APPENDIX A12

DIGITALISATION STRATEGY

Northern Gas Networks

11th December 2024

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1. Introduction

We are Northern Gas Networks (NGN), the gas distributor for the North of England. We provide gas to 2.7 million homes and businesses through our vast underground pipe network.

We are committed to providing a safe, reliable and great value service. One way we can do that is by delivering a programme of digital transformation to help provide a sustainable future for all. Digitalisation enables everything we do, whether we are replacing pipes, fixing leaks, developing low carbon energy solutions or supporting our most vulnerable customers.

Digitalisation, and accessible Open Energy Data, are catalysts to the future of energy in the UK. NGN is committed to being in the vanguard of this important and exciting work…

Mark Horsley,
CEO NGN

By giving people an agile and intuitive experience, we empower them to know more, care more and achieve more…

Matthew Little,
3iG Director

By thinking differently, listening to our colleagues, customers and stakeholders, working closely with our partners and considering our communities, we are redefining the capabilities of a utility company.

NGN is a regulated business that operates through 5 year cycles called Price Control periods. The current Price Control period, RIIO-GD2, runs until March 2026, the next period, RIIO-GD3, runs from April 2026 to March 2031. This strategy has been published to provide both an insight into our digitalisation work in RIIO-GD2, and what we plan to do in RIIO-GD3.

1.1 What do we mean by Digitalisation & Data

For us digitalisation is the action of taking old manual and semi-manual ways of doing things and introducing new technology and new thinking to improve the efficiency of the process, optimise the experience of our colleagues, stakeholders and customers, and protect and enrich our data. It is not about getting rid of people, but instead it should help them do the best job they can, interact with us in the manner of their choosing, or get valuable insight from the information we hold. Data is the rocket fuel that makes digitalisation possible driving what we do and how we do it. We cannot have digitalisation without data, and data is supercharged by digitalisation.

2. Our Vision

Right from the start of the RIIO period, the vision of our digital transformation has remained the same: Integrated Information Management. Our work towards this vision is supported by four main pillars:

| Collect data at source, store it securely and use it wisely. | Build applications and processes that our colleagues, partners and customers find easy to use. | Deliver tech that keeps us at the leading edge of efficiency, safety, customer and integrity. | Never lose sight of the fact that it is our colleagues who will make this technology work. |
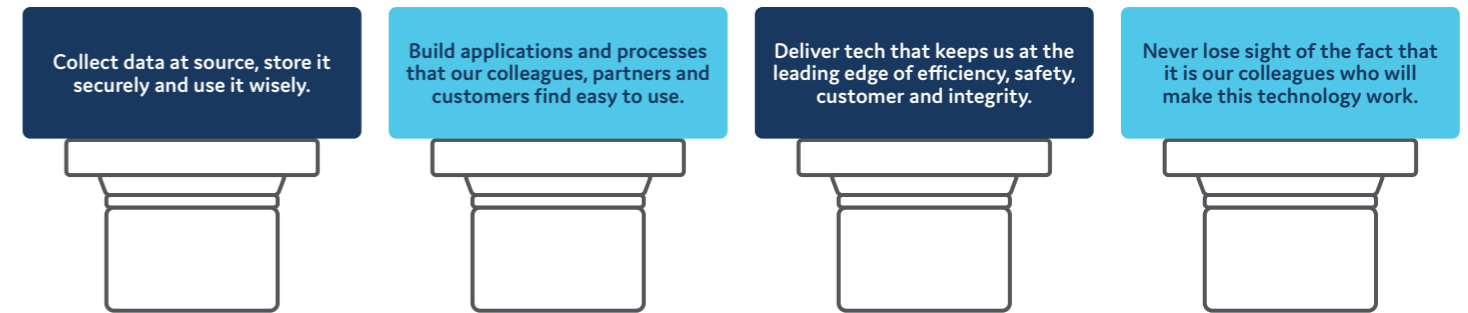
Figure 1 – Our Vision

Each digital product or service that we design and develop is informed by this strong and clear vision.

Future ways of working through integrated information management
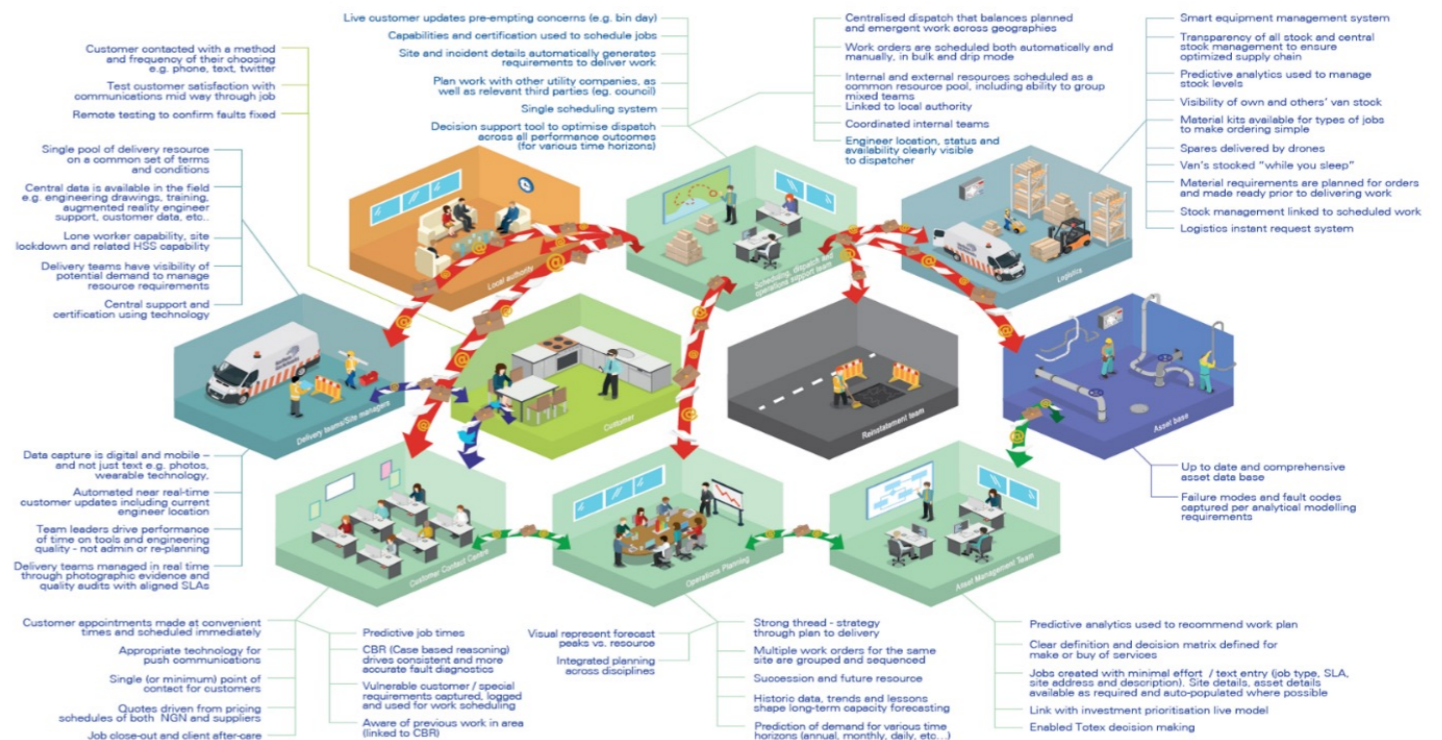
Figure 2 – Our vision of integrated information management in NGN

This graphic encapsulates the ultimate purpose of our vision: a digital enterprise flowing data across every aspect of our business, generating insight and driving efficiency, safety and customer service.

At our latest stakeholder event our approach to digitalisation, and especially to the opening up of our data, was well received, with an average acceptability score of 70%. We also received valuable feedback around the need to provide a little more clarity on some of the work that we are doing.

2.1 Our Digitalisation Journey

Running through everything we do is the consistent theme of Integrated Information Management and this will remain the cornerstone of the digitalisation work that we will need to do in RIIO-GD3.
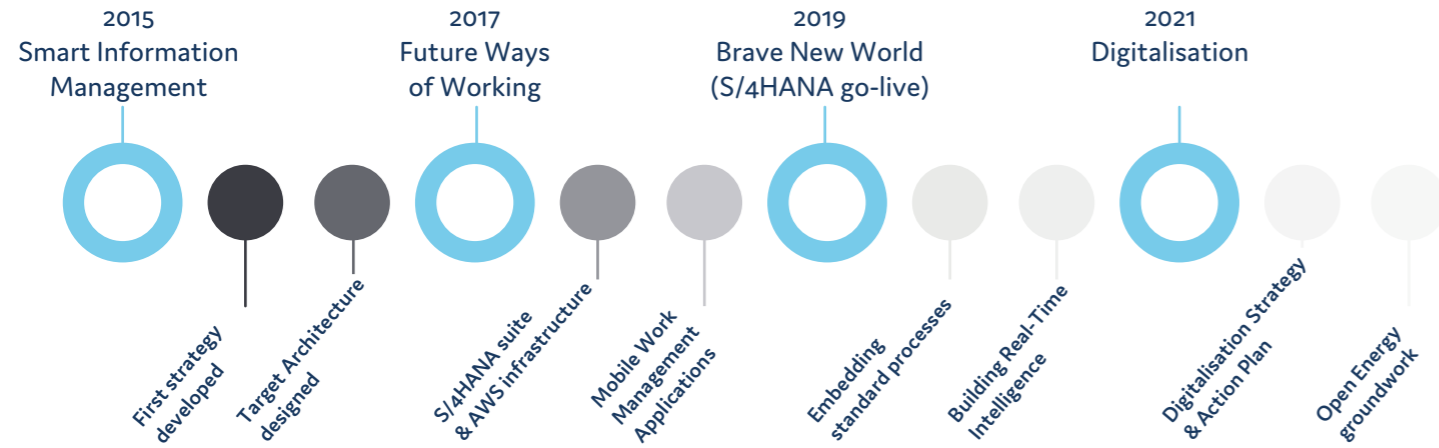
Figure 3 – Our digitalisation story so far

Our digitalisation story has been ten years in the making. We began by analysing areas of inefficient data processing and delayed reporting and developed our strategy to bring in new enterprise systems and a redesigned data architecture.

