SGN
Your gas. Our network.

SGN's Digitalisation Strategy

Modernising Energy Data

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Contents

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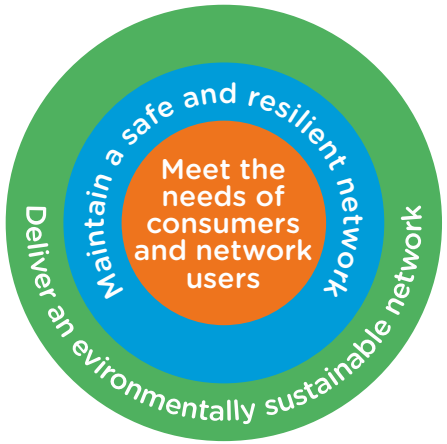
01 Introduction

The UK industrial strategy's grand challenge for clean growth and net-zero carbon emissions by 2050 (2045 in Scotland) requires all energy companies to lead change and work collaboratively and innovatively in delivering a progressive modernisation of Britain's national infrastructure.

What customers want and value from networks: meeting the needs of customers and network users: RIIO-2 Output Categories



Network companies must deliver a high quality and reliable service to all network users and consumers, including those in vulnerable situations

Network companies must deliver a safe and resilient network that is efficient and responsive to change

Network companies must enable the transition towards a smart, reliable, low cost and low carbon energy system for all consumers and network users.

Delivering a cost effective and socially accepted low carbon transition will require significant transformational change to the existing energy infrastructure, along with the types of energy that are used and how and when they are used. **Modernising energy data** is at the heart of enabling this and delivering the key output categories as defined by Ofgem and consumers.

Our energy system therefore, needs technologies and infrastructure that are both cost effective and clean, but it also needs innovation in processes, transactions and consumer offerings to realise a whole-system energy infrastructure that delivers on all three output categories as defined by Ofgem below. This is a fundamental part of the Government's Industrial Strategy and Ofgem's approach to RIIO-GD2.

It is widely recognised that energy networks need to evolve from being passive to active and this is achieved through adoption of smart technologies (IoT), exploitation of the data they generate and utilisation of analytical insights, artificial intelligence (AI) and machine learning (ML) solutions to enable whole energy system solutions.

The availability of quality network data will be critical to achieving net-zero through the successful decarbonisation of our energy system[1]. Improvements to energy data, combined with greater collaboration between networks and systems that have previously been discreet, will require essential investment to take forward the Energy Data Task Force (EDTF) recommendations[2]. Doing this will open the door to shared opportunities and deliver efficiencies not only for customers, but to facilitate the wider whole system environmental, economic and consumer benefits.

[1] https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law
[2] https://es.catapult.org.uk/news/energy-data-taskforce-report/

02 The challenge

The Energy Data Taskforce has developed five recommendations within their report: A Strategy for a Modern Digitalised Energy System (summarised here):

1. **Digitalisation of the energy system** - Government and Ofgem should use existing legislative and regulatory measures to direct the sector to adopt the principle of Digitalisation of the Energy System in the consumers' interest.

2. **Maximising the value of data** - Government and Ofgem should direct the sector to adopt the principle that Energy System Data should be "Presumed Open", supported by requirements that data is 'Discoverable, Searchable, Understandable', with common 'Structures, Interfaces and Standards' and is 'Secure and Resilient'.

3. **Visibility of data** - A Data Catalogue should be established to provide visibility through standardised metadata of Energy System Datasets across Government, the regulator and industry.

4. **Coordination of asset registration** - An Asset Registration Strategy should be established in order to increase registration compliance, improve the reliability of data and improve the efficiency of data collection.

5. **Visibility of infrastructure and assets** - A unified Digital System Map of the Energy System should be established to increase visibility of the Energy System infrastructure and assets, enable optimisation of investment and inform the creation of new markets.

02 The challenge

Martin Cave, Ofgem chairman, said: “Data will play a crucial role in enabling competition and innovation to drive down prices for customers and provide them with new products and services. “This is why Ofgem fully supports the Taskforce’s five recommendations to improve data use. We will be working with BEIS, consumer groups and the industry to ensure better use of data unlocks a brighter future for energy consumers.”

Chris Skidmore MP, Energy and Clean Growth Minister, said: “Transparent and accessible data will become ever more important as the UK develops its smart, green energy system. The way we share and harness that data will help us all as we move towards the greater use of low carbon technologies such as solar panels, battery storage systems and electric vehicles. The recommendations in this report will help to ensure data is at the forefront of our low carbon energy system which will continue to go from strength to strength as we power towards becoming a net zero economy by 2050.”

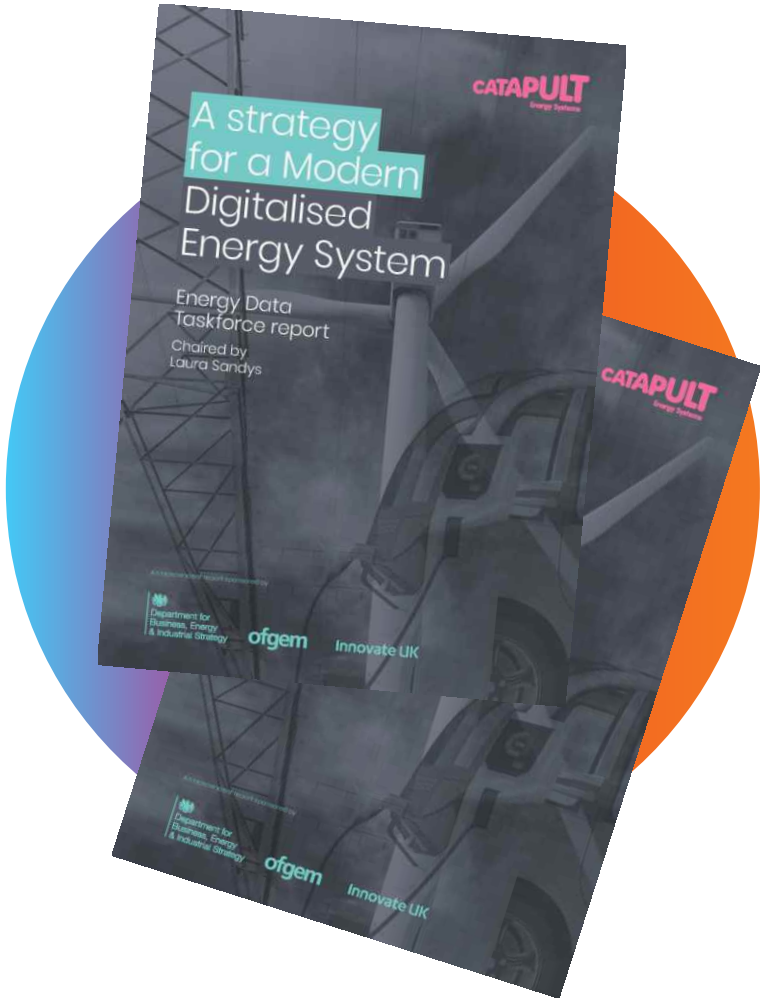
As a key part of the UK energy system, SGN will be required to support, input and enable the above listed principles through a combination of people, process and technology changes across our business and our wider industry.

The technical and practical solutions to support the EDTF five recommendations and Open Data Sharing generally, has not been defined yet, but functions to support collection, storage, processes and use of open data will need to demonstrate appropriate levels of security and privacy arrangements to mitigate risk whilst still fostering innovation. In addition to these recommendations and the need to enable them, we know that:

- Our future energy system will require more detailed, accurate and timely data to deliver the "big data" driven innovation which incorporates complex analytics, artificial intelligence and machine learning.

- Underpinning the delivery of Open Data will be the proliferation of new technologies e.g. machine learning and artificial intelligence, and new data types such as video, voice, satellite imagery etc. These will bring a complexity in managing significantly increased volumes and variety of data and will require advanced data science/artificial intelligence technologies, methodologies and skills to govern, control and deliver.

- A study for the Government estimates the benefits of a smart energy system to be between £17bn and £40bn to 2050. These benefits come from avoided or deferred network reinforcements, avoided generation build, avoided curtailment of low carbon generation, and better operation of the system.



03 Responding to our customers' priorities

As outlined in our wider business plan, we listened to our customers to understand what matters to them and how they would like us to improve. Customers told us they have seven priorities, which we found also resonated with stakeholders. Through further engagement we developed and refined our response to make three clear commitments to our customers.

We will make a positive impact by:
- Supporting those vulnerable in the community
- Providing excellent service

We will deliver a safe and efficient service by:
- Keeping the gas flowing
- Acting safely
- Keeping costs down

We will build a shared net-zero future by:
- Accelerating decarbonised energy solutions
- Minimising our environmental impact.

