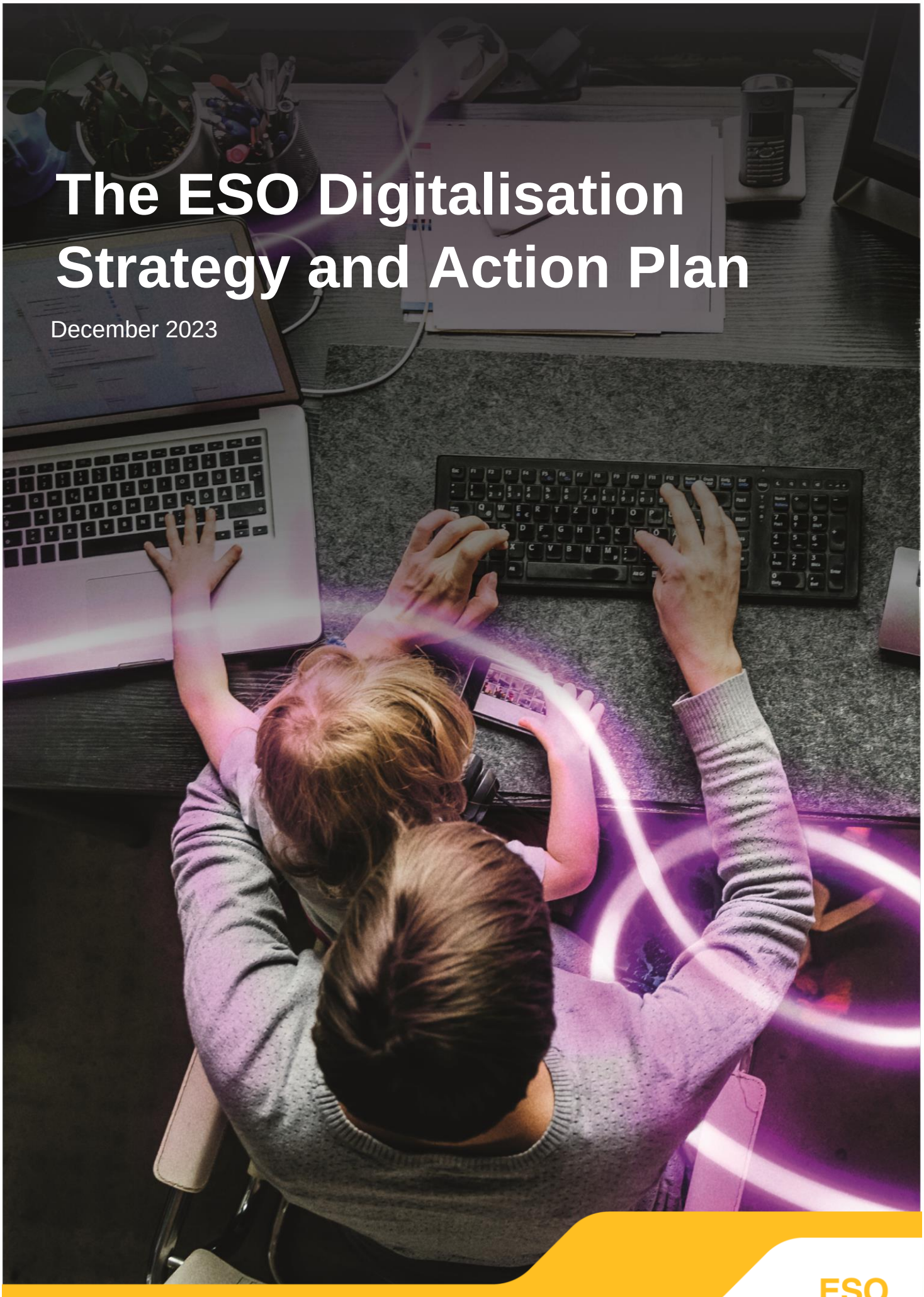
The ESO Digitalisation Strategy and Action Plan

December 2023



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Foreword

Our mission as the Electricity System Operator (ESO) is to drive the transformation to a fully decarbonised electricity system by 2035 which is reliable, affordable, and fair for all.

The new Energy Act 2023 will transform the UK's energy system by strengthening energy security and supporting the safe and sustainable delivery of net zero. Our evolution to the Future System Operator (FSO) in 2024 will position us at the heart of the energy transition, catalysing broader industry innovation and collaboration as our role expands beyond electricity. This, combined with the increased volume of data and information in the industry, the fast pace of digital innovation around the world, the growing intricacy of the energy ecosystem, and the evolving needs of our customers, require strategic reinvention from us.

As we continue to deliver our Business Plan (BP) 2 commitments, we have had an opportunity to reflect on our priorities and assess how we can maximise outcomes and value, whilst setting the foundational pathways towards future growth. Our 2023 Digitalisation Strategy and Action Plan (DSAP) introduces new efforts to leverage emerging technology, harmonise data standards to drive interoperability, maximise the value of data, and facilitate innovation and collaboration across the whole energy system. It establishes our Digital First path towards becoming a Digital Leader with the ambition for the FSO to utilise the power of data and innovation to drive collaborative digitalisation of the whole energy system. This ambition puts customers first in everything we do, ensuring we work closely with them as we build the industry's digitalisation journey together, acknowledging that achieving the decarbonisation goals will require a collective effort from all.

We look forward with enthusiasm to our FSO evolution and appreciate the profound responsibility to help digitalise and decarbonise a sustainable whole energy system, as we strive for the net zero target.

Shubhi Rajnish

ESO Chief Information Officer

Submission Overview

In our last update in June 2023, we shared that we completed the Digitalisation Action Plan deliverables identified for the BP1 period. This document not only updates the status of the deliverables for the Digitalisation Action Plan for the BP2 period, but it also revises our March 2022 Digitalisation Strategy and details new crosscutting efforts that will be essential to achieving our 2035 and FSO ambitions.

Our previous Digitalisation Strategy covered the whole RIIO-2 period; however, a lot has changed in our industry and at the ESO. Our transformation into the FSO is increasing our remit and requires us to revisit our ambitions. The FSO will be a new public corporation, owned by the Government, that holistically looks across Great Britain, giving an independent view of the entire energy system. We have been working diligently on developing a new Digitalisation Strategy that extends our strategic horizon through 2035 and encompasses our current understanding of the FSO responsibilities. While our FSO scope is still being refined, we believe that there is a need to accelerate the decarbonisation journey and that we have enough information to set the course on our future direction at the time of this DSAP.

Considering this evolving journey for FSO, we have developed our Digitalisation Strategy with a principles-based approach that can continuously evolve to stay relevant and adapt to changing industry needs. Additionally, we will provide any necessary updates to our strategy bi-annually.

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Executive Summary

Our role in industry is evolving and our approach to digitalisation needs to evolve with it.

To encapsulate our FSO responsibilities and advisory position, we have created a new Digitalisation Strategy vision: Utilising the power of data and innovation, we will become a **Digital Leader** and drive collaborative digitalisation of the whole energy system.

Through our Digitalisation Strategy, we will look to expand the bounds of what is possible across four themes:

1. We will facilitate industry technological expertise by staying abreast of emerging technologies, industry trends, and sharing digital best practices.

2. We will maximise the value of data by leveraging it to inform decisions and enhance operational efficiencies.

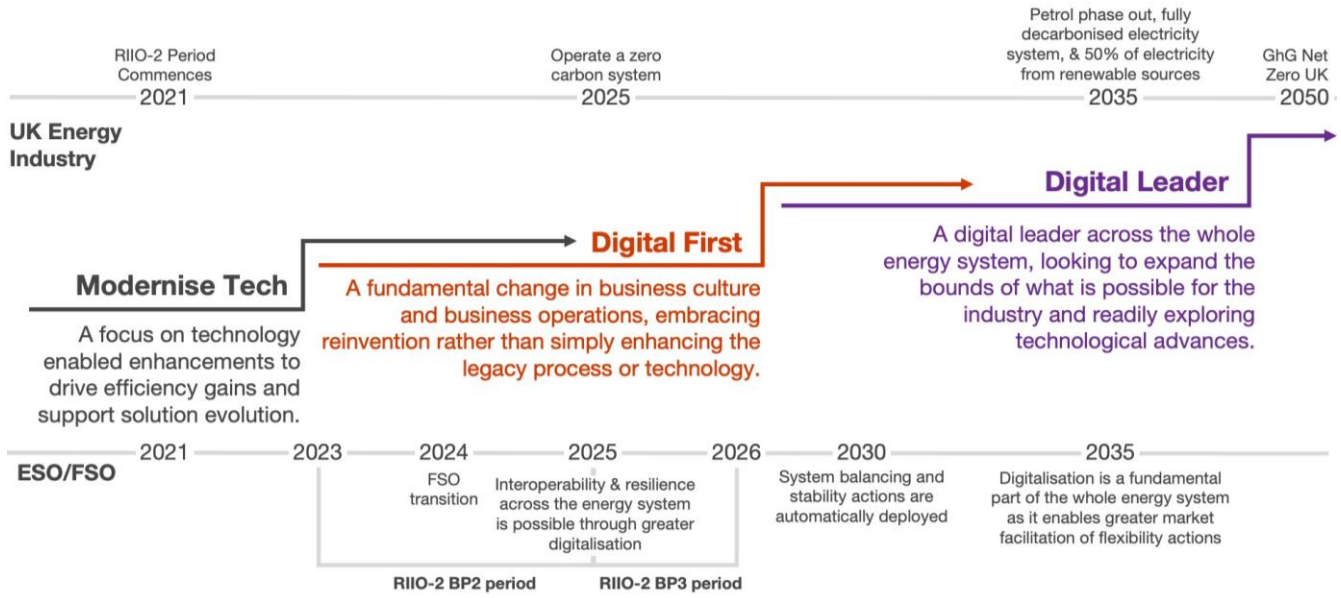
3. We will help to set the industry's digital direction through collaborating on the development of data standards and accessible, reliable, and interoperable data.

4. We will explore innovation opportunities by collaborating and partnering with all our existing and emerging partners.

Digital Leader:
Embeds digital in every aspect of the business and operates with continuous digital reinvention, facilitating digital collaboration within and beyond the industry.

Digital First:
Integrates digital into every aspect of the business, thinks digital beyond the ESO and for the industry, thinks digital beyond existing technology.

In our previous Digitalisation Strategy, we committed to modernising technology and focused on our approach to doing that. It centred around three elements: digital mindset, product model, and agile delivery. These elements came together to implement proven technologies and methodologies to replace outdated tools and develop new customer-centric products and services. We are evolving those modernising technology elements into the next phase of our Digital Leader journey – transforming our people, processes, data, and technology as **Digital First**. The steps to achieve Digital First have already begun, but consistency will be essential to further integrate digital into every aspect of our business. The timeline below gives an indication of our expected digitalisation transitions.



Given the evolving nature of our FSO scope and ongoing market developments, we needed a Digitalisation Strategy that is flexible and adaptable. We have therefore developed a set of Digitalisation Strategy Principles to guide our investment and prioritisation for technology decisions. These Principles start with a Digital Culture at their centre, which is surrounded by Accelerators that facilitate how we deliver our strategy and Enablers that support our strategy and make its delivery possible.

In developing these Principles, we engaged with a wide variety of customers to understand their needs and the value the ESO and FSO need to provide. We will remain regularly engaged with our customers going forward, making these living principles that can be continuously iterated to best address industry needs and to ensure we unlock innovation by enabling customer digital journeys. This will ensure they remain relevant, ambitious, aligned, and value-driven in this constantly evolving digital world.

We have created new crosscutting efforts related to these Digitalisation Strategy Principles that will underpin our ongoing BP2 deliverables, set the FSO up for success, and maximise value for both internal and external customers. To ensure we are delivering on that value, we have developed metrics to measure our DSAP progress and its effect on the digital experience of our customers. A summary of these metrics can be found in **Appendix B: Digitalisation Metrics**. We will update our progress on these in each DSAP update going forward.

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Digitalisation Strategy

Chapter 1: Introduction

1.1 What's in this document?

This document shares our approach to digitalisation and how we deliver products and services to meet our customers' needs and create consumer and public interest benefits. Our Digitalisation Strategy contains three chapters:

1. This first chapter provides details on how our new strategy was created and why it was created in this way.
2. The second chapter addresses why changes are needed with the current industry context.
3. The third chapter details our Digitalisation Strategy Principles.

Following our Digitalisation Strategy is our detailed Digitalisation Action Plan with roadmaps for new crosscutting efforts and relevant BP2 deliverables. Our document concludes with relevant appendices on our customer engagements, performance metrics, and our current digital products and services.

1.2 What does 'digital' mean at the ESO?

Digital: *Applying the culture, practices, processes, data and technologies of the modern era to drive progress towards net zero while maintaining energy security and minimising costs for consumers.*

Tom Loosemore, co-founder of the UK Government Digital Service (GDS), defined digital as, "Applying the culture, practices, processes and technologies of the Internet-era to respond to people's raised expectations."[1] We largely agree with Tom's definition and have used it as the foundation for our definition of **digital**.

We believe that digital is a key component to not only our business, but to the industry's ambitions.

1.3 How did we create our Digitalisation Strategy?

We began developing our DSAP by considering Ofgem's Digitalisation Strategy and Action Plan Guidance[2] refreshed in August 2023. The table below shows where we address each of these items throughout this DSAP submission.

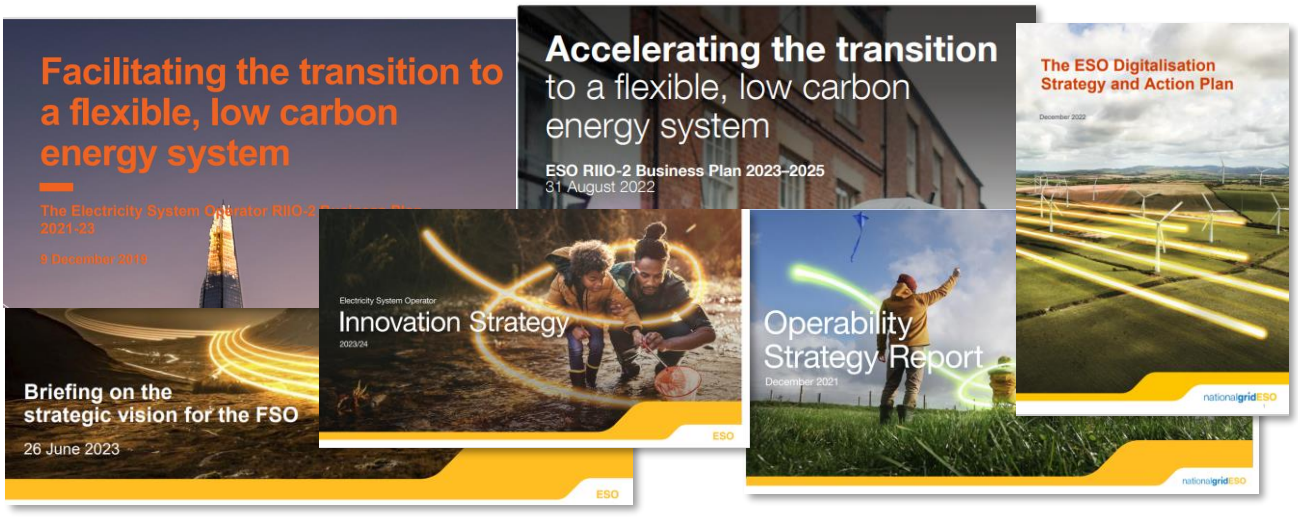
	Ofgem DSAP Guidance Principles	How this is addressed in the ESO DSAP
1	Prioritise providing benefits to the stakeholders who pay for the Products & Services as well as benefits that are in the Public Interest.	Throughout our Digitalisation Strategy we acknowledge our growing list of customers and our Digital Customer Experience Accelerator showcases our customer centric decision making for our Products & Services.
2	Ensure Products & Services work towards a defined vision.	Our Digitalisation Strategy sets a clear vision that will guide us through the FSO transition and beyond.

[1] twitter.com/tomskitomski/status/880099461132845056

[2] Ofgem, 2023. Digitalisation Strategy and Action Plan Guidance

3	Take full advantage of opportunities to deliver benefits early and to iterate improvements to Products & Services.	As detailed in many of our Digitalisation Strategy Principles, we take a continuous improvement approach to everything we do. Additionally, our Principles endeavour to deliver solutions before our customers realise the need for them.
4	Enable stakeholders to understand the Products & Services, the status of their delivery and how to access them.	**Appendix C: Current Digital Products and Services** gives a description and link for each of our key digital products while our **Digitalisation Action Plan** indicates where we are in developing new Products & Services.
5	Ensure visibility about the nature and status of actions in the Digitalisation Action Plan.	Our **Digitalisation Action Plan** gives an update on our progress and timelines for our deliverables and crosscutting efforts.
6	Ensure there is shared understanding of how success and performance is measured.	**Appendix B: Digitalisation Metrics** shows the metrics we will be using to measure the success of our DSAP.
7	Coordinate with the wider ecosystem of Products & Services.	Our Data and Information Ecosystem Accelerator aims to further industry interoperability and coordination of Products & Services.

After reviewing the Ofgem guidance, we gathered our previous strategic documents, business plans, and published FSO responsibilities and strategy. We used these documents in drafting our narrative to align our directionality and simplify our strategy for internal and external consumption.



With a clear view of our direction, we began to develop a strategy that is adaptable to the pace of change. As we hit milestones in our completion journey, we took sections of our strategy to customers for feedback. A summary of that feedback is below and the full details can be found in **Appendix A: Customer Engagement and Feedback**.

1.4 Who is our Digitalisation Strategy for?

Our Digitalisation Strategy is for our customers. To digitally advance Great Britain's whole energy system and enable its decarbonisation, we need to bring together people and entities from across the energy system and beyond. We intend for this strategy to provide clarity on our digital direction and pace so that we can all support and enable the digital journey of the industry together. With this in mind, we have expanded and simplified our definition of our customers to include people or entities that pay us for products and services, who we pay for their products and services, who use our energy, who have a vested interest in our activities and decisions, and that work for and with us.

Customers

- *People or entities that **pay us** for products and services*
- *People or entities who **we pay** for the products and services we receive from them*
- *People or entities who **use our energy** (e.g., consumers)*
- *People or entities with a **vested interest** in our activities and decisions (e.g., regulators, government, media, investors)*
- *People or entities that **work for and with** our organisations (e.g., employees, contractors, innovation partners)*

We recognise that each of our customers are in various stages of their own digital maturity journeys. To truly become a Digital Leader, we need to regularly engage with all customers on their digital needs, from long-time partners like Distribution Network Operators (DNOs), to newer industry players, like battery storage providers and demand aggregators. We need to facilitate the partnerships and collaboration that will deliver innovative solutions to digitally advance and decarbonise Great Britain's whole energy system.

If you would like to get involved in future consortiums addressing the industry's digital future, or if you have feedback on this DSAP submission, please email us: box.dsap@nationalgrideso.com or write to us:

Digital, Data & Technology Team, Electricity System Operator, Faraday House, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

1.5 How did our customers help to shape our strategy?

While creating this Digitalisation Strategy, we presented draft content to the Technology Advisory Council (TAC) and met with organisations in key customer and wider stakeholder groups to better understand their needs for the future. **Appendix A: Customer Engagement and Feedback** details the external feedback we have received and demonstrates where these are addressed throughout our DSAP. Below is a summary of the current digital and data related customer needs that were identified through our engagements, many of which were reinforced in the recent Ofgem decision on frameworks for future systems and network regulation.[3]

- **Increased regional data visibility:** The level of detail required to truly mitigate the risk of intermittent renewable resources and whole energy system planning does not currently exist in industry data, but it is essential for price discovery, efficient investment, and operational decision-making for new assets.
- **Easy access to trusted industry data**: Market participants and new entrants struggle to find specific datasets, especially those that have multiple exchanges amongst multiple industry parties.
- **Interoperable systems and distributed data sharing infrastructure**: Many industry digital products and services have been developed in siloes and increased collaboration is needed to reduce duplicated efforts and to unlock higher customer value.
- **Testing environments (sandboxes) internally and for industry**: The risk factor for the energy industry is high with minimal to no room for mistakes when releasing new technologies and tools. Safe spaces for innovation collaboration are needed to develop and test new systems thoroughly together.
- **Self-service and reduced enquiry response times**: For innovation to move at the pace needed to achieve industry net-zero goals, we need to provide self-service data products for customers to make their own decisions effectively and increase speed at which we deliver answers to queries that go beyond our self-service offerings.

This strategy accounts for these customer needs throughout our Digitalisation Strategy Principles captured in Chapter 3, as well as in the crosscutting Digitalisation Action Plan efforts. If you would like to provide supplementary context on any of these needs or bring additional needs for our consideration, please let us know using the contact information provided in **Section 1.4** of this document.

[3] Decision on frameworks for future systems and network regulation | Ofgem

1.6 How does our strategy deliver value?

Our role in Great Britain's energy system means that we can provide unique value for our industry. This strategy will deliver tangible and significant value by fostering collaboration, employing effective and forward-looking solutions, and aligning the industry's digital efforts to maximise value at the lowest cost. Below are the four value pools where we can make the most impact for our customers.

Value Driven	Responsive & Efficient	A Trusted Advisor	Engaged with Customers
We aim to deliver digital tools and services that **maximise value** for customers and the entire energy sector **at the lowest cost**	We prioritise the rapid deployment of proactive and **effective solutions** that **that meet internal and external needs** while also being **adaptable** to future requirements	We provide industry thought leadership and facilitate a **transparent** and **collaborative** energy sector through **open and discoverable data**	We seek to continuously gather customer feedback and to use it to **improve customers' digital interactions**

We have identified a number of metrics to demonstrate our progress and the value our DSAP is delivering. These can be found in **Appendix B: Digitalisation Metrics**.

1.7 How has our Digitalisation Strategy ambition been designed?

We have designed this Digitalisation Strategy to be flexible and agile enough to live on a sliding spectrum, adjusting to regulatory and market developments.

While still complex, today's business solutions are built around legacy tools designed to operate an electricity transmission system made of large, singular points of generation.

The FSO's scope is evolving and the variables from the Future Energy Scenarios[4] and the Electricity+ Framework[5] will evolve business expectations and opportunities.

As our own role evolves and as the industry evolves at a pace faster than ever before, it is essential that our Digitalisation Strategy becomes a living document that we continuously iterate to match industry and organisational needs and priorities. This will ensure our digitalisation efforts stay aligned with our FSO scope.

[4] FES Documents | ESO (nationalgrideso.com)

[5] Electricity+: Electricity as the Backbone of an Integrated Energy System | World Economic Forum (weforum.org)

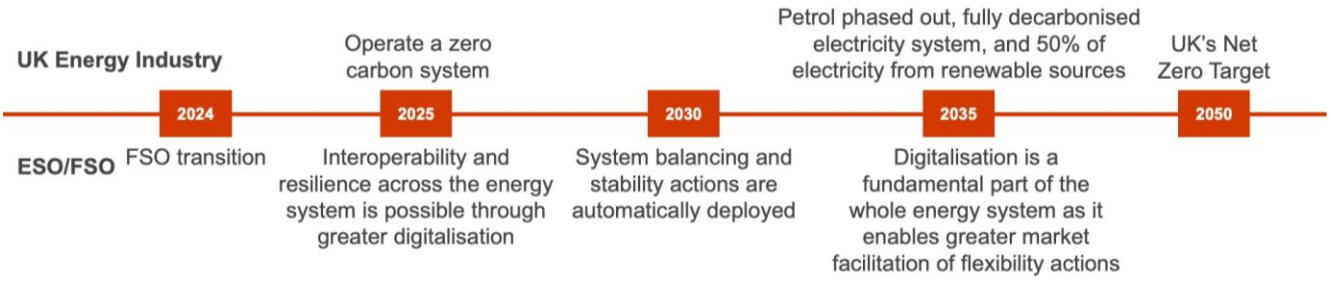
Chapter 2: The Case for Change

2.1 Why we need this Digitalisation Strategy

Against the backdrop of a cost-of-living crisis, the impact echo of the Ukraine war on security of supply, and the huge strides still required to achieve net zero by 2050, the competing demands of the energy trilemma are evident. We must be an enabler to the new technologies, business models, and changes in consumer behaviour that will decarbonise the energy system by 2035 and achieve net zero.

Unparalleled change is needed across the whole system to transition away from fossil fuels and deliver clean, green, and affordable energy for everyone across Great Britain. Collaboration with and amongst our customers is the only way we can achieve these decarbonisation goals. We need to work together to develop, implement, and adopt game-changing technologies to reduce costs and realise targets.

One of our key messages in our 2023 Future Energy Scenarios centres around consumer and digitalisation.



Customer engagement plays a crucial role in the transition towards a sustainable and secure energy system, while reducing energy costs. Removal of barriers to participation enables customers to become an active partner in the delivery of net zero. Innovation and smart digital solutions are required to give more granular and regional insights and to enable informed customer participation in the industry and its markets.

2.2 Industry Drivers of Change

Beyond the decarbonisation goals, the energy industry is fundamentally changing the way in which it operates. The new paradigm should be embraced to ensure change happens at the pace required to achieve industry goals. Each of the transitions noted below comes with its own challenges and opportunities.