As a vehicle to embed digitalisation into our business, we introduced Future Ways of Working (FWoW), a digital transformation programme with a deliberate emphasis on the small d & t. FWoW was not a technology project, forced on unwilling or unaware colleagues, it was an evolution to an empowered digital workforce. FWoW not only delivered technology and process improvements, it also equipped many of our colleagues with the skills they need to identify areas that require improvement, and with the voice to do something about it.

2.2 Some of our achievements

Figure 4 – Some of our achievements

3. Our Enterprise Architecture – Now and in the Future

Our work in RIIO-GD1 and 2 has been focussed on building an enterprise architecture (EA) that is simplified, standardised and ready for anything the future may hold.

Our current enterprise architecture
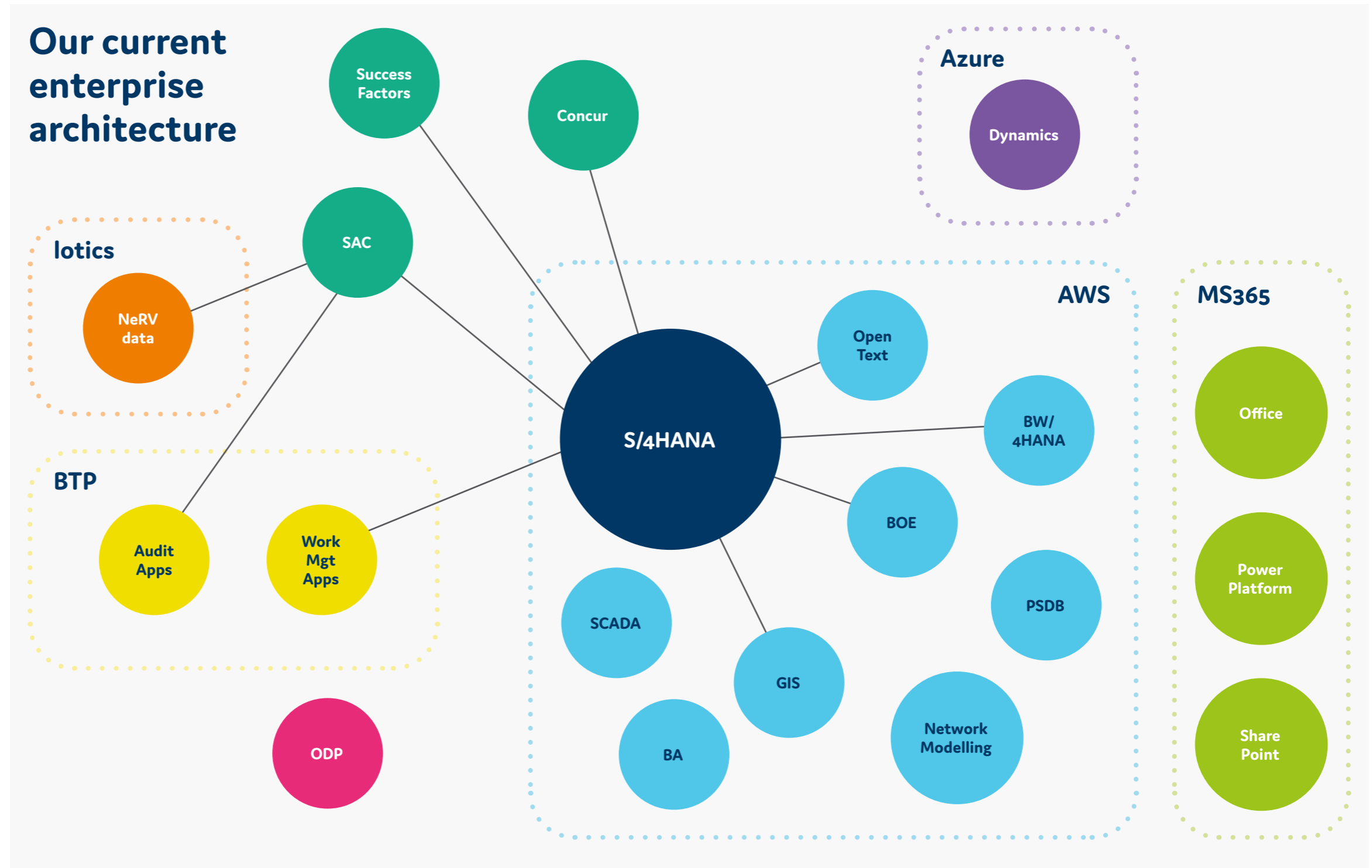
Figure 5 – Our current enterprise architecture

At the centre of our enterprise is S/4HANA. This is where the large majority of our asset data is stored and processed, along with all transactional and master data generated by our operations and back office functions. We maintain S/4HANA as standard, with minimum customisation, meaning we can continue to upgrade to new versions, allowing us to keep pace with improvements in technology. So that we can collect data from the field and update our records in real-time, we have built our own work management solutions on our chosen digital cloud

platform – Business Technology Platform (BTP). We have also used BTP to build our own bespoke applications for our safety and operational audits. For unstructured data that relates to a specific project or asset, such as invoices or schematics, we have an Enterprise Content Management solution (OpenText), that stores the data while keying it directly to the relevant record in S/4HANA, meaning that the user can access the documents they need through S4, rather than having to physically switch to a different application. We have a number of

integrated solutions for reporting and analytics. The SAP Analytics Cloud platform is our main solution for **data visualisation and management reporting**. This can draw live data from S4, or stored data from our data warehouse (BW/4HANA). Business Objects Enterprise is the solution we use to monitor the **quality and completeness of the data** that flows through S4. We still have some stand-alone systems, notably our Pressure System Control applications, our Customer Relationship Management tool, Dynamics, and our Open Data Portal.

Our planned RIIO-GD3 enterprise architecture
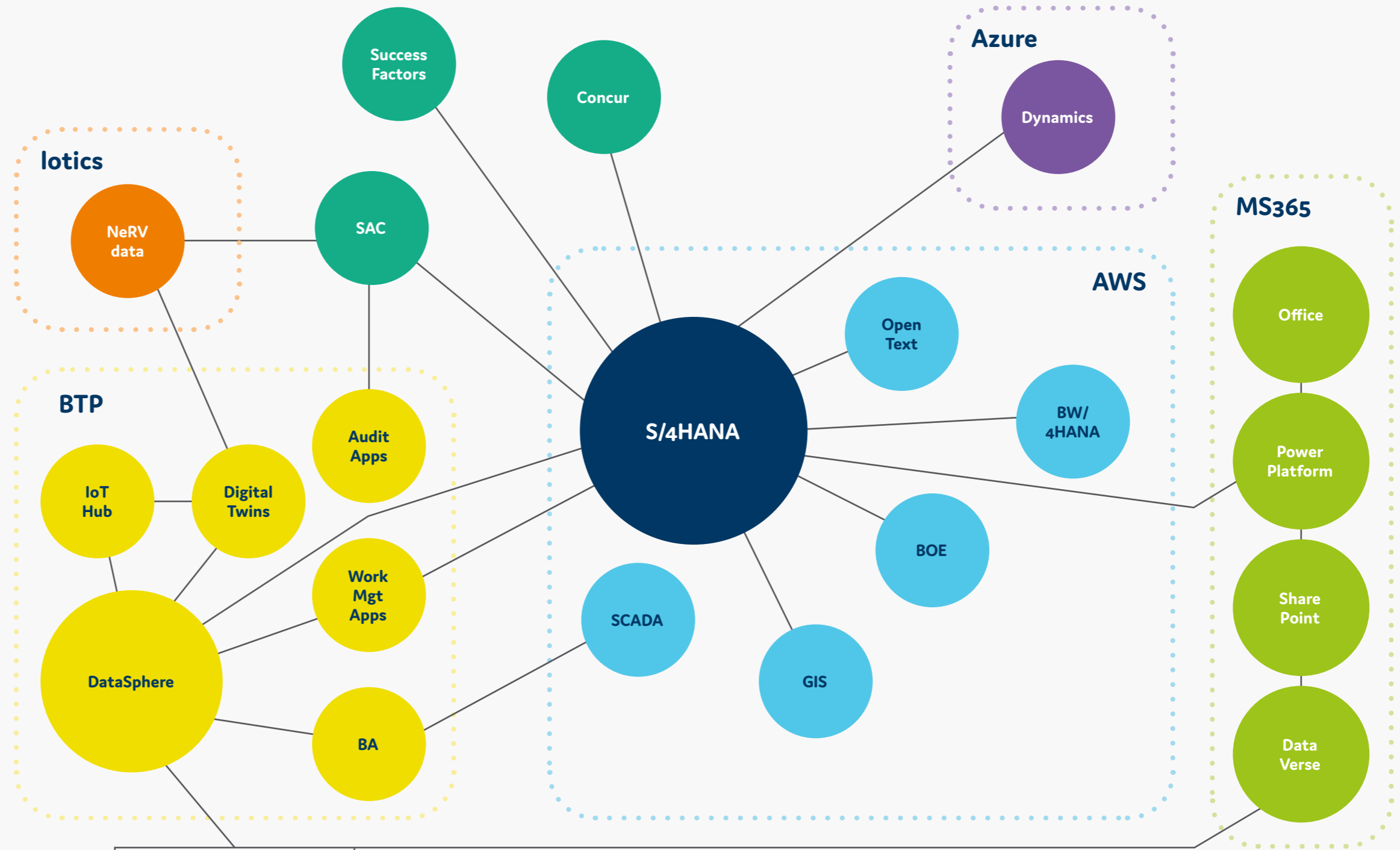
Figure 6 – Our planned RIIO-GD3 enterprise architecture

S/4HANA remains the engine of our digital enterprise, and overall our EA will remain the same, but in RIIO-GD3 we intend to make some small but significant changes, to optimise the flow of data across our business, and to rise to the opportunities of Open Energy Data. We will integrate our CRM and Pressure Systems applications with our digital enterprise. We will build a data management solution to automate the processes of data classification and metadata management, whilst also automating the provision of data to our Open Data Portalcon and to the newest edition to our EA: the Data Preparation Node that will allow us to connect to an industry-wide Data Sharing Infrastructure.