Our three commitments and the seven customer priorities that underpin them align to Ofgem's output categories of 'meeting the needs of consumer and network users', 'maintaining a safe and resilient network' and 'delivering an environmentally sustainable network'.

SGN's Digitalisation Strategy will underpin and directly align to our three commitments and seven customer priorities whilst specifically addressing the five key challenges outlined by the Energy Data Taskforce.

04 The case for digital change

Change is occurring in the energy sector at a rapid rate and this is being driven by interrelated factors with the move towards decarbonisation and decentralisation of energy resources and increasing consumer expectations. With this future energy system, there are many functions that will require data to be gathered, transmitted, stored, analysed, interpreted, presented and disseminated in new ways.

To help consolidate the approach needed, benefits and implications for delivery, Government and Ofgem have commissioned reports: Energy Data Review, A Strategy for a Modern Digitalised Energy System, Data for the Public Good, from think tanks such as Catapult and research organisations leading current thinking around the key role data and technology must play in delivering data-driven innovation for the energy system of the future. Big data, open/shared data, analytics, machine learning and artificial intelligence etc. all offer transformational opportunities.

There is increasing expectation that digitally transformative technology such as artificial intelligence, data science and the internet of things will help increase the productivity of infrastructure by extracting insights from data about these assets. This expectation and opportunity should be further explored by all utility companies including SGN. Additionally, there is opportunity to be investigated on how stakeholders and decision makers outside SGN can understand more about what infrastructure exists, how it interacts, how it is used and crucially how the energy system as a whole can be made more efficient.

Open data is data that can be freely used, shared and built-on by anyone, anywhere, for any purpose as opposed to data that is used solely internally for defined business purpose or issued externally as part of a published report or specific data transfer. The delivery of an Open Data and Digital Twins, which is the digitisation of the physical assets we own and operate, typically including real-time data about that asset, will be enabled by the proliferation of new technologies such as sensors, machine learning and artificial intelligence to help to enable the delivery of an optimised, future-proofed energy infrastructure, as well as delivering consumer focused value.

This transformation will bring a complexity in managing significantly increased volumes and variety of data which will require advanced data science/artificial intelligence technologies, methodologies and skills to govern, control and deliver. New tools, platforms, processes and governance arrangements will also need to be developed to qualify data, as well as the aggregation and anonymisation of data to overcome data privacy and compliance issues. An example of this is the effort involved in data sharing agreements required as part of the London Underground Asset Register project, described later in this document. This alone resulted in several years of legal time to complete these sharing agreements, data security and privacy is a huge consideration and the anonymisation and aggregation of data required under the UK's Smart Metering programme is another example of governance, security and privacy arrangements that need to be considered, defined and well governed.

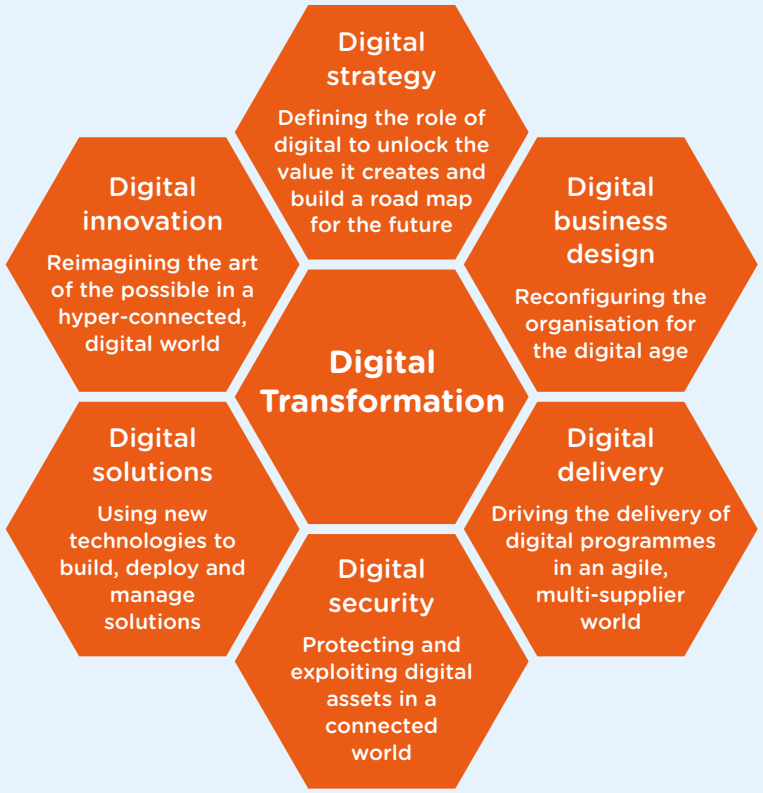
Often, as was the case with Smart Metering, this requires new central bodies, platforms and/or regulation changes in addition to security models that oversee end-to-end security from operational devices and technology to more traditional IT Cyber security. More data sharing equates to more opportunity for data loss or security breaches unless the necessary controls and governance is in place to safeguard the benefits associated with data sharing and/or making data open.

Consideration and centralised, coordinated and strategic planning on the requirements and the effects on the UK energy industry's central data sharing bodies such as Xoserve, Electralink, Gemserve, and the Data Communications Company (DCC) is required. Such bodies can significantly support and enable the delivery of the industry's digitalisation agenda but without oversight, coordination and funding, can also inhibit and stifle change and agility within our industry.

04 The case for digital change

In extreme cases, such bodies can drive costs and delay to the digitalisation agenda if not adequately coordinated and managed. Industry code management and changes to it and the technical ability to deliver these will require a significant overhaul. However, we see that technology can facilitate this change with a move towards more flexible and agile integration through open Application Programmable Interfaces (APIs) and a greater reliance on self-service in the utilisation of these services.

The benefits of publishing UK energy system data to drive enhanced, collaborative innovation has been well documented and in terms of impact on the economy, HM Treasury[3], Open Data Institute[4] and European Commission[5] have stated that the value to UK GDP for openly sharing open data is between 0.4% - 1.4% year-on-year increase; the WorldBank places a conservative estimate of approximately £1.8bn p.a[6]. Another study by the WorldBank has highlighted that in the UK energy & resources data are amongst the key datasets for enabling economic growth via Open Data arrangements.



Our digital strategy is inextricably linked with our wider business plans, Ofgem, Government and energy industry strategy. Our methods of sharing, listening to and learning from wider stakeholder groups are outlined later in this document. Also, our strategy must be deliverable in order to achieve results. The diagram above illustrates how we execute against our digital strategy. There are multiple facets to consider in order to achieve digital change as illustrated. Strategy alone does not bring about change. Continuing focus on areas such as innovation, security and digital delivery is fundamental to delivering digital transformation. SGN has already appointed a "Head of Digital Delivery" and the supporting organisation, to help build and enable the capability to execute against this strategy and we continue to build the case within our business plans of the need to continue to promote innovation within our industry.

[3] HM Treasury: The Economic value of data: discussion paper. August 2018
[4] The economic value of data assets under alternative policy regimes. A Lateral Economics report for the Open Data Institute. March 2016 https://theodi.org/article/research-the-economic-value-of-open-versus-paid-data/
[5] Creating Value through open data: European Commission November 2015 A study on the Impact of Re-use of Public Data Resources: https://www.europeandataportal.eu/en/highlights/creating-value-through-open-data
[6] https://www.worldbank.org/content/dam/Worldbank/document/Open-Data-for-Economic-Growth.pdf

05 Our progress so far

Related Ofgem Guidance:

- **Actions being taken to align with the recommendations made by the EDTF**
- **Approaches to user engagement and feedback on the digitalisation strategy**
- **How network digitalisation is being coordinated between network companies**
- **Consideration of making available metadata**

In conjunction with the Energy Networks Association (ENA), we have established a new Data Working Group which incorporates gas and electricity networks (distribution, transmission and ESO). Our data working group has defined in its terms of reference how we can collectively:

- Deliver the Energy Data Taskforce (EDTF) recommendations;
- Work with Ofgem, BEIS and Innovate UK to assist in the delivery of the EDTF recommendations including being part of the Innovate UK Digitisation Competition Steering Group;
- Progress the themes set out in paragraphs 2.36-2.47 of Ofgem's business planning guidelines.
- Lead the development of a common Digital Systems Map, which is Recommendation 5 of the EDTF. This should include investigating international best practice, such as the Australian Network Opportunity Maps;
- Identify and agree data sharing requirements required to meet the EDTF recommendations, including across Transmission and Distribution, Gas and Electricity;
- Identify and agree common platforms for sharing data to ensure data is made as accessible and easy to use for stakeholders as possible, and to ensure that the shared costs of data sharing are kept as low as possible for customers;
- Where relevant, identify or define industry standards for energy data so that customers and stakeholders can access data in a common manner; and
- To support the EDTF data catalogue (Recommendation 3) by producing a common index of what Network data is available, including metadata.