Digitalisation, as well as open data, will underpin the transition to net zero through better monitoring and management of the system, improved sharing of large quantities of high-quality data and the analytics that this enables, and the development of customer-centric solutions. This is key to navigating the increasing industry complexity at the lowest cost for consumers. It is a key facilitator to our overall mission, broader strategies and investment plans.

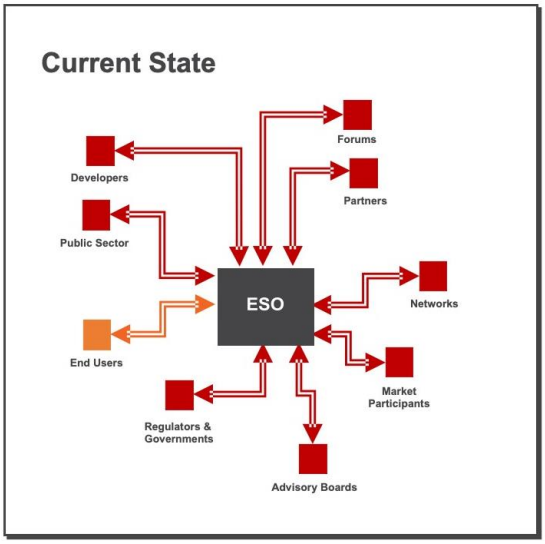
2.3 Transitioning to the FSO

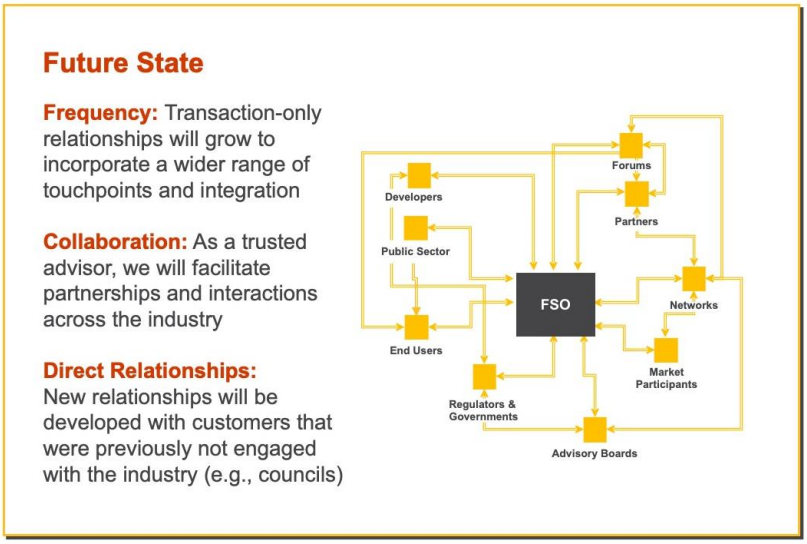
The FSO aims to achieve three objectives from a sustainable whole energy system perspective: Net Zero, Security of Supply, and Efficiency & Economy. Traditionally, Britain's energy system has been split into two areas – gas and electricity – but to effectively address the industry drivers of change there needs to be co-ordination across the whole energy system, with one single entity responsible for translating policy into immediate strategy. This is where the real value of the FSO will be delivered.

From a digital perspective, the FSO will provide more regionally specific, multivector data. It will require new digital and data approaches with solutions and processes that do not yet exist. A long-term and whole system approach means that we are rightly placed to advise on the technology and systems needed to be designed and built to support the delivery of Great Britain's net zero commitments, as well as the standards that govern them.

2.4 Changing the Way We Work Together

Our FSO transition will evolve how frequently and closely we work with the wider industry on a wider range of topics. These relationships are key to developing whole energy system visibility for decision making and innovation. Intertwined processes, innovation collaborations, and open data will help keep industry costs low as we go through immense changes. To better facilitate these endeavours, our industry needs to align on foundational digital and data directions.





2.5 The Path Forward

As our ways of working together evolve, the ESO must become a credible leader to facilitate the industry's digital efforts. We know that our pathway to Digital Leader has some pre-requisite steps. Our ongoing technology modernisation efforts, described in our previous Digitalisation Strategy from March 2022,[6] must finish our baseline enhancements to our legacy systems before we can fully embody Digital First.

The Digitalisation Strategy Pillars from our previous strategy are still relevant to our business today. We are building upon these prior efforts on open data, digital market enablement, advanced digital tools, and our ways of working through this new strategy. The three elements of the ways of working pillar: digital mindset, product

[6] March 2022 Digitalisation Strategy

model, and agile delivery, established our path toward customer-centric design thinking, DevSecOps, and agile and iterative development methodologies which we are still progressing throughout our business.

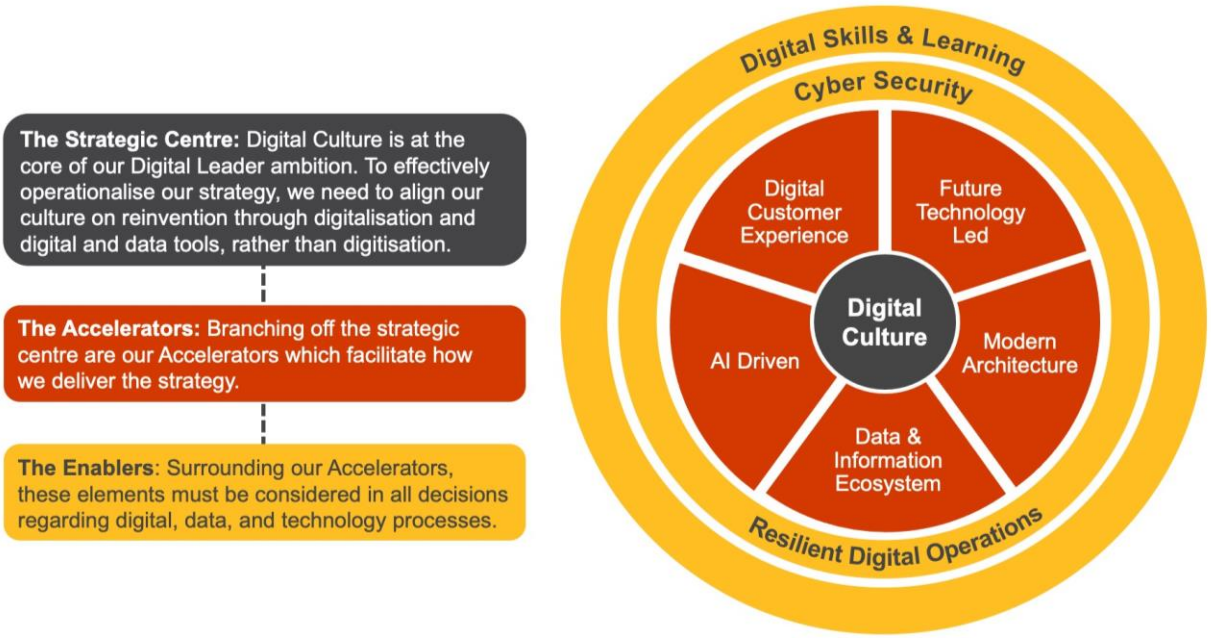
As we move into our Digital First phase, we are changing the way we solve problems, creating solutions based on customer needs and available technologies rather than updating legacy processes to try to meet new needs. We will continue to take a customer-centric approach to technologies and processes, but we will also expand our digital focus to develop the right tools to solve business problems for the wider energy industry. To be Digital First, we will need to go beyond the digital mindset, product model, and agile delivery elements to create a workforce that is leading the industry in digital fluency and adoption of the newest technological advancements. We have created the following Digital Strategy Principles to guide us in this shift.

Chapter 3: Our Digitalisation Strategy Principles

3.1 How our Digitalisation Strategy has evolved

In response to Ofgem's seven Digitalisation Strategy and Action Plan Guidance Principles, the Energy Digitalisation Taskforce (EDiT) recommendations, and the Government's Digital Services (GDS) standards, we developed a series of strategic pillars that aligned to the core delivery roles that have been used since 2019. A detailed analysis of these pillars and our FSO endeavours concluded that their broadness was outdated and needed to be refined to more accurately reflect our changing role in the energy sector.

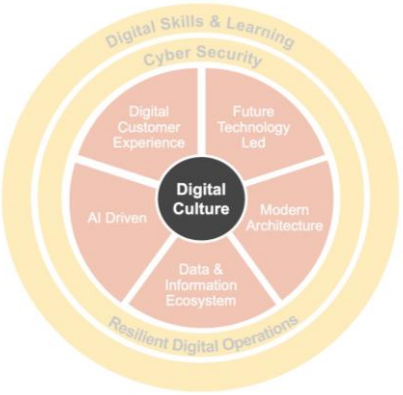
As a result, we created our new Digitalisation Strategy Principles. These nine Principles, explained in detail throughout the rest of this chapter, will guide the ESO's investment and prioritisation of technology and data decisions. They are depicted as a wheel made of three categories:



All Principles work together to create a Digital First ESO, bringing improvements and efficiency to digital interactions for the industry and for internal customers. These components aim to increase automation and digital assistance so that our employees can focus on high value, complex, and strategic tasks. They also aim to increase industry transparency and availability of data at a crucial time of transition.

Throughout the next several sections, we explore each of these Principles in detail and highlight how these will impact the way we do business. Additionally, our **Digitalisation Action Plan** features new crosscutting efforts for each Principle that were not previously included in our BP2 submission but that we believe are instrumental in achieving our Digitalisation Strategy ambitions and our FSO objectives.

3.2 The Strategic Centre: Digital Culture[7]



Aligned with Energy Systems Catapult recommendations for a Digitalised Energy System,8 Digital Culture is embraced as the strategic centre of our new Digitalisation Strategy Principles, and thus our Digital Leader ambition. To effectively operationalise our strategy, we need to align our culture on whole energy system reinvention through digitalisation. Embracing digital and data technologies can provide added security and safeguards while reducing costs through optimisation.

Digital Culture: What it means

An organisation-wide mindset that applies data and technology to everything we do and prioritises digital innovation, agility, security, and continuous learning to drive digital transformation.

Our responsibilities are growing, and with them our need to rely on industry digital and data assets. To fulfill those responsibilities, we are continuing with the DevSecOps and agile delivery ways of working from our previous strategy while influencing the adoption of new digital instincts across the organisation. The behaviours our Digital Culture will cultivate are essential to the adoption of new technologies, analytical processes, and innovation. Without them, our strategy will not move at the pace needed for decarbonisation.

What good will look like

Employees have the resources and space to digitally reinvent and innovate their work, collaborating with others to make change a reality.

The organisation embeds feedback loops into problem-solving processes to ensure we are addressing internal and industry problems at speed and with the right tools.

Technology and data solution ideation looks beyond the present time and starts with an ideal end in mind, rather than existing processes and procedures.

Our Digital Culture Behaviours

Growth Mindset
We will persistently seek new, innovative and better solutions that prepare for the unknowns of the whole energy system by continuously learning and experimenting new skills, technologies and methodologies.

Data Driven
We will prioritise the collection, analysis and usage of data, through recognised means and methods, to inform decision making and we mandate transparent metrics in the pursuit of continuous improvement.

Progress at Pace
We will deliver value to our customers at pace by listening to their needs, involving them in solutioning, and leveraging digital technologies, automation, and innovative solutions in iterative approaches to problem solving

Highly Engaged
We will enable and actively engage with internal and external customers to work together seamlessly, utilising digital tools and platforms to share information, ideas, and expertise to advance the industry.

Results Obsessed
We will be accountable for delivering tangible results that directly benefit our customers and we will measure our success through key performance indicators and regular feedback conversations with our customers.

[7] Our Digital Culture will be further refined and integrated with our FSO culture once that has been formally established.

[8] Delivering a Digitalised Energy System - Energy Systems Catapult

Our Approach to Developing a Digital Culture

We have developed a two-part approach to ensuring these behaviours are developed thoroughly and consistently across the organisation.

First, we are introducing **Digital Charters** to provide a vision for each key business area, embracing the 'art of the possible' in those visions. These charters will specify the roadmap to achieve Digital First in each respective business area, clarifying expectations for collaboration. The first focus areas for our Digital Charters will be in the following areas: Customers, Connections, Strategic Spatial Energy Plan, Regional Energy Strategic Planning and Security of Supply.

Second, we are **Developing and Deepening In-House Capability,** building and enhancing the organisation's internal expertise, knowledge, and skills to perform digital and data functions independently and efficiently. Our organisation will develop and implement a capability development campaign on new skills (e.g., Agile, DevSecOps, Design Thinking, Cloud, AI, Data Engineering), host immersive workshops and showcase with real life innovation examples (inhouse, industry wide, and with universities) to provide a safe environment for experiment-based learning and to understand coming technologies, and provision avenues such as lunch-and-learns, coding cafes, tech talks, hackathons, and digital wikis to foster a continuous informal learning ethos. For these new capabilities to be effective, several digital and data building blocks will need to be in place. Further details on how we are tackling our workforce capabilities can be found in section **3.3 Enabler: Digital Skills and Learning**.

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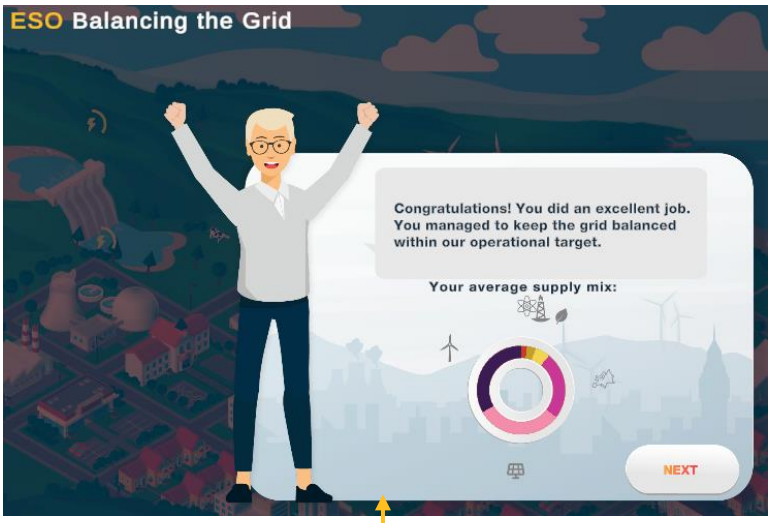
Case Study: Gamification

Using gamification to foster our Digital Culture can create a fun and engaging environment while furthering the adoption of digital tools and practices. Gamification is the application of game elements and design techniques in non-game contexts to achieve practical outcomes. It makes real-life activities exciting and effective by weaving in competitiveness and rewards.

As our internal customer personas are updated, we will use them to apply various gamification techniques to help in achieving our business objectives. A few example options we are exploring are:



Simulation Games
Continuing to build digital replicas, like the Virtual Energy System, and combining it with AI and historical disaster scenario data will improve our ability to simulate real-world challenges that the organisation will face. Putting these into interactive games will create risk-free digital environments to practice problem-solving. For example, to demonstrate some of the challenges control room operatives face every day, we developed Balance the Grid.

Leaderboards
Leaderboards will showcase individual and team achievements in digital skills and successful digital process adoption. Healthy competition grows camaraderie and recognition can increase job satisfaction and advancement.

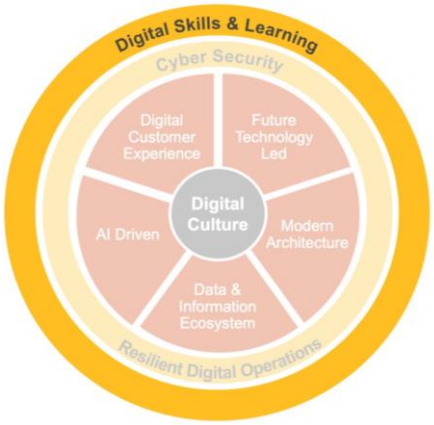
Digital Adoption Challenges
Challenges and quests aimed to increase the mastery of new digital tools and technologies. Participants will be rewarded for completing tasks and achieving milestones.

Innovation Contests
Employees will submit ideas for innovation contests where the most feasible and impactful proposals are rewarded. The employees that create winning proposals that can be developed internally can be seconded into roles to further the organisation's progress in that space.

What this means for a new joiner

As a new joiner, gamification can make initial knowledge ramp up a lot more exciting. The challenges and games let them know where their skills are up to par with the rest of the organisation and also pinpoint immediate areas for growth. Leaderboards help to identify the experts that new joiners can go to for help in their growth areas, and it also gives them an opportunity for organisational recognition in areas they are an expert in from previous jobs. People can know their name and the value they will bring to the team in only a matter of weeks! The innovation contests are also a great way for their voice to be heard right from the start, with opportunities to collaborate with others across the organisation that they would not immediately interact with otherwise.

3.3 Enabler: Digital Skills and Learning



Career development and learning opportunities are non-negotiables not only for our workforce, but also for our business to keep up with the changing world around us. The implementation of new technologies is shifting the type of work done by humans and we need to increase the frequency in which we revise our talent strategy to embrace these changes. For the ESO to achieve this Digitalisation Strategy, the net zero ambitions, and lead industry, we will need new skills and capabilities in place. Our Digital Skills and Learning Enabler focuses on defining which digital capabilities and skills we will develop internally and which we will seek externally, as well as how we plan to do so.

Digital Skills & Learning: What it means

Having the knowledge and expertise to implement and manage digital initiatives and a workforce that has the skills to apply data and technology to everything we do.

What good will look like

Operational efficiencies from increased productivity in day-to-day work streamlined by a workforce that embraces digital.

Rapid decision making supported by trustworthy data and digital tools that deliver valuable services to the wider industry.

Motivated and energised employees who embrace innovation and technological advancement with a spirit of continuous improvement.

The five principles below will guide our efforts for this enabler.

Digital Skills and Learning Principles

1. Enhance access and inclusion of digital skills and learning
2. Embed digital skills and learning across the organisation and industry
3. Approach continuous learning through consistent measurement of digital and data capabilities
4. Engage industry and academia to build relevant talent
5. Invest in current and expected future in-demand digital and data skills

These efforts have already kicked off with identifying which capabilities and skills we see as essential for our future FSO scope and the direction of the industry. We have defined capabities as a set of broad attributes, skills, knowledge, and resources that enable us to achieve our goals. Skills are the specific proficiencies and abilities that individuals possess related to a task or function. For example, we have identified multiple skills that will be crucial in our Data and Analytics Capability, such as: handling and managing data, statistics and probability, modelling and visualisation, and AI and machine learning. While we will need additional elements to create this capability, like our Data and Analytics Platform (DAP),[9] these elements are not useful without a workforce that is skilled in implementing and adopting them. With the continual advancement of technology, we will aim to evolve the future skills of our workforce before they are needed for a specific business rollout.

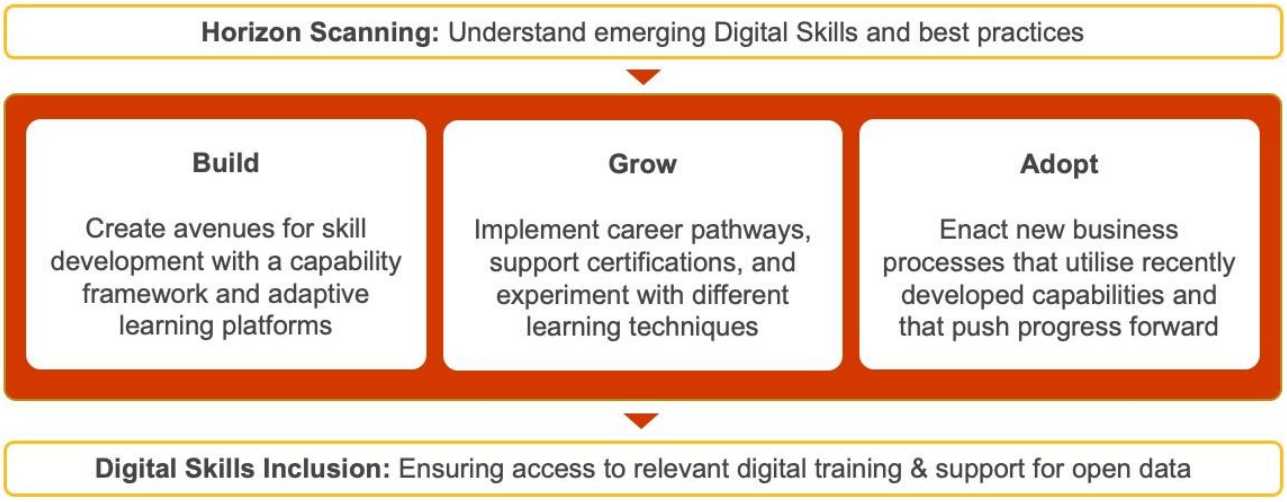
Knowing that our industry needs to recruit for 400,000 jobs between now and 2050 to get the UK to net zero,[10] we will seek to not only develop our existing internal talent but also look to grow external talent pipelines with efforts such as our AI Centre of Excellence and other university programmes.

[9] Our Data and Analytics Platform is explained in detail throughout our BP2 Annex 4: Digital, Data, and Technology here: nationalgrideso.com/document/266131/download

[10] Building the net zero energy workforce | National Grid Group

Our Approach to Digital Skills and Learning

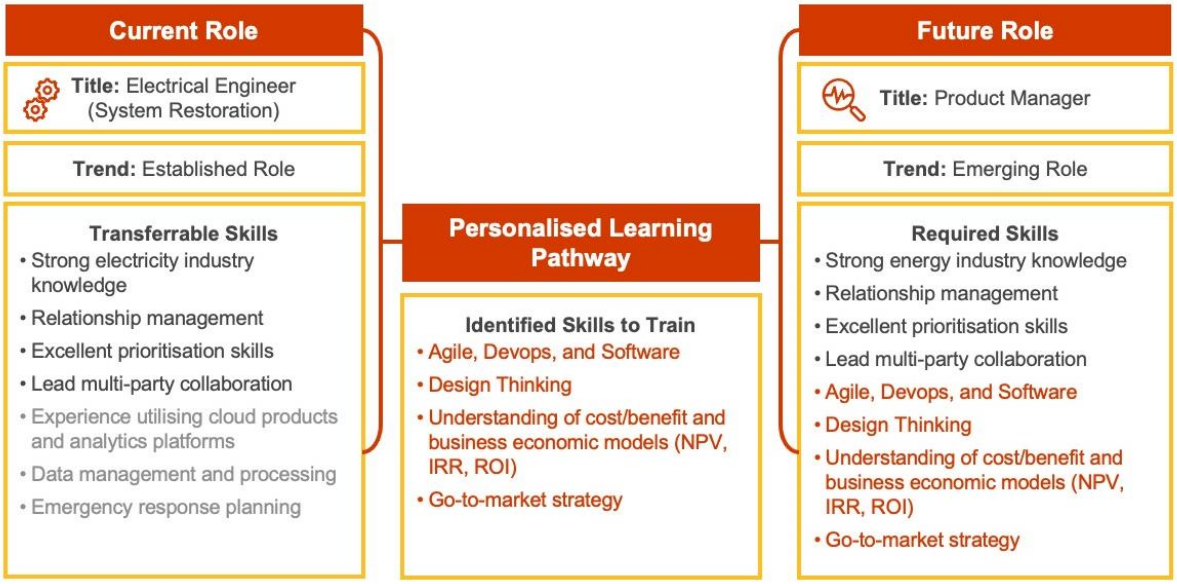
The core of our digital talent strategy will focus on attracting the right talent, building avenues to develop our workforce capabilties, growing our workforce skills, and implementing means to future talent for the industry. Our Future Technology Led Accelerator's horizon scanning will continuously inform our skills and learning programmes to ensure we are embracing emerging technologies and prepared to implement them when they are scalable. Additionally, as we develop our talent strategy, we will determine what trainings can be made public for digital skills inclusion as well as ensure the general public has access to the support tools necessary to enable usage of industry open data.



Case Study: Digital Career Pathways

By getting a better understanding of the future skills needed for our business and for the industry, we can develop career progression pathways for our workforce. With an expected deficit of talent in the industry, it is important that we continue to grow from within and make room for new entrants to the field. Working with employees to determine pathways that are exciting to them can help renew interest and spark new engagement, but only if the right tools are available for their successful transition.

Example Career Pathway



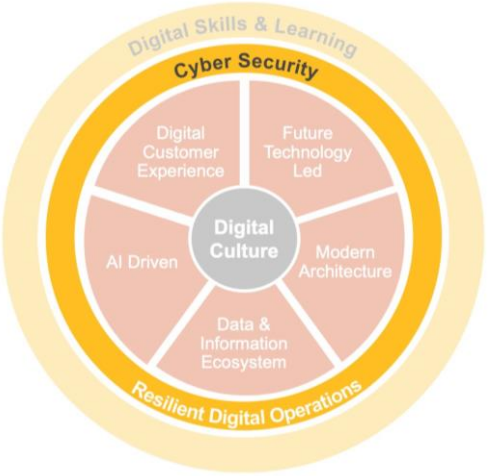
World Economic Forum's Future of Work Pilot, 2021

What this means for an ESO Electrical Engineer

Some of our electrical engineering roles can be niche and highly specialised by nature. Learning curves are steep and these employees often join a small pool of highly regarded experts in industry. However, after years in this type of role some are ready to grow their skillset unlocking new opportunities. Their skills can be incredibly powerful when put to use in other parts of the business, but it can be difficult to know which new skills will be most effective and where to start the learning process. There is so much out there! The implementation of career progression pathways helps provide a learning roadmap on the skills needed to make the transition into a new role that will pique individual employee interests. Easily accessible training means it can be included throughout workweek and having clearly established pathways helps leaders to better understand their employee's aspirations and progress. They can work in partnership with leaders actively supporting individuals by facilitating learning within existing roles and balancing work tasks with dedicated training sessions.