Please note that some parts of this architecture are indicative and may end up being hosted in different environments.

4. Stakeholders

Our stakeholders, from local business and charities to the UK Government, are at the forefront of our Digitalisation Strategy. We believe that digitalisation will improve not only the service that we provide to our stakeholders, but also our relationship with them, the way that we interact, the way that we share data and information, and the way that we work together to achieve common goals.

We use this map to identify key stakeholder groups, and build personas, applying these personas before developing a new digital product or service. We use our stakeholder database to engage with the relevant groups.

Stakeholder Map

National Policy Shapers (N)

N1 Government Departments	N3 Peers	N5 Pressure Groups	N7 Industry Bodies	N9 Other Utilities/ Infrastructure	N11 Regulatory bodies	N13 Cyber Security (New)
N2 Ministers	N4 Select Committees	N6 Consumer Groups	N8 Think Tanks & Research Groups	N10 Media/ Trade press	N12 Environmental Groups (New)	

Local Place Makers (L)

L1 Sub-Regional & Local Government	L4 Highways Authorities	L7 Charity/3rd sector agencies	L10 Skills, Research & Accreditation Institutions	L13 Transport Providers (New)
L2 MPs and MEPs	L5 Health & Emergency Services Providers	L8 Community, Faith and local interest groups	L11 Business, Trade & Manufacturing	L14 Digitisation (New)
L3 Mayors	L6 Resilience Forums	L9 Media/ Trade press	L12 LEPs	L15 Community Environmental Groups (New)

Customers (C)

C1 Domestic customers	C4 Fuel poor customers (New)	C7 At risk of been left behind (New)	C10 Investors Builders & Developers	C13 Independent Gas Transporters	C16 Gas Producers	C19 Community and local energy (New)
C2 Vulnerable customers	C5 Residents of multi-occupancy buildings (New)	C8 SMEs and Microbusi-nesses	C11 Housing & landlord	C14 Gas Suppliers and shippers	C17 Appliance manufacturers	
C3 Transient customers	C6 Next generation of bill payers	C9 Large load customers	C12 Landowners including farmers	C15 Utility Infrastructure Providers (UIPS)	C18 Non gas users (New)	

Wider workforce and supply chain (W)

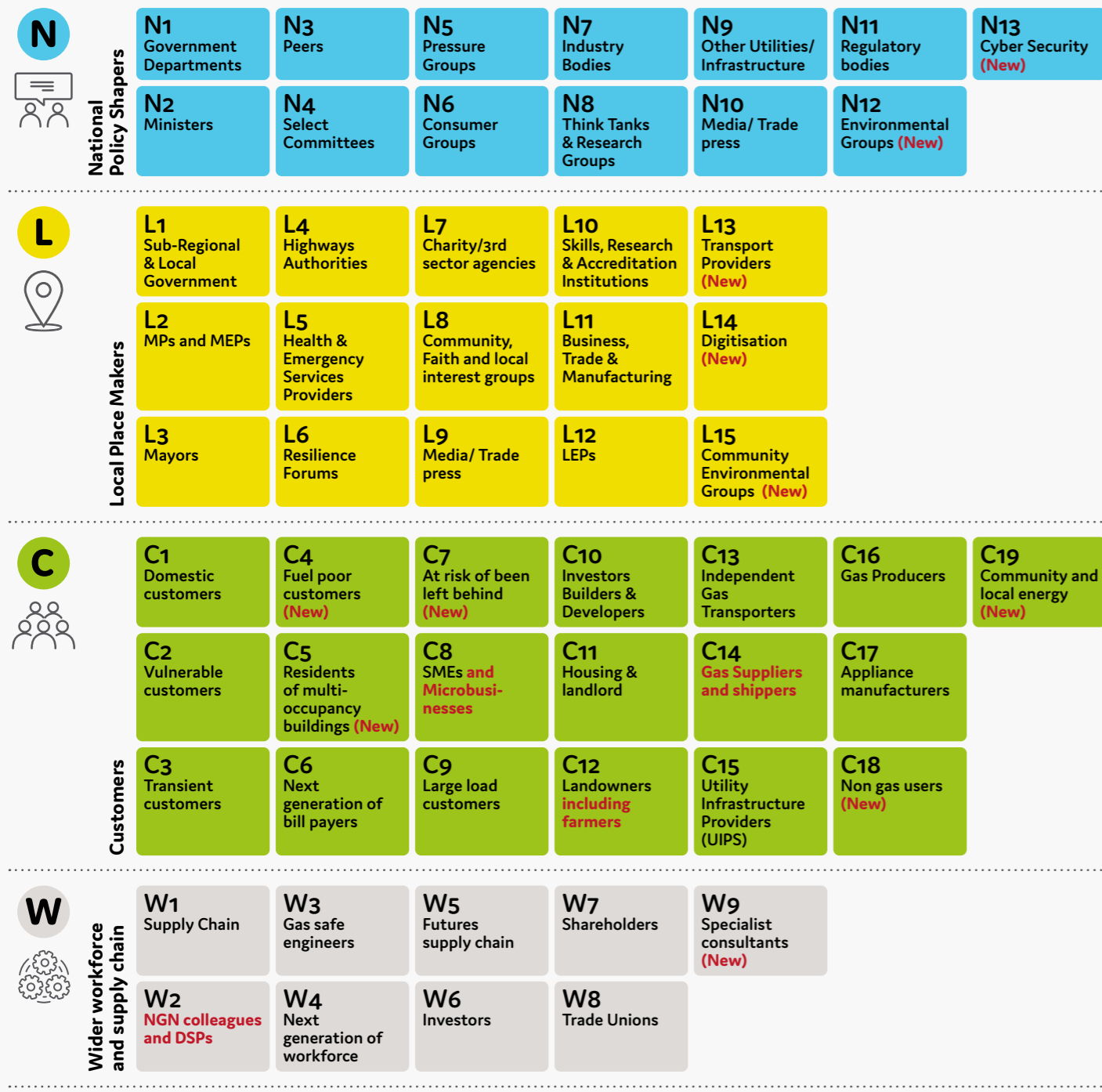|				
W1 Supply Chain	W3 Gas safe engineers	W5 Futures supply chain	W7 Shareholders	W9 Specialist consultants (New)
W2 NGN colleagues and DSPs	W4 Next generation of workforce	W6 Investors	W8 Trade Unions	

Figure 7 – NGN stakeholder map

4.1 Making sure no one is left behind

We know how important it is to reach everyone, especially those who may have difficulty accessing digital services, or who are hesitant to do so. We have been engaging with hard-to-reach stakeholder groups, with digitalisation as one of the key areas of discussion.

Under-reached stakeholders

A. Physical Challenges

A1 Blind / Partially sighted
A2 Hearing impairment
A3 Poor mobility
A4 Restricted hand movement
A5 Unable to answer door
A6 Chronic/serious illness
A7 Poor sense of smell/ taste

B. Mental Wellbeing

B1 Neuro diverse
B2 Specific learning difficulty
B3 Mental health challenges
B4 Addiction

C. Financial Hardship

C1 Fuel poor
C2 Unemployed
C3 Pre-payment meters

D. Temporary vulnerability

D1 Post hospital recovery
D2 Pregnancy and maternity
D3 Young adult householder
D4 Life changes

E. Socio-demographic

E1 Ethnic minority groups
E2 Lesbian, Gay, Bisexual, Transgender, and Queer people
E3 Younger people
E4 Pensionable age
E5 Families with young children <5
E6 Gender reassignment
E7 Military veterans
E8 Ex-offenders

F. Household composition

F1 Refugees/asylum seekers/newly arrived communities
F2 Gypsy, Roma Traveller (transitory communities)
F3 People who are homeless
F4 Carers
F5 People living in tower blocks
F6 Single parents
F7 Working location (Office, outdoors, home)

G. Rural vulnerability

G1 Farming communities
G2 Geographically remote

H. Accessibility including language

H1 No/ limited access to digital technology
H2 English not first language
H3 A social / communicate\ on impairment
H4 Limited in free time

I. Medically Dependant on Energy

I1 Nebuliser and Apnoea monitor
I2 Medicine refrigeration
I3 Oxygen Use
I4 Stair Lift, Hoist, Electric bed
I5 Heart, lung & Ventilator
I6 Dialysis, feeding pump and automated medication
I7 Oxygen Concentrator
I8 Other medical dependency

J. Cultural

J1 Faith Groups

Figure 8 – Identifying hard-to-reach stakeholder groups

4.2 Inclusivity by design

Our stakeholders are telling us that inclusivity should be a priority for us in RIIO-GD3, and that this should also apply to our digitalisation work. Any digitalisation initiative in RIIO-GD3 will be assessed using NGNs Inclusivity Framework to ensure that inclusion and accessibility are key factors in any product for service that we design. One practical example of this is our Open Data Portal, where as part of the development work in RIIO-GD3 we will ensure that software to enable the automatic reading or translation of text is available on the platform.

4.3 Personas

Our use of personas to help shape both strategic direction and specific design decisions began in RIIO-GD1 when we built profiles of colleague types to inform design choices in our FWoW programme. We found personas to be a powerful tool in helping us to build the right thing in the right way.