We will support and work closely with the ENA by creating a joint, UK Energy Networks Digitalisation Strategy, designed to provide a consistent view of modernising energy data across all energy networks. Our own Digitalisation Strategy has been developed in accordance with the guidance issued by Ofgem and will be further developed in alignment with our other whole system partners, ensuring that our customers' needs and expectations remain at the forefront of our ambition. With our full support and involvement, the Energy Networks Association (ENA) will lead a stakeholder event in 2020 to communicate the progress of the Digitalisation Strategy.

05 Our progress so far

The table below from our association summarises the work already underway as the industry works toward the recommendations set out in the EDTF Report.

1. Digitalisation of the Energy System	Ofgem/BEIS/Innovate UK are looking to develop best practices for digitalisation which will be outcomes-based. Networks and ENA expect to contribute to the collaborative development of best practices and then the responsibility and timing for the implementation of those outcomes will need to be agreed. This initiative also delivers against Recommendation 2 of the EDTF report.
2. Maximising the Value of Data	Open Data: ENA is embedding the principles of Open Data into its Open Networks developments and is committed to opening data where it is in consumers' interests. We will continue to look for opportunity for system changes to increase accessibility of data. Common Data: ENA has begun work to try and standardise data formats and data sharing processes under Open Networks. These developments began with data exchanges between transmission and distribution electricity networks but has now begun to consider planning and operational data exchanges between electricity and gas networks. We expect that this work will continue through RIIO1 timescales with the implementation of systems change in RIIO2 timescales. Best Practices: as in Recommendation 1 of the EDTF report.
3. Visibility of Data **4. Coordination of Asset Registration** **5. Visibility of Infrastructure and Assets – a Digital System Map**	We understand that Innovate UK is going to be running an industry competition to develop a digital architecture to deliver the building block recommendations in 3-5 by bringing different data together from disparate systems. ENA proposes to actively participate in the competition and development of building blocks so that we can plan cost-effective implementation. Visibility of Data includes a Data Index which we expect will draw on network data (e.g. ENA Open Networks has established a System Wide Resource Register providing visibility of electricity distribution connected assets and the expectation is that this will be built on with further data sets in future top contribute towards this). On top of the digital architecture, we will work towards consistent data between all networks. ENA proposes to work with industry stakeholders to deliver the proposed Digital System Map to increase visibility of the Energy System infrastructure and assets. We expect to take an incremental approach to delivery of the map so that we can achieve visibility of key data early and then build from there. This should start to deliver benefits early.

06 Our data sharing and digitalisation is already bringing about benefits

Related Ofgem Guidance: Workforce planning with respect to ensuring digital, data and technology capabilities, demonstrating that these have a credible path to being in place to meet the needs of the digitalisation strategy now and in the future

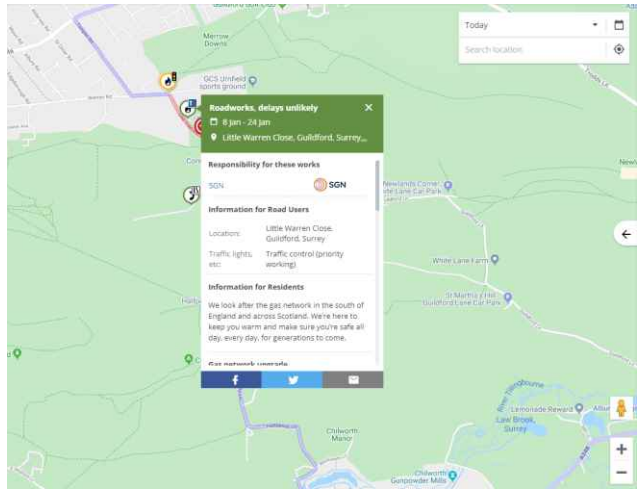
At SGN, we have been working continuously over the course of several years to play our part in modernising energy data and network operation through digitalising the energy system. This section lists out just some of the digitalisation and data sharing projects we have delivered which closely align to EDTF recommendations.

Visibility of Infrastructure and Assets: The Government's Geospatial Commission recently selected the Greater London Authority (GLA) to complete one of two pilots nationally that will create a digital map of existing underground assets. We are an active contributor in the London pilot, London's Underground Asset Register (LUAR). LUAR will be managed by the GLA, cover six London Local Authority areas, and will be complete by 1 April 2020. We are working in collaboration with GLA, Ordnance Survey and multiple underground asset owners who operate within the Greater London area. Although targeting London at this stage, this project is a pilot for what could become a UK-wide underground asset register. As part of this project, we are working with the GLA, asset owners, including other utility companies, transport providers and local authorities to identify the data that currently exists on underground assets, the format in which it currently exists as well as the condition of the data itself.

The expected benefits of mapping underground assets include:

- Reducing utility strikes to increase safety
- Decreasing time spent on site to reduce road network disruption
- Streamlining back-office planning to ensure more efficient on-site work
- Improving local authority infrastructure planning

We've sought to explore ways in which we can develop a more integrated approach to planning to meet such growth and establish a clear view of local government decarbonisation strategies. In addition to creating enhanced relationships with Local Authority planning departments, and greater understanding of planned change, our engagement has also encouraged the sharing of data across each other's planning platforms, in turn allowing us to integrate data directly into our planning models. As well as supporting longer-term strategic planning this has also meant day to day activities across a range of processes can be planned in full recognition of the most up to date information around growth and development, further enhancing our aim of achieving the fully holistic approach.



Customer visibility of streetworks: In 2019 SGN launched real time access to our planned and emergency works via a publicly available website: https://one.network/. This website allows SGN along with other utilities and highways authorities to communicate live updates to road users and members of public and facilitates better planning, monitoring and analysis of roadworks, events and traffic impact for our customers. Key benefits of the website are:

- Better customer information by providing real-time access to information about all of our planned and emergency works.
- In the first six months since launch, we had 114,398 site hits with 130 customer enquiries via email.
- This has resulted in a 24% reduction in customer enquiries about replacement works.

06 Our data sharing and digitalisation is already bringing about benefits

Visibility of Infrastructure and Assets:
SGN's Network Planning team have engaged with the National Improvement Service for Scotland. One of the projects that they are currently working on is facilitating a national data hub for all Local Authorities in Scotland, including the collation of all Local Development Plans on a single Geospatial Information System (GIS) platform. The aspiration is to allow SGN access to the Spatial Hub, where the business will be able to access the very latest GIS files directly to use with our network models, ensuring we always have the latest information and thereby removing the requirement to seek updates from each Local Authority on an individual basis. Our Network Planning team is currently in discussions with the National Improvement Service for Scotland to finalise a data sharing agreement.

Strategic Planning Data, Glasgow and Reading
We have in place data sharing agreements covering 109 Local Authorities, whereby their local plan data has been shared and directly imported onto our planning platform. This large-scale data sharing activity allows geo-spatial polygons i.e map-based areas to identify development areas to be incorporated into our network analysis models. Local Authorities are contacted on an annual basis, allowing polygons to be refreshed in line with the latest available information, informed by Housing Land Audits (HLA) which are carried out on an annual basis.

Our closer involvement with the wider planning community has led to our own planning staff being involved in a series of wider initiatives, helping shape opportunities for closer working relationships, greater coordination and more integrated approaches to longer term strategic planning. Our Planning team involvement in the Glasgow City Region Operational Infrastructure Group is a very good example of a proactive initiative. The Glasgow City Region area covers a third of Scotland's population and generates a third of its economic wealth. At a Strategic infrastructure Summit, held in September 2017, a joint agreement was reached between eight councils covering the west of Scotland and major infrastructure providers operating within the area to best consider how to maximise over £1 billion of City Deal investment in the Glasgow city region. This led to the creation of the Operational Infrastructure Group (OIG), aimed at meeting a range of objectives, two of which were:

- Establish a Regional Infrastructure Forum to liaise and collaborate with the utility companies to minimise disruption and ensure that required utilities are in place to support economic growth.
- Align infrastructure investments with partners' investment, through a strategic infrastructure investment plan to ensure that the economic benefits of all infrastructure projects are maximised.
- Once again, the process has highlighted the benefits of sharing spatial information relating to anticipated growth and development. It has given us direct access to an overview of the Spatial Development Strategies of each of the eight councils.

SGN have also been working closely with Croydon Borough Council on three pilot projects – Croydon, Tower Hamlets and London Docks - used to trial initiatives looking at the opportunities to improve the identification and management of collaboration of utility works. Croydon Borough in conjunction with project partners have a web-based product to assist in the identification of such opportunities. SGN, Thames Water and Atkins in particular, have supported much of this work and identified a number of opportunities in which to trial collaborative working. In parallel with this initiative, SGN have worked with the local authority sharing data and evaluating potential impact of developments planned as part of Croydon Growth Zone, looking to establish both reinforcement and diversionary works with a view to tailored works to avoid revisiting any location on more than one occasion.