3.4 Enabler: Cyber Security

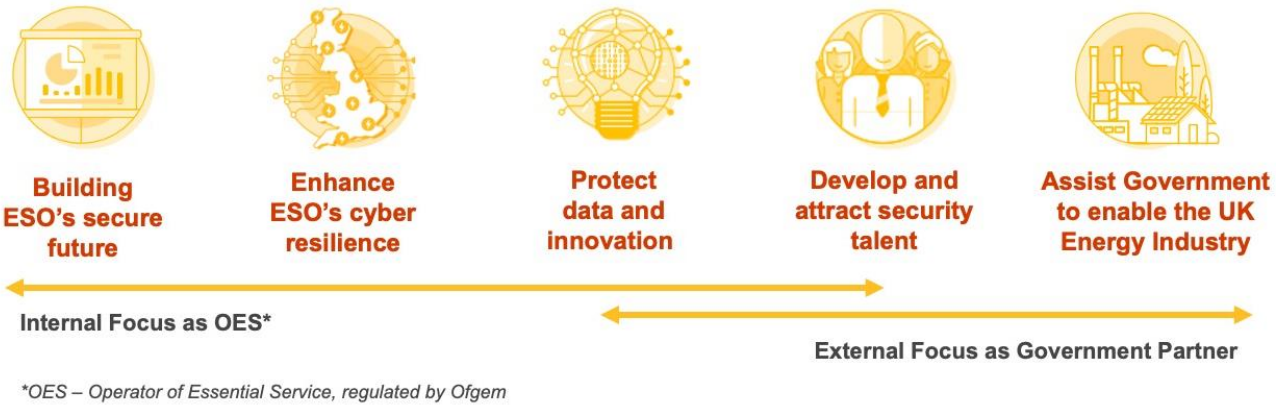
Our role in the Great Britain energy ecosystem means that the protection of our assets, people and technology has long been a priority for our business. As the nature of the threat and the needs of our stakeholders change, our response must continually evolve, enabling us to meet a new set of challenges head on. Behind each digital component of our business, there is an element of Cyber Security to keep our business and Critical National Infrastructure safe.



Cyber Security: What it means

Creating a resilient and secure organisation focused on ensuring that supply and demand is always met, while protecting customers, people and their data, and being an industry leading organisation, innovating, enabling, and leading the way for a secure transition to net zero.

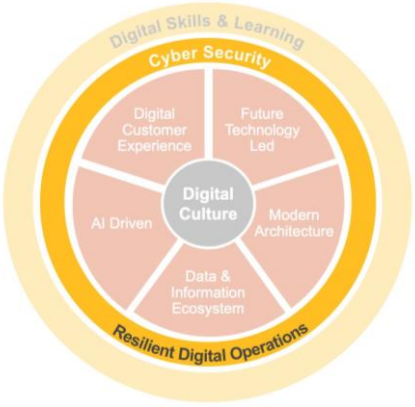
Our Cyber Security efforts focus on five key principles:



Please note that due to the sensitive nature of our security information and the need to safeguard against possible security threats, additional information has been excluded from this DSAP.

3.5 Enabler: Resilient Digital Operations

Resilient Digital Operations are essential to keeping sensitive information safe and ensuring our customers can consistently rely upon our markets and platforms. We leverage the application of digital technologies and Site Reliability Engineering (SRE) to help us proactively monitor and respond more efficiently through disruption – whether that disruption is a crisis or an opportunity.



Resilient Digital Operations: What it means

Resilience across digital infrastructure, systems, platforms, processes and teams to maximise operational agility and protect against ever-evolving physical and environmental threats.

Our Resilient Digital Operations efforts focus on three key approaches:

Redundancy and Intersection

Embracing DevSecOps principles through the utilisation of SRE and modernising our network

Advanced Incident Response

Anticipating industry needs and leveraging advanced AIOps in monitoring and response

Risk and Stress Proofing

Moving from Monitoring to Observability to get new insights on why failures have occurred

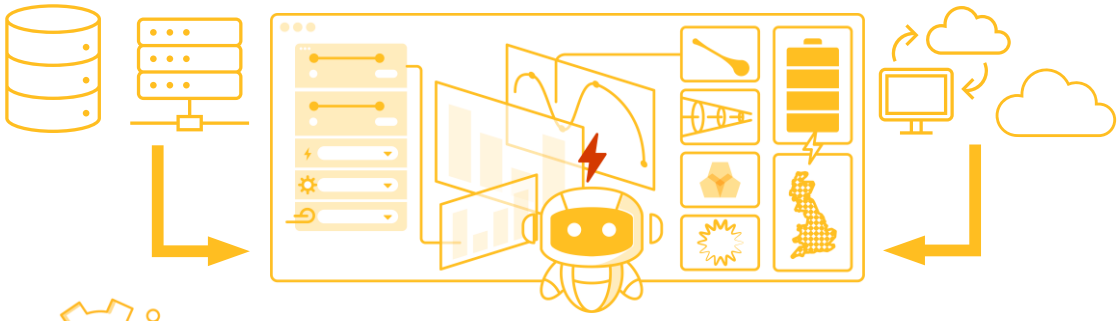
Please note that due to the sensitive nature of our operational information and the need to safeguard against possible security threats, additional information has been excluded from this DSAP.

ESO

Case Study: Network Control Management

To enhance our ability to take actions more quickly in the control room, we are upgrading our Network Control Management System (NCMS) to integrate it with our new Critical National Infrastructure (CNI) data centres. This will be an agile tool that will be able to adapt to the changing system requirements and ensure continued cyber resilience in a rapidly changing landscape. The NCMS plays a key role within the wider IT system landscape to support whole system operation, enabling greater interoperability with the Distribution System Operators (DSOs).

NCMS consists of a hybrid environment of a legacy server client-based architecture working together with a modern cloud-based containerisation platform. This brings our Digital Resilient Operations principles into our critical systems by leveraging cloud methodologies to make resilience and scalability seamless.



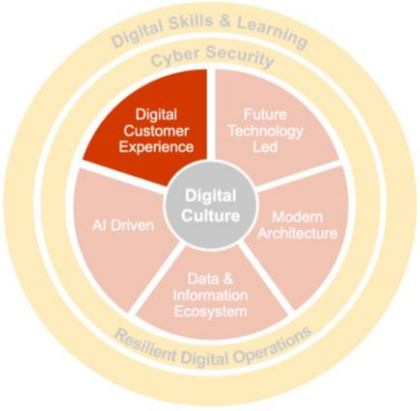
Where possible, we utilise virtual machines and failovers, leveraging open-source containerisation orchestration systems (e.g., Kubernetes) to make workloads scalable and resilient to underlying hardware and software issues. Our CNI operations span across multiple data centres so that our entire digital operations are N-1 fault and failure tolerant.

What this means for a Distribution System Operator (DSO)

DSOs need to coordinate with ESO to manage real time operations and plan contingencies in the event of a system incident. This is predominately focused on the operation of networks and relates mostly to general technical co-ordination. For example, ESO dispatches distributed energy resources (DERs) at a distribution level, which requires intervention from DSOs to manage a variety of real time system conditions.

Coordination is required on a number of items, such as: service dispatch, operational liaisons, and incident planning and management. As DSO systems are also interoperable with the NCMS at ESO, there is seamless sharing of data and information leading to faster response times, built on the confidence of resilient and fault tolerant network operations.

3.6 Accelerator: Digital Customer Experience



Our first Accelerator is Digital Customer Experience because the needs of our customers drive the rest of our strategic endeavours. This Accelerator is reciprocal with our Customer Strategy as we become more integrated with our customers and their processes. It seeks to create a deeper understanding of changing customer needs and establish how we can best work together on solutions.

Digital Customer Experience: What it means

Prioritisation of internal and external customer experiences in our actions and decisions, anticipating future customer needs and responding quickly with appropriate digital products and processes.

We strive to be proactive, responsive, and data-driven in delivering an exceptional and continuously improving digital experience, from facilitating industry collaborations that will improve digital for the whole energy system to developing intuitive user designs for our platforms and automations. Our efforts aim to enable and empower our customers.

Both internal and external customers can expect increased effort in the ESO understanding and anticipating their needs. We will be adopting a new customer service operating model to streamline query and complaint management, as well as enhance relationships with external customers. This information will feed into solutions that are aimed to be developed before customers realise their need for them. These solutions will also include more personalised and user-friendly interfaces. We will determine the most impactful strategies for our different customer groups and increase the amount of self-service and self-help options so that customers can get to what they need faster. This Accelerator aims to reduce complexity and mundane tasks so that all customers can focus their time on more value-add elements of their work.

What good will look like

Increased efficiency & improved customer experiences by utilising a content knowledge library and self-serve options that reduce the time to value.

Increased Customer Satisfaction scores & Trusted Partner scores by predicting and anticipating changing customer needs.

Increased Employee Satisfaction scores from ensuring employees have the correct tools to do their jobs that also enable process streamlining and automation.

Additionally, we are focusing on updating the ways we work together on digital and data initiatives specifically by implementing a new hub-and-spoke data operating model that embraces our new independent beginning as the FSO. This operating model creates clarity on responsibilities across our organisation and better enables us to interact with internal and external customers on their digital needs. We are working to better align our internal and external messaging on our digital direction and increase our change management efforts to increase the pace of innovation adoption.

As our customer base continues to grow, we will be increasing our external engagements and transparency as well as leading collaborations with industry peers to develop common frameworks that will improve interoperability through commonality and standardisation.

Our Approach to Enhancing Digital Customer Experiences

To ensure we are focusing on the right priorities that will have the most impact, we have developed a six-step approach to optimise our customer efforts.

The solutions we develop through this approach are designed with the end in mind to meet the customer need in the way the customer needs it. They will be developed collaboratively and from a Digital First perspective with reinvention at the top of mind, rather than always building off legacy solutions. We determine the customer need, then determine the ideal solution before looking for the technological approach to creating that solution.

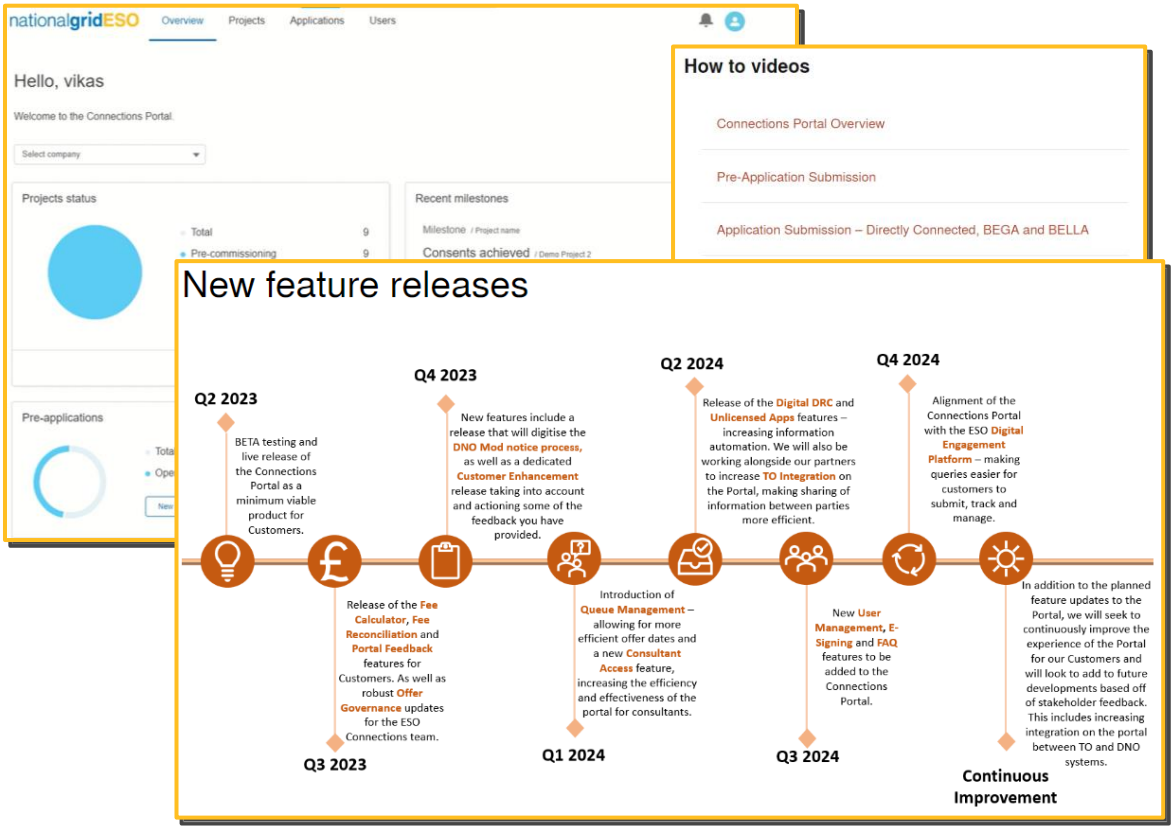
Digital Customer Experience in Practice

As we developed this Digitalisation Strategy, we wanted to make sure we were tackling the right issues. Throughout our Digitalisation Strategy Principles you will see examples of real projects that are aimed at making the lives of internal and external customers easier.

Case Study: Connections Portal

As energy has become more distributed, the number of grid connection inquiries has increased, resulting in the need for the Connections Reform. Many of the inquiries are coming from new market entrants that are not familiar with historical processes and the intricacies of the industry. Additionally, the historical processes have been opaque without an easy way to get progress updates or make changes to submissions.

The connections offer process[11] and the new Connections Portal[12] has streamlined the multiparty process of determining the feasibility of a customer's electricity grid connection. It creates an online avenue for the application for connections and other agreements, increases transparency of progress on ongoing applications, identifies the customer's Connections Contract Manager, and enables transparent query resolution. The portal has been designed with user-friendly dashboards, training videos, and we have set expectations on planned future releases.



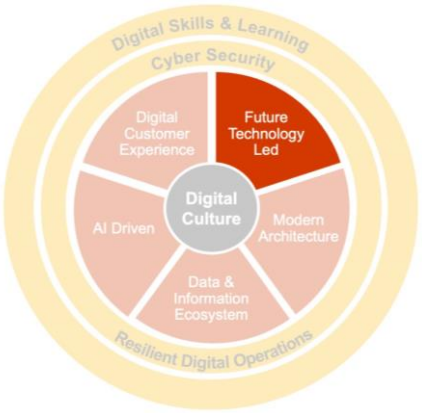
What this means for an Electric Vehicle Infrastructure Provider

These providers often manage the connections requests for new electric vehicle infrastructure on behalf of their customers. In the historical connections process, it was difficult for them to give customers an update on their respective project because there was no transparency into the transmission operator and energy system operator processes. It was all about who you know and what their capacity was to look into requests. Those requests might not even be about projects in that person's portfolio. With the new connections portal, these providers can check a dashboard for progress updates and track the resolution of their queries so that they can get back to their customers on their questions in a fraction of the time. It also helps them to plan projects more strategically when they have access to application progress updates.

[11] nationalgrideso.com/industry-information/connections/connections-offer-process

[12] nationalgrideso.com/industry-information/connections/connections-portal

3.7 Accelerator: Future Technology Led



A zero carbon Great Britain electricity system will not be possible without technological innovation. Our Future Technology Led Accelerator is an eye towards the future, enabling the consideration of technology trends in our decision-making and planning.

Future Technology Led: What it means

Evaluating technologies and scientific innovations for their relevance and potential impact, and proactively exploring the opportunities and threats with internal and external experts.

The world is changing more rapidly than ever before, and our industry needs to keep up with that pace. At the ESO, we have implemented a series of horizon scanning efforts to keep abreast of the changes that will impact our business and the wider energy system. We scan across Political, Economic, Sociological, Technological, Legal, and Environmental (PESTLE) external factors at an organisational level and we are placing a particular focus on monitoring and evaluating emerging technologies, given the speed of technological change. Having an eye on industry specific developments and general technology trends informs our decisions and significantly impacts all our Digitalisation Strategy Principles as we work to become a more forward-looking organisation.

What good will look like

Engagement with external technology ecosystems that enables us to explore nascent technologies, influence their development and realise benefits for the energy system.

Embraced innovation, learning and continuous improvement within ESO, that welcomes disruptive technologies and learns lessons from other sectors.

ESO-driven technological innovation across the future energy landscape in collaboration with third parties.

Through our technology horizon scanning we will identify emerging technologies and trends, and the opportunities and threats they present to the ESO and the wider energy system. We will evaluate the potential impacts of the emerging technologies and prioritise them accordingly for deeper investigation. For priority technologies we will explore adoption considerations (such as future skills requirements, architecture needs and ethical matters), generate use case ideas and build relationships with the external technology ecosystem.

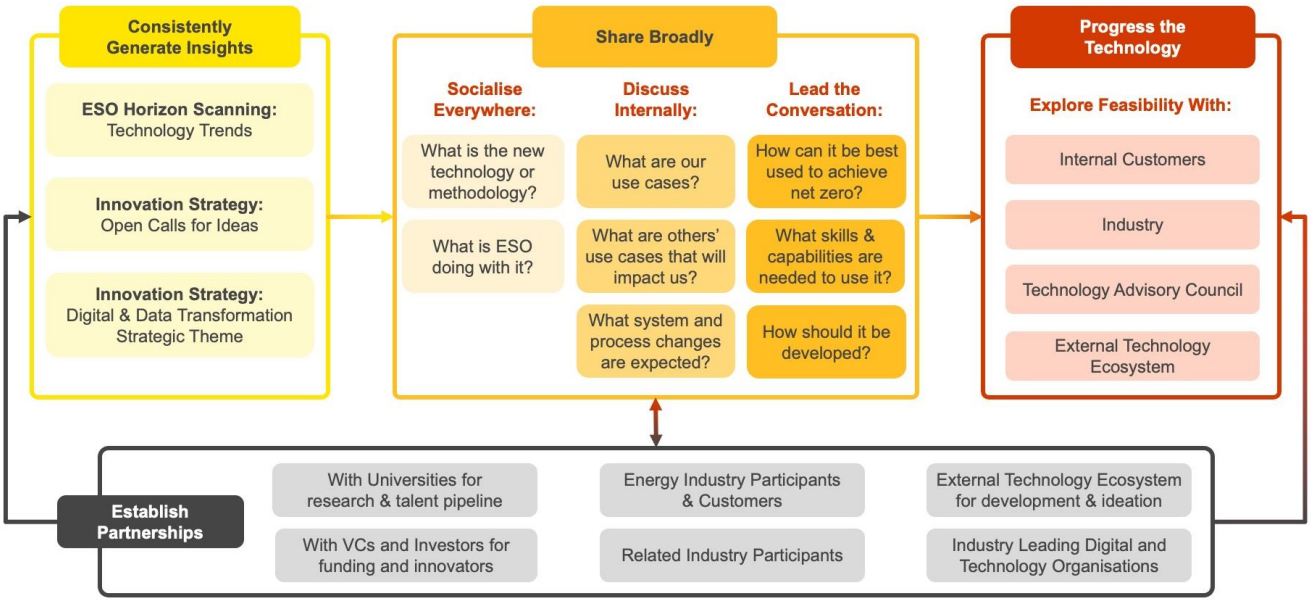
The insights generated through technology horizon scanning will be brought to the attention of colleagues who can take appropriate actions through an internal review process. This process will include the establishment of a quarterly Digital, Data and Technology horizon scanning forum and close integration with the organisational level processes for horizon scanning. We expect that many of the insights we generate will lead to ideas for innovation projects. Therefore, this Accelerator is closely aligned with our Innovation Strategy[13] which hosts public open calls for innovative ideas and enables experimentation with nascent technologies that could be instrumental to the industry.

Finally, this Accelerator will build internal awareness and understanding of emerging technologies, through colleague communications and events. It is essential that we bring our workforce along the path of ideation and creation. From giving visibility of insights to creating avenues for employee ideation, we will need to make sure that we are bringing insights to life in the everyday scope of the ESO's work. This engagement will be underpinned by the development of an Innovation Horizon Insights Library that provides open access to the technology horizon scanning outputs for all colleagues.

[13] nationalgrideso.com/future-energy/innovation/innovation-strategy

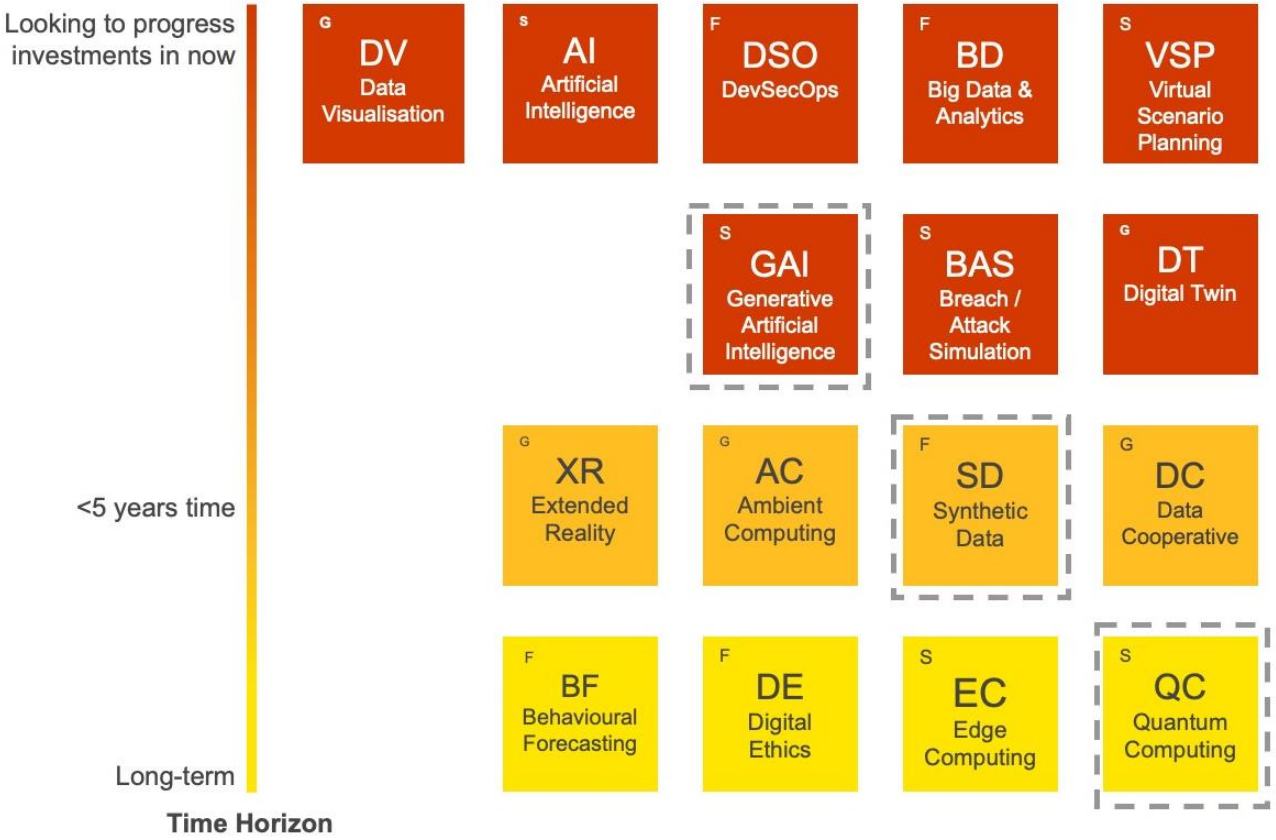
Our Approach to Being Future Technology Led

External partners will be instrumental to every step of our Future Technology Led process. We will identify and nurture relationships that enable knowledge sharing and experimentation with emerging technologies. Our relationships within technology ecosystems will also allow us to influence the external development of emerging technologies towards the needs of the future energy system and create common sandbox environments where we can test new technologies with relevant partners. This will drive innovation for the future energy landscape, while also revealing opportunities for third parties to collaborate with us on innovation projects and other initiatives. We are working diligently to remove blockers to collaboration in our innovation processes and we wish to partner with a wider range of innovators in future, including small and medium-sized enterprises and start-ups.



Our technology areas of focus

As we look towards both our future and that of the industry, there are several technologies and digital capabilities that we see a need for further exploring through our Innovation Strategy and our Future Technology Led Accelerator. The table below shows each of these technologies and when we think they will need further investment. On the next several pages, we dive into a subset of these technologies to show their potential and where we are in our exploration phase for each.