CASE STUDY

In RIIO-GD2 we have built customer personas to bring our work at the Net Zero Research Village to life for our stakeholders and innovation partners. You can download the 'NeRV – Futures Close' app from the Apple App Store to see the personas and take a virtual tour of the village.

Mrs Josie Chen
Lives in the 1910s Terrace Left

I'm going inside the property

Their Story

Meet Josie Chen, a retired single lady living on a pension of £221.20 a week. Josies home is a charming 1910s terrace, embodying a bygone era of British architecture. While Josie cherishes the simplicity of her home, managing on a limited budget poses its challenges. Josie has lived in the property since moving there with her mother in the late 1980s. Since the passing of her mother, Josie has made modest improvements to her home, like updating windows,

To help define our work on digitalisation and open data in RIIO-GD3, we are developing a series of Data Personas, covering all major stakeholder groups, for example:

- Customers - including customers in vulnerable situations and the digitally excluded
- Colleagues – incorporating all areas of the business, and contractors
- Local Government & LAEPs
- Community Representative & Charities
- Other Utilities - taking a cross vector, whole systems approach

We have started to map the needs of these stakeholder groups to our Digitalisation Strategy and Action Plan:

Our Colleagues

Continuously making decisions that impact our customers, stakeholders and their peers, our colleagues need quick and easy access to information and guidance, a simplified system to help manage their work and record their activities, and the knowledge of what has happened, what is happening now, and what is going to happen in the future.

What we have done

Standard work and asset management solutions (S/4HANA & BTP) with user interfaces designed by and for our colleagues.

Standard customer engagement solution (MS Dynamics) for customer interactions

Realtime reporting using SAP Analytics Cloud

Escape Forecasting Tool

What we need to do

Predictive/Prescriptive Maintenance

Improved use of GIS

Integration of work management and customer engagement solutions

Optimise access to information using Artificial Intelligence

Our Customers

Using gas to heat their homes and cook their meals, our customers need a safe and reliable gas supply, a fast response in the event of an emergency, and good service whenever and however they need it. They do not necessarily want or need a digital solution for these things.

What we have done

Provided new channels of communication via chatbot without removing or demoting other channels

Standard customer engagement solution (MS Dynamics) for customer interactions

What we need to do

Ensure that we protect customer data in the right way.

Continue to provide and enhance the choice of communication channels.

Continue to improve the reliability and resilience of the network through the innovative use of digital technologies

Regional Decision Makers

Responsible for reducing carbon within the councils and within their areas, whilst also coordinating traffic management, running local services and encouraging economic investment.

What we have done

Published data on our Open Data Portal to help councils focus on customers in vulnerable situations

Our Open Data on appliance checks is used by Gas Safe in their Stay Gas Safe mapping solution

What we need to do

Give more clarity on what data is available and the benefits it will bring.

Increase the use of our Open Data Portal through continuous engagement.

Introduce technology like AI or digital twins to help align planning activities through collaboration.

Provide shared data functionality for LAEPs and RESPs

Charities & Community Groups

To optimise the positive impact they make, charities and community groups require data sharing on customers in vulnerable situations e.g. social data mapping, opportunities to collaborate/link with other similar organisations and knowledge sharing. They need easy access to information ranging from high-level awareness to granular, bespoke data.

What we have done

Our Open Data feeds vulnerability mapping solutions and Carbon Monoxide partnership solutions.

What we need to do

Give more clarity on what data is available and the benefits it will bring.

An enhanced data portal to include visualisation functionality.

Increased accessibility and inclusivity functionality embedded in our digital services.

Other Utilities

Needs vary across utilities; however, most will need to be able to access regional performance data and identify emerging best practices. Forums that bring together whole system actors are important, with data and knowledge sharing being key

What we have done

Shared learning on our pioneering use of Utility Network Model.

Attended Advisory Groups for NESO

Worked with GDNs and DNOs to agree a standard open data licence.

Collaborated with other GDNs on data interoperability.

What we need to do

Continue to collaborate on data interoperability

Work to link Open Data Portals

Introduce the new components required to interface with the Data Sharing Infrastructure

Design and adopt a common shared data licence with all other GDNs and DNOs

As well as creating a visual representation of each persona, we will conduct interviews with representatives of each group, enabling the development of a detailed mapping of stakeholder needs and expectations for our data sharing services that will be fundamental in our designs for open data in RIIO-GD3 and beyond.

5. Digital skills

During the RIIO-GD2 period, we have expanded the skills we need to achieve our vision of Integrated Information Management. We have upskilled colleagues in the project management skills needed to deliver well-governed, results-driven digitalisation projects and trained colleagues in the skills needed to provide business analysis for robotic process automation (RPA) or artificial intelligence (AI). We have a highly skilled infrastructure team of Amazon Web Services (AWS), Linux and Wintel specialists. We have developed the skills of our ICE (Intelligence Centre of Excellence) and DICE (Data and Information Centre of Excellence) teams in data management, data modelling, coding and analytics. We have given the opportunity to colleagues from all areas of the business to learn valuable skills in the functional and technical elements of SAP.

In many cases these colleagues started their NGN careers in completely different roles, but expressed a desire to learn and a passion for our digitalisation work that you simply cannot teach people. Most importantly, they know the business, they know our operations and they know our customers. Providing an environment where these colleagues can develop into highly skilled team members who are delivering the amazing products and services we will go through in this document is something NGN is extremely proud to have done.

We don't just focus on the skills of our IT department, but also work hard to ensure all our colleagues know what digitalisation means, and why it is so important not just to NGN as a company, but the energy sector as a whole. During our digital transformation, we took embedded business colleagues with functional and technical experts. Taking this one step further, in our Process Optimisation Programme we introduced 'Digital Accelerator' sessions to guide colleagues through some of the common digital technologies, like automation and AI, while providing tips on how to identify improvement opportunities in their ways of working, and in their interaction with other colleagues and customers. This is still a challenging area for us. NGN is an engineering firm, and digitalisation is not necessarily the top priority for many of our colleagues. We will continue to address this through strong engagement with all areas of the business.

One gap in skills that we have identified is a deficit of in-house expertise in analytical languages such as Python. This will hamper our ambitions in RIIO-GD3, relating to the implementation of **machine-learning and AI solutions**, as well as our ability to get the best out of new **IoT pipelines or digital twins**. We will address this gap in the first year of RIIO-GD3 to ensure there is no impact to our ambitious plans.

6. Leading into the future on Data & Digitalisation

In our 2022-24 Strategy[1], we talked through a number of general areas that would form the basis of our digitalisation work. We've gone from strength to strength in both our understanding, and practical application, of digitalisation, and we are now able to talk much more specifically about our digitalisation work, and the direction in which it is going. To structure this next section we have used Ofgems definitions of the 6 key areas of focus they expect from Digitalisation for the rest of this decade.

6.1 Data Best Practice

Complete, consistent and available data is essential in the transition to a Net Zero energy system. To ensure a consistent approach from all network companies to data management and data-sharing, Ofgem has published the Data Best Practice (DBP) Guidance[2], a principles-based guide to help and support the energy sector to open up their data and make it as easy as possible for data users to find the data that they need.

We are committed to complying with DBP as the minimum standard for our work in open data and in all other data-sharing activities to help a secure and fair transition to a Net Zero energy system.

6.1.1 Data Triage

We need to have robust processes in place to ensure data that could be used to pose a threat to society is not shared openly. We follow strict data triage guidelines each time we either receive a request for a particular dataset, or where we have identified a dataset that we think could be published on our Open Data Portal. Our data triage procedure[3] is based on an industry standard developed by all network companies[4], and guidance published by the National Protective Security Authority[5].

CASE STUDY

We were approached by a local authority for help identifying customers in vulnerable situations. They asked for data related to PSR customers in their catchment area, broken down by geographic location and category. We triaged this request, and were able to provide an aggregated dataset that answered the question whilst maintaining compliance with privacy and security obligations. Based on the positive feedback, we will soon publish similar datasets for every local authority in the north of England on our Open Data Portal.

We will continue to collaborate with other network companies and all our regulatory and government partners to ensure our data triage is robust and consistently applied across the energy sector, while remaining fair and not putting unnecessary obstacles in the way of legitimate data users.

6.1.2 Data Classification

We generate and hold a wide variety of data assets that must be protected against unauthorised access, disclosure, modification or other misuse, so we have a robust policy on data classification. Efficient management of data assets is necessary to comply with legal and regulatory obligations such as relevant data protection legislation, and to ensure efficient handling of data requests. Different types of data require different protection measures, so applying classification markings to data assets ensures effective information security and management.

CASE STUDY

We have introduced defined data classification categories into our data management processes, and we apply these categories a part of our data triage prior to publication of data on our Open Data Portal.

Open	Open data is made available externally and there should be no restriction on its use. To mitigate any security risk, access to open data will be through a registration process. Open data is governed by an open data licence, Creative Commons 4.0 BY.
Shared	Shared data contains elements that should not be published without restriction. Access to shared data will be through a shared data licence or data sharing agreement governing all parties.
Internal	Internal data can be accessed by employees of NGN, but should not be shared externally.
Confidential	Confidential data can be accessed by authorised personnel in NGN, but should not be shared externally or with unauthorised individuals.

The assessment and application of data classification is still a manual process for us, and we know that as the amount of data going through our Open Data Portal grows, and with the introduction of the Data Sharing Infrastructure, this manual process will be neither efficient nor sustainable. In RIIO-GD3 we plan to introduce a more automated approach to data classification.

Specifically in terms of DBP Guidance, data classification is essential to maintain secure and compliant open data standards, ensuring that data is shared in a way that is appropriate to any risk that it could pose. Again, consistency across all network companies is key to providing the best service to the data user, and we will continue to work closely with all organisations to promote a consistent approach to data classification.