Line Search Before You Dig: We have digitised a previously manual process to the on-line system called Line search before you dig (LSBUD). This mapping process is a legally required service we offer to third parties. However, we have significantly improved this service to customers and third parties by moving from a manual process where we would respond to around 500 map enquiries a week and respond within a Day+20 timescale. SGN is now able to provide our maps externally within minutes of receiving an enquiry and as a consequence, is now able to process on average **15,000 enquires a week**. In addition to delivering much higher levels of customer service and responsiveness, this system has brought in significant safety benefits to our customers, due to more people working safely around our pipes.

07 Engagement, collaboration and sharing of best practice

Related Ofgem Guidance:

- **How network digitalisation is being coordinated between network companies**
- **Approaches to user engagement and feedback on the digitalisation strategy: Approaches to continuously improving the digitalisation strategy**

As part of the ENA Data Working Group we will contribute and lead collaboration and engagement through the following;

- Given the collaborative nature of the EDTF, ENA and Members will need to work closely with BEIS, Ofgem, Innovate UK, Energy Systems Catapult, National Infrastructure Commission and other relevant industry stakeholders to understand their concerns and feedback. This will include inviting these parties to group meetings as and when required.
- Where possible, understand existing industry best practice and form common industry approaches and standards. The group must ensure that industry stance, guidance produced, standards and notification processes regarding data are effectively disseminated to all relevant, industry, regulatory and third-party stakeholders.
- The group will host stakeholder events to communicate and engage stakeholders on the progress of the Data Working Group and ENA Digitalisation Strategy.
- The group will respond collaboratively to Government, Ofgem and other industry consultations, calls for evidence, funding mechanisms, demonstration projects, etc.
- The group will share of best processes and techniques related to data collection, management and analysis.

We have worked with the ENA and published information on our collaborative industry event which will be held mid-March 2020 and will offer SGN and all network companies the opportunity to share our digital strategies, learn and work together collaboratively in order to advance this agenda.

In our SGN stakeholder research report, Impact Utilities (August 2018) found that 78% of our stakeholders expect SGN to utilise the latest technology, yet in the same research, only 38% of our stakeholders believe we are performing well or excelling in utilising the latest technology.

Our customers expect us to keep pace with other companies and offer the service that they are frequently becoming more used to therefore reducing effort for them, investing in technology allows us to do this.

We will continue to seek feedback from our customers, stakeholders and industry partners on who to continuously improve our Digitalisation Strategy for the benefit of consumers.

07 Engagement, collaboration and sharing of best practice

We will seek this feedback and input to our strategy via:

- Our Digitalisation Strategy will be further developed in alignment with our other whole system partners, to ensure customers' needs and expectations remain at the forefront of our ambition.
- We will create a joint, UK Energy Networks Digitalisation Strategy, designed to provide a consistent view of modernising energy data across all energy networks.
- The ENA will lead a stakeholder event in mid-March 2020 to communicate the progress of the Digitalisation Strategy.
- Customer feedback forums.
- Our website, and other digital communication and collaboration forums.
- Digitalisation expert and technology partner and advisor review and input.
- Our Innovation partners and innovation collaboration forums such as the Gas Innovation Group.
- Direct engagement with members of the Energy Data Task Force including attendance at the ongoing workshops being run by this group to progress their recommendations.

At SGN, we constantly seek ways to improve our network data and increase the inter-operability between our own systems and the other DNs, National Grid and the ESO. We are committed to the practical implementation needed to make change happen for RIIO-GD2 and the longer term. We will work jointly to clarify and set out the necessary funding arrangements to deliver our industry plans, to ensure 'open data' and 'whole system' solutions are appropriately and efficiently defined and funded.

08 Digital skills and culture

Related Ofgem Guidance:

- **Preferred corporate ways of working when delivering digital and data services**
- **Workforce planning with respect to ensuring digital, data and technology capabilities, demonstrating that these have a credible path to being in place to meet the needs of the digitalisation strategy now and in the future**

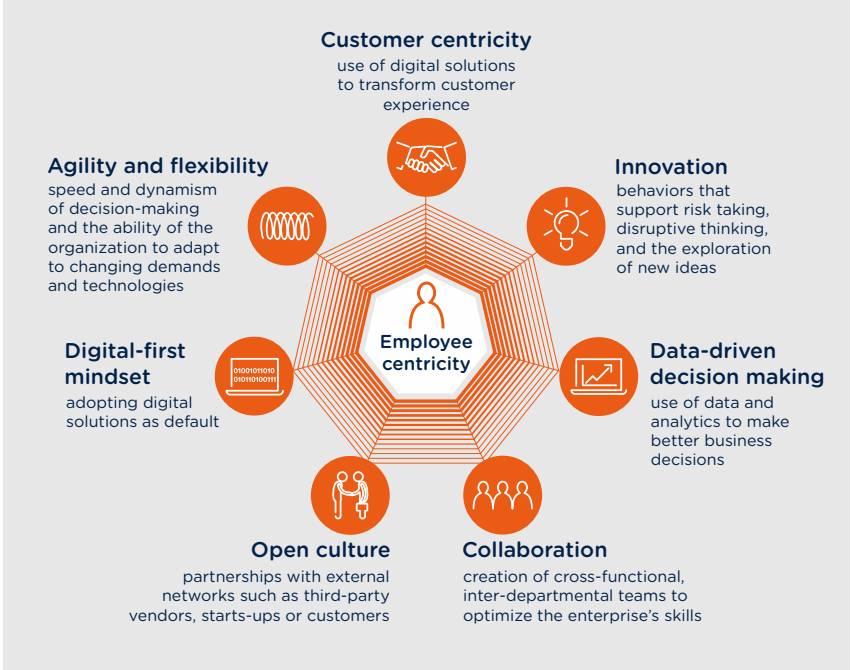
Digitalisation of the energy system will require significant cultural change across the energy sector. Such a cultural change must be achieved within SGN's own organisation as well.

To achieve the specific focus of the Digitalisation Strategy that is being asked by our external stakeholders and our regulator, we need to achieve an internal 'data culture' and this is part of a wider 'digital culture' that our organisation needs to grow and mature.

The EDTF report highlights the importance of developing culture and skills as part of delivering a digitalisation strategy;

"The energy sector has been slow to harness the potential that data offers and has, in some ways, been left behind" .... "Organisations should focus on data talent development" and "It is hard to get the right combination of data, energy and engineering talent"

A recent study by Cap Gemini[7] on digital culture shows the employee at the centre of everything and speaks to digital mindset, innovation and data driven behaviour. As shown below:



[7] CAPGEMINI_digitalculture_report_2018

08 Digital skills and culture

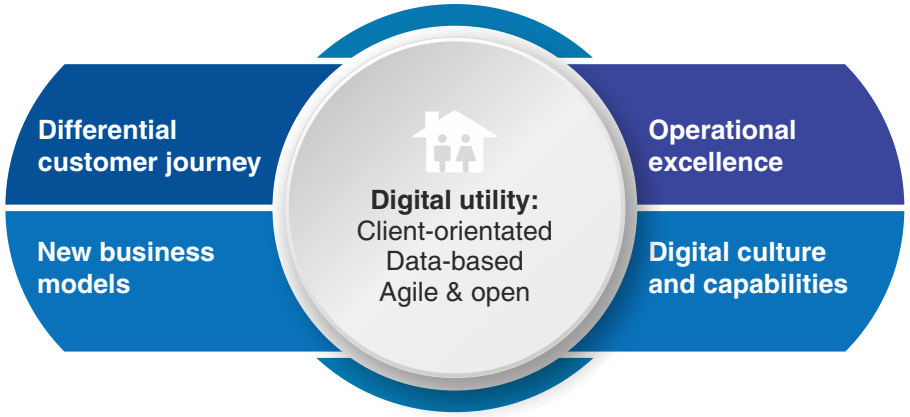
Investment in our our employees is key to achieving the Digitalisation Strategy. Digital enablement of the workforce, talent recruitment, skills development and upskilling our existing workforce will all be necessary to support SGN's digital transformation. We are already beginning this journey by focusing on a number of key aspects to change and improve our digital culture and skill sets;

- We are building an in-house Data and Analytics capability who have already delivered a number of exciting examples of the power of data and insight to our wider organisation.
- The creation and development of a dedicated change management team with the required skills and framework to enable transition and adoption of change within our organisation, including digital change.
- Our IT organisation has recently insourced a number of key technical skills as part of their creation of digital Centres of Excellence.
- Development of our internal digital training team and training partners who are co-located with our business functions to focus on providing ongoing support and guidance to our wider workforce in the adoption and utilisation of digital technology.
- Investment and delivery of a learning management system to support training and learning across the entire organisation.