F,G,S
X
XX

F – A field of study
G – A grouping of technologies
S – A single technology
X – Technology symbol
XX – Technology name

See further Deep-Dives later in this document

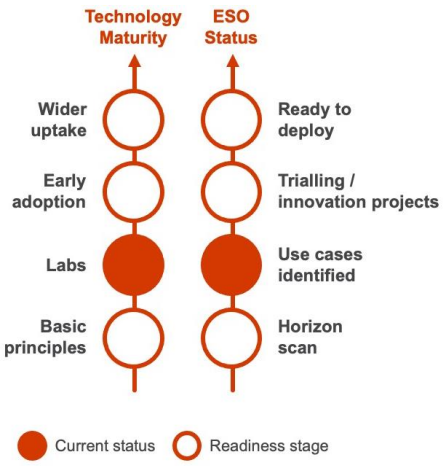
Horizon Scan: Computing and Hardware

How we think about it at the ESO

As our requirements for data processing and Artificial Intelligence (AI) grow, we must plan to exploit the opportunities offered by advances in computing, including high performance computing, edge computing and quantum computing. At the same time, we must be mindful of the environmental impacts and find sustainable solutions with technology partners. Moore's Law, which posits that computing power doubles on approximately every two years, is also likely to reach its physical limits in the next decade. This could lead to alternative hardware breakthroughs and potential impacts on the decarbonisation and digitalisation of our sector.

Deep Dive: Quantum Computing

This is a new kind of computing that exploits the unusual properties of subatomic particles. It has the potential to massively speed up computations for certain kinds of problems, potentially taking seconds to solve problems that would take 'classical' supercomputers thousands of years to solve. Quantum computers are highly unlikely to replace most of our computing needs, but they do have the potential to transform how we approach some problems in optimisation, simulation, and machine learning. Potential uses of Quantum Computing in the energy sector include large-scale coordination of distributed energy resources, long-term system planning and simulating the system impacts of new technologies (e.g., smart devices).



ESO Next Steps

Improving awareness and pathways for skills and capabilities

Identifying high value use-cases

Where you can keep up to date

- National Quantum Technologies Programme (NQTP) – a £1 billion dynamic collaboration between UK industry, academia and government.
- National Quantum Computing Centre (NQCC) – the UK's national lab for quantum computing. Th NQCC works with businesses, government and the research community to deliver quantum computing capabilities for the UK.

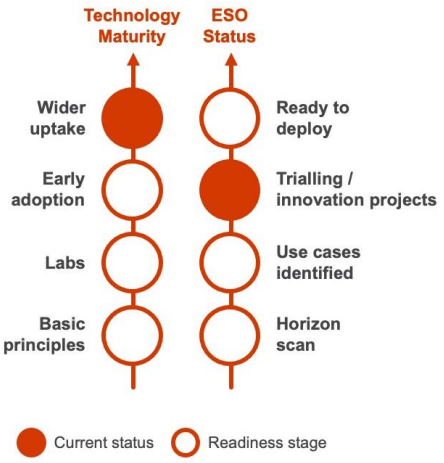
Horizon Scan: Modelling and AI

How we think about it at the ESO

We already use mathematical and statistical modelling extensively in our work, from forecasting generation and demand, to simulating the impacts of new connections to the transmission network. Artificial Intelligence (AI) and Machine Learning (ML) offer new opportunities for improving model accuracy (as already achieved in the Solar PV Nowcasting case study) and drastically reducing model run times. However, we must also balance the limitations and risks of AI, such as the lack of explanation for its results and the potential for perpetuating bias and misinformation. This is a rapidly developing technology landscape and it is a priority area for our horizon scanning.

Deep Dive: Generative AI

Generative AI (e.g., ChatGPT, DALL-E, Bard) is a type of Artificial Intelligence that creates a wide range of information beyond that of text and numerical responses. It can include video, audio and more. Acting like a personal assistant, Generative AI tools can be an 'all-seeing eye', aggregating information from different sources and producing user specific responses to requests of all levels, from a customer question on connection processes to a Power System Engineer question on historical grid patterns. A key potential use case of Generative AI in the energy sector is the ability for digital assistants that can offer statistically preferrable decision options based on large quantities of historical and current data.



ESO Next Steps

Internal Trialling

Governance and Standards

Where you can keep up to date

- **Digital Catapult** - the UK authority on advanced digital technology, with expertise in artificial intelligence and machine learning.
- **The Alan Turing Institute** - the UK's national institute for data science and artificial intelligence.

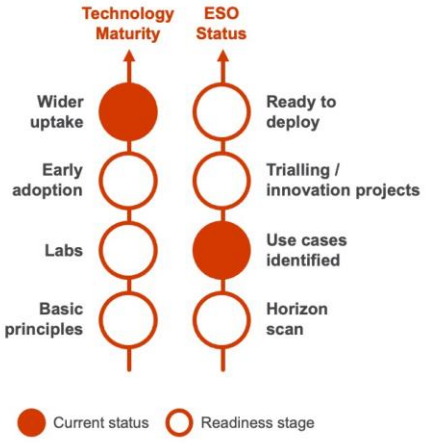
Horizon Scan: Data and Connectivity

How we think about it at the ESO

The amount of data generated to support energy system operations continues to grow with new sources of data coming from innovations in sensors, space technologies, Internet of Things and synthetic data. Advances in connectivity promise to allow real-time sharing of data that can unlock new business models and boost automation. As the scale of data continues to grow, we must consider new ways of collating, integrating, processing and storing it. Innovation is required in data management and data privacy, to overcome the limitations of traditional approaches and ensure that information is accessible to the people and organisations that can use it to drive consumer and societal benefit.

Deep Dive: Synthetic Data

Synthetic data is a specific type of Privacy Enhancing Technology (PET) that resembles real data sets without compromising privacy of the original data sets. This data, though similar in nature to the source data, limits the risk of classified or secured data being used unfavourably while allowing for a statistical analysis matching that of the original data set. Alternatively, it can be used to build upon small datasets to create enough data for robust and statistically significant model development. A key potential use-case of Synthetic Data in the energy sector could be improving regional modelling of different energy sector scenarios for emergency preparation and response planning.



ESO Next Steps

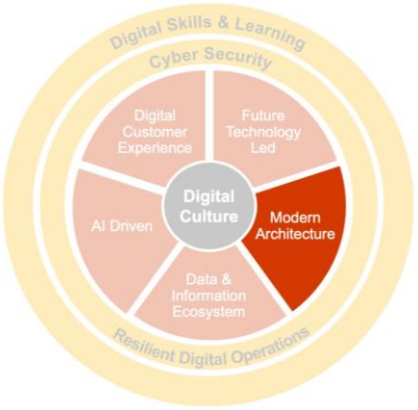
Identifying high value use-cases

Preparing Training Data

Where you can keep up to date

- **The Open Data Institute** (ODI) - the ODI works with organisations to build data infrastructure, knowledge, and strategies that create trust in data and data practices.

3.8 Accelerator: Modern Architecture



Our enterprise architecture is the foundation for how we operate as a digital and data centric business. The adoption of Modern Architecture enables a transformation to ways of working that focus on our customers with iterative agile development and release cycles.

Accelerator: Modern Architecture: What it means

Utilising modern, scalable, and secure architectures that can efficiently respond to changing demands and processing requirements while improving processes and system performance for end-users.

A full migration to cloud-based applications has always been a difficult path for organisations that deal with critical national infrastructure, however, developments in recent years are better establishing the path. We are evaluating our operations to see where we can further replace, renovate and scale applications through cloud-based, modular and loosely coupled designs. These cloud designs will improve our cyber security, enhance our operational stability and Resilient Digital Operations, create cost efficiencies, increase deployment speeds, and enable innovation through greater interoperability.

Our cloud-first approach will prioritise technology changes and implementations by customer need, business problem, and net zero ambition. Maximum customer value and benefit will be delivered through the alignment of Modern Architecture, Digital Customer Experience, and our ways of working.

What good will look like

Accelerated speed to value through a cloud-first approach that scales and rapidly deploys solutions based on business needs.

A future proof digital landscape that considers a whole energy system and facilitates cross-industry collaboration.

Simplified architecture that improves self-serve capabilities for internal and external customers.

Our Approach to Modern Architecture

We will retire, refactor or replace legacy architecture, technology and solution designs with modern architecture and technology aligned to our Modern Architecture Blueprint to maximise efficiencies and mitigate risk.

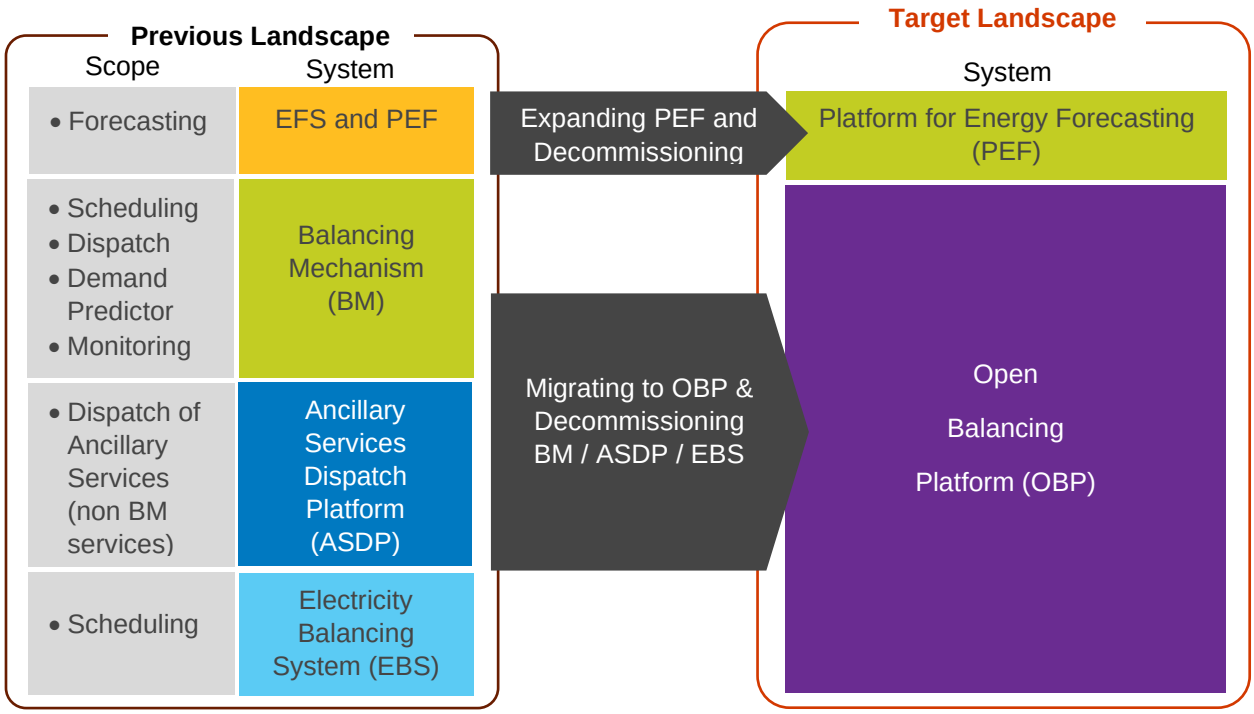
Modern Architecture Blueprint

Delivery Infrastructure ***Deliver Faster*** Taking a cloud native approach with simplified build, deployment, and monitoring enabling safe and rapid delivery with appropriate controls and audit support .	**Features** • Cloud First • Containerised & Scalable Services • Infrastructure as Code
API & Integration ***Service Driven*** Building net-new capabilities that use micro services and event-driven designs and a platform with self-service APIs that can be expanded beyond the organisation to external customers and partners.	**Features** • Event Driven Patterns • Public & Private Gateways • Microservice Topology
Telemetry & Networks ***Standard Products*** Removing barriers and making connections to energy grids and balancing & control systems viable at an accelerated pace with low costs to customers.	**Features** • Network as Code • 5G & Low Orbit Satellite • Virtual Network
Customer Touchpoint ***Experience*** Developing a content and knowledge repository with a consolidated view of our customers, received through multiple channels, to enhance convenience and personalisation.	**Features** • Mobile access • Embedded AI
Platforms & Ecosystems ***X-as-a-Service*** Adopting Software-as-a-Service and standard design patterns and architecture models, focusing on features, business value and user experience over technical infrastructure. Buy for commodity build for differentiation.	**Features** • Reusable Design Patterns • Published Standards and Design Patterns

Case Study: Open Balancing Platform

The Open Balancing Platform (OBP) is a new real-time balancing capability to replace legacy ESO balancing systems and processes and support zero carbon grid operations. The OBP is designed and built flexibly to enable new energy services and access for smaller generation units far more quickly and at lower risk than is currently possible. This new platform will provide transparency of decision making, data publication services, drive operational flexibility by using an agile system flow, and increase the overall security and resilience in relation to overall balancing operations.

Our OBP has been designed to meet the business functional and non-functional requirements using modular component design patterns (microservices) and a combination of cloud-native and on-premises infrastructure and software environments. The use of microservices to design, build and deploy modular component solutions allows business functions to be built, deployed, and maintained independently. This reduces the impact of future change on the balancing solution, limits outages during deployment of new features and enhancements and enables the addition of new modules aligned to a standard and predictable release model.



What this means for a battery storage operator

Network connected batteries are typically dispatched as a fast response to provide balancing and ancillary services – e.g., operational challenges relating to voltage, frequency, and inertia. OBP includes a battery zone for the bulk dispatch of small battery management units (BMUs).

This provides the following benefits for battery storage operators:

- An optimised way of dispatching batteries to offer network support, with the ability to dispatch more often, and at smaller intervals.
- An increase in battery assets being dispatched due to the reduced time it takes for the ESO Control Room to make balancing decisions and issue these dispatch instructions.
- More economical outcomes for battery storage operation businesses, given the increased likelihood of dispatch and more operational windows to participate in the ancillary services and capacity markets.

3.9 Where Digital Meets Data

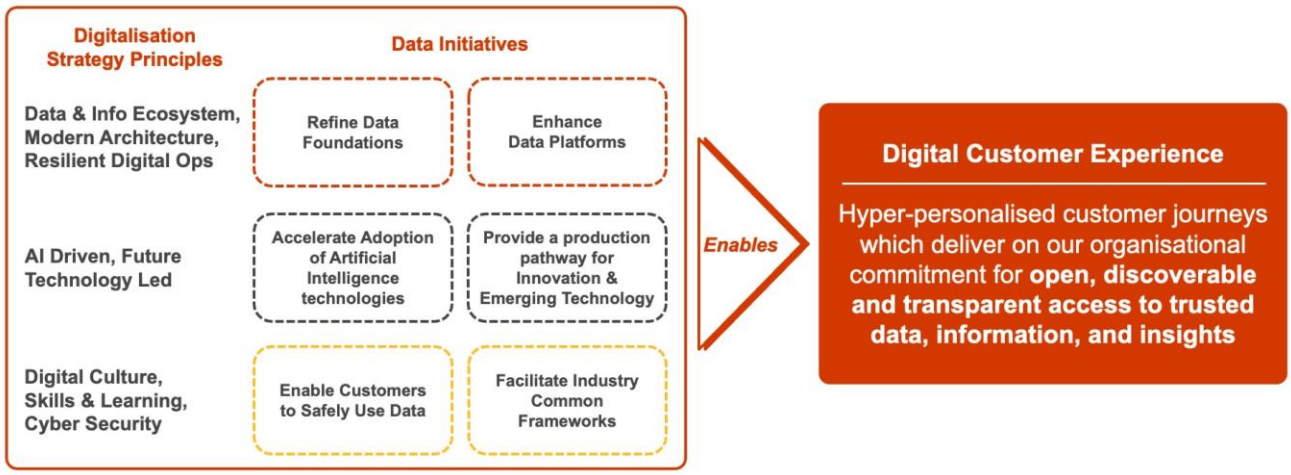
We have embedded data into our Digitalisation Strategy because the relationship between digital and data is integral and interdependent. Data delivers the information and insights we need to make decisions, optimise, and improve performance. The digital transformation that our organisation and the industry requires to accelerate the energy transition can only be achieved through open access to trusted, discoverable and interoperable data. As we grow into our FSO scope, the data we manage will be at the core of how we operate, our strategic decision making, and our optimisation of future investments. Additionally, we will need to effectively manage the increased volume and complexity of data, driven by the shift to a whole energy system approach.

We are taking action now to enhance our data foundations and data capabilities in accordance with Ofgem's Data Best Practice Guidance[14] and we look forward to actively participating in discussions on data sharing infrastructure for the purpose of encouraging industry innovation and collaboration, as described in the Frameworks for Future Systems and Networks Regulation.[15]

To guide our approach to data, we have developed two **Strategic Data Objectives**:

These will drive the availability, access to, and sharing of data across the whole energy system to encourage innovation and collaboration.

Our final two Digitalisation Strategy Accelerators described next, Data and Information Ecosystem and AI Driven, will elevate our data quality, the frameworks that govern data, and the models we use to get insights from data to achieve those objectives. This will make our data more useful for our customers when combined with the rest of our principles, as described in the image below.

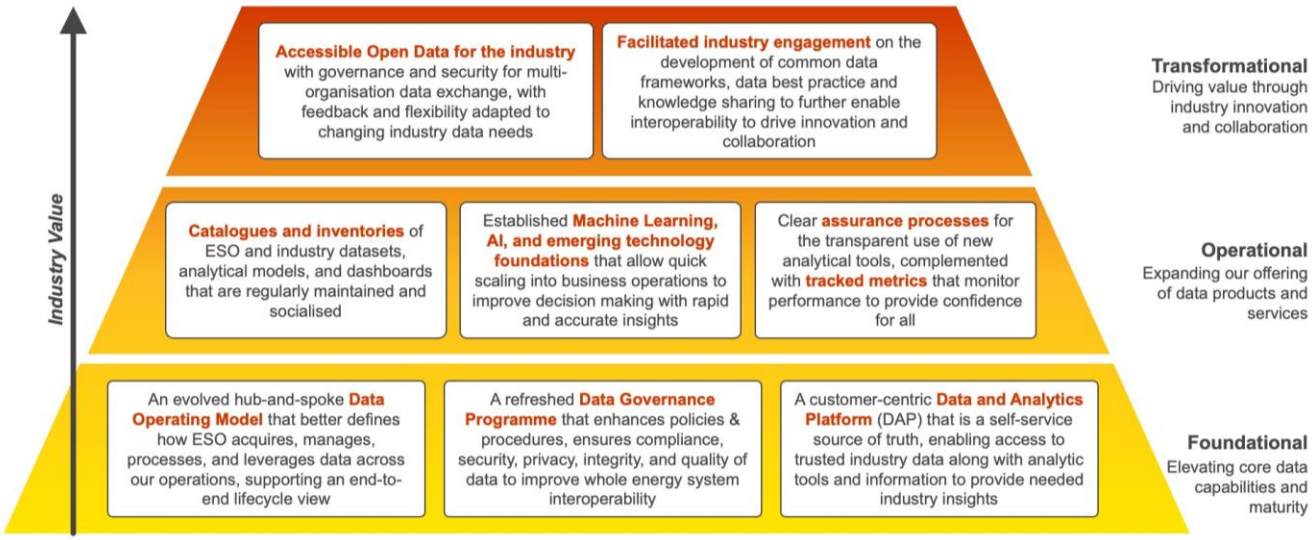


The value of our data initiatives will manifest itself through various data capabilities available to industry – as shown in the tiered diagram below. The *Foundational* items are about elevating core data capabilities and

[14] Ofgem, 2023. Data Best Practice Guidance

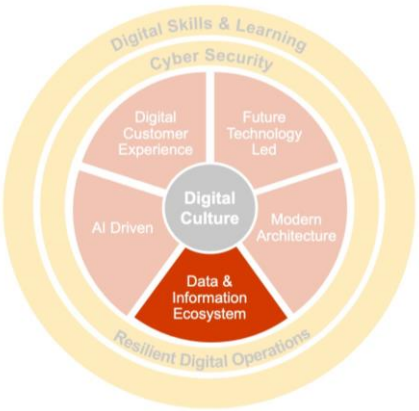
[15] Ofgem, 2023. Frameworks for future systems and network regulation

maturity, progressing to *Operational* relating to expanding our offering of data products and services, and *Transformational* which related to driving value through industry innovation and collaboration.



The following two sections go into detail on each of our final two Digitalisation Strategy Accelerators which further develop our approach to these capabilities. Additionally, our efforts to meet Ofgem's Data Best Practice Principles are detailed in **Appendix D: Addressing Ofgem's Data Best Practice Principles**.

3.10 Accelerator: Data and Information Ecosystem



Our industry cannot effectively make decisions on the wealth of data that is accumulating unless we know what data exists, what it means, whether we can trust it, and unless we have the right tools in place to process it into something meaningful. Our Data and Information Ecosystem Accelerator aims to facilitate open data for the industry and beyond, enabling collaboration and innovation, where everyone is speaking the same data language and has access to the information they need, when they need it.

Data & Information Ecosystem: What it means

Redefining and modernising the organisation's data and information assets to enhance quality, increase open data accessibility, and reduce barriers to internal and industry collaboration and innovation.

What good will look like

Open data that contributes to innovation and collaboration in the industry to accelerate net zero ambitions and transform customer journeys.

Trusted data that encourages transparency, preserves privacy while increasing accessibility and self-service across the industry.

Internal and external customers empowered by information through open data to make informed decisions that create and maximise value.

This Accelerator refines our data foundations and continues our BP2 efforts to implement a new hub-and-spoke data operating model to support our future FSO roles, such as regional energy system planning as well as our existing roles. It not only focuses on getting our data into more clean and consistent formats throughout our business, but it also aims to facilitate the improvement of underlying issues for industry data sharing infrastructure to enable interoperability across the energy ecosystem and other relevant sectors. For example, there is an increasing importance on the integrity of geospatial data across vectors to inform crucial decisions in achieving net zero. Both internal and external customers need this information but additional efforts are also required to aggregate the data and ensure its consistency across regions. In addition to scoping the data needs of our new FSO roles, we will be addressing these requirements through improved data management and industry common frameworks.

Improved ESO Data Management

Our DAP is the first step towards enhancing data discoverability and accessibility, creating a single platform to share trusted ESO data for insights and analytics. As we shift towards DAP, it gives us an opportunity to review and improve our data quality. We are creating a new Data Quality Programmme to refine our policies and procedures and ensure high quality data. Additionally, our implementation of DAP gives us an opportunity to revisit our governance processes, clearly assign data owners and other data roles related to data assets, enhance our visibility into any duplicated efforts across the organisation, and make our approach to storing and archiving data more consistent. We have established a new ESO Data Council to manage these efforts while considering the individual needs of our current and future business roles. DAP will also be the foundation for our Open Data Portal and catalogue, expanding external data visibility in the industry. Refining common terms, taxonomy standards, and descriptions for our own data means our customers know what to expect when they access our data and can streamline their own processes.

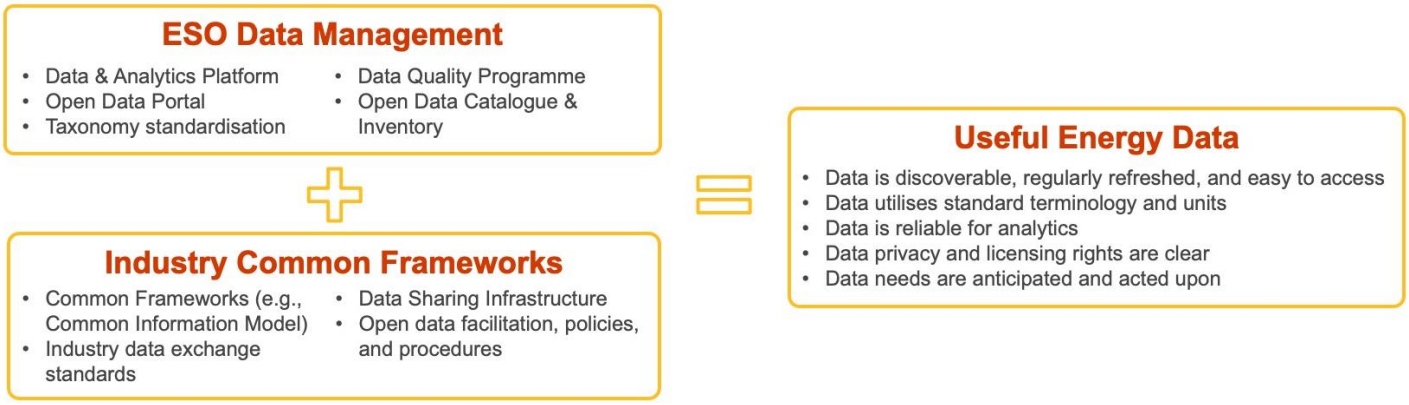
Industry Common Frameworks

As we enhance our internal data governance and consolidate our data into DAP, we will be collaborating with the industry on the common frameworks necessary to improve interoperability and create useful energy data. We will use our revised internal governance practices as a baseline for open data facilitation, policies, and procedures, updating them and creating a prioritisation structure that coincides with industry need and best practices. Our data programmes aim to follow the recommendations of industry wide efforts, such as the

Energy Digitalisation Taskforce, the UK Government's National Digital Twin Programme,[16] the DESNZ Digital Spine Feasibility Study[17], and Ofgem's Energy Data Sharing Infrastructure workstream of the Future Systems and Networks Regulation,[18] integrating them into our operations where possible and furthering consistency in the industry while encouraging industry participants on a common data direction.

Our Approach to the Data and Information Ecosystem

We aim to create useful energy data that is easy to access and regularly available in a consistent form. Consistent with the Energy Digitalsation Taskforce's interoperability and digital governance recommendations,[19] our aim is to make sure industry data can be used for analytics that will drive value and affordably as we collectively achieve the net zero goals.