6.1.3 Data Catalogue & Metadata Management

To help data users to find out if the data they need is available, we have published a data catalogue[6] containing a comprehensive list of data assets that have gone through our data triage process. This is continually updated.

We continue to work closely with other network companies and Ofgem to make iterative improvements to our catalogue to ensure consistency across the energy sector and enhance the experience of the data user.

Metadata helps us to manage content, and is an analytical asset containing real insight. It allows users to explore multiple data assets to find the information that is useful to them, especially if the metadata is consistent across different organisations.

CASE STUDY

All the data available through our Open Data Portal has the 15 metadata elements defined in the DCMES (Dublin Core Metadata Element Set) applied to them. This is a standard used by all GDNs and DNOs, providing consistency for data users.

The generation and application of metadata, and the collation of a data catalogue, are currently manual processes. As with data classification, we know that this approach will not be sustainable, and we plan to automate the process during RIIO-GD3.

Our data catalogue and associated metadata has been designed to be interoperable between systems, and available for reporting and analysis. We will continue to work with other network companies to ensure that the application and interpretation of these metadata elements remains consistent.

6.1.4 Data Quality

Our Data & Information Centre of Excellence (DICE) was established in 2018 and continues to provide leadership in all data management activities. In 2023, the centralised, full-time team analysed and cleansed nearly 50,000 individual data items, making sure that a single consistent schema is applied to ensure full interoperability. They apply a strong governance regime that is flexible enough to adapt to changing stakeholder needs without compromising on integrity. Using the principles defined in this governance regime, their automated assurance reports continuously scan the data, apply predefined business rules and parameters, and correct or highlight discrepancies.

CASE STUDY

Data relating to the supply points within our network is refreshed daily by a file transfer from Xoserve. Prior to FWoW inconsistencies in the data would cause the transfer to fail almost every day, and finding and fixing the problem would often take over a week, meaning that potentially incorrect supply point data was being used by our operational colleagues. After analysing the issue, the DICE introduced an AI bot to monitor the daily files to find and fix any inconsistencies, and where it could not provide a fix, it would isolate the record for human intervention so that the transfer could carry on. The daily files now transfer without a hitch, meaning our operational colleagues have the most up-to-date information available.

6.1.5 Data Interoperability

If the data shared by one organisation cannot be easily integrated with data from another, then analytics is made extremely difficult. Likewise, if gas data cannot interoperate with electricity data, and vice versa, then automated, whole-systems decisions will be very difficult.

We are committed to working with other gas distribution networks (GDNs), electricity distribution network operators (DNOs) and transmission companies to enable data interoperability as quickly as possible. We're starting by using consistent naming conventions for our own data sets on our Open Data Portal and, where there are unavoidable deviations, a glossary (published with each dataset) will help data users to understand how each data item relates to others.

CASE STUDY

We're working with networks from the electricity and water sectors to **build interoperability into our respective Priority Service Register (PSR) customer data**, increasing each organisation's visibility of their vulnerable customers. This makes it easier to offer support to the most vulnerable members of society, especially in the event of an incident.

For data interoperability to succeed, it must be a collaborative effort, and we are currently working with the other GDNs to make our most popular data assets interoperable, starting with our geospatial asset data. This will help data users to easily gain insight from each network's data. We plan to carry out a more formal collaborative project in RIIO-GD3 for an equally important data asset: capacity and demand data.

6.2 Digital Platforms

We are building platforms as a point of access to our digital services, and the data that we hold.

6.2.1 Open Data Portal

Our Open Data Portal went live in August 2023, making a number of our data assets, that have been classified as open, freely available to all data users. The portal provides a quick and easy way for data users to find, understand and download the data assets that are available. We've applied the Creative Commons BY 4.0 open data licence[7] to each data asset published on the portal, to simplify its use as much as possible. We are now improving the portal, increasing the number and diversity of data assets available on it, while making sure that we listen and adapt to the needs of our stakeholders.
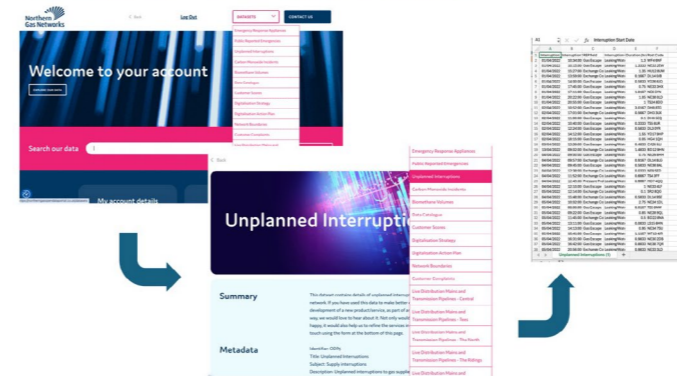

Figure 9 – NGN Open Data Portal

We've engaged with stakeholders about how we should continue to develop our Open Data Portal, both directly and by providing feedback opportunities through the portal itself. From this engagement, and by measuring where we are now against our Data Best Practice obligations, we have designed an exciting programme of work in RIIO-GD3. We want to build a library of standard Application Programming Interfaces (APIs) so that data users can interface with the data directly, whilst retaining the capability to download via other standard file formats. We want to build smart data visualisation tools into the portal itself, giving a one-stop-shop experience for users to explore our open data. We also want to give users the ability to live-stream data from our **Net Zero Research Village**. To ensure that users have access to the most up-to-date information in the most efficient, secure and sustainable way, in the background we want to set up a data broker that will automatically move data from our backend systems to our portal, based on the **classification of the dataset**, and assist with new data requests.

We considered several options to achieve all of this. One option was to use an off-the-shelf open data platform as a service solution. However, we believe that our approach of developing, hosting and supporting our own bespoke solution, whilst still using open-source open data management platforms represents exceptional value for customers and data users in the long-term, as we will be able to better react to the changing requirements of data users. One example of this is during our most recent engagement events, stakeholders gave a clear direction that we should prioritise accessibility to vulnerable customers[8]. We will do this through our redeveloped Open Data Portal by incorporating assisted reading and translation software.

Open data is a priority for us, but we have a responsibility to make sure that only data that is safe to make freely available is classified as 'open'. We must guard against the misuse or mis-appropriation of our data as much as possible. We have added a registration process to our Open Data Portal, and will continue to make iterative improvements to ensure the safety and integrity of the portal and the data within it.

CASE STUDY

In 2023, we published data relating to carbon monoxide events that we had attended as part of our Emergency Response work on our Open Data Portal[9]. Our Vulnerability and Carbon Monoxide Allowance (VCMA)[10] colleagues were approached by a leading data science firm that was developing a national tool to collate all carbon monoxide data collected by, among others, gas distribution networks, the UK fire service, the coastguard and appliance manufacturers. This tool would provide insight into how carbon monoxide incidents can be reduced. We directed the firm to the data published on our Open Data Portal, and, when they required data that had not been published, they contacted us through our portal so that we could give them the data they needed to optimise their product.

Specific stakeholder engagement on our Open Data Portal

As open data covers a vast span of use cases, we have engaged with many stakeholders to find out how we can best service the needs of all data users, while maintaining proper governance, data integrity and security.

There are many benefits of this engagement, and the Open Data Portal that it is helping to shape. Stakeholders get access to the data they need, but also discover other data assets that would be useful to them that they didn't realise we owned.
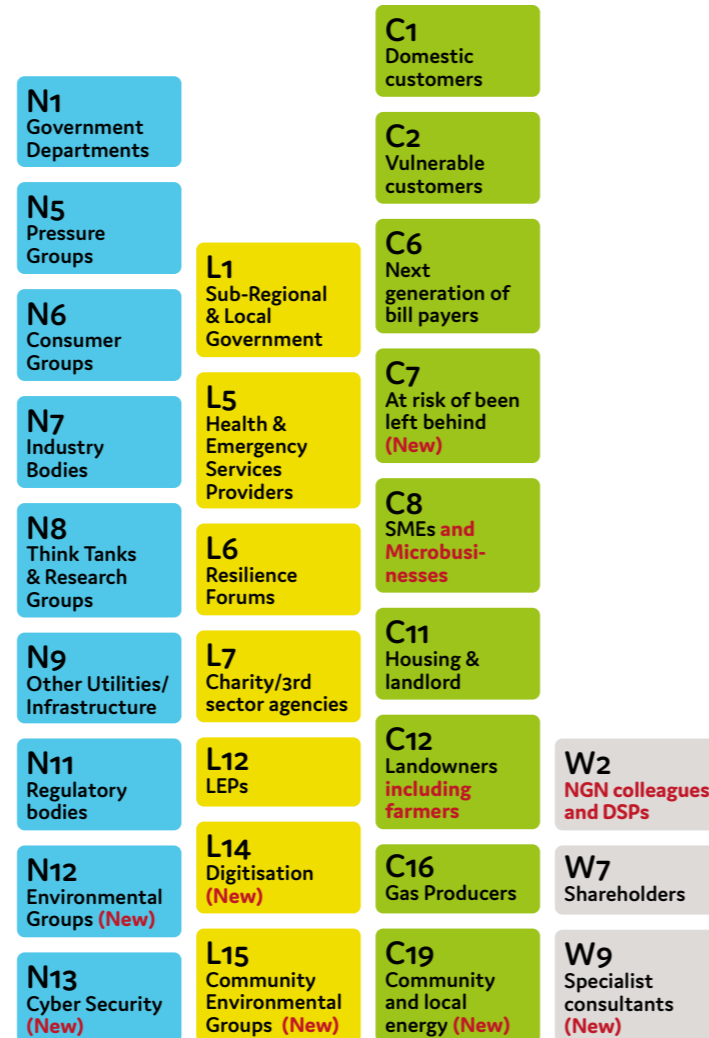
N1 Government Departments

N5 Pressure Groups

N6 Consumer Groups

N7 Industry Bodies

N8 Think Tanks & Research Groups

N9 Other Utilities/ Infrastructure

N11 Regulatory bodies

N12 Environmental Groups (New)

N13 Cyber Security (New)

L1 Sub-Regional & Local Government

L5 Health & Emergency Services Providers

L6 Resilience Forums

L7 Charity/3rd sector agencies

L12 LEPs

L14 Digitisation (New)

L15 Community Environmental Groups (New)

C1 Domestic customers

C2 Vulnerable customers

C6 Next generation of bill payers

C7 At risk of been left behind (New)

C8 SMEs and Microbusinesses

C11 Housing & landlord

C12 Landowners including farmers

C16 Gas Producers

C19 Community and local energy (New)

W2 NGN colleagues and DSPs

W7 Shareholders

W9 Specialist consultants (New)

Figure 10 – Stakeholder Groups specifically engaged on Open Data

How we are measuring success

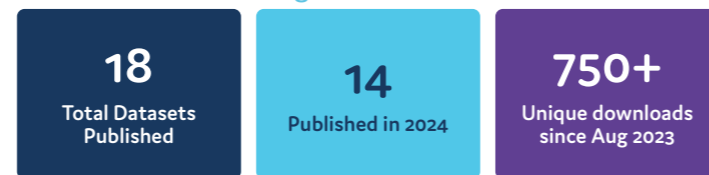| 18	14	750+
Total Datasets Published	Published in 2024	Unique downloads since Aug 2023

Figure 11 – Statistics relating to our Open Data Portal

6.2.2 Geospatial Data Platform

In 2021, we embarked on a significant upgrade of our Geospatial Information Systems (GIS) which included a move to a Utility Network Data Model (UNM) – a first for a utility in the UK. The UNM allows us to model a richer set of network devices, network structures, subdomains and relationships to a previously unobtainable level of detail. Importantly, the UNM now also supports connectivity by association rather than just on the basis of geometric connectivity. During the upgrade, we developed rules and techniques to build and maintain the connectivity and quality of the network as part of the data migration. These rules enable associated assets in the network so that a fully connected data model can be built.

CASE STUDY

We're exploring the new capabilities available to us now that we have adopted the Utility Network Model. One of these is the Trace Tool that allows instant mapping of all connected assets, upstream and downstream, from any point in the network. This is a significant benefit to the resilience of the network.

The use of geospatial information systems (GIS) is a vital part of the safe and resilient operation of our network, and as a Digitalisation As Usual activity, we will continue to iteratively improve these systems, increasing the breadth and resilience of the data flowing between S4 and GIS, and building analytical applications like the Built Over Mains Analysis Tool.

6.2.3 The Net Zero Research Village

One of our gas sites at Low Thornley, near Gateshead, is now the Net Zero Research Village (NeRV)[11], a facility designed to enable research of cutting-edge technologies and techniques to accelerate energy innovation and support the transition to Net Zero, with digitalisation at its heart.

Nine buildings, representing a broad spread of the residential properties in Great Britain, have been fitted with thousands of sensors, measuring everything from temperature and humidity to ambient radiation and noise. Data collected by the sensors is streamed to a secure platform, where it can be shared in real time with multiple partner organisations.

Figure 12 – Futures Close in the NERV

CASE STUDY

So that we can visualise and analyse the data generated by the sensors in the nine NeRV houses, the readings are pushed from Iotics into our SAP Analytics Cloud, where real-time dashboards show the data from each sensor. When different hardware, software or structural innovations are being tested in the houses we see, as it happens, the impact that they have. We also have immediate access to historical data for trend analysis

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9   This can be found on our Open Data Portal: https://northerngasopendataportal.co.uk/dataset/7

10   The Vulnerability and Carbon Monoxide Allowance. For more details see https://www.northerngasnetworks.co.uk/current-business-plan/vulnerability-and-carbon-monoxide-allowance/vcma-application-form/

11   https://ebusiness.ncl.ac.uk/projects/customer-energy-village/

Average House Level Data for Temperature (1 filter)

1900s Mid-Terrace	19.04
1900s Terrace Left	18.79
1900s Terrace Right	19.67
1930s Semi Left	22.60
1930s Semi Right	19.94
1950s Bungalow	19.95
1970s Flat - G Floor	18.79
1970s Flat - U Floor	19.40
1990s Detached	19.49

Average House Level Data for Temperature (2 filters)

	1900s Mid-Terrace	1900s Terrace Left	1900s Terrace Right	1930s Semi Left	1930s Semi Right	1950s Bungalow	1970s Flat - G Floor	1970s Flat - U Floor	1990s Detached
Bathroom	17.60	17.15	19.87		19.55	21.68			19.53
Bed 1	18.45	18.90	18.52	22.96	20.70	18.87	19.21	20.08	19.17
Bed 2	19.00	19.62	19.82	22.30	21.38	18.10	19.64	20.10	19.34
Kitchen	20.68	20.60	20.78	24.62	21.10	20.40	19.96	19.95	20.94
Landing	17.84	16.11	18.42	21.70	18.56		14.86	17.72	19.06
Living Room	20.66	20.34	20.60	23.78	20.62	19.61	20.54	19.87	20.84
Bed 3				21.42	19.54				19.54
Dining Room				23.48	20.54				21.04
Hallway				20.52	18.15	21.04	18.52	18.69	19.12
WCFF					19.29				
Bed 4									18.87
EnSuite									20.18
Garage									14.07
Utility									21.84
WC									19.31

Figure 13 – One of the real-time dashboards built for NeRV

The data management we have put in place at NeRV, with its free movement of data and flexible architecture designed for innovation, is possible because of our vision of Integrated Information Management. The NeRV helps drive that vision forward, generating new and varied use cases, while providing a platform for stakeholder engagement.

We already have several industry and academic partners using NeRV, as well as non-energy utilities, and NGN is committed to continuing to grow NeRV as a practical hub and digital platform for research and development.

Specific stakeholder engagement on the Net Zero Research Village

The NeRV is a great resource for research and development in the delivery of a just and secure transition to Net Zero, and we want to talk to as many people as possible about it. We've engaged with multiple stakeholder groups about using the facility for R&D or educational purposes, and hosted a number of visitors to our site at Low Thornley.
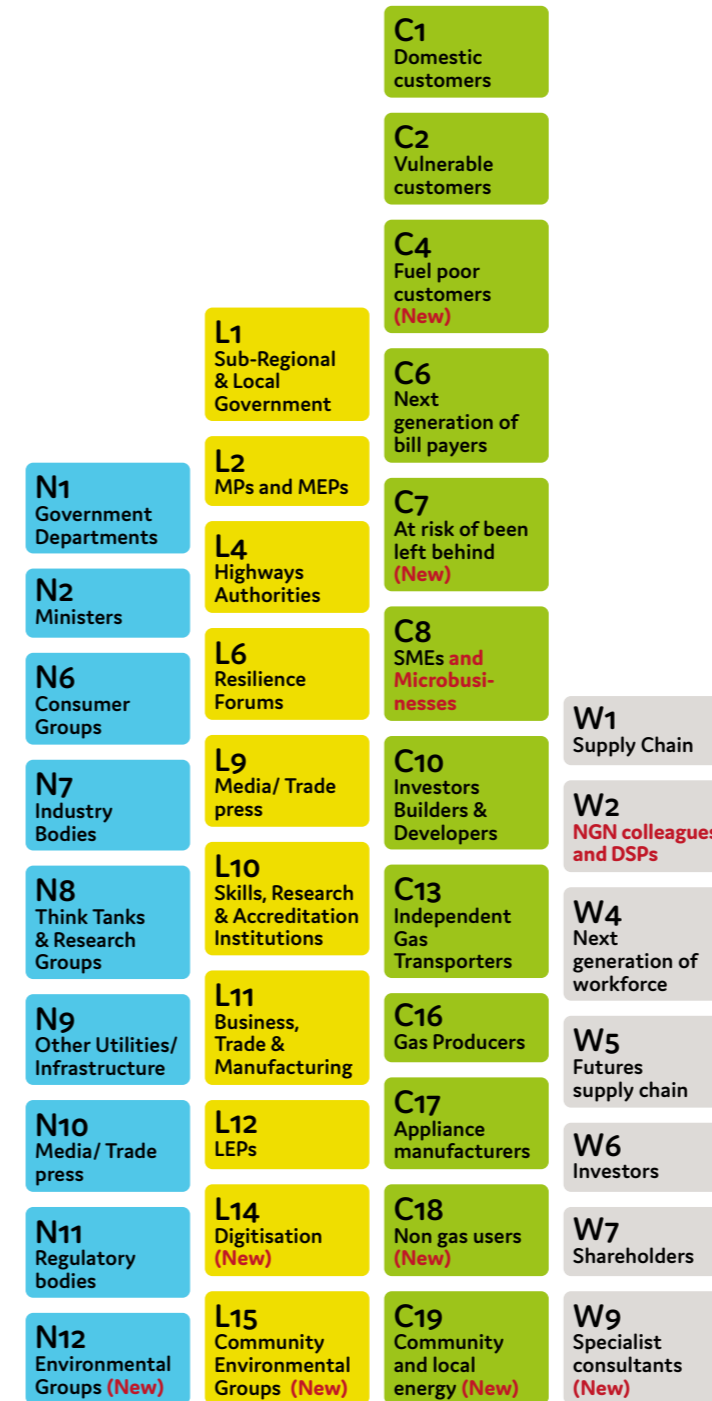
N1 Government Departments
N2 Ministers
N6 Consumer Groups
N7 Industry Bodies
N8 Think Tanks & Research Groups
N9 Other Utilities/ Infrastructure
N10 Media/ Trade press
N11 Regulatory bodies
N12 Environmental Groups (New)

L1 Sub-Regional & Local Government
L2 MPs and MEPs
L4 Highways Authorities
L6 Resilience Forums
L9 Media/ Trade press
L10 Skills, Research & Accreditation Institutions
L11 Business, Trade & Manufacturing
L12 LEPs
L14 Digitisation (New)
L15 Community Environmental Groups (New)

C1 Domestic customers
C2 Vulnerable customers
C4 Fuel poor customers (New)
C6 Next generation of bill payers
C7 At risk of been left behind (New)
C8 SMEs and Microbusinesses
C10 Investors Builders & Developers
C13 Independent Gas Transporters
C16 Gas Producers
C17 Appliance manufacturers
C18 Non gas users (New)
C19 Community and local energy (New)

W1 Supply Chain
W2 NGN colleagues and DSPs
W4 Next generation of workforce
W5 Futures supply chain
W6 Investors
W7 Shareholders
W9 Specialist consultants (New)

Figure 14 – Stakeholder Groups specifically engaged on the NeRV

6.3 Digital Infrastructure

Our digital infrastructure is either built on a public cloud infrastructure or operates through software as a service (SaaS). We do not own or operate any servers on-premise. This migration to the cloud has enabled us to reduce the costs of operating our technology and supported the work of bringing services in house. All our cloud operations are managed by our in-house team.

For the rest of RIIO-GD2, and throughout RIIO-GD3, as part of Digitalisation As Usual, we plan to continue to operate from cloud services while continually developing this platform as new capability, such as serverless technology, develops. This will allow us to continue to reduce our IT operational costs and to improve the resilience of the digital services that we offer through increased availability and flexibility.

6.3.1 Data Sharing Infrastructures

Energy data will be essential to the success of Regional Energy Strategic Planning, and to Local Area Energy Planning, however, there will be datasets that have not been classified as open, but that will need to be shared in a secure, frictionless way. In RIIO-GD2 we will continue to manage the distribution of data classified as 'Shared' through the use of individual Data Sharing Agreements, whilst using the learning from this engagement to enable us to design and implement a secure section of our Data Portal for the dissemination of 'Shared' data to registered and vetted organisations.

A significant step in the enhancement of secure exchange of data across the energy sector will be the development of a Data Sharing Infrastructure. This promotes and enables greater collaboration and innovation across the energy sector.

We have engaged with both Ofgem and the new National Energy System Operator (NESO) as members of Advisory Groups chosen to help shape strategy.

To ensure that we can play our part in this important initiative, in RIIO-GD3 we will be adding to our digital infrastructure to ensure that we can interface to the Data Sharing Infrastructure through a Data Preparation Node, ensuring that there is no compromise in the continued security and integrity of our cloud infrastructure.

6.4 Digital Processes

We have built a solid digital foundation with S/4HANA and other complementary technologies, and we can now maximise the efficiency of processes in place across all our back-office functions by introducing innovative solutions to problems around data quality, manual data input or transformation, and lack of actionable information.

6.4.1 Automation & Optimisation

Process optimisation and automation means that data flows through our systems with as little intervention as possible. Data has more integrity, consistency and completeness, and because we know that this data is created, collected or enriched through this process, it can made available to be used anywhere in our integrated systems. Automation frees up our colleagues' time to act on the data that is processed, rather than doing the processing themselves, ultimately giving a better service to our colleagues and customers.

One example is the introduction of RPA. This is the development of bots to carry out repetitive, logical tasks to free up our colleagues to use the data, not just wrangle it. This increases job satisfaction and retention, which in turn improves the service provided to our customers.

CASE STUDY

Once we've completed a repair or maintenance on our underground pipes, we need to fill in any hole that we have made. A request is made to a specialist contractor to carry out this reinstatement work. We have introduced a bot to automatically generate the request, verifying the address and making sure all the relevant information is available. We have also introduced new tasks that would not have been sustainable in the old manual process, so the bot also identifies and highlights any vulnerable customers included in the reinstatement requests, which helps the contractor to prioritise those customers. This is a service enhanced through digitalisation that benefits our colleagues and customers.

We can apply RPA at scale, across every area of the business, without having to use point solutions that increase complexity and cost. Staying true to our design principles, we use the RPA components of our two main software providers, SAP and Microsoft.

RPA forms only a part of our process optimisation approach, so that we can broaden the scope of our activities to include automated reporting and workflow, improved user interface, targeted training and application development.

Specific stakeholder engagement on Automation & Optimisation

At the moment, we are focusing on enhancing our internal processes but as we progress we will incorporate more activities that affect more of our stakeholders, and we will ensure that engagement is a priority. Even now, with the focus on internal processes, our stakeholders and customers can benefit.
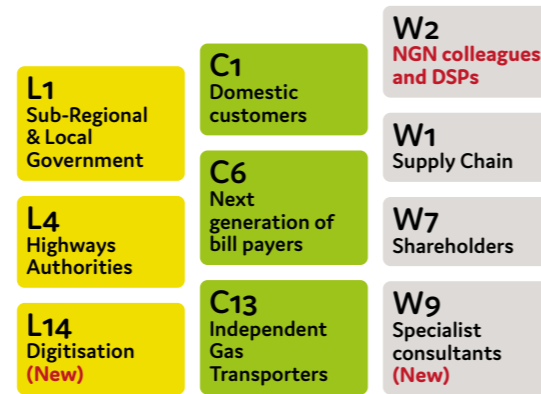

Figure 15 – Stakeholder groups specifically engaged on POP
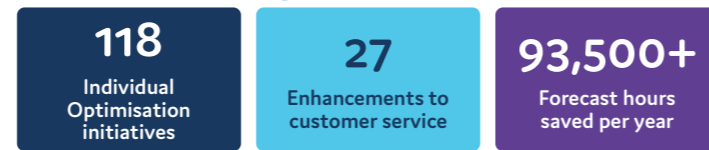
How we're measuring success

Figure 16 – Statistics relating to process optimisation

6.4.2 Artificial Intelligence

The growth in digital technologies incorporating AI is creating new and exciting opportunities for utilities to build products and services that can help them to better serve their customers and communities. We must take into consideration all the benefits of AI in a responsible, safe and prudent manner – taking full advantage of the digital foundation we have built.

CASE STUDY

One practical use for AI is data quality management. We developed a solution that incorporated real-time validation of asset data at the point of entry into our S/4HANA system, with alerts notifying and educating the user. Based on business rules, these are multi-characteristic, high-complexity algorithms. We also built an AI component that scanned all 1.5 million asset records every hour, assessing the quality of the data. This AI used machine learning to develop new validation processes. Real-time dashboards visualised large datasets in a dynamic way that allowed the user to focus on outliers, to drill down, verify and correct anomalies. Any new rules, once signed off by the business owner, were added to the rules-based component. Staying true to our design principles, we only used the standard functionality of our core systems.

We will continue to explore new ways to apply AI in our data management processes, as well as ways that we can leverage the advances in Generative AI and Large Language Models in other areas of the business. We are currently trialling the use of MS Co-Pilot to support with many of our back office activities like minute taking and information summation. We are also building a proof of concept conversational-AI to help our operational colleague access the policies and procedures they need.

In RIIO-GD3 we will expand the use of AI, subject to our strong governance. Planned initiatives include the use of AI to assist in routine operational procedures, the use of image recognition to identify encroachment or areas/activities of concern, and the use of AI to augment network planning decisions - an area of focus for our stakeholders. We recognise, however, that the potential pitfalls of generative AI, like hallucinations and misinformation, can be doubly impactful in our operations, where the health and safety of our colleagues and the public are our first priority. That is why, in weighing up the options available to us, we have decided that an area of focus for us will be the growth of the skills of our own developers, so that we can understand and control our own Large Language Models, and the algorithms we use, to mitigate any risk and optimise the benefits of AI in NGN.

6.4.3 Intelligent Analytics

The guiding principle of our Digitalisation Strategy is to make accurate data available to all who need it, in the right time, on the right device, and fully contextualised to allow data-driven decision-making.

As part of our digital transformation work in the Future Ways of Working programme, we looked at the various options for reporting, including a decentralised, federated or centralised model. We decided on the centralised model, as this would ensure consistency of reporting, not just in terms of look and feel, but also in how the data itself is structured and modelled. The reports we produce in this centralised model are self-service however, and are designed to automatically refresh and provide the user with the ability to drill-down and explore the data to find additional insight.

Established in 2018, the Intelligence Centre of Excellence is our reporting and analytics team, developing and maintaining a suite of real-time dashboards and other analytic applications. Using our Integrated Information Management, the ICE team have built a catalogue of reports covering every aspect of our business, and including the automated generation of tables from our Regulatory Reporting Pack (RRP). The ICE team's work has brought benefits in terms of real-time visualisation of business-critical data, helping us make informed decisions based on the information at hand.

CASE STUDY

Our 24/7/365 Emergency Service protects customers' lives and property in the North of England, with our First Call Engineers responding to around 65,000 public-reported emergencies each year.

We have built an analytics solution to forecast when and where emergency calls will be received, based on the weather, the geography and the location of our pipes. The solution uses predictive models to create the forecast, machine learning to continuously improve the accuracy of the models, and our visualisation tools to produce the information our operational colleagues need in the best format for them, for example as interactive dashboards or automated email notifications.

If we have a good idea of when and where emergencies are likely to be reported, we can make sure that we have engineers in the right place at the right time to respond. This means they could get there quicker, providing a better service to our customers and reducing their carbon footprint by minimising travel. It also means we will be more confident that we have resilience in the winter.

As a Digitalisation As Usual activity, the ICE team will continue to investigate what is possible in the area of reporting, while also building wider, more adaptive models to enable self-service analytics for our colleagues.

Specific stakeholder engagement on Analytics & Artificial Intelligence

We've engaged with multiple stakeholder groups to gain insight into what they need, how they will use the data and information we provide, and how best we can visualise it. This can range from a simple table to complex graphical or geospatial representation, but the benefit of Integrated Information Management is that we can meet all these requirements using the same base of quality, consistent and available data.

We've explored stakeholders' expectations and reservations about AI and incorporated that into our approach. We've also been able to leverage the exceptional technical and business knowledge of our Centres of Excellence to provide innovative, efficient and effective solutions to stakeholder requirements.
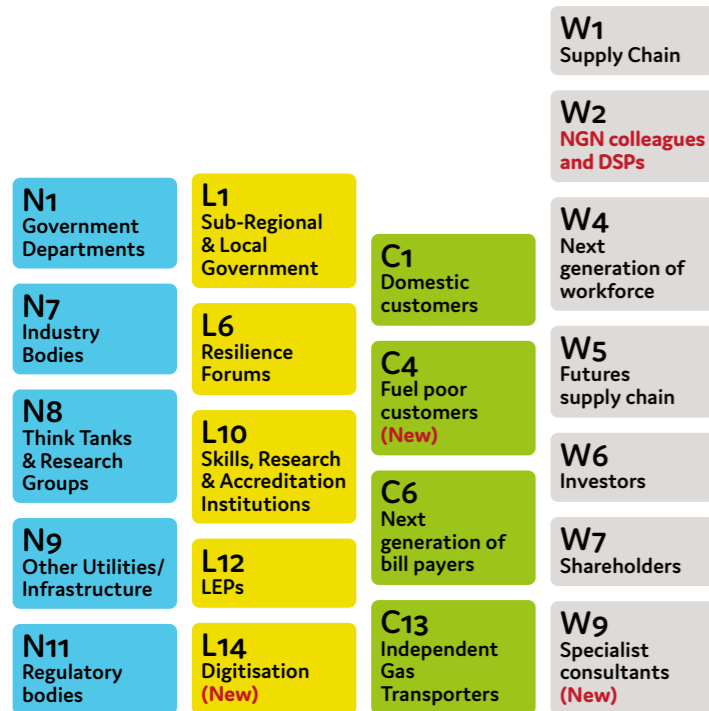
Figure 17 – Stakeholder groups specifically engaged on data analytics, visualisation and AI

How we're measuring success

90+	360
Realtime dashboards	Active users

Workstream	No. of reports
E&R	30
Data quality	17
Connections	5
Logistics	5
Asset maintenance	19
Audit	12
IT	5

Figure 18 – Statistics relating to real-time reporting in NGN

6.5 Network Monitoring

Our digital infrastructure provides a strong foundation for the future. As the amount of data available to us continues to grow, so too will the value of using that data correctly. Our assets provide us with valuable insight, and we need to capture this through an Internet of Things, a connected network of assets with data flowing freely between them.

6.5.1 Intelligent Asset Management

We have designed an asset hierarchy in our S/4HANA system that links all assets from the offtake to the supply endpoint. This allows us to build Asset Maintenance Plans (AMPs) in S4, which can then be automatically scheduled and released to our operational colleagues. The hierarchy also fully complements and is interoperable with our Utility Network Model. There is still work to do to ensure that the data held in S4 is complete, and our DICE will continue to do this throughout the rest of RIIO-GD2.

In RIIO-GD3 our focus will be on building analytical models using the data in S4 to introduce predictive and prescriptive maintenance of assets. We plan to enrich these models by integrating data from our pressure management systems like SCADA. This will ensure resilience of our network and security of supply, a priority for our stakeholders, who expect that NGN's focus should be on keeping customers' lives running smoothly by providing reliable and uninterrupted supplies and minimising disruption to their daily activities, and that our top sustainability commitment should be keeping our infrastructure resilient. Robust maintenance of our assets before they go wrong will be a critical in ensuring resilience, and the use of predictive & prescriptive analytics will that our maintenance plans are designed to optimise asset health whilst minimising risk.

6.5.2 Sensors & the Internet of Things

One of our Digitalisation As Usual activities is to fit loggers and other sensors to assets in our gas network, and to improve the communications network that allows them to transmit data. We do this to optimise our ability to control the gas network, ensuring resilience and continuity of supply. We are currently expanding our use of a communication technology called LoRaWAN. This low power, open-standard solution allows us to gather real time operational data using just battery power where mains power is not available. This significantly increases our resilience.

As we continue to expand the number of sensors on our network in RIIO-GD3 we plan to add to our Enterprise Architecture, to build a hub that can analyse the data coming through from these sensors and make sure it is sent wherever it needs to go.

Having this Internet of Things backbone will enable us to improve physical security of our sites, generate and use enriched data such as live demand and site status data, connect our assets to create digital twins and dynamic modelling, and ensure right-time information is passed to other industry partners like NESO.

6.5.3 Digital Twins

The development of digital twins - virtual representations of physical assets, locations or networks - is the natural conclusion of much of our digitalisation work. We already model our network of pipes and assets to ensure the integrity of our network and to model new scenarios of changing population, weather or energy mix to ensure we can always maintain reliability of supply. With the planned Enterprise Architecture, in RIIO-GD3 we will have the opportunity to augment our modelling capability with the introduction of digital twins, further strengthening the resilience of our gas network.

Robust digital twins would not be possible without the work that we have done in ensuring clean, consistent, and complete asset data, whilst BTP provides an integrated digital platform with the services available to model and build the digital twins themselves. Our Enterprise Architecture is designed to help us unlock the potential of digital twins.

With the Data Sharing Infrastructure being introduced during RIIO-GD3, our digital twin capabilities will become part of an ecosystem of digital twins from across the energy sector, making up NESOs Virtual Energy System. To ensure that we can react quickly to this transition to a whole systems approach, we want to grow our own in-house capability, much in the same way as we have done with reporting and app development, introducing new skills so that we can develop and support our own digital twins, and ensure that they and the data they process is interoperable across the energy sector.

6.6 Digitised Field Works

Our main focus throughout RIIO-GD1 and RIIO-GD2 has been the digitalisation of field operations, and we have laid a strong foundation of applications and process improvements that we will build upon in RIIO-GD3.

6.6.1 Mobile Work Management Solutions

The first pillar of our vision for digitalisation is to collect data at source. For our operational colleagues, this means providing mobile applications that enable the receipt and completion of work orders, tasks and activities. This was a priority for our digitalisation work in RIIO-GD1 and 2, and we have built work management applications for our Emergency & Repair, Connections and Maintenance workstreams. This allows us to collect data at the point of creation and have it immediately update work and asset records in our S/4HANA system, for real-time reporting and monitoring.

The second pillar of our vision for digitalisation is to design and build applications that are easy to use. Although the data being collected is vital, inputting it should not be a burden on the colleague who is actually doing the work. That is why we included our operational colleagues in designing the mobile applications they would be using, and together we built a thoughtfully architected, single platform which minimises the need to toggle between applications, maintains a consistent user interface and feeds from and to the same data schema.

From engagement with our main stakeholder group for this work, our operational colleagues, we learnt that a focus on user experience (UX) is important because a seamless, enjoyable UX will help in ensuring data accuracy and completeness. As is the amount of data we ask the user to collect. It is tempting to throw everything in there, but designing an application where manual input of data is the exception rather than the rule is an effective way to reduce 'input fatigue', which leads to incorrect data entry.

We will continue to make iterative improvements to our work management applications as a Digitalisation As Usual activity. This will include the addition of new forms to capture changing data requirements, or workflow to accommodate new or changed processes. With our in-house developers, we will be able to respond to changing needs in a quick and agile way, whilst retaining the ability to trial and adopt new technological advances as they develop. One major change we plan on making in RIIO-GD3 is to build the automatic update of asset data through our maintenance app. This will significantly increase the availability of data in S/4HANA, which will in turn be a key enabler for the development of predictive and prescriptive maintenance plans.

6.6.2 Enhanced User Interfaces

The work that we have done to build our digital infrastructure and develop our digital processes has fulfilled our vision to collect data at source and store it securely, and to introduce leading-edge technology. Although everything we have done has been informed by the other two pillars of our vision: to develop easy to use, user-centric applications, our focus now and throughout RIIO-GD3 will be on these two pillars. We will build front-end interfaces that take full advantage of the powerful capabilities of our digital infrastructure, but provide a simplified user experience that will be designed specifically by and for our users.

<div style="background:navy; color:white; padding:4px">

CASE STUDY

</div>

1. If a load-shedding situation occurs, it is imperative that we are able to identify and contact those large capacity users who have Interruptible contracts quickly. In the past this process has been extremely manual, relying on multiple excel spreadsheets.

   We now store the interruptible contracts in S/4HANA, and have built a Fiori application to allow easy access to this data, in a format that enables us to record every contact with the interruptible users, maintain their contact details and report the progress of any load-shedding event or simulation in real-time to the National Grid.

2. We have a duty of care to monitor and manage any asbestos on our network. In the past this has been done through a stand-alone database, with associated manual processes to make sure the data is correct, and to calculate how often checks need to be made.

   We have completely digitised this, migrating the data held in the stand-alone database into S/4HANA, and linking it with the site record already held there. This takes full advantage of the site hierarchy we have already built in S4, streamlining the data capture and update process, whilst ensuring that key data is mastered in one place.

   On top of this we have built a new User Interface using an SAP Fiori app, to allow field data capture and automated update of the record in S4. All this is finished off with real-time, automated reporting.

For the next year we will be upgrading the standard user interface for our S/4HANA system, further improving the user experience, whilst also improving the speed and efficiency of the processes that flow through it.

In RIIO-GD3 we plan to expand this work further, building improved interfaces for our finance and logistics processes. We also want to build interfaces that will allow us to harness the capabilities of our digital infrastructure in some previously more specialist, stand-alone business functions, like the management of asset risk, and pressure/demand management. Not only does it bring these important functions fully into our digital architecture, it also means that the data that these functions process and generate can benefit from our data management capability, and is available for sharing.

Contact us

This Digitalisation Strategy should inform and bring value to you. If there is any clarification, question or comment regarding this strategy document, we would love to hear from you. Please get in touch with us via one of the communication channels listed below.

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- **X** @NGNgas
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