In addition to the above, SGN is working closely with key partners to learn and adopt new ways of working, change management practices and practical skills required to improve digital maturity. During RIIO-GD1, we have embraced Lean and Agile working practices and worked with organisations such as Amazon, Microsoft, Deloitte Digital, The Hivemind and Boston Consulting Group Digital Ventures to learn from some of the most innovative and digitally mature organisations on the planet. We have taken much of his best practice and applied it within our own organisation running design thinking sessions with our operational colleagues and Network Engineers (see section 12) and exploring the art of the possible when it comes to digital transformation. We will continue to leverage this wider pool of talent and advice throughout the remainder of RIIO-GD1 and RIIO-GD2 by working closely with our digital partners and technology leaders with a specific focus on leveraging cultural and working practice changes that we can apply within SGN.

As the diagram below highlights from a 2019 research paper from global advisory firm KPMG[8], culture and capability are a fundamental aspect of enabling digital utilities and facilitating a data based, agile and open organisation. In their paper, "The digitization of utilities"[9], PWC highlight the need for 'investing in the basics' they also talk about a seven-step Digital Maturity Framework which is required to progress its digitalisation strategy and build a data driven culture.

The digital utility

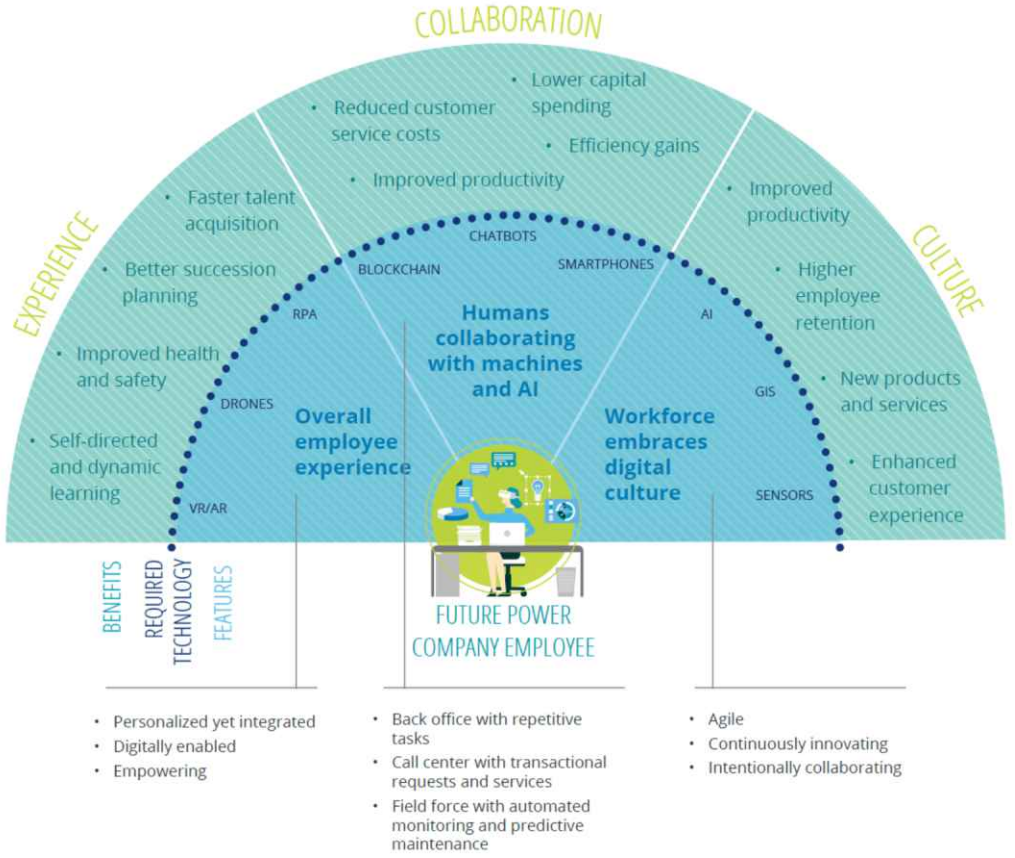


[8] KPMG_India_The-power-of-digital_2018
[9] PWC_the-digitization-of-utilities_2016

08 Digital skills and culture

During RIIO-GD1, we assessed our digital maturity with advisors, Deloitte Digital and with their advice, developed a roadmap for the organisation to follow in order to continually assess and develop our digital capability. As we progress into RIIO-GD2 and even more emphasis is placed on further developing this capability by our key stakeholders, we will refine and update this plan on how the company will continue to deliver, develop and improve its Digitalisation Strategy. In their paper of the utility of the future[10], Deloitte provide a visual summary of their vision for the power company employee of the future which we have incorporated within our thinking and plans for GD2:

The power company employee of the future



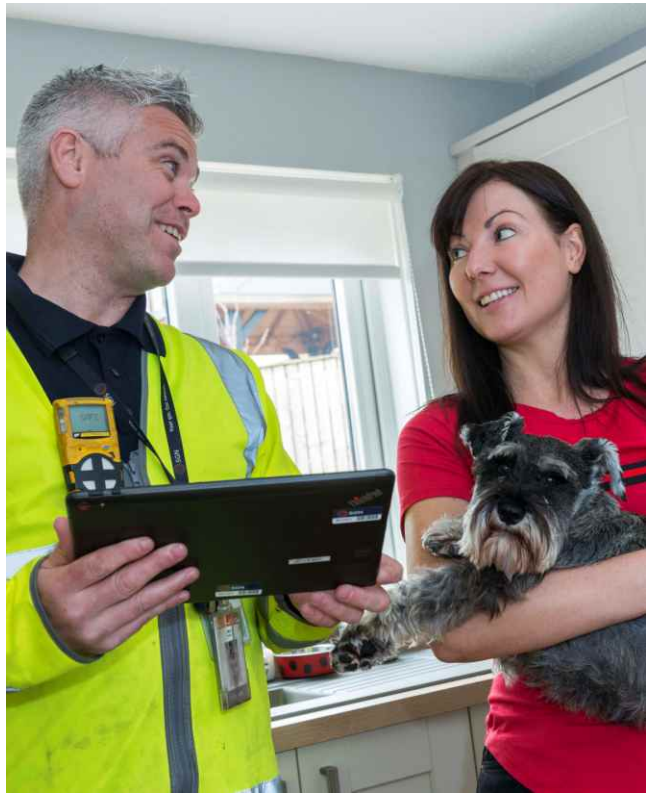
Note: AR/VR: Virtual reality/augmented reality; RPA: Robotic process automation; AI: Artificial intelligence; GIS: Geographic information systems (mapping technology). Required technologies listed are not comprehensive.
Source: Deloitte analysis.

[10] DELOITTE_digital-innovation creating the utility of the future_2019

09 Data Types and User Needs

Related Ofgem Guidance:

- **Reporting our current understanding of user needs (e.g. new data needs; existing data improvement needs) and Consideration of making available metadata (which is data that describes and gives information about other data).**
- **Delivery plans to meet users' needs: cost, benefit, options, validation, prioritisation.**
- **Potential to aid other markets and the wider economy/consumers, including those participants that might be currently unrelated to energy network investment and operation.**



SGN's Digitalisation Strategy will underpin our three commitments and seven customer priorities (section 3.) that in turn align to Ofgem's output categories of 'meeting the needs of consumer and network users', 'maintaining a safe and resilient network' and 'delivering an environmentally sustainable network', whilst specifically addressing the five key challenges outlined by the Energy data taskforce.

We see digitalisation categories falling into the same three high-level output areas;

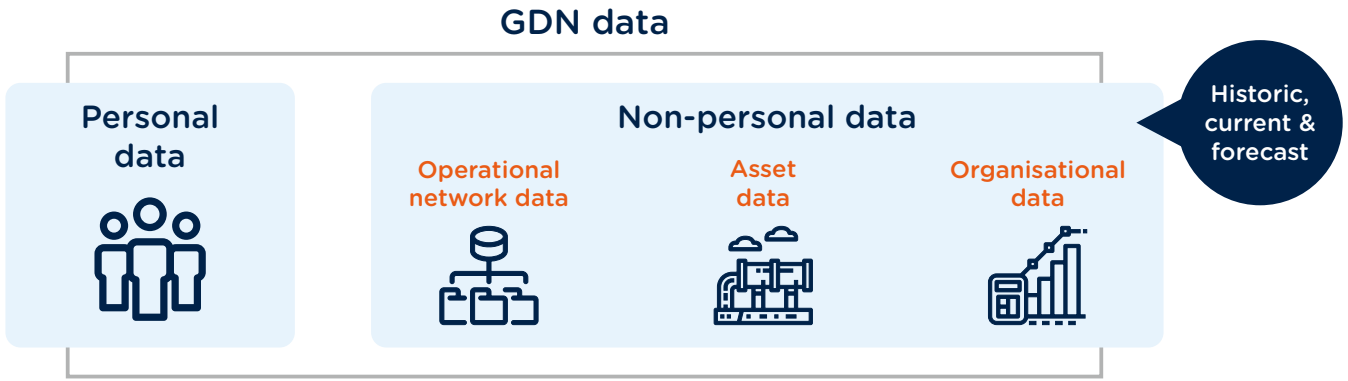
1. Customers and Network user needs
2. Environmentally Sustainable Network
3. Maintaining a safe and resilient network

Broadly, our current data landscape can be split into 4 high-level groups;

1. Personal data e.g. employee or customer information
2. Operational Network data e.g. demand, forecast, pressure data
3. Asset data e.g. location, asset type, age, material etc.
4. Organisational data e.g. financial information, employee base, business structure etc.

09 Data Types and User Needs

Value can and will be created by cross referencing these groups with a wider set of external stakeholders as illustrated below:



Data sharing and use

Regulators | Supply chain | Retailers | Infrastructure owners & operators | SME's | Policy makers | Consumers & NFP | Tech firms | Researchers

Meet customer and network user needs

- Vulnerable customers
- Complaints management
- Supply interruption
- New connections

Environmentally sustainable network

- Reduce environmental impact
- Support low carbon transition

Maintain a safe and resilient network

- Efficiently deliver a safe and resilient network
- Be change responsive

09 Data Types and User Needs

We believe it is important to constantly assess and re-examine the needs and opportunities available through digitalisation and data sharing and to work with our stakeholders to prioritise these; equally we will demonstrate appropriate levels of security & privacy arrangements to mitigate risk whilst still fostering innovation. We believe it is important to deliver benefits and results through small, frequent, incremental improvements enabling value to be released as quickly as possible whilst remaining flexible to the changing needs of customers, industry and stakeholders.

Sample value opportunities through Data Sharing

Meet customer and network user needs	**Centrally publish existing shared infrastructure assets – the digital twin:** • Improved platform for public access to info on GDN b/g infrastructure – move to near/real time updates • Low contention project – foundation for collaboration • Enable service & technology proof & development • Delivers benefit through consistent, discoverable & understandable data x-sector • Industry service for "Dial before you Dig" • Overlay other Utility b/g asset (electric, water etc)	**SPIN-OFFS?** • GDN roadwork updates app • Link to HA & other roadworks – analytics on traffic flows & coordinating planned utility works • Feeds to SatNav providers with real time updates
Environmentally sustainable network	**Smart Infrastructure – Realtime Networks, Smart meters: measure, monitor, manage, automate** • Network capacity sensor data: analytics incorporating broader data sets to better determine national & local loads to reduce loss through development of AI to ML pressure mgt solutions • Combined Asset condition data (beyond Monetised Risk) to accelerate Repex programme, incl. potential X-boundary collaboration • Smart meter data to hone local demand-v-supply mgt	
Maintain a safe and resilient network	**Riser asset data register:** • Provide geospatial register of riser assets inc. control valves (record keeping GD2 output) • Accessibility for LA's, landlords & emergency services for incident mgt. • Combining Risk assessment data in particular for Rep3 >6 stories. Insights on risk assessments to improve industry knowledge & mitigation	**SPIN-OFFS?** • App dev of digitised assets to enhance broader incident management coordination • Analysis on incident response & management data

The above list is of value opportunities is illustrative and will continue to be reviewed and amended in line with customer, stakeholder and industry feedback, as defined in section 5.

10 Architecture, Governance and Delivery

Related Ofgem Guidance:

- **Energy system digital architecture requirements and associated delivery plans**
- **Consideration of making available metadata (which is data that describes and gives information about other data)**
- **Preferred corporate ways of working when delivering digital and data services**
- **Preferred corporate digital and data best practices, such as to realise user needs-driven data visibility, data interoperability and implementation of the EDTF recommendation that energy system data is presumed open**

In order to deliver our Digitalisation Strategy, there are important building blocks around business technical and data architecture and the governance, controls and compliance that must be in place to enable all the benefits previously highlighted. Data cannot be presumed to be open without these. As previously mentioned, the standards, security, governance and data privacy controls put in place around the UK's smart meter data is a good example of some of these foundations which are an essential part of delivering successful outcomes. This section defines SGN's approach to developing these building blocks.

At SGN, we have a robust Data Governance Framework in place to support the key expectations and requirements highlighted by Ofgem with regards to data and digitalisation in their guidance notes[11], particularly those referenced in the Energy Data Taskforce Report. The EDTF Report states that 'a Modern, Digitalised Energy System should deliver the most productive, efficient and cost-effective use of assets, enable the creation and deployment of the most innovative services, and support participation of all actors, both large and small, through better understanding and insights into the opportunities and risks of the rapidly decarbonising and decentralising system. This will be enabled, and benefits will be unlocked through more data, easier access to data, much improved analytics, greater interoperability and greater digital capabilities across the energy sector.'

SGN's Data Governance Framework specifically attempts to address the three core areas highlighted by the report:

- **Data Digitalisation:** The report highlights the need for organisations to 'develop long term data strategies and plans for implementation,' with the Taskforce recommending that 'baseline expectations of digitalisation strategies are set through measures such as the RIIO-GD2 business planning process.'
- **Open Data:** The report highlights the fact that data is to be 'presumed open' which 'reverses the current default for data accessibility from closed to open' but also highlights the issue of data quality when presuming data to be open and purports that 'where quality issues are identified, the organisations responsible for data collection and management should put best practice information management processes in place to rectify issues at source.'
- **Structure & Interface Standards:** The report proposes that 'data structure and interface standards should be adopted or developed where appropriate to enable data across organisations to be aggregated and utilised more easily.' It also suggests that a Data Catalogue be initiated to provide a 'single, searchable location that provides visibility of Energy System Databases.'

[11] Ofgem Guidance Digitalisation Strategy Sept 2019

10 Architecture, Governance and Delivery

These were identified as three key areas to enable the energy sector to overcome the two key issues of 'Data Gaps' due to poor data quality and energy businesses being bad at 'Extracting Value' due to low quality and consistency and restricted access.

The enablement of this requires SGN to have a robust Data Governance Framework in place, which we have, not only in terms of strong policies, processes and standards, but also in terms of Data Management in areas such as Data Architecture, Data Quality, Metadata Management and Information Security and sharing.

To align to this government and regulatory expectation, SGN's data will need to be well governed and managed to ensure it delivers the levels of quality, availability, currency and value which will be demanded by digital technology and solutions i.e. Internet of Things, Analytics, Artificial Intelligence and Machine Learning. Digital technologies won't of themselves deliver societal and environmental benefits, but the data used by them will.

The EDTF report also refers to energy companies 'making available metadata' and delivering 'preferred corporate digital and data best practices, such as to realise user needs-driven data visibility, data interoperability and implementation of the EDTF recommendation that data is presumed open.' The enablement of this will require SGN to have a robust Data Governance practices in place, in terms of strong policies, processes and standards, but also in the way it manages its data such as Data Architecture, Data Quality, Metadata Management and Information Security.

We will ensure coordination of these practices via our industry level ENA Data Working Group and continually look to share and learn about best practice through the collaboration, engagement and project delivery previously referred to.

> "SGN's data will need to be well governed and managed to ensure it delivers the levels of quality, availability, currency and value which will be demanded by digital technology and solutions..."

11 Innovation, wider initiatives and future data opportunities and improvements

Related Ofgem Guidance:

- **How digitalisation strategies are contributing to and aligning with wider initiatives**

We have been developing our Digitalisation Strategy over many years. Taking input from global Digital and Innovation leaders and partners whom we already work with. It's strongly aligned to our Innovation Strategy and delivery portfolio.

The technology themes highlighted within SGNs RIIO-GD2 business plan, our Digitalisation Strategy and in particular, our proposals around open data and whole systems data provision have been heavily influenced by the recommendations and direction highlighted by the Energy Data Taskforce. We have also taken input from The Centre for Digital Built Britain, The wider National Infrastructure Commission agenda, The National Data Strategy and UK Digital Strategy as well as globally leading advisory and technology companies.

We have received multiple sources of advice and guidance to support our digitalisation strategy and future technology readiness and the technologies that are likely to be impacting our business in a significant way during RIIO-GD2. The table and report reference shown below from Gartner, highlights the game changing digital technologies requiring investment that affect the Utilities sector.

SGN Digital Vision 2017

11 Innovation, wider initiatives and future data opportunities and improvements

Figure 1: Game Change Technologies by Sector, Gartner 2019[12]

Game-Changing Technologies

Percentage of Respondents

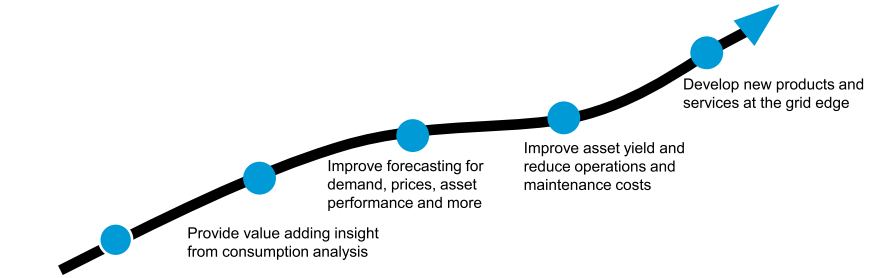
	Utilities (n = 99)		Top Performers (n = 230)		Typical Performers (n = 2,329)		Trailing Performers (n = 276)	
1	Data analytics (including predictive analytics)	33%	Artificial intelligence/ machine learning	40%	Artificial intelligence/ machine learning	25%	Artificial intelligence/ machine learning	24%
2	Artificial intelligence/ machine learning	26%	Data analytics (including predictive analytics)	23%	Data analytics (including predictive analytics)	25%	Data analytics (including predictive analytics)	21%
3	Internet of Things	17%	Cloud (including XaaS)	12%	Cloud (including XaaS)	10%	Cloud (including XaaS)	14%
4	Cloud (including XaaS)	10%	Digital transformation	10%	Internet of Things	10%	Internet of Things	11%
5	Automation	8%	Mobile (including 5G)	7%	Digital transformation	9%	Digital transformation	7%
6	Mobile (including 5G)	5%	RPA	6%	Mobile (including 5G)	6%	Industry-specific	5%
7	Business intelligence	4%	Internet of Things	6%	Automation	5%	Business intelligence	5%
8	Industry-specific	3%	Blockchain	5%	Blockchain	4%	Automation	5%
9	RPA	3%	Automation	3%	Industry-specific	4%	Blockchain	5%
10	Information technology	2%	Information technology	3%	Business intelligence	3%	Mobile (including 5G)	5%

Base: All answering, excluding "prefer not to answer"; n varies by segment
Showing the 10 most common answers per segment, coded open-text responses, multiple responses allowed
Q: Which technology area do you expect will be a game changer for your organization?
ID: 368223

Figure 2: AI for Business Value, Gartner 2018[13]

By 2020, 85% of CIOs Will Be Piloting AI Programs Through a Combination of Buy, Build and Outsource

Utility CIOs will play a critical role in helping their organization to:



AI impacts all aspects of utility operations

[12] Gartner: 2019 CIO Agenda: Utility Industry Insights, Published: 15 October 2018 Gartner ID: G00368223
[13] Gartner: 2019 - AI for Business Value: Gartner Industry Presentation 04 Nov 2018

11 Innovation, wider initiatives and future data opportunities and improvements

Over and above the independent advice of Gartner, we have sourced multiple highly-respected technology advisors and partners and the following references further evidence of the need to prepare our company and its operations for the significant technology changes that will occur between now and 2026, and drive our Digitalisation Strategy, these include:

- Artificial Intelligence: The Next Digital Frontier (McKinsey & Company, June 2017)
- Age of Analytics: (McKinsey Global Institute December 2016)
- Review of latest developments in the Internet of Things. (Cambridge Consultants - Tim Winchcomb, Sam Massey, Paul Beastall. March 2017)
- Harvey Nash / KPMG CIO Survey 2018
- MIT technology Review – Engines of Insight 2018
- Gartner 2019 CIO Agenda: Utility Industry Insights Published: 15 October 2018
- Deloitte Consulting 2018 Global CIO Survey
- Accenture and MIT (Massachusetts Institute of Technology) Winning with Analytics Report
- Cap Gemini Transformation of intelligent utilities with analytics, big data, and
- 'The Internet of Things (2017).

These themes have been exploited and progressed by numerous innovation projects that we have already undertaken within SGN where connected "things" have been developed, utilised and either have been, or are in the process of being, rolled out to our operational environment. These are examples of IIoT technology which in themselves generate and issue new and different data sources, never previously available to manage and operate our Network.

In addition to ensuring sufficient funding for implementation of the technology supporting these areas, it is vital that continued research, development and low technology readiness innovation funding is provided to support the further progression of the recommendations made by the EDTF and our broader set of advisors.

11 Innovation, wider initiatives and future data opportunities and improvements

Examples of the projects that have been developed are:

Project Name	Reference	Project overview	Link to project detail
NIA Projects			
Advanced gas detection	NIA_SGN0064	The objectives of the project are to produce a portable gas detection device to detect methane and CO gases and determine if readings detected on site are from a natural gas leak. These readings are then automatically linking to geospatial positions as a digital record of work.	http://www.smarternetworks.org/project/nia_sgn0064
Remote pressure control and management	NIA_SGN0122	The project is delivering the ability to remotely adjust gas pressures via connected pressure management devices.	http://www.smarternetworks.org/project/nia_sgn0122
Remote site monitoring	NIA_SGN0110	This project is developing probes which can be left at sites and will send automatic gas reading to the cloud for management of potential gas escapes.	http://www.smarternetworks.org/project/nia_sgn0110
Automated Pressure Tester	NIA_SGN0079	This device aims to help ensure the accuracy and consistency of the testing of gas pressures and data recording process while removing the potential for human error and providing the opportunity to automatically update our asset records via a suitable cloud-based service.	http://www.smarternetworks.org/project/nia_sgn0079
Osprey Pressure Validator	NIA_SGN0021	A wireless, intrinsically safe, battery-powered remote monitoring unit that fits inside bollards, posts and meter boxes and monitors gas pressure up to 100mbar.	http://www.smarternetworks.org/project/nia_sgn0021
Network Innovation Competition Projects			
Robotics – CIRIS and CISBOT	SGNGN01	In addition to repairing and inspecting our pipes whilst significantly reducing customer disruption these robots provide in pipe inspection video data as well as other data relating to potential corrosion and / or asset health through acoustic data. The use and sharing of this data is an area that SGN wishes to further explore	http://www.smarternetworks.org/project/sgngn01
Real Time Networks	SGNGN03	This project has resulted in essentially making part of our distribution network “smart” by applying weather, flow, gas quality and demand sensors across the Medway region of our distribution network. The additional application of these sensors provides SGN with significantly more data and information from which we can assess our forecasting and demand management models.	http://www.smarternetworks.org/project/sgngn03

11 Innovation, wider initiatives and future data opportunities and improvements

In addition to applying the technology changes demonstrated by these innovation projects, at SGN we promote and develop an innovation culture through working with partners, applying new ways of working such as lean and agile working practices, developing proof of concepts and working closely with innovative vendors who excel in innovation such as Amazon and Microsoft.

Although still a relatively immature technology, we also believe 'blockchain' is an opportunity for the UK energy industry, with the potential to play a significant role in future proofing networks and supporting energy transition.

UK industry on the whole, is still waking up to its potential, although the UK Food Standards Agency is one example of where it is being applied as a regulatory tool to ensure compliance in the food sector. Ofgem's focus on whole systems thinking and integration should provide the impetus and opportunity for collaboration to investigate blockchain and drive the development of the right applications in our regulated environment.

Because it's new but with potential for longer term benefits, blockchain is a prime candidate for R&D as part of the innovation stimulus, particularly around new technologies which have a lower technology readiness within our industry.

12 Next Steps: Costs, Funding and Governance

Approaches to user engagement and feedback on the Digitalisation Strategy

Approaches to continuously improving the Digitalisation Strategy

Delivery plans to meet users' needs: cost, benefit, options, validation, prioritisation

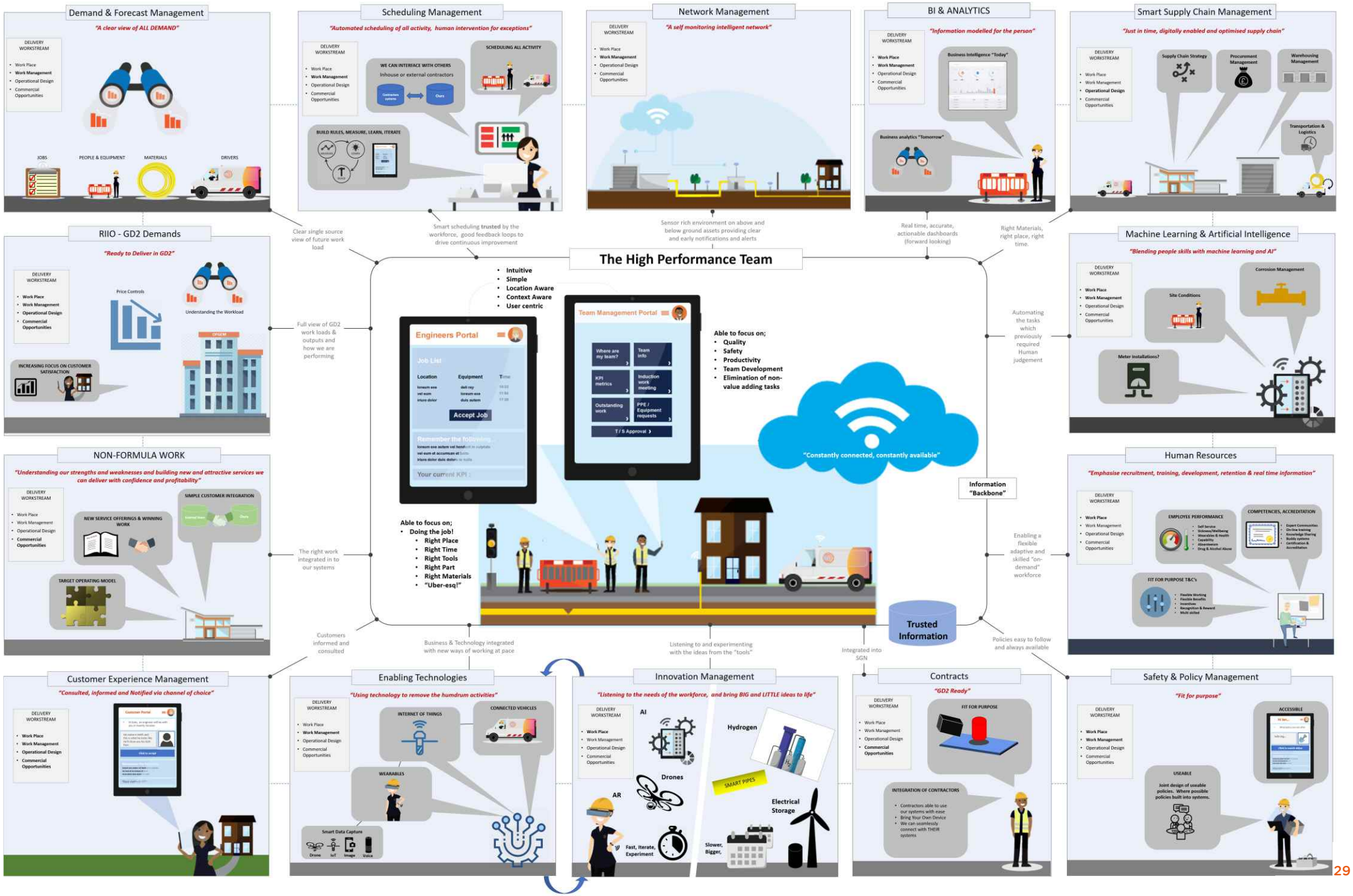
This is SGNs first externally published Digitalisation Strategy and we will commit to updating this and republishing this on an annual basis. As already mentioned in section 5, we will hold a joint digitalisation strategy event in mid-March 2020 with other Network companies and key stakeholders in order to show case **strategies**, **learn**, **collaborate** and further **refine** and **improve** this strategy in line with stakeholder feedback.

This strategy will also be shared directly with members of the EDTF, in order to obtain direct feedback on our alignment with their recommendations and ways in which this strategy can be improved.

SGN has already undertaken a number of Digital Vision sessions with our wider business and external stakeholders as highlighted in referenced in section 11. We have begun a journey of refining and prioritising our Digital Vision and roadmaps across each of our business areas as shown below.

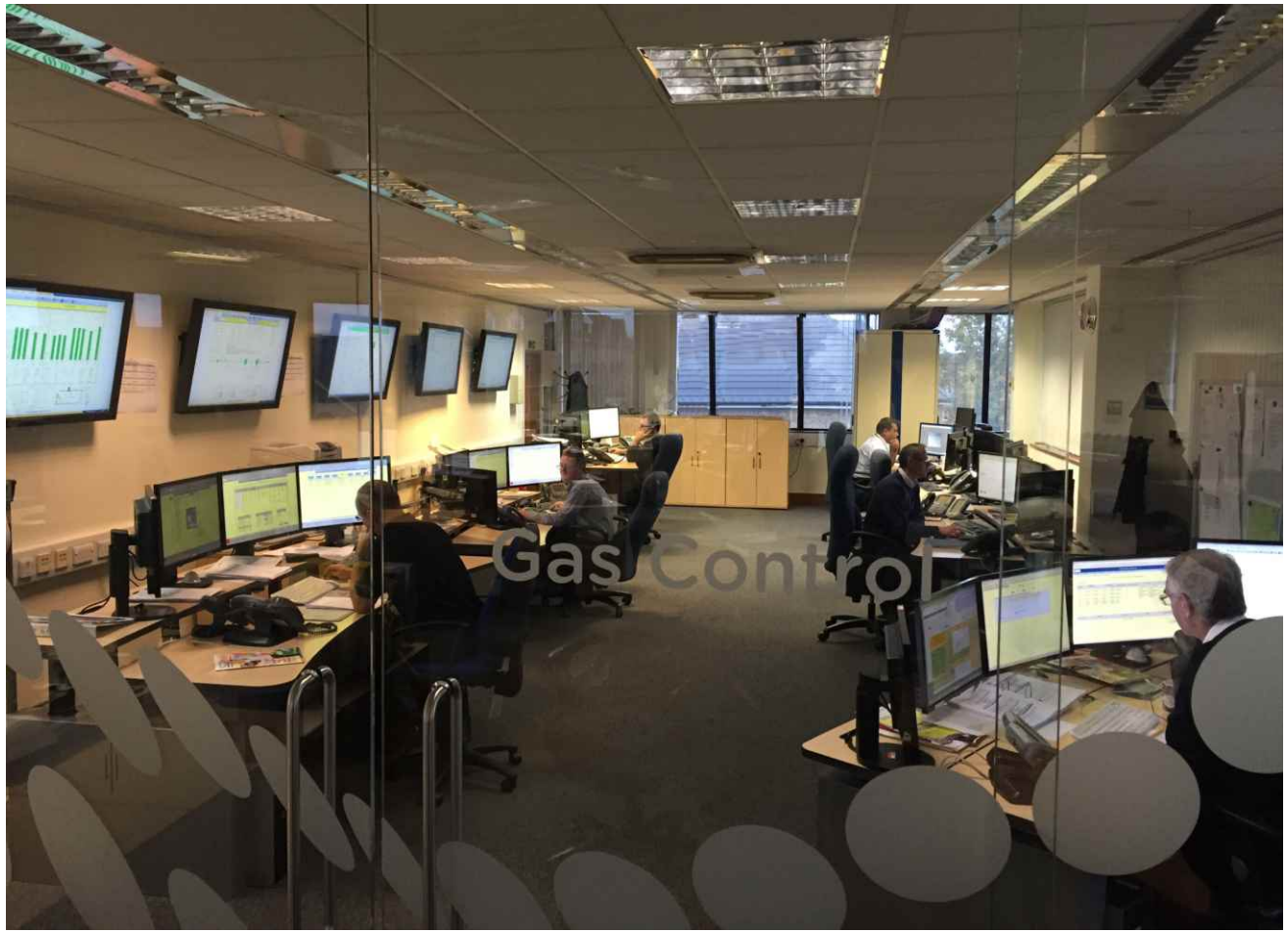
The attached two visuals are outputs from "digital design thinking" session run recently with business teams from Operations and Network Management teams respectively. As you can see there is a vast array of ideas, opportunity and benefits to be explored around the digitalisation of our business.

Digital Vision - Operations



Digital Network Vision

12 Next Steps: Costs, Funding and Governance



Our next stage of developing these roadmaps is to focus in on the priority areas. Our Lean and Agile working practices have taught us to do fewer things well and deliver benefits in small, incremental stages rather than trying to do everything at once.

It is vital that to progress the EDTF and wider digitalisation guidance, that funding arrangements and incentives are carefully considered in order to actively stimulate and progress these guidelines rather than stifle and constrain them. Additional investment in technology and innovation as well as reviewing the associated governance arrangements relating to Digitalisation is fundamental and key to this success.

We are pleased to see the commitment from Ofgem to work closely with industry and other stakeholders in supporting this work and the recognition that changes to the RIIO-GD2 framework of funding and incentives it may become necessary to support the delivery of high-quality digitalisation strategies.

We have submitted an initial costed action plan and recommendations with our RIIO-GD2 Business Plan and look forward to working with Ofgem on refining and improving the funding arrangements and assessment related to the digitalisation of our energy system.