16 The National Digital Twin Programme (NDTP) - GOV.UK (www.gov.uk)

17 Digital Spine Feasibility Study: successful project - GOV.UK (www.gov.uk)

18 Ofgem, 2023. A Roadmap to an Energy Data Sharing Infrastructure

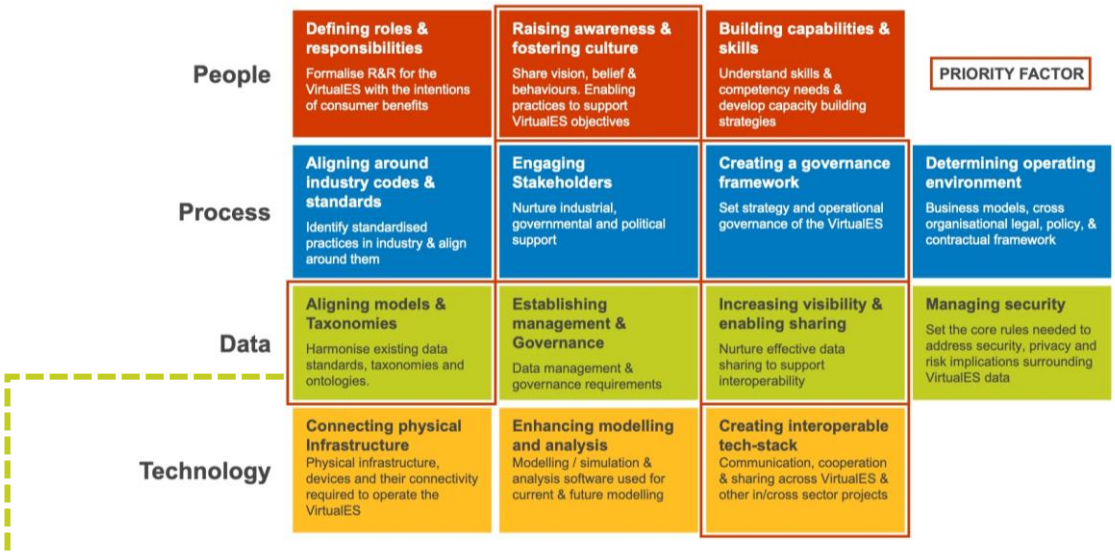
19 Delivering a Digitalised Energy System - Energy Systems Catapult

ESO

Case Study: Industry Common Frameworks

To enable the Virtual Energy System the need for a common social-technical framework was identified to define access, operation, and security protocols for interoperability. This framework is the beginning of a broader conversation needed on interoperability for FSO roles like Regional Energy System Planning, where the data from hundreds of organisations will need to be aggregated to provide a multi-vector whole energy system view for Great Britain.

Through research, expert interviews, and industry-wide engagement, 14 key socio-technical factors, grouped in the categories of People, Process, Data, and Technology have been identified as necessary for the development and delivery of the Virtual Energy System today. We will be working with industry to continue to build out these factors for more broad industry application in the future.



EXAMPLE: ALIGNING MODELS and TAXONOMIES

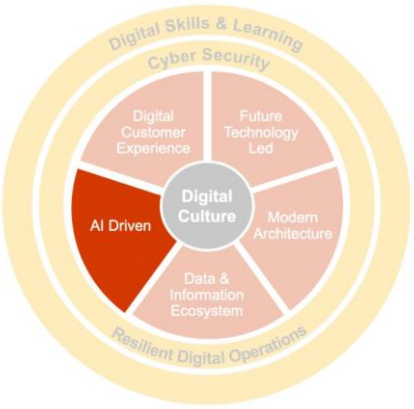
Harmonising Industry Data Exchange Standards – GB Common Information Model (CIM), Common Grid Exchange Specification (CGMES)

The Common Information Model (CIM) is expected to be used more broadly for data exchanges in the energy industry, as reflected in **Ofgem's Long Term Development Statement (LDTS) consultation**. This harmonisation will drive commonality, standardisation, and interoperability across the whole energy system.

What this means for an ESO Network Planner

Our Network Planners manage a lot of data from a lot of systems from a lot of different organisations. With CIM based processes in place, they save time on cleaning and organising data, which is essential before beginning data modelling. The data they use is also compatible with our DAP so they can leverage the most sophisticated analytical techniques in our Advanced Analytics Environment. Additionally, modelling in DAP is easily discoverable, so peers do not have to hunt for the information that they need to do their job and our external customers know that this analysis exists through our Open Data Catalogue. If our customers choose to access it, the data will be compatible with their systems too.

3.11 Accelerator: AI Driven



We see Artificial Intelligence as something that will shape our ability to deliver customer value. AI Driven provides an approach for the effective application of AI and analytics so that they are used safely, responsibly, and at an accelerated pace across the business.

Through this AI Driven Accelerator, we aim to adopt emerging AI technology at scale to dramatically enhance the ways of working across the business. This is not a one-size fits all approach and will include everything from automating mundane tasks so that our workforce can focus on value-add activities, to pre-emptively identifying risks before they impact the system, to developing internal generative AI that recommends decisions based on historical information and well-trained models, to deploying highly skilled expert AI teams to modernise key areas like our control room.

> ***AI Driven: What it means***
>
> *Leveraging AI and other readily available technologies across the whole energy system to increase the speed and quality of decision making and management, driving accelerated customer value.*

> ***What good will look like***
>
> Defined processes for the development of models and implementation of emerging digital and data tools, increasing organisational pace of change.
>
> Effective and efficient operationalisation of artificial intelligence and other readily available technologies into all areas of the business, driving speed and accuracy of decision making.
>
> Workforce leverages Gen AI tools for productivity and enhanced decision making, while visual Gen AI tools are used for network design and planning.
>
> An expert data science and AI engineering teams drive automation and rapidly expand the capability of control room through AI.

The governance and standardisation efforts we are pursuing through our Data and Information Ecosystem Accelerator will be essential for getting our data into a usable format for advanced analytics. The Digital Skills and Learning Enabler will also play a key role in getting our customers up to speed on how to use the next generation AI tools, as well as the AI solutions we are providing. Our DAP will host our Advanced Analytics Environmnet (AAE) which, along with next generation AI tools, will accelerate our data science teams in experimenting, productionising, and operationalising AI applications to drive business performance. With these foundations coming into place, we can begin to tackle the four workstreams for this AI Driven Accelerator.

The Four Workstreams for AI Driven

1. Analytics Normalisation

This workstream applies standards, policies, and governance to drive baseline AI and Analytics norms across the organisation and deploys processes to manage and enhance existing models accordingly. This workstream gives visibility into the various models that exist across the organisation, and leverages our new hub-and-spoke data operating model to implement standards and validation processes before the models can be productionalised.

2. New Solutioning

This workstream creates new solutions utilising emerging technology to address business analytical needs, while adhering to defined standards, and operationalising them throughout the business. As the business moves into its new whole energy system scope, we know that the wish list for advanced analytics will continue to grow. To make sure we address all the existing identified needs and can collect future needs, we are

implementing new processes for logging requests, prioritising them and dedicating resources to them.

3. Cutting Edge

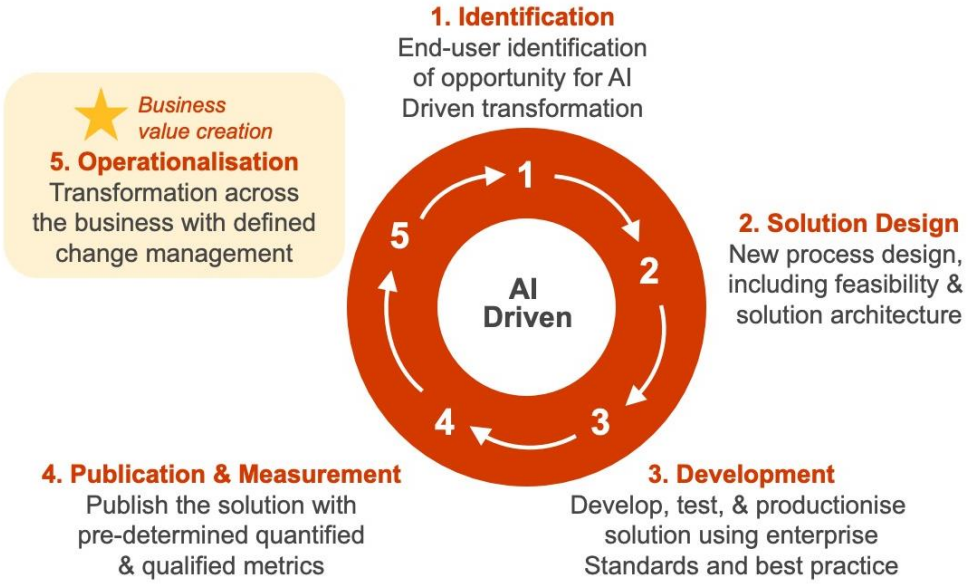
This workstream takes innovative proof-of-concept technologies and approaches and operationalises them throughout the business. We are creating a pathway from innovation theorising and testing to actual deployment in the business. However, for these new technologies and approaches to be successful, more needs to be done than just deployment. We need to bring customers along a journey to understand what has been deployed, how to to use it, and why it is better than the previous ways of doing things. This workstream requires a true change management and enablement approach.

4. Building Skills, Capabilities, and Partnerships

Our final workstream ensures that we have what we need to deliver our analytics ambitions and other AI Driven workstreams effectively and at pace. We will have added focus from our Digital Skills and Learning efforts in this area and broaden our partnership efforts in the AI Centre of Excellence and the Future Technology Led Accelerator.

Our Approach to Implementing AI Driven

While the pathways vary slightly depending on the workstream, the framework below details our general approach for AI Driven. All solutions begin with a need from end-users and end with the operationalisation of analytics to create business transformation. Post-operationalisation, the cycle begins again as end-user work evolves from that operationalisation. This process will provide increased consistency and rigor in the models being developed. Combining that with our implementation of a model library and DAP, we will be creating a single source of truth for the ESO's data and analytics and empower data-driven decision making.

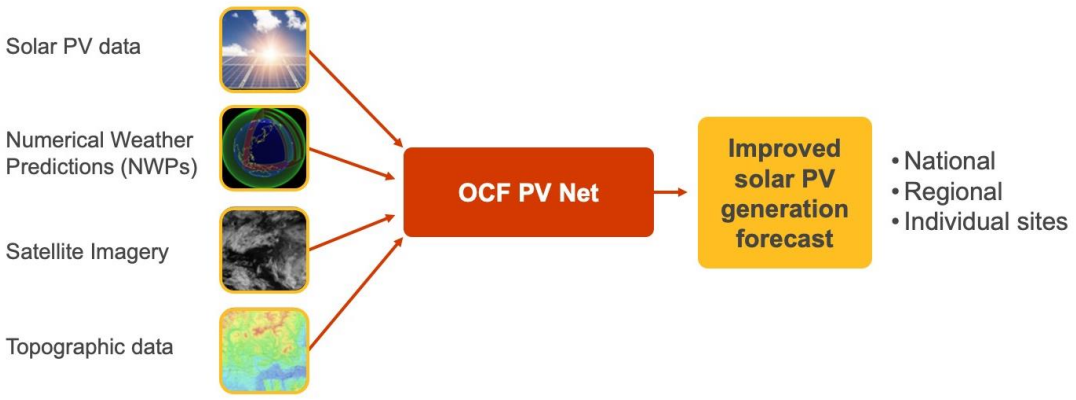


Case Study: Solar Photovoltaic Nowcasting

In collaboration with one of our ecosystem partners, Open Climate Fix (OCF), we are developing deep Machine Learning (ML) techniques to predict solar electricity generation more accurately. Nowcasting involves a machine learning model forecasting the near future – in minutes and hours rather than days – and historically found use in predicting rainfall. In this new pioneering work, we have applied a similar approach to predicting where sunlight will fall, training a machine learning model to read satellite images and understand how and where clouds are moving in relation to solar arrays below.

A prototype of the Photovoltaic (PV) Nowcasting service was developed based on the needs of key customers and end users of the forecasts. It leveraged a microservice architecture to allow targeted and iterative component upgrades to test improvements without changing other components' behaviour. Additionally, utilising software tools that can spin up (and down) environments easily allowed for the testing of new features in development environments while allowing the main production to keep running uninterrupted.

ML forecasting model combining data from multiple sources:



What this means for an ESO Demand Forecaster

Our solar forecasting models historically used Numerical Weather Prediction models which take a long time to compute and are not real time. These typically only update every hour, however, the nature of clouds shifting means that solar output can change in a matter of minutes. When the first fully operational PV Nowcasting service was delivered to our control room in December 2022, it gave us access to a forecast that updates every five minutes with satellite imagery that provides enhanced situational awareness of rapid changes in predicted solar output. This new forecast is also 2.8 times more accurate than our previous PV forecast! ESO has always kept reserve power, often flexible gas plants, in readiness to respond to unexpected changes in supply or demand. However, increased certainty in our forecasts reduces the number of carbon-emitting generators we need to hold in reserve and allows more efficient balancing actions – meaning we will provide better value for customers while making significant steps towards a zero-carbon electricity system.

Additionally, in working with our ecosystem partner Open Climate Fix, we have learned some valuable lessons about machine learning projects, about the trade-offs for building our own tools, and about security and authentication. We have since taken these lessons forward in other internal discussions on how to best utilise this type of technology on in other areas of the business.

Conclusion

As we continue to refine our building blocks to become Digital First, our future goal of becoming a Digital Leader is always in mind. Through our new FSO responsibilities, our customers will be expecting us to grow further as a trusted advisor for the industry with a complete whole energy system view. This means we will be best placed to understand what is needed from the industry in its digitalisation journey and that we have a responsibility to facilitate its path forward.

Why the FSO needs to be a Digital Leader

Increased responsibility for the industry

The FSO's advisory position means that we need to have an opinion on the industry's digital maturity and understand the digital perspectives of internal and external customers. Additionally, if we are expected to potentially operate common industry assets, we need to be prepared for technical and operational leadership across these assets.

Increased complexity of the Future Energy Scenarios

The FSO needs be able to respond quickly to the increasingly complex problems of the whole energy system and achieve net zero goals in an affordable way – technology and automation will be key to providing the necessary insights at the speed required.

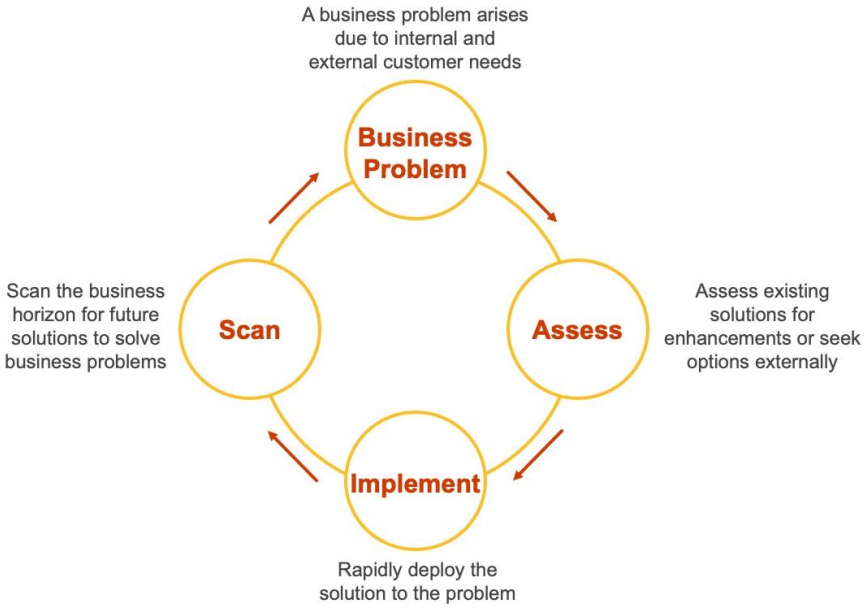
Increased pace of change

Digitally native newcomers to the industry and digital uptakes from historical customers are rapidly changing their ways of working as technological advancements become more available – directional alignment is needed to achieve the best and the quickest path to net zero

Increased need for collaboration

While we may have more visibility into the whole energy system in our FSO role, we will not have all the answers to the industry's needs. A network of partners and participants are needed to decrease the likelihood of duplicated efforts, errors, and missteps to keep consumer and industry costs low.

Becoming a Digital Leader is not the end destination. It is a north star that will guide the FSO to consistently resolve business problems through re-iteration and digital evolution. The market for technological solutions is always changing and the FSO needs to be prepared for the future needs of the business and the industry through early investment and adoption, recognising that the future cannot be predicted and that an eye must always be kept to the horizon.



Digitalisation Action Plan

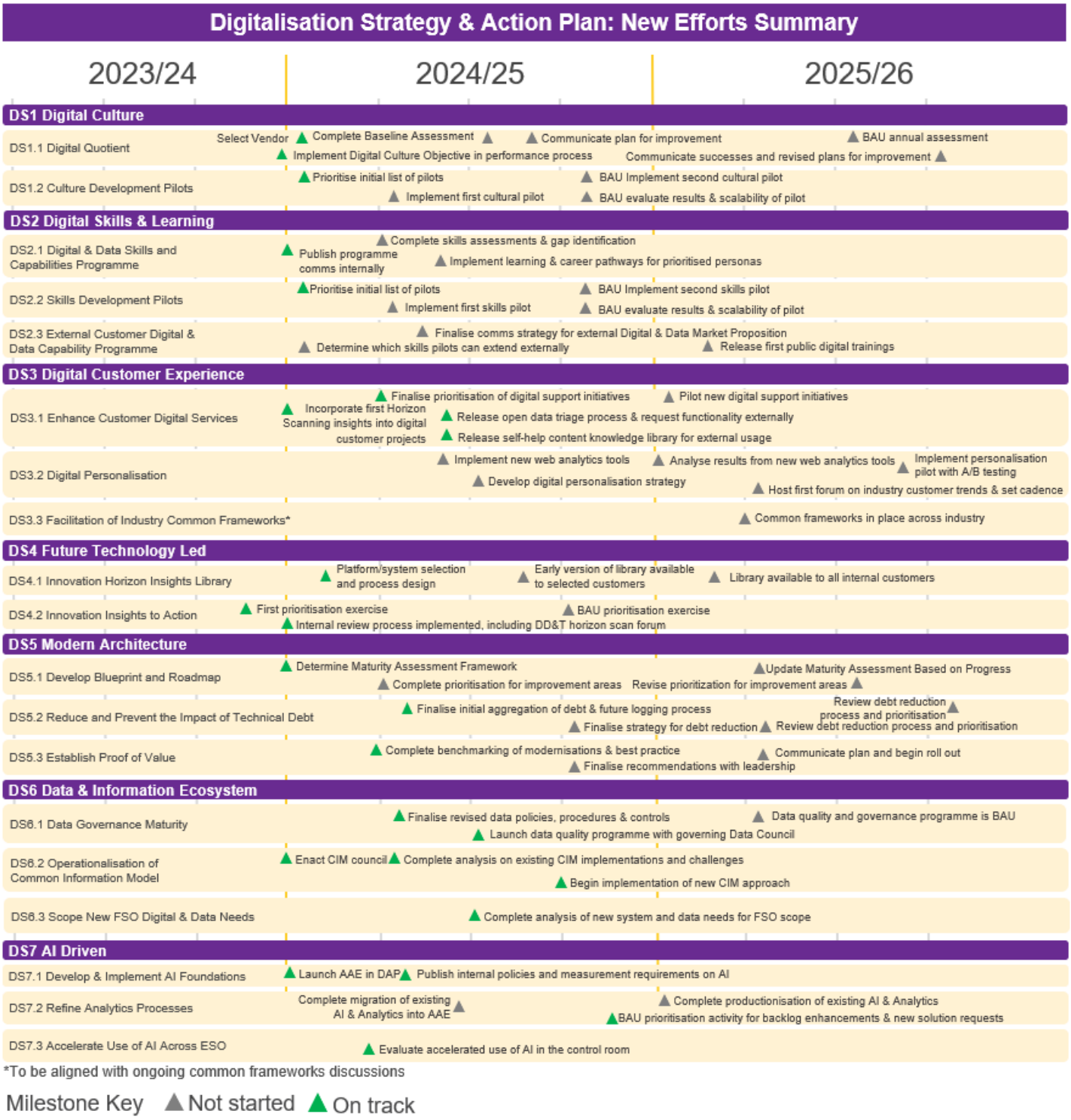
Success in achieving our Digitalisation Strategy is closely linked to the successful delivery of our overarching Business Plan, however, the anticipated FSO responsibilities require us to look beyond our existing plans. In our previous Digitalisation Strategy, we had crafted a 'Digitalisation Matrix' to help conceptualise the relationship between the strategy and the three core ESO delivery roles in our Business Plan. While that matrix is still very much applicable to our overall digital transformation, we will need to take a new approach as our remit broadens as the FSO in the coming months.

The new Digitalisation Strategy focuses on Principles that will guide investments and processes through these periods of unknowns, while also considering known scope, such as gas system planning. In developing the new strategy, we identified the need for crosscutting efforts that sit across all our BP2 deliverables and that will be essential foundations for a successful FSO transformation. They are descibed in the section below, as are the updates to our ongoing BP2 deliverables.

New Digitalisation Strategy Crosscutting Efforts

While listening to customer feedback, we realised that there was more we could be doing to make our BP2 deliverables more impactful and to deliver value quickly in our new FSO roles. As a result, we are creating targeted efforts to implement a Digital Culture and our three Enablers. Additionally, in comparing our Business Plan Activities to our new strategy, we identified new crosscutting efforts for each of our Accelerators that aim to close the gap on where we are today and what we need to be doing to become a Digital Leader and achieve the FSO ambitions. While these efforts are not activities that we covered in our Business Plan and DD&T Investments previously, we intend to report on them in a similar manner through our Digitalisation Action Plan.

The figure on the next page shows a plan view of these new efforts.


Digitalisation Strategy & Action Plan: New Efforts Summary
2023/24
2024/25
2025/26
DS1 Digital Culture
DS1.1 Digital Quotient
Select Vendor
Complete Baseline Assessment
Communicate plan for improvement
BAU annual assessment
Implement Digital Culture Objective in performance process
Communicate successes and revised plans for improvement
DS1.2 Culture Development Pilots
Prioritise initial list of pilots
BAU Implement second cultural pilot
Implement first cultural pilot
BAU evaluate results & scalability of pilot
DS2 Digital Skills & Learning
DS2.1 Digital & Data Skills and Capabilities Programme
Complete skills assessments & gap identification
Publish programme comms internally
Implement learning & career pathways for prioritised personas
DS2.2 Skills Development Pilots
Prioritise initial list of pilots
BAU Implement second skills pilot
Implement first skills pilot
BAU evaluate results & scalability of pilot
DS2.3 External Customer Digital & Data Capability Programme
Finalise comms strategy for external Digital & Data Market Proposition
Determine which skills pilots can extend externally
Release first public digital trainings
DS3 Digital Customer Experience
DS3.1 Enhance Customer Digital Services
Finalise prioritisation of digital support initiatives
Pilot new digital support initiatives
Incorporate first Horizon Scanning insights into digital customer projects
Release open data triage process & request functionality externally
Release self-help content knowledge library for external usage
DS3.2 Digital Personalisation
Implement new web analytics tools
Analyse results from new web analytics tools
Implement personalisation pilot with A/B testing
Develop digital personalisation strategy
Host first forum on industry customer trends & set cadence
DS3.3 Facilitation of Industry Common Frameworks*
Common frameworks in place across industry
DS4 Future Technology Led
DS4.1 Innovation Horizon Insights Library
Platform/system selection and process design
Early version of library available to selected customers
Library available to all internal customers
DS4.2 Innovation Insights to Action
First prioritisation exercise
BAU prioritisation exercise
Internal review process implemented, including DD&T horizon scan forum
DS5 Modern Architecture
DS5.1 Develop Blueprint and Roadmap
Determine Maturity Assessment Framework
Update Maturity Assessment Based on Progress
Complete prioritisation for improvement areas
Revise prioritization for improvement areas
DS5.2 Reduce and Prevent the Impact of Technical Debt
Finalise initial aggregation of debt & future logging process
Review debt reduction process and prioritisation
Finalise strategy for debt reduction
Review debt reduction process and prioritisation
DS5.3 Establish Proof of Value
Complete benchmarking of modernisations & best practice
Communicate plan and begin roll out
Finalise recommendations with leadership
DS6 Data & Information Ecosystem
DS6.1 Data Governance Maturity
Finalise revised data policies, procedures & controls
Data quality and governance programme is BAU
Launch data quality programme with governing Data Council
DS6.2 Operationalisation of Common Information Model
Enact CIM council
Complete analysis on existing CIM implementations and challenges
Begin implementation of new CIM approach
DS6.3 Scope New FSO Digital & Data Needs
Complete analysis of new system and data needs for FSO scope
DS7 AI Driven
DS7.1 Develop & Implement AI Foundations
Launch AAE in DAP
Publish internal policies and measurement requirements on AI
DS7.2 Refine Analytics Processes
Complete migration of existing AI & Analytics into AAE
Complete productionisation of existing AI & Analytics
BAU prioritisation activity for backlog enhancements & new solution requests
DS7.3 Accelerate Use of AI Across ESO
Evaluate accelerated use of AI in the control room
*To be aligned with ongoing common frameworks discussions
Milestone Key
Not started
On track

Digital Culture Crosscutting Efforts

In addition to the formal programmes identified below, many informal activities are required to shift to our Digital Culture. As we grow into our FSO responsibilities, we will ensure our leaders are displaying Digital Culture behaviours and perpetuating the messages from our Digitalisation Strategy. Communications will revolve around having the digital tools and safeguards in place to "fail safe" without impacting the live system to ensure innovations and emerging technologies are welcomed.

