydatapiag.org.uk/
[162] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943685/Electricity_Engineering_Standards_Review.pdf
[163] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943685/Electricity_Engineering_Standards_Review.pdf
[164] https://www.bsigroup.com/en-GB/
[165] https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy
[166] https://www.openbanking.org.uk/customers/what-is-open-banking/

	service providers and the Financial Conduct Authority. Through this coordination the financial sector has delivered interoperability of swathes of data and created faster, more joined up services for consumers and businesses.
Sharing research data via the European Bioinformatics Institute[167] has led to faster development of vaccines.	European Bioinformatics Institute (EMBL-EBI) maintains a vast range of freely available, open access data resources. These have allowed scientists to upload, access, and analyse a broad variety of biological datasets. Coordinating data in this way has increased the visibility of research and given scientists the ability to build on and react to new research quickly. This has accelerated COVID-19 research and helped further understanding of the biology, transmission, and spread of that virus.
Estonia's e-Governance[168] has coordinated data sharing across government bodies	Estonia are creating coordinated digital capabilities for their state, 99% of Government services have been digitalised as part of their e-Governance initiative. They have developed an interoperable data exchange service enabling Estonia's public and private information services to function as an integrated whole. Other digitalised Estonian services include, electronic voting, digital ID enable access to numerous e-services, mobile parking and a blockchain enabled secure healthcare services.
The Danish DataHub[169] brings together data across their electricity market	DataHub houses all Danish electricity consumption data and handles businesses processes such as switching energy suppliers. It is brining uniformity to information exchanges associated with this consumption. The DataHub is optimise market conditions while also making data sets available for use more widely.
Greater London Authority Infrastructure Advisory Panel[170]	This is an initiative helping coordination of infrastructure initiatives for Local Authorities in Greater London. Driven by their wide-ranging interests across sectors, Local Authorities and groups that represent them are often an important stakeholder for digitalisation of infrastructure, particularly with respect to ensuring coordination of work, products and services.
Programmable Web API[171], an open source directory of APIs	Open source software lends itself to enhancing product/service interoperability as information about the software is readily accessible by all stakeholders. Integrating plans to use open-source software as part

[167] https://www.ebi.ac.uk/about
[168] https://e-estonia.com/solutions/e-governance/
[169] https://en.energinet.dk/Electricity/DataHub#Documents
[170] https://www.london.gov.uk/what-we-do/business-and-economy/better-infrastructure/infrastructure-advisory-panel
[171] https://www.programmableweb.com/category/all/apis

	of a DSAP can enable a robust approach to ensuring interoperability is achieved.
European Open Science Cloud (EOSC)[172]	A part of the European Data Strategy[173], the EOSC is an excellent example of multiple organisations agreeing to follow practices and standards with data to ensure it is interoperable and that data is open to its stakeholders. Of more general interest is the EOSC data portal[174], which provides a coherent digital product and service catalogue and gateway for stakeholders.
Ofcom Spectrum Strategy[175]	Communications networks are the vehicle for collection and data exchanges, this is a significant focal point for coordination. Ofcom, the regulator of communications networks has a programme of work ensuring the UK has an effective strategy for data collection and exchange. Work like this is valuable for the consideration of DSAP work, particularly in utilities sectors.
Open UK[176]	Open UK is one example of a a not-for-profit organisation that promotes the use of open-source technology. Open-source technology typically presents opportunities for ensuring the interoperability of data and digital products/services, owing to the ready access stakeholders have to the methods and standards used by the technology. Organisations like Open UK can provide practical opportunities to grow networks and to share practices and approaches to getting the most out of open-source technology.

[172] https://ec.europa.eu/digital-single-market/en/european-open-science-cloud
[173] https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy_en
[174] https://eosc-portal.eu/
[175] https://www.ofcom.org.uk/consultations-and-statements/category-1/spectrum-management-strategy
[176] https://openuk.uk/