Digital Culture Efforts	Status	Actions
DS1.1 Digital Quotient ***Deliverable Description:*** *Implementing a measurement and assessment tool that quantifies the ESO's digital readiness and capabilities.* ***Deliverable Value Add:*** *Provide clarity on action areas in organisational digital capabilities and inform strategic decisions on digital transformation.*	On Track	• Determine an appropriate vendor to develop and implement the Digital Quotient. • Determine the categories that the Digital Quotient will measure the maturity of digital transformation on, such as Customer, Business Strategy, Technology Delivery, Data Quality, Operations, Organisational Culture, and People Capability to assist in the identification of root causes that could impede innovation and technological adoption within the organisation. • Identify the survey questions and release them to the workforce to collect a baseline for each selected category. • Upon survey closure, identify areas for improvement, develop improvement targets, and create a plan to achieve the targets. • Develop an organisational change management strategy to implement the plan. • Communicate results, new targets and the engagement plan to achieve them, as well as the expectations for the individuals to achieve them. • Implement a Digital Culture objective in every employee's performance appraisal process as well as a checklist of how they can achieve success on this objective (e.g., adopting newly deployed system, participating in mentorship, coaching, or hackathon type programmes, sharing ideas for digital innovation or participating in pilots).
DS1.2 Culture Development Pilots ***Deliverable Description:*** *Exploring and testing new practices that foster innovation, improve adaptability to digital and data, and mature the Digital Culture within the organisation.* ***Deliverable Value Add:*** *Enable digital innovation ideation and increase the pace of adoption of new digital and data tools to realise value quicker.*	On Track	• Develop a list of desired cultural experimentation pilots and a prioritisation methodology for piloting them, reviewing where these pilots can be combined with other business change efforts. Examples include: 1. Establish a Change Champion Network to influence behaviours and drive culture adoption. 2. Gamify behavioural shifts through micro-nudges, challenges, and leader boards (e.g., expand A2.3 Training simulation and technology). 3. Host competitions (e.g., AI and data science hackathons) for ideation and innovation. 4. Encourage joining internal and external teams of excellence in related fields (e.g., geospatial groups). 5. Create a digital mentorship programme. 6. Develop a digital coaching programme. 7. Launch 10–15-minute Tech Talks at company-wide meetings to socialise relevant interesting digital developments internally. • Develop metrics for success for the prioritised pilots and expectations for internal customer persona adoptions, evaluate pilot success, and develop a plan to scale successful pilots across the business.

Digital Skills and Learning Crosscutting Efforts

With the increasing importance of data in decision-making, it is critical that internal and external customers can understand, analyse, and use digital tools and data effectively. Our focus will be to increase the digital and data capabilities of our organisation to a foundational level across the board, while also further developing new capabilities that are needed to harness emerging technologies in our business. Additionally, we plan to support the digital and data enablement of our external customers to ensure they can make use of the tools the ESO is providing to the public.

Digital Skills and Learning Efforts	Status	Actions
DS2.1 Digital and Data Skills and Capabilities Programme ***Deliverable Description**: Establishing basic capability personas and implementing learning initiatives to develop the skills necessary to navigate and leverage digital and data; this initiative is aligned with the ongoing enterprise-wide programme.* ***Deliverable Value Add**: Structure and align organisational efforts on digital and data recruitment, development, and retention efforts to ensure the correct skills and capabilities are embedded throughout the business in to harness digital tools and data to improve innovation, efficiency, and decision-making.*	On Track	• Review the identified capabilities, sub-capabilities, and skills that are essential for: 1. the organisation at a foundational understanding level. 2. deployment of the hub-and-spoke data operating model. 3. the FSO whole energy system scope. • Develop skills metrics and proficiency levels (e.g., foundational, expert) for the capabilities. • Create and communicate learning pathways (for functional and role-specific training, as well as technical leadership training and new hire orientation training and new profile assignment training) to upskill the workforce to close the capability gaps. • Develop recruitment and contracting strategies for missing or low proficiency capabilities that will not be fully addressed by upskilling the workforce. • Collaborate with Academia on thought leadership for the industry and career pathways for graduates (please refer to the *AI Centre of Excellence*). • Implement a semi-annual review process of DS4.1 Innovation Horizon Insights Library, and subsequently determine a talent strategy for digital and data skills, profiles, and capabilities to address the noted implications of emerging technologies and innovations. • Align on organisation-wide, blended learning (e.g., in person, web-based, experiential) tools and a learning and development platform to be used for capability training and engagement.
DS2.2 Skills Development Pilots ***Deliverable Description:** Exploring and testing new practices that reinforce the development of new skills needed for the future of the business.* ***Deliverable Value Add:** Further digital capabilities and adaptability through a variety of approaches that cater to all internal customer personas to progress the organisation's technological abilities.*	On Track	• Leverage the career pathways and understanding of gaps in skills, profiles, and capabilities from DS2.1 Digital and Data Skills and Capabilities Programme, to determine focus areas for workforce upskilling. • Leverage internal customer personas to understand workforce learning preferences. • Develop a list of desired skills development experimentation pilots and a prioritisation for them, reviewing where these pilots can be combined with other business change efforts. Examples include: 1. Internal secondments to digital and analytical roles (e.g., AI Centre of Excellence) and external secondments with trusted partners to foster collaboration, develop new skills, eliminate single points of failure, and bring real world experience to business pilots and innovation development, and learn new industry perspectives and approaches to problems. 2. Host immersive workshops and showcases with real life examples (inhouse or industry wide) of technology invention or creative data usage to inspire innovation ideation and increase comfort with new technologies. 3. Require learning pathway or certification completions as a pre-requisite for internal roles and transfers to standardise role definitions and expectations.

		4. Expand informal and grassroot learning programmes such as lunch-and-learns, coding cafes, and digital communities (e.g., wikis) to create continuous learning environments. • Develop metrics for success for the prioritised pilots and expectations for internal customer persona adoptions, evaluate pilot success, and develop a plan to scale across the business.
DS2.3 External Customer Digital and Data Capability Programme ***Deliverable Description**: Developing materials that enable greater public usage of open data and our services and keep them informed of digital developments.* ***Deliverable Value Add**: Enable innovation and collaboration across and beyond the industry by distributing access to data and valuable expertise.*	On Track	• Leverage the Go-to-Market Digital and Data Proposition, established in DS3.1 Enhance Customer Digital Services, for our external customer personas and develop a communications plan to ensure everyone from the digitally savvy to the digitally excluded understand the pathways to access open data and are aware of avenues to provide feedback to the ESO/FSO. • Leverage the learning programmes from DS2.1 Digital and Data Skills and Capabilities Programme to offer non-ESO specific training on digital and data hot topics to the public to facilitate enhanced public understanding of digital topics. • Leverage customer personas and journeys from DS3.2 Digital Personalisation to identify other areas where public training could be helpful to enable industry participation and develop or procure appropriate trainings. • Determine if any DS2.2 Skills Development Pilots can be expanded to external customers.

Resilient Digital Operations Crosscutting Efforts

Please note that due to the sensitive nature of our operational information and the need to safeguard against possible security threats, additional information has been excluded from this DSAP.

Cyber Security Crosscutting Efforts

Please note that due to the sensitive nature of our security information and the need to safeguard against possible security threats, additional information has been excluded from this DSAP.

Digital Customer Experience Crosscutting Efforts

The formal programmes below are further enhanced by a change in the ways we work with our customers. In D19.1.1 Data and Analytics Operating Model, we have developed a new way of working with our internal customers on digital and data efforts that will increase the pace of change within our organisation. Additionally, our new Customer Service Operating Model will deepen our relationships with external customers to co-create solutions that meet their needs. Our workforce will be well- trained in customer personas and will design solutions with these personas front of mind.

Digital Customer Experience Efforts	Status	Actions
DS3.1 Enhance Customer Digital Services ***Deliverable Description**: Implementing advanced support tools and services to offer a better user experience for customers.* ***Deliverable Value Add**: Automation and self-service options designed based on customer needs reduces time to value and increases customer satisfaction.*	On Track	• Create a new Digital Customer Experience metric and implement the means to collect the data. • Implement a semi-annual review process of internal horizon scans, and subsequently raise awareness of customer implications of emerging technologies and innovations, seeking to address customer needs before they are needed. • Prioritise and socialise customer challenges in quarterly delivery plans with identified next steps for addressing customer challenges. • Implement a design thinking process to develop user-centred approaches to new and existing (e.g., D17.8 Digital Engagement Platform) solutions that are self-service by default and that

		leverage support tools (e.g., chat bots), automation and AI where possible to streamline procedures and create value. • Enabling internal and external customers with the ability to request new open data. • Develop a self-help content knowledge library that is a repository for customers to address frequently asked questions. • Streamline query management processes to ensure customers can submit requests for assistance consistently, simply and seamlessly. • Develop a cadence for reviewing the newest customer insights from our Customer Relationship Management to ensure we provide the right enhancements.
DS3.2 Digital Personalisation ***Deliverable Description**: Refining our capabilities and processes for understanding our growing list of internal and external customers and tailoring the user experiences for all ESO digital experiences (e.g., websites, portals) to individual visitor or segment preferences and needs.* ***Deliverable Value Add**: Consistently refreshing our understanding of customer needs and reducing the time to value for customers, improving customer satisfaction in their ability to resolve their needs through self-service digital experiences.*	On Track	• Continue to relentlessly collect user experience data from internal and external customers through regular surveys, support tickets, usage statistics, targeted discussions, and forums and develop customer insights through: 1. Refining analytical models for quantitative feedback to show trends and predict user needs. 2. Developing AI models for qualitative feedback to show trends and predict user needs. • Refine and expand our customer personas to encompass our growing number of internal and external customers and better understand preferences for adopting new technologies, ways of working, and mindsets. • Define existing internal and external digital customer journeys and identify - digital challenges. • Develop transparent data-driven performance reporting to track solution deliveries as well as performance once deployed. • Implement web analytics tools to collect website and internal application interactions and usage to determine key areas for personalisation. • Curate content that is dynamic for user profiles (e.g., customised landing pages, geo-targeted, user generated content, personalised calls to action). • Leverage DS2.3 External Customer Digital and Data Capability Programme to educate users on specific challenge areas and websites or portals that some may find difficult to use. • Host regular forums that socialise customer trends and areas for industry digital improvements that will enable our customers, our industry, and ourselves to better address needs.
DS3.3 Facilitation of Industry Common Frameworks ***Deliverable Description**: Facilitating industry agreement on a common socio-technical frameworks for digital and data.* ***Deliverable Value Add**: Drive commonality, standardisation, and interoperability across industry data, enabling a faster pace for innovation.*	On Track	• Participate in industry interoperability working groups and, where additional efforts are needed, facilitate Great Britain energy industry discussions on the adoption of common frameworks that will streamline innovation and progress towards net zero, such as a common language (e.g., common information model), recommended infrastructure, and processes to connect and federate individual digital twins from across the energy sector into an ecosystem through the data sharing infrastructure. • Continue to develop the work from the Virtual Energy System Programme to collaboratively create and manage the data sharing infrastructure and its common social-technical framework with the industry which includes, but is not limited to: governance, policy, legal, data rights and consent management, ontologies, metadata standards, interoperability approaches, skills, data standards, security protocols, dispute resolution, performance, and codes of practice. • Support development of common frameworks for the industry with DESNZ, Ofgem, and the UK Government's National Digital Twin Programme. • Leverage DS2.3 External Customer Digital and Data Capability Programme to ensure the development of communications and

	trainings aimed to increase internal and external customer understanding of an agreed upon framework.

Future Technology Led Crosscutting Efforts

Our actions for the Future Technology Led Accelerator work in tandem with the Open Calls for Innovation, as described in our Innovation Strategy,[20] and our organisational horizon scanning for Political, Economic, Sociological, Technological, Legal and Environmental factors that may impact our business. Both stem novel ideas and technologies that the ESO needs to consider for its business operations as well as opportunities for innovation pilots for the industry. In addition to regularly socialising insights internally and externally, the deliverables below aim to establish better processes for actioning them.

Future Technology Led Efforts	Status	Actions
DS4.1 Innovation Horizon Insights Library ***Deliverable Description:*** *Developing an internal platform that enhances the way the ESO ideates and collaborates on horizon scanning insights and ideas.* ***Deliverable Value Add:*** *Provide open access to historical ideas and insights to stimulate new ideas and expand the understanding of what is possible.*	On Track	• Evaluate potential options and choose a platform or system that can serve as the repository. • Determine cadence and format required for ingestion and categorisation of horizon scanning insights into the platform or system. • Enable users to provide feedback, comments, or to collaborate on ideas in the repository to foster engagement and stimulate new ideas. • Monitor usage and gather insights on what content is most valuable.
DS4.2 Innovation Insights to Action ***Deliverable Description:*** *Creating avenues to explore and pilot digital innovation ideas with rapid prototyping and innovation challenges throughout the business.* ***Deliverable Value Add****: Proactively adapt to emerging technology and trends to seize new opportunities in the industry and mitigate risks.*	On Track	• Establish methodologies for evaluating and prioritising insights, with the input of internal and external subject matter experts. • Develop a checklist of adoption considerations for priority emerging technologies (e.g., future skills requirements, architecture changes, legal and ethical considerations), socialise these possible implications internally, and determine criteria for actioning pre-emptive measures. • Develop an internal review process for priority insights, to decide upon actions that need taking (e.g., a new use case idea could be developed into an Innovation proposal or could flow into enhancements and new solution developments in DS7.2 Refine Analytics Processes). • As part of the internal review process, establish a Digital, Data and Technology horizon scanning forum that discusses new developments on a quarterly basis.

Modern Architecture Crosscutting Efforts

The implementation of our Modern Architecture Blueprint, as well as our enhancements to our Resilient Digital Operations, include taking a cloud native design and working in tandem with other Accelerators. The actions below address our delivery infrastructure, API and integration, and telemetry and networks improvements while our Digital Customer Experience Accelerator addresses our customer touchpoints, and our platforms and ecosystems are addressed in our Data and Information Ecosystem Accelerator.

Modern Architecture Efforts	Status	Actions
DS5.1 Develop Blueprint and Roadmap	On Track	• Select a framework or methodology for conducting the maturity assessment and defining the maturity levels.

[20] nationalgrideso.com/future-energy/innovation/innovation-strategy

***Deliverable Description**: Completing a maturity assessment to track and measure the transformation of the legacy system estate to the Modern Architecture Blueprint.* ***Deliverable Value Add**: Provide a clear picture of remaining work to be done and a path for prioritisation to a flexible loosely coupled architecture which will support growth and agility.*		• Evaluate the existing architecture against the maturity criteria to determine a baseline of current maturity. • Identify areas for improvement, determine new targets, and develop an action plan. • Determine resource allocation for action plan. • Develop an organisational change management plan to implement plan. • Communicate results, new targets, and the plan to achieve them, as well as the expectations for the individuals to achieve them.
DS5.2 Reduce and Prevent the Impact of Technical Debt ***Deliverable Description:** Developing a technical debt burn-down analysis and plan, implementing technical reference models to achieve faster deployment.* ***Deliverable Value Add:** Provide a clear picture of remaining work to be done and a path for prioritisation, removing redundancy, risk and cost.*	On Track	• Align organisation on definition of technical debt and the items included today and how to log future technical debt items . • Develop a repository of debt items, including an estimation on the level of effort required to address the item and a priority level for each item. • Establish metrics that measure outcomes of technical debt reduction (e.g., system stability, performance, maintenance). • Determine strategy for reduction of debt items and a target threshold. • Create a burn-down analysis to track reduction from current baseline level to identified acceptable thresholds. • Revisit progress, level of effort, and prioritisation quarterly and revise strategy as needed.
DS5.3 Establish Proof of Value ***Deliverable Description:** Creating a value case to show the benefits that will be achieved from modernising architecture and Agile DevSecOps ways of working.* ***Deliverable Value Add**: Prove the value of efficiencies, scalability, and innovation enablement that comes with modernisation and aligning to industry standards and technologies.*	On Track	• Engage internal and external customers to determine current challenges for architecture and engineering ways of working as well as identify any grey IT that may not already be logged. • Complete a benchmarking assessment to outline various modernisations and best practices. • Determine metrics to measure the success and impact of modernisation efforts (e.g., cost savings, reduced time-to-market, risk level reduction, reduction in grey IT). • Quantify the tangible and intangible benefits of the various modernisations and determine the potential ROI with a sensitivity analysis. • Review value case with ESO leadership and recommended next steps.

Data and Information Ecosystem Crosscutting Efforts

The Data and Information Ecosystem Accelerator refines the ESO's management of data in preparation for more advanced analytics and open data by default for the industry. It creates processes aimed at improving the integrity of data as well as improving the discoverability of that data.

Data and Information Ecosystem Efforts	Status	Actions
DS6.1 Data Governance Maturity ***Deliverable Description**: Maturing data management and governance processes, refining internal data policies and procedures, integrating these with DAP, and establishing a Data Council for ESO and key open data participants and recipients.* ***Deliverable Value Add**: Drive quality and trust in our data assets internally and externally.*	On track	• Enhance existing organisational data policies, procedures, and controls to ensure they maintain alignment with Ofgem's Data Best Practice guidance and that they are FSO ready. • In coordination with DS3.3 Facilitation of Industry Common Frameworks, ensure organisational data policies, procedures, and controls are aligned with developing industry standards and common terminologies (e.g., metadata, inventory policy). • Establish an ESO Data Council that upholds data management standards and policies, enforces processes on data archival and retention, assigns data roles (e.g., owners and stewards), and oversees a data quality programme for the business. • In coordination with DS6.2 Operationalisation of Common Information Model, establish a Common Terminology Forum to drive common terms within the ESO and discuss and approve

		common data terms and glossary updates for ESO data catalogue. • Create an open data triage process, upon the availability of the D17.9 Open Data Catalogue, to systematically identify issues (e.g., privacy, security, commercial, negative consumer impact or legislation and regulator barriers) which limit potential openness and identify what techniques can be used to mitigate these issues. • Establish a Data Quality Programme that: 1. Identifies and measures quality of our critical data (e.g., geospatial data for regional planning). 2. Develops prioritisation criteria for remediation of data quality issues. 3. Provide transparency to internal and external customers on the data quality of the datasets they access. 4. Provides internal and external feedback loops that enable logging of data quality issues. • Create a new Data Quality metric and implement the means to collect the data.
DS6.2 Operationalisation of Common Information Model ***Deliverable Description:*** *Operationalising a standardised and comprehensive Common Information Model (CIM) to improve information management and exchange within the ESO organisation.* ***Deliverable Value Add:*** *Provides regulatory certainty. Drives commonality, standardisation, and interoperability across network planning data. Further applications of the CIM beyond the standard will become easier, (based on known CIM), profiles for different instances of data exchange can be built upon the core model.*	On Track	• Create an aggregated view of the different applications of Common Information Models (CIMs) across our business (e.g., GB CIM, IEC CIM, CGMS) and determine the pros and cons for each. • Leverage DS3.3 Facilitation of Industry Common Framework to engage with wider 'external' CIM Ecosystem working groups and understand utilisation and opportunities to increase model collaboration in the industry. • Gain internal consensus on the preferred CIM for the business and explore interoperability between diverse operational systems, such as balancing and control systems, market systems, and network systems and potential for CIM adoption/refinement. • Develop a plan for wide-scale implementation of the CIM across the ESO. • Share lessons learned from deployment with the industry. • Stand-up a CIM council to lead ESO implementation, monitor adherence and usage of best practice, determine expansion needs, and keep aligned with developing standards at the global level.
DS6.3 Scope New FSO Digital and Data Needs ***Deliverable Description:*** *Work with newly identified FSO business leads to identify upcoming digital and data tools, capabilities, and needs to deliver new obligations.* ***Deliverable Value Add:*** *Ensure the ability to deliver on new FSO roles.*		• Analyse customer digital needs for the new FSO roles. • Develop Digital Charters to provide a vision for each new business area, embracing the 'art of the possible' in those visions. • Determine which technologies and capabilities exist in-house already or will be developed in-house. • Scope potential external solutions that will close the gap between in-house technologies and capabilities and those needed to achieve customer digital needs for the new FSO roles.

ESO

AI Driven Crosscutting Efforts

The AI Driven Accelerator is the heart of our efforts to upscale our analytical rigour across the organisation. The actions below will reach across the business to further enable our organisation in new analytical techniques as well as ensure a baseline minimum standard for maintaining and operationalising analytics.

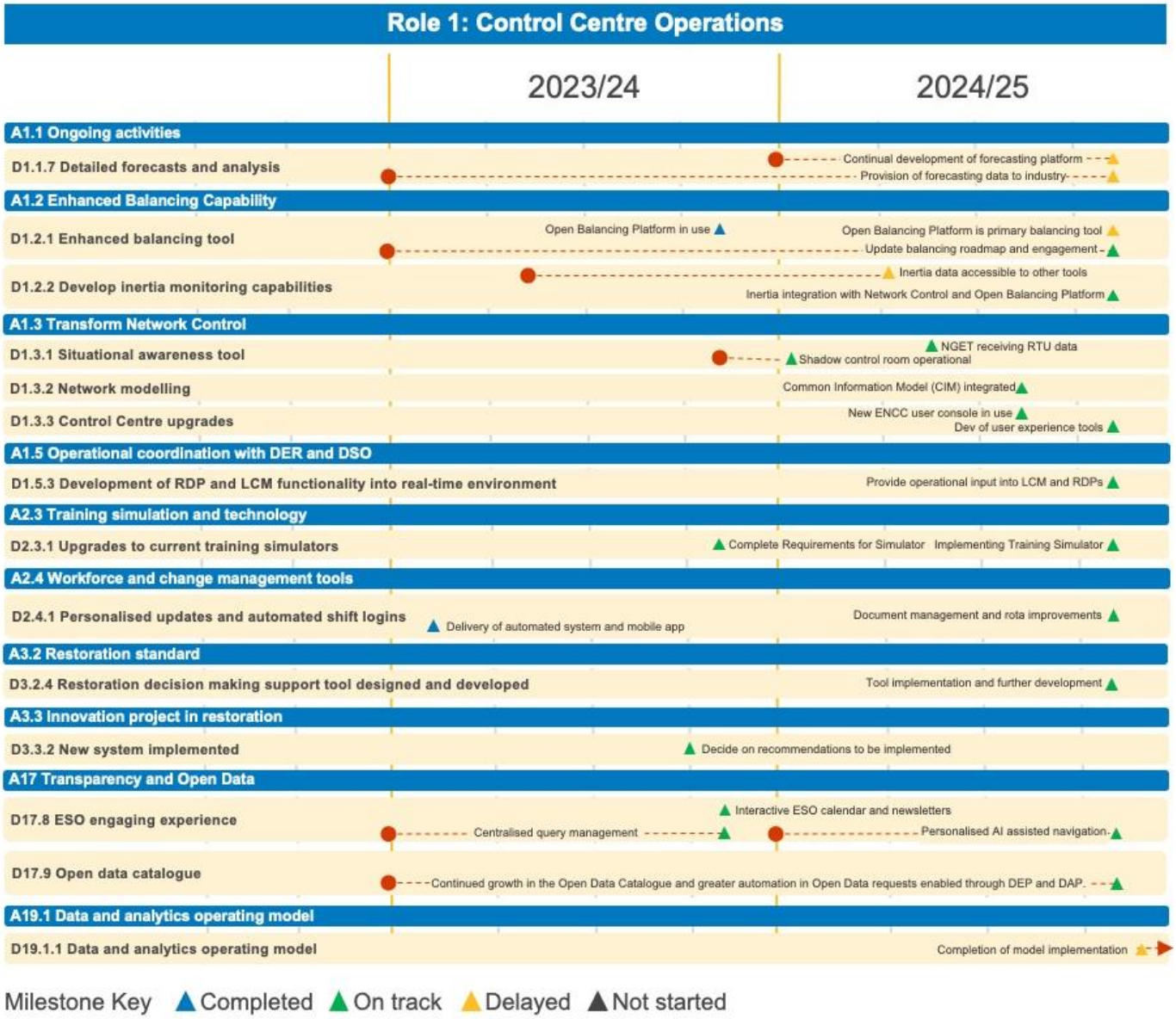
AI Driven Efforts	Status	Actions
DS7.1 Develop and Implement AI Foundations ***Deliverable Description**: Migrating existing AI and analytics to an Advanced Analytics Environment (AAE) and creating policies to drive AI capabilities, streamline operationalisation, and create productivity dividends through automation and best practice.* ***Deliverable Value Add**: Allow the organisation to efficiently harness AI to improve automation and data insights and ensure models conform to a minimum standard that confirms consistency, quality, and reliability for data-driven decision making.*	On Track	• Develop an Advanced Analytics Environment (AAE), a service built within the Data and Analytics Platform (DAP) that enables data science teams to experiment and productionise Machine Learning (ML) applications, ensuring consistency across applications, rapid deployment and decommissioning of environments, as well as a fast iterative development cycle for scaling. • Develop, publish, and apply policy around AI ways of working, coding, ML and Data standards as well as AI Ethics, working with legal teams to understand assurance aspects. • Leverage D19.1.1 Data and Analytics Operating Model to implement an end-to-end process that starts with end-user idea origination and apply a peer review / productionisation process for AI initiatives. • Leverage DS2.1 Digital and Data Skills and Capabilities Programme to internally socialise where and how to begin developing AI based analytics, explain the policies around it, and implement accreditation/certification pathways for AI developers. • Create a robust measurement program for measuring statistical performance of models and utilisation once productionised. • Determine the thresholds for minimum performance and criteria for model remediation to ensure each are delivering value. • Create a change management framework for the operationalisation of new solutions in the business to drive end-user engagement and adoption. • Develop feedback loops for end users on the adoption of newly operationalised models to consider continuous improvement and how related business processes can be further transformed and improved through AI and analytics.
DS7.2 Refine Analytics Processes ***Deliverable Description**: Utilising productivity dividends to create and address a prioritised list of advanced analytics and AI use cases, incorporating cutting-edge analytical technologies.* ***Deliverable Value Add**: Drive business value from prioritised delivery and operationalisation of advanced analytics and AI into business processes.*	On Track	• Identify existing AI and analytics across the business and relocate them to the AAE as a single source of truth for consistent access and oversight. • Create an expert AI team focused on control room use cases. • Leverage the policies created in DS7.1 Develop and Implement AI Foundations to review existing models and log enhancements or redesigns needed for each model to achieve the newly defined minimum standard. • Aggregate the backlog of new solutions requested across the business. • Determine the prioritisation logic for needed model enhancements and redesigns and new solutions. • Leverage DS4.2 Innovation Insights to Action to determine new cutting-edge technology and analytics solutions that could be incorporated into enhancements, redesigns, and new solutions. • Determine the level of effort and resources required to develop each enhancement, redesign, and new solution. • Implement model enhancements, redesigns, and new solutions based on priority and operationalise the revised models. • Leverage D19.1.1 Data and Analytics Operating Model to develop a process for the identification of need for a new model and

		creation and validation of newly developed models with criteria for placing them into the model library when ready for production. • Continuously develop new solutions with the business, and where relevant for new technologies, with the AI Centre of Excellence and external partners.
DS7.2 Accelerate Use of AI Across ESO ***Deliverable Description**: Actively reviewing areas of the business (e.g., the control room) as a whole to establish where processes can be reinvented with AI.* ***Deliverable Value Add**: Enhance efficiency, enable streamlined operations, and realise cost saving opportunities.*	On Track	• Starting with our control room, assess current processes end-to-end to understand AI enhancement opportunities. • Define clear goals, objectives, and plan to address AI enhancement opportunities. • Expand

Business Plan Activities, Deliverables, and Investments

We report against our BP2 activities, deliverables, milestones, and investments on a quarterly basis through the RIIO-2 deliverables tracker.[21] This tracker contains detail about each milestone, and these are linked back in our Business Plan to agreed performance measures that have been tested with stakeholders and regulatory bodies. A summary of the digitalisation relevant deliverables and their milestone updates is below. Any digitalisation relevant deliverables that do not have detailed updates included below are expected to continue as planned. For information on the ESO's previously completed activities and deliverables, please refer to our Completed DSAP Related Deliverables file here: nationalgrideso.com/document/299261/download.

Role 1 Activities, Deliverables, and Investments



[21] nationalgrideso.com/document/284596/download

Activity/Deliverables	Related Investment	Status	Update
A1.1 Ongoing activities			
D1.1.7 Produce and publish detailed forecasts and analysis, for both demand and generation, published at day ahead and other timescales. Forecasts will be enhanced using detailed statistical and machine learning approaches. ***Deliverable Description**:* *Provides the new forecasting platform that will automate forecasting processes and improve forecasting accuracy. The platform will also allow publication of forecasting data to industry. It will replace the existing demand predictor in the Control Centre and deliver greater benefits from our future balancing tools than would be possible with the existing forecast provision.* ***Deliverable Value Add:** Our forecasting enhancements will provide the Control Centre and market participants with better quality, more frequent forecasts, allowing them to make better operational decisions. This helps minimise balancing costs and reduce carbon emissions.*	260 Forecasting enhancements 670 Real-time predictions	Milestone 1 and 2 – Delayed, Internal reasons Milestone 3 – On track	• Milestone 1: Solar Power Product Implementation – The initial phase of the Solar Power product has been successfully developed in BP1, delivering value to consumers. In BP2, our objective is to transition the existing product from the current cloud solution to a strategic cloud solution and complete the remaining feature delivery. To ensure alignment with consumer value and business requirements, we have re-prioritised the forecasting roadmap/backlog through the cost monitoring framework (CMF). As a result, we have rescheduled this milestone to a later date (June 24) and shifted our focus to the delivery of Wind Power Generation Forecast product. • Milestone 2: Wind Power and National Demand Product Implementation – In order to enhance deliverability confidence for the milestones and address an error in the BP2 submission (two milestones as one), a reassessment has been conducted regarding the priority, size, and complexity of this milestone. • Milestone 3: Integration with OBP and DAP (as far as possible) – Work is in progress for Integration with Data analytics platform (DAP) and Open Balancing platform (OBP).
A1.2 Enhanced Balancing Capability			
D1.2.1 Future of Balancing ***Deliverable Description:** Deliver the Open Balancing Platform (OBP), our future balancing system. The OBP will replace the Balancing Mechanism (BM), the Electricity Balancing System (EBS) and the Ancillary Services Dispatch Platform (ASDP).* ***Deliverable Value Add:** Our existing balancing systems will become obsolete and need to be replaced within the RIIO-2 period or shortly afterwards. The transformation of our balancing systems is essential to meeting the requirements of zero carbon operation.*	180 Enhanced Balancing Capability	Milestone 1 – Complete Milestone 2, 4, 6, 8 – Delayed, Internal reasons Milestone 3, 5, 7 – On track	• Milestone 1: Increment 8. Issued an end of Increment report on Earned Value and Progress – Completed on 18 July as per original plan. • Milestone 2: Increment 9. The Increment is planned to deliver release 1, which will provide: Bi-directional Interfacing with BM and Base Energy Balancing Capabilities, including Market Data Processing, Margin Analysis, Meter Data Handling, Network Modelling, Demand Forecasting and crucially Bulk Optimisation and Dispatch. This will remove existing inefficiencies in dispatch caused by having multiple systems and workarounds. – The delay is a technicality due to a data misalignment between BP2 Annex 1 (Figure 1 - transformational deliverables roadmap), DD&T Annex 4 (Table 49 - Outcome Roadmap) and the Delivery schedule. Programme Increments are not directly related to OBP Releases. We are delivering on schedule to the DD&T Annex 4 roadmap and as reported in the cost monitoring framework. This states that Release 1 deliverable is due in Q3 FY24 not Q2 FY24 and is on track for Q3 FY24. This is also aligned with our communications via the quarterly balancing programme external engagement events. Programme Increment 9 delivers capabilities required to achieve release 1 completion in Q3 FY24. • Milestone 4: Increment 11. The Increment is planned to deliver release 2, which will provide: Pre-Qualification and Contract Integration; improved Market Situational Awareness; Improved Demand and Network Situational Awareness; and Realtime

			Constraint Management – The delay is a technicality due to a data misalignment between BP2 Annex 1 (Figure 1 - transformational deliverables roadmap), DD&T Annex 4 (Table 49 - Outcome Roadmap) and the Delivery schedule. Programme Increments are not directly related to OBP Releases. We are delivering on schedule to the DD&T Annex 4 roadmap and as reported in the cost monitoring framework. This states that Release 2 deliverable is due in Q3 FY25 not Q4 FY24 and is on track for Q3 FY25. This is also aligned with our communications via the quarterly balancing programme external engagement events. Programme Increment 11 delivers capabilities required to achieve release 2 completion in Q3 FY25. • Milestone 6: Programme Increment 13. The Increment is planned to deliver release 3, which will provide: Unit registration integration; Predicted generation through PEF integration; Mastery of Network constraints; and the first release of the National Optimiser – The delay is a technicality due to a data misalignment between BP2 Annex 1 (Figure 1 - transformational deliverables roadmap), DD&T Annex 4 (Table 49 - Outcome Roadmap) and the Delivery schedule. Programme Increments are not directly related to OBP Releases. We are delivering on schedule to the DD&T Annex 4 roadmap and as reported in the cost monitoring framework. This states that Release 3 deliverable is due in Q1 FY26 not Q2 FY25 and is on track for Q1 FY26. This is also aligned with our communications via the quarterly balancing programme external engagement events. Programme Increment 13 delivers capabilities required to achieve release 3 completion in Q1 FY26. • Milestone: Increment 15. The Increment is planned to deliver release 4, which will provide: Frequency Data integration; replacement of User written response requirements; Inertia Monitoring; and Frequency Response Management – The delay is a technicality due to a data misalignment between BP2 Annex 1 (Figure 1 - transformational deliverables roadmap), DD&T Annex 4 (Table 49 - Outcome Roadmap) and the Delivery schedule. Programme Increments are not directly related to OBP Releases. We are delivering on schedule to the DD&T Annex 4 roadmap and as reported in the cost monitoring framework. This states that Release 4 deliverable is due in Q3 FY26 not Q4 FY25 and is on track for Q3 FY26. This is also aligned with our communications via the quarterly balancing programme external engagement events. Programme Increment 15 delivers capabilities required to achieve release 4 completion in Q3 FY26.
D1.2.2 Develop inertia monitoring capabilities and other tools to address emerging technology and system management issues (as required), as outlined in future Operability Requirements Reports ***Deliverable Description**: This will provide and enhance the tools required to enable control centre users to manage changes to the system in real-time, securely, and economically.*	130 Emergent technology and system management	Milestone 1 – Delayed internal reasons Milestone 2 – on track	• Milestone 1: Integrate inertia data with Data and Analytics Platform - Inertia data has been collected and stored within the Data and Analytics Platform (DAP) since December 2022 as part of the initial DAP pilot project. We are working with the DAP project team to create additional dashboards that provide additional benefits to end users as additional data sources are added to DAP. This milestone should have aligned with that shown in Annex 4 (DDT) of BP2 which is March 2024 and is on track to deliver ahead of that date. • Milestone 2: Integrate tools created with network control tool. Inertia monitoring tools integrated with DAP and enhanced balancing capability - These

Deliverable Value Add: *This deliverable will provide Control Engineers with the tools to monitor and manage evolving operational challenges that are arising due to the changing system parameters. Consumers benefit as fully integrated tools enable cost optimal decisions to be made for new operational challenges. Industry interest as this deliverable Enables increased options to manage new challenges.*			integrations are likely to be via DAP and final delivery will align with the end project (OBP and Network Control / User console) priorities and timelines.
A1.3 Transform Network Control			
D1.3.1 Develop and deliver new real-time situational awareness tool, so Control Centre engineers can better understand changing network limitations, leading to a more efficient risk-based operation of the system. ***Deliverable Description:*** *This will provide and enhance the tools required to enable control centre engineers to manage changes to the system in real-time and in planning timescales, securely and economically.* ***Deliverable Value Add:*** *This deliverable will provide Control Engineers with the tools to manage real-time scenarios and plan operation of the electricity network more effectively. Lower cost to consumers through more efficient management of balancing costs without increasing system security risks. Providing greater situational awareness will ensure increased system security and potentially reduce balancing costs.*	110 Network Control	Milestones 1, 3-6 – on track Milestones 2, 7 – Delayed internal reasons	• Milestone 1: Look Ahead Iteration 1 / VSAT/OSA hosted in new DCs - Not yet started but remains aligned with these dates for delivery. • Milestone 2: Look Ahead functionality running in Development Environments - Dates to be revised to align with new Data Centre delivery dates. Not expected to knock-on to any other milestones. • Milestone 3: Commence Build of Voltage Stability Analysis Tool (VSAT) and Online Stability Assessment (OSA) Tool Environments - Not yet started - awaiting Data Centre delivery. • Milestone 4: Shadow Control Centre established. Initial Data and Analytics Platform (DAP) integration - Shadow Control facilities to be developed as part of the training suite for new NCMS with the option to develop further into a proposed FSO Contingency Control Centre post-project completion. DAP integration target date remains March 2024. • Milestone 5: NGET receiving RTU Data. DAP and balancing integration - DAP integration target date remains March 2024. Balancing integration target date remains September 2024. • Milestone 6: Serial RTU connections removed - RTU PoC in progress with third parties, expected outcome Jan 24 - this milestone delivery will be dependent on both ESO and NGET progress with their respective SCADA replacement deliveries. • Milestone 7: Deliver integrated network control tool (inc VSAT and Look Ahead OSA), including its specific digital twin - Date to be changed to October 25 following a rebase line of plan that has taken place to understand the impact of GE product pivot to new GridOS technology.
D1.3.2 Enhanced network modelling capabilities with online analysis of voltage and power flow profiles closer to real time ***Deliverable Description:*** *This will provide and enhance the tools required to enable control centre engineers to manage changes to the system in real-time and in planning timescales, securely and economically.* ***Deliverable Value Add:*** *Accurate modelling of the electricity network in real-time and in planning timescales is critical to safe and efficient power system operation. Look-Ahead Analysis will allow lower costs to consumers through more efficient*	150 Operational awareness and decision support	Milestone 1, 3, 4 – on track Milestone 2 – Delayed internal reasons	• Milestone 1: Common Information Model (CIM) Integration Requirements Complete - CIM model integration requirements aligned with NCMS product delivery plan. • Milestone 2: Integrate with enhanced balancing tool - Reviewed against latest NCMS and Balancing delivery plans and integration target date is now September 2024. No anticipated knock-on to other milestones. Delay is caused by a few internal factors: - NCMS Pivot to GridOS - the focus on the pivot to GridOS from an NCMS perspective has meant the integration work with OBP (enhanced balancing tool) has been re-prioritised. - Due to the complexity of both the NCMS and OBP toolsets, requirement development for the interfaces and functionality to be shared between the two tools has taken longer than

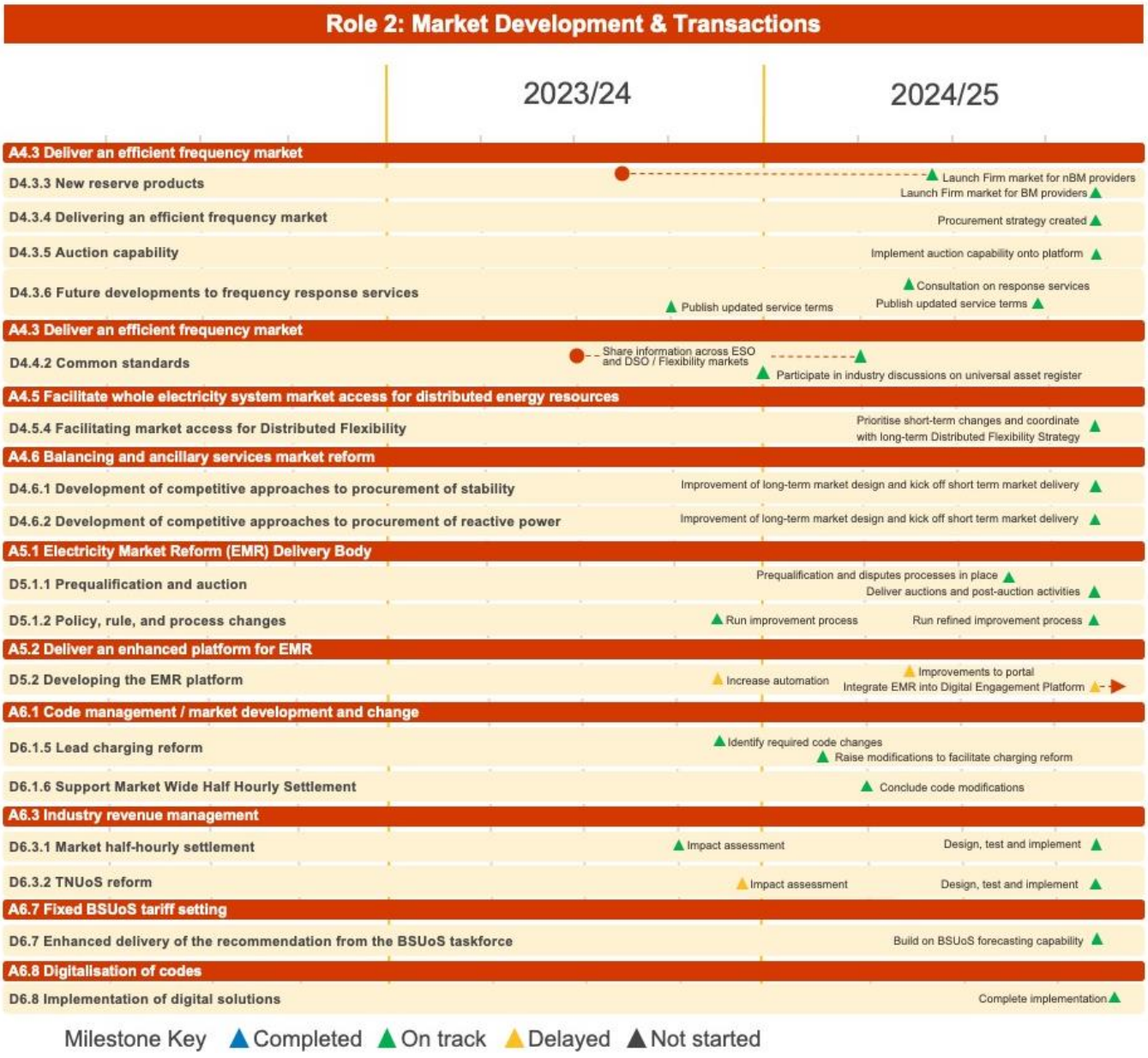
management of balancing costs without increasing system security risks. Accurate modelling will provide greater situational awareness will ensure increased system security and potentially reduce balancing costs.			expected and is still ongoing in a number of areas (for example Constraint Visualisation). A high-level plan for delivery of the integrations between NCMS and OBP are now in place. • Milestone 3: Common Information Model (CIM) Integration Complete - CIM model integration aligned with NCMS product delivery plan. • Milestone 4: Integrate with Network Control Management System (NCMS) - integration aligned with NCMS product delivery plan" Milestone 1: CIM model integration requirements aligned with NCMS product delivery plan..
D1.3.3 Upgraded Control Centre video walls and operator consoles, with a single interface giving an overall state of the power system ***Deliverable Description**:* *This will allow an overall view of the state of the power system in one place enabling Control Centre managers to make better and quicker informed decisions. In emergency cases, the silver command team will also be able to have faster reaction times and give the most up to date and relevant information to external stakeholders.* *We are delivering a single capability to manage the user interface/experience for our control room systems. This includes core application components, visualisation tools, control centre dashboards, video wall and infrastructure/facilities enhancements to update our command and emergency management capability.* ***Deliverable Value Add:** This deliverable will provide Control Engineers with the enhanced situational awareness capabilities via a single interface to manage real-time scenarios and plan operation of the electricity network more effectively. Lower costs to consumers through more efficient management of balancing costs without increasing system security risks. Providing greater situational awareness will ensure increased system security and potentially reduce balancing costs.*	110 Network Control 140 ENCC Operator Console 180 Enhanced balancing capability 220 Data and analytics platform	Milestone 1, 2 – Complete Milestone 3-7 – On track	• Milestone 1: Complete UI/UX requirements for ENCC Operator Console - User requirements completed and design is now underway. • Milestone 2: Commence Design Phase - User requirements completed and conceptual solution architecture is complete and now informing the procurement of the solution. • Milestone 3: Commence Build - Awaiting outcome of procurement activities. • Milestone 4: Scope requirement and start design of video walls - User requirements completed and design is underway. This design will be informed by the upcoming procurement PQQ. Working with epri to understand the control room of the future and how we can apply this to our environment. • Milestone 5: Commence Solution Testing - User requirements completed and now entering procurement phase for new hardware and software. • Milestone 6: ENCC Operator Console build complete. Move to implementation and enhanced testing - User requirements completed and now entering procurement phase for new hardware and software. • Milestone 7: Development and testing of user experience tools and video walls - User requirements completed and now entering procurement phase for new hardware and software.
A1.5 Operational coordination with DER and DSO			
D1.5.3 Development of RDP and LCM functionality into real-time environment ***Deliverable Description:*** *Platform commitments and gives our stakeholders the opportunity to derive insights from data. It enables the exchange of operational data and may facilitate new balancing*	110 Network Control 180 Enhanced Balancing Capability	On track	• Continue to provide operational input into LCM and RDPs. • LCM is still in early development stages, but trials are proceeding.

opportunities through integration of DER real-time data. ***Deliverable Value Add:*** *DER markets for flexibility are driving new forms of flexibility and will enable learning to be embedded into enduring future arrangements. Early engagement with DER via RDPs and LCMs will increase the experience and knowledge and enable to removal of market blockers across industry, enhancing participation in new markets and increasing competitivity.*			
A2.3 Training simulation and technology			
D2.3.1 Upgrades to current simulators, including annual scenario snapshot refreshes, ahead of developing new training simulation capability, including end-to-end bespoke training scenarios, and simulated operational systems using live data. ***Deliverable Description:*** *Allows Control Centre Engineers to train on end-to-end integrated environments giving a realistic Control Centre experience.* ***Deliverable Value Add:*** *Consumers are benefitted through Control Centre engineers making better operational decisions, ensuring that the system continues to run safely and reliably, while minimising bills.* *Providing realistic simulation and training capabilities will ensure control engineers are well placed to deliver increased system security and to potentially reduce balancing costs.*	200 Future simulation and tools	Milestone 1 – Delayed internal reasons Milestone 2-4 – On track	• Milestone 1: Initial NCMS Training Simulator Stood Up - NCMS initial onsite delivery is delayed this has impacted on our ability to stand up the initial Training Simulator. Data Centre is available from October assumed 6 months post this to have a training simulator. However, the Training Simulator is not required till October 24 to meet overall delivery timescales. As such a strategic decision has been made to move this delivery to June 24. • Milestone 2: Complete Requirements for Joint Training Simulator - ESO project mandate in process being raised and requirement gathering formally beginning after this. • Milestone 3: Commence Dev/Test Phase and Milestone 4: Training Simulator Move to Implementation - Needs to be baselined against NCMS and OBP plans to align for delivery. Needs to be baselined against NCMS and OBP plans to align for delivery..
A2.4 Workforce and change management tools			
D2.4.1 Personalised updates and automated shift logins to be made available on different platforms and updated to a user's profile, giving better training and operational decision making. ***Deliverable Description:*** *This is an investment in greater automation to produce personalised training packages for career development and enhancement.* ***Deliverable Value Add****: Creating a repository for all our training, authorisation and development information pertaining to operational staff centralises governance and oversight to give assurance of operational staff capability and competence in role.*	190 Workforce and Change Management Tools	Milestone 1 – Complete Milestone 2-4 – On track	• Milestone 1: Delivery of Automated System and Mobile App - Phase 3 is currently being assessed by internal and external IT providers with a number of future developments in the pipeline. The new automated system has now replaced the old manual system and the mobile app is being used by all operational staff. • Milestone 2: Develop document management and rota improvements - Phase 3 requirements have been mapped and the statement of works has been submitted to the vendor. Awaiting update.
A3.2 Restoration standard			

D3.2.4 Restoration decision making support tool designed and developed to aid faster restoration times in line with stakeholder expectations and licence obligations. ***Deliverable Description:*** *This tool will support the informed decision making of the control centre engineers in a national power outage scenario on the best restoration route to implement based on a number of factors such as MW, MVAr, SCL etc of the network, availability and response time of the restoration providers.* ***Deliverable Value Add:*** *Reduce restoration timeframe, reduce diverging restoration timeframe across regions and reduce operational costs. (This is a licence obligation). Ensures prompt security of supply following a partial or total national power outage.*	510 Restoration Decision	Milestone 1 – Delayed internal reasons Milestone 2 – On track	• Milestone 1: Tool available for integration with Network Control programme - Resourcing issues - unavailability of specialist resource in ESO IT team has introduced delays to the delivery of the RDSTapp is being used by all operational staff.
A3.3 Innovation project in restoration			
D3.3.2 Subject to industry adoption, Distributed ReStart proof of concept findings implemented and new system and communication methods implemented. ***Deliverable Description:*** *implement findings of the Network Innovation Competition project Distributed ReStart, which is a collaborative solution developed by the ESO and DNOs to enable DER to participate in the restoration market.* ***Deliverable Value Add:*** *Significant financial benefits to consumers through increased competition, lower costs, reduction in CO2 emissions and quicker restoration.*	460 Restoration	Milestone 1 – Complete Milestone 2 – On track	• Milestone 1: We will fully understand Distributed ReStart's final recommendations and their implications - Recommendations from Distributed ReStart are being implemented as part of ESRS.
A17 Transparency and Open Data			
D17.8 Digital Engagement Platform (DEP) continued phased deployment ***Deliverable Description:*** *DEP will make the experience of engaging with the ESO more intuitive and user friendly by providing a single sign on for all ESO services and a personalised user experience with access to information, data and other services including markets, connections and codes.* ***Deliverable Value Add:*** *This deliverable will make it easier to engage and do business with the ESO, supporting our 2025 ambition to be a trusted partner. Enhanced access to information and data for existing and new market participants is expected to drive innovation and increased market participation.*	250 Digital Engagement Platform	On track	• The DEP will make the experience of engaging with the ESO more intuitive and user friendly by providing a single sign on for all ESO services and a personalised user experience with access to information, data and other services including markets, connections and codes. • Progress made: Following the successful deployment of the Digital Experience Platform at the end of March 2023, the DEP Programme has delivered a number of smaller agile releases including enhancements to Asset Management and Content search as well as enabling features for the single sign on capability. Plan for next FY24 Q3: October: Release 2 will include deployment of single sign on capability (CIAM) to data portal, Single Market Platform and Enduring Auction capability. This will provide a seamless customer experience across the different portals. In addition, Release 2 will see the introduction of the ESO Account Management

Improved access to content is also expected to benefit consumer engagement with net zero and energy more broadly.			Space where stakeholders will be able to start to manage their interactions with the ESO in one place including their data portal subscriptions. Future releases in Q4 and FY25 Q1 will include features to enable a personalised user experience for ESO news and events as well as a holistic query management solution aligned with the Customer Service Operating Model.
D17.9 Open Data Catalogue ***Deliverable Description:*** *Provides external users with a view of ESO Data and enables internal users to develop their own data products to benefit consumers.* ***Deliverable Value Add:*** *The Open Data Catalogue will allow market participants to discover the data held by the ESO, published and unpublished, as a means to inform Open Data requests. In this way, we can make more data available without incurring costs associated of publishing data that is not in demand. Making our data accessible promotes innovation and the creation of new insights, supporting net-zero and market efficiency.*	220 Data and Analytics Platform 250 Digital Engagement Platform	On track	• Provides external users with a view of ESO Data and enables internal users to develop their own data products to benefit consumers. • Initial integration with Catalogue tool, undergoing continuous technology assessment to ensure meets business and customer requirements.
A19.1 Data and analytics operating model			
D19.1.1 Data and Analytics (D&A) Operating Model ***Deliverable Description****: This deliverable is the operating model (people and process) that allows us to fully exploit the technology delivered through the DAP investment.* ***Deliverable Value Add****: This deliverable will implementing robust and compliant data management practices coupled with an agile delivery model for data products, including Open Data. This benefits consumers by further enabling Open Data, and delivering the D&A tools required to operate a zero-carbon grid. The Operating Model will deliver the advanced D&A capability required to plan and operate a zero-carbon grid reliably; and further enables Open Data.*	220 Data and Analytics Platform	On track	• Our D&A operating model brings together people, process, and technology to enable the continuous development and enhancement of D&A tools across the ESO and ongoing publication of data to external stakeholders via our Open Data Portal. The Operating Model is comprised of i) a "Hub" team, setting the "rules and tools" for data product development and includes Data Governance, Data Operations and Data Stewardship, and ii) business "Spoke" teams, who work with the Hub team on our DAP platform to create new data products in a self-serve manner. • Continuous development is being undertaken to implement the operating model.

Role 2 Activities, Deliverables, and Investments



Activity/Deliverables	Related Investment	Status	Update
A4.3 Deliver an efficient frequency market			
D4.3.3 New reserve products - development and introduction of a new suite of products to provide reserve to the Control Centre ***Deliverable Description**: Development and introduction of a new suite of products to enhance our procurement process for our reformed ancillary services markets, including our auction capability and maximising user participation.*	400 Single Markets Platform 420 Auction Capability 610 Settlements, Charging and Billing	Milestone 1 – Delayed internal reasons Milestone 2 – On track	• Milestone 1: Launch Firm market for nBM providers (dependency on D4.3.5) - Reserve Reform currently going through internal discovery - an update on a new delivery plan will be communicated in October - The delivery of a nbm service market for reserve is dependent on when the enduring solution of OBP strategic for nbm will go live. So, we are dependent on OBP delivery. • Milestone 2: Launch Firm market for BM providers (dependency on OBP delivery) - Reserve Reform currently going through internal discovery - an update

Deliverable Value Add: *Engaging with stakeholders to give them the opportunity to comment on future changes will ensure we continue to improve these services for industry and the Control Centre.*			on a new delivery plan will be communicated in October.
D4.3.4 Delivering an efficient frequency market ***Deliverable Description:*** *This deliverable will improve usability and access, optimise procurement services, and ensures we have the capability to perform settlements for a higher number of market participants in the Single Markets Platform.* ***Deliverable Value Add:*** *Market participants able to participate in market auctions through interface of Single Markets Platform.*	400 Single Markets Platform 420 Auction Capability 610 Settlements, Charging and Billing	On track	• Created longer-term procurement strategy which spans response and reserve looking at how the products interact with each other operationally and commercially, and the wider market. • ESO are in the process of internally reviewing potential day 2 roadmap options. • ESO recognise that the delay of our reserve products will impact the development of these activities as per the BP milestone.
D4.3.5 Auction capability ***Deliverable Description****: Implementation of the enduring auction capability and transition of the newly introduced services of BP1 onto the platform.* ***Deliverable Value Add****: This will offer market participants increased tendering opportunities via co-optimised auctions, improved user experience, enhanced automation and system integration with Single Markets Platform.*	420 Auction Capability	On track	• Implementation of the enduring auction capability and transition of the newly introduced services of BP1 onto the platform. • The industry EAC consultation was undertaken from 14 June 2023 to 14 July 2023. NGESO reviewed and responded to feedback received from stakeholders and market participants. In addition, amendments were made to the proposed service terms and procurement rules that were launched as part of the consultation. • These amended documents were submitted to Ofgem for review on 14 August 2023 and a result is expected by WC 9 October 2023. • ESO are now focused on market participant readiness. Mock auctions are also being planned to start in the coming weeks. • ESO are on track to go live in Autumn.
D4.3.6 Future developments to frequency response services ***Deliverable Description****: Supports the onboarding, procurement, settlement, and process for further developing new frequency response services.* ***Deliverable Value Add****: The design of the new frequency response services will be further developed, based on experience and learnings following their launch. These optimisations will 1) increase access to the response market and 2) improve the efficiency of the market and the ability of the ESO to source these services from the lowest-cost provider in all periods. These optimisations will lower overall procurement costs for the ESO.*	400 Single Markets Platform	Milestone 1 – Complete Milestone 2-4 – On track	• Milestone 1: In line with our new approach to annually consult on the new response services, we expect to formally engage with industry through the EBR Article 18 process in summer 2023-24. - Release 2 (2023-24) Electricity Balancing Regulation (EBR) consultation launched in Summer 2023 and will be submitted to Ofgem end of September 23. Key topics of focus for 2023-24 include removing barriers to Data-derived metering (baselining), clarity on topics such as State of Energy, updates to ramp rates, as well as a range of changes to tools and improvements to enable the Control Centre to operate the electricity transmission system securely. • Milestone 2: We expect to publish updated service terms towards the end of Q3 2023-24. These changes will then feed into the C16 consultation process. - Service terms will be updated and published subject to the outcome of the EBR consultation in Q2.
A4.4 Deliver a single, integrated platform for ESO Markets			
D4.4.2 Common standards, including interoperable systems, a common data model and shared minimum specifications between ESO and other flexibility platforms as well as at the distribution level.	400 Single Markets Platform	Milestone 1 – Delayed consumer benefits	• Milestone 1: Supported the development of a proof of concept for industry asset register -SMP has developed an asset / unit registry to support NGESO balancing services markets. We have shared our data model with others in the industry for information (including 3rd party market providers such as Piclo).

Deliverable Description: *Facilitation of optimised markets across distribution and transmission requirements and Industry platforms integrated more closely.* ***Deliverable Value Add:*** *This will optimise participation and facilitate real time transparency of what assets are participating in which markets at any time. Targeting greater levels of integration across ESO and DSO markets is expected to result in greater levels of liquidity for the benefit of the consumer.*		Milestone 2-4 – On track	However, this activity is influenced by wider industry developments that are likely to be informed by recent Ofgem consultation and call for input that focus on the development and integration of flexibility markets. Outside of simply focusing on asset registers SMP is actively working with DNOs and Electralink on a proof of concept to deliver ""risk of conflict"" reports into our production system to inform NGESO about assets pre-qualified for balancing services that may be committed elsewhere / on outage at the DNO level. This is a significant step to closer integration and is functionality well in advance of just asset registry. • Milestone 2: Participation in proof of concept for industry asset register, Milestone 3: Integrate SMP with industry asset register (subject to it being available), and Milestone 4: Improved DER asset visibility within SMP and / or wider NGESO platforms - NGESO is actively working with DNOs and Electralink on a Proof of Concept to establish integration into our production SMP system. This will inform NGESO about assets pre-qualified for balancing services on SMP that may be committed elsewhere / on outage at the DNO level. This is a significant step to closer ESO / DNO integration and is functionality well in advance of just asset registry.
A4.5 Facilitate whole electricity system market access for distributed energy resources			
D4.5.4 Facilitating market access for Distributed Flexibility ***Deliverable Description:*** *Deliver additional SMP functionality and more balancing services through subsequent releases to enable whole electricity flexibility activities.* ***Deliverable Value Add:*** *To facilitate entry to ESO markets for distributed flexibility, we must remove key technical and commercial barriers and blockers, and introduce enabling systems and processes to make entry as seamless as possible.*	250 Digital Engagement Platform 400 Single Markets Platform	On track	• Milestone 1: Understand the key technical and commercial barriers to distributed flexibility today and deliver prioritised short-term changes as per ESO strategy. Progress towards the delivery of SMP (as per A4.4). - We continue to engage with the market and stakeholders and evolving our strategy around the development of flex markets including the delivery of SMP. Over the course of 2023-2024 we will be developing a flexibility strategy that will propose the direction we will be taking. Our Flex Strategy is nearing completion. Included in this is a review of stacking and key service requirements. • Milestone 2: Continue to identify and deliver changes required to facilitate distributed flexibility participation and coordinate with long-term Distributed Flexibility Strategy - We continue to engage with the market to ensure that we can coordinate flexibility. this includes Open Networks, our own internal product development and moreover creating our plans for evolving market strategy and this will become more apparent over the summer of 2023. Our Flexibility strategy is nearing completion including a review of stacking and service requirements.
A4.6 Balancing and ancillary services market reform			
D4.6.1 Development of competitive approaches to procurement of stability. ***Deliverable Description****: Deliver the ability to register, model, settle, instruct, and report new services arising from pathfinders.* ***Deliverable Value Add:*** *We need to continuously evolve our markets to facilitate new stability technologies and solutions to meet dramatically changing requirements. We must design these markets in a way that*	130 Emergent technology and system management	On track	• Milestone 1: Long-term procurement: Implement the findings of innovation project and build on learnings from pathfinders, develop the details of implementing enduring long-term market based on the output from BP1. Short-term market: Depending on outcome of innovation project in BP1, kick off implementation programme to deliver short-term market. Go-live date to be determined based on the outcome of innovation project - On progressing the mid-term (Y-1) Stability Market, we have launched and concluded a Request for Information on our initial service design. The RFI was out for 4 weeks and was well-received by the market. We have digested the valuable feedback

promotes efficient investment, efficient dispatch, and value for money.				provided by 18 different companies and are now actively reviewing our service design considerations. As part of the RFI, we have engaged in multiple bilateral conversations with prospective providers and plan to hold more whole industry webinars as we progress to the next phase of launching the market which is an Expression of Interest. In parallel, we are continuing to finalise the Y-4 and D-1 initial market design and beginning to engage the relevant teams in ESO to understand what will be required to deliver these markets, and in what timescales this can be achieved. Our delivery plans will be updated through the recently introduced Markets Roadmap monthly delivery plan updates. This work includes activities to map out our existing processes for stability procurement (e.g., Pathfinders) and design new process and capability to be able to support Y-4 and D-1 markets. Alignment with ESO's new balancing, auction, and settlement systems will be a fundamental enabler.
D4.6.2 Development of competitive approaches to procurement of reactive power. ***Deliverable Description:*** *Deliver the ability to register, model, settle, instruct and report new services arising from pathfinders.* ***Deliverable Value Add:*** *The fundamental balancing and operability requirements of the system are dramatically changing and we need to continuously evolve our markets to facilitate new technologies and solutions to meet reactive power requirements. We must design these markets in a way that promotes efficient investment, efficient dispatch, and value for money.*	130 Emergent technology and system management	On track	•	Following the reprioritisation activity ahead of winter 22/23, work on a Reactive Power market was paused. This work is now being re-started with a new timeline and deliverables being planned.
A5.1 Electricity Market Reform (EMR) Delivery Body				
D5.1.1 Continuation of Electricity Market Reform (EMR) Delivery Body obligations: We will deliver the prequalification and auction processes for the Capacity Market and qualification and allocation processes for Contracts for Difference (CfD). We will also deliver our agreement management obligations for the CM. ***Deliverable Description:*** *The new EMR platform will enable us to be flexible, scalable, and adaptable to respond to customer and regulatory requirements faster and at a lower cost. It will offer a step change in user experience, supporting self-service and improved navigation. We will support our customers in using the new platform by updating our processes and guidance. The new platform will also enable us to automate manual processes and optimise any remaining manual processes and controls. This in turn will enable us to focus operational*	320 EMR Portal Improvements (Capacity Market and Contracts for Difference)	Milestone 1,2 – Complete Milestone 3-8 – On track	•	Milestone 1: Publish co-created guidance covering any rule changes and system and operational improvements, in collaboration with Ofgem, BEIS and industry, within 4 weeks of rules being set - CM-Guidance is being updated with: 1. specific focus on areas of feedback. 2. a new section of "new for this year" to assist parties with understanding Rules changes. 3. slides requested by DESNZ to aid in policy conversations to ensure consistent messaging cross-party in response to emerging focus of questions. EMR DB have published the Operational Plan and circulated to over 3,000 parties on 12 June 2023. EMR customer events are scheduled to take place on 19 July (in-person) and 25 July (online) to launch this year's CM process, with a focus on prequalification and rule changes. The EMR DB team have been working to update the process for query management to achieve quicker SLAs, and undertaken cross training of team to enable more rounded advice.

resource increasingly on higher value-adding activities.

Deliverable Value Add: *We are delivering the Capacity Market and CfDs on behalf of Government as key mechanisms to ensure security of electricity supply and to drive the transition to low carbon electricity generation. Consumers are benefitting from these important activities by continuing to have secure electricity supplies at an appropriate cost as we support the country through the transition to net zero. The Capacity Market and CfDs are key markets for industry as they provide opportunities for existing participants as well as new entrants.*

CfD: The EMR DB published CfD guidance prior the application window opening for Allocation Round 5. The guidance included:

- How customers should complete the application form if applying for a private network CfD agreement.
- How Floating Offshore Wind applicants should provide the supply chain plan.
- How Solar PV applicants should entered their Initial Installed Capacity Estimate.
- Clear steps on how applicants could view their Allocation results (e.g., examples were added of how applicants can check for confirmation of an action in the system being completed).
- Overall formatting of the guidance documents was updated to ensure there was a clear flow through of each section related to the CfD Allocation process.

Guidance changes were refined in consultation with Delivery Partners, DESNZ and Ofgem and draft guidance documents were reviewed by a select group of customers.

The EMR DB also engaged through:

-An auction scenarios video distributed to customers shortly after the budget notice being for Allocation Round being published

-The CfD Launch Event and the EMR DB led applicant readiness webinar in early 2023.

- Milestone 2: Commence the pre-qualification process, with customers benefitting from enhanced guidance - CM: Prequalification application window closes on 19 September. The team is busy providing support to Applicants, including responding to queries. During 7/8 September, the Portal was running very slowly - the DB identified the root cause, correct it, and issued comms to stakeholders on 8 September.
- Milestone 3: Conclude the pre-qualification and disputes processes and prepare for the auctions - CfD: Ofgem upheld the DB's decision on all of the disputes submitted to them. We recognise however that Ofgem did not uphold the DB's position on every matter included in the disputes. CM: Once the PQ window closes, the Prequalification Assessment window opens, during which the team will be assessing applications. Ways of working have been agreed with the Legal team to assist with resolving complicated issues. The Tier 1 dispute window will open on 1 November and we will update this milestone with outcomes in next quarter's reporting.
- Milestone 4: Deliver the auctions and post-auction activities, including capturing key learning points with industry - Delivery of these milestones is sequential and so this milestone will commence after the preceding one has concluded. CfD: The DB has successfully completed the AR5 auction process. Auction Round 5 results were released to industry on 8 September 2023.
- Milestone 5: Publish co-created guidance covering any rule changes and system and operational improvements, in collaboration with Ofgem, BEIS and industry, within 4 weeks of rules being laid. - This milestone is dependent on decisions regarding Rule changes and learnings from the current Auction. Once these are known, guidance will be updated in preparation for the next Auction. CfD: following

			completion of the AR5 Auction, the team is carrying out a customer satisfaction survey. Feedback through survey responses and recommendations from the independent auditor will be reflected in updates to the Guidance in advance of Allocation Round 6 in 2024.
D5.1.2 Continuation of EMR Delivery Body obligations: We work with BEIS, Ofgem and industry to identify, assess and implement policy, rule and process changes to further develop the Capacity Market and CfD mechanisms. We will also actively contribute to BEIS's Ten Year Review of the Capacity Market and their strategic policy development for CfDs ***Deliverable Description:*** *We will ensure that changes to policy, rules and processes are supported through our EMR platform.* ***Deliverable Value Add:*** *This helps to ensure the Capacity Market and CfDs regimes continue to deliver the objectives of ensuring security of electricity supply and driving the transition to low carbon electricity generation in an efficient and effective way. Ensuring policy, rules and processes are efficient and effective will help deliver security of supply at an appropriate cost and support the transition to net zero. Simplification and greater clarity of policy, rules and processes will reduce barriers to enter these markets.*	320 EMR Portal Improvements (Capacity Market and Contracts for Difference)	Milestone 1 – Complete reasons Milestone 2-4 – On track	• Milestone 1: Develop a clear process for capturing and assessing policy, rule and process improvements which draws on operational experience and industry feedback and feed this into CMAG and other relevant BEIS and Ofgem processes. - The EMR DB has developed and shared with Ofgem a process for how they will identify and undertake initial assessment of proposals and then progress them through CMAG. Further work is being undertaken internally to develop a standardised approach for impact assessments, based on experience with changes to date, which will then be discussed with delivery partners for their input. • Milestone 2: Q2-4: Once established, we will run the improvement process on an ongoing basis, with key outputs timed to meet BEIS, Ofgem and CMAG timelines. - Several new changes have been raised by stakeholders, including a process change raised jointly by the DB and ESC, which are being considered by CMAG. The complex nature and potential policy implications of the changes means that they have not yet progressed to the impact assessment stage, which is when the DB will be able to test their internal process changes. However, the DB continues to be an active participant at CMAG, including challenging proposals and providing views on how the CM Rules apply. The DB is working on their list of potential changes and still anticipates being in a position to take them to CMAG within the expected timeframes for this milestone. • Milestone 3: Undertake informal review of the improvement process with industry, BEIS and Ofgem to identify ways to refine the approach. - Once the improvement process has been tested on several code change proposals, the EMR DB will review how well it has functioned to support delivery partners with identifying, assessing, and implementing changes. • Milestone 4: Q2 - Q4: Implement process refinements and run refined improvement process from Q2 onwards - This milestone is dependent on the outcomes of the one above relating to process improvements.
A5.2 Deliver an enhanced platform for EMR			
D5.2 Developing the EMR platform ***Deliverable Description:*** *We will deliver a 'new' EMR solution which will be flexible, scalable, and adaptable to respond to customer and regulatory requirements faster and at a lower cost than currently experienced. It will offer a step change in the current user experience, implementing self-service and improved navigation. Also process automation and optimise any remaining manual processes and controls.* *Our plan for BP2 is to integrate the EMR service into the DEP. DEP will*	320 EMR Portal Improvements (Capacity Market and Contracts for Difference) 250 Digital Engagement Platform	Milestone 1-3 – Delayed internal reasons Milestone 4 – On track	• Milestone 1: Additional improvements to EMR portal delivered to improve customer experience. Regulatory changes implemented for annual processes, Milestone 2: Using portal and data to increase automation of ESO processes to improve efficiency and information available to industry, and Milestone 3: Additional improvements to EMR portal to improve customer experience. Regulatory changes implemented for annual processes - We have engaged with industry and Ofgem on a new portal delivery roadmap which has been updated since the creation of the BP2 delivery schedule milestones. The original BP2 milestone is therefore delayed and we are in discussion with Ofgem around how we report our delivery based on the new roadmap. We issued a request to changed delivery schedule

replace the current nationalgrideso.com website and create a single point of access into the ESO systems and external facing processes, providing secure, open access to data, compliant with data classification policies and standards. Our intention is to align our front-end user interface for EMR to the design system delivered the DEP and integrate the EMR Single Sign-On (SSO) functionality using the new customer identity and access management (CIAM) solution, also delivered by DEP. ***Deliverable Value Add:*** *Customer-focused improvements and faster development of regulatory change along with reduced complexity for applicants maximises the participation of eligible providers, thus ensuring liquidity and confidence from the consumer that participants will deliver on obligations at an appropriate cost.*			milestones for the New Portal to the Ofgem team in August following the updated roadmap. We are awaiting feedback from the Ofgem team prior to amending any milestones. • Milestone 4: Deliver planned integration of EMR within the Digital Engagement Platform, considerate of any licensed business separation requirements - Alignment of EMR into the Digital Engagement Platform is part of the backlog for DEP commitments.
A6.1 Code management / market development and change			
D6.1.5 Lead charging reform ***Deliverable Description:*** *Subject to the outcomes of the TNUoS Taskforces but we expect to be in a position to recommend code changes for progression with industry.* ***Deliverable Value Add:*** *Act on a recent Ofgem call for evidence regarding the potential need for TNUoS reform to spread costs more fairly between end users.*	610 Settlements, Charging and Billing	On track	• Milestone 1: Raise TNUoS modifications to facilitate charging reform - TNUoS Taskforce is currently working through allocated workstreams regarding identified issues. These 'sub groups' will need to complete over the coming months to clearly articulate the defects and create solutions before any code modifications are raised. To date it has been agreed that 2 proposed changes can now progress to draft modification stage with a further review from Task Force prior to formally raising. We have presented on an issue regarding isolated MITS to TCMF but further investigation is required before this is raised. Scaling Factors was presented at the Taskforce and is likely to be raised in the coming months. In addition, CMP413, raised by EDF is progressing through workgroups and ESO are fully engaged in this process. The TNUoS 10year projection has also been developed alongside this modification to aid industry in making investment decisions. This was an extra piece of work that the ESO have done on top of the obligations within the CUSC. • Milestone 2: Identify required code changes - Enduring Fixed BSUoS - CMP408 (amending the notice period) is awaiting a panel decision alongside CMP415 which looks at the fixed period following the analysis carried out through the CMP408 workgroup and the Enduring Fixed BSUoS subgroup. This sub-group is now on pause as it was agreed to wait for a decision on the aforementioned modifications and collect further data before raising any more modifications. This sub-group has received really positive feedback for the discussion it provided across industry, and the analysis that was shared.
D6.1.6 Support Market Wide Half Hourly Settlement ***Deliverable Description:*** *Identify the areas where code change is needed.* ***Deliverable Value Add:*** *This is a significant code review led by Ofgem*	610 Settlements, Charging and Billing	Milestone 1 – On track Milestone 2 – Delayed	• Milestone 1: Code modifications concluded - As per the MHHS Programme Plan - the scope of Modifications is due to be baselined by Q4 FY24 (Feb). • Milestone 2: Produce required CUSC legal text and modifications raised - As per the MHHS Programme

and therefore it is essential that the ESO delivers the required outputs via code changes.		external reasons	Plan - the scope of Modifications is due to be baselined by Q4 FY24 (Feb). CUSC legal text is being drafted to feed into the MHHS Significant Code Review process by the MHHS Programme milestone of Feb 2024.
A6.3 Industry revenue management D6.3.1 Market half-hourly settlement ***Deliverable Description:*** *Update our billing system to charge BSUoS and TNUoS using half-hourly metered data only.* ***Deliverable Value Add:*** *This is part of Ofgem's Electricity Settlement Reform Significant Code Review and plays a significant role in the transition to net zero. There will be benefits relating to generation and network investment savings, load shifting reducing the need to operate generation assets at peak times and more accurate forecasting resulting in a reduction in the residual imbalance that the ESO needs to resolve.*	610 Settlements, Charging and Billing	Milestone 1 – Complete Milestone 2-7 – On track	• Milestone 1: High Level Discovery - 22/6 - high level I/A provided for MHHS P210 file change.
D6.3.2 TNUoS reform ***Deliverable Description:*** *Update our billing system to affect any TNUoS charging methodology changes recommended by the TNUoS taskforce and subsequently progressed via charging modification proposals.* ***Deliverable Value Add:*** *Ofgem is considering launching a wider review of the TNUoS methodology. This will support the government's ambitions for net zero, deliver benefits for consumers and lead to more efficient utilisation of and investment in the network.*	610 Settlements, Charging and Billing	Milestone 1-2 – Delayed external reasons Milestone 3-8 – On track	• Milestone 1: High Level Discovery - 22/6- Revenue team has shortlisted defects (considered by TF) for review, and have allocated these two categories (to progress as packages of work), aiming to create a workstream plan using the categories. Still some uncertainty on taskforce generally as individual regs may get consumed by tnuos taskforce output which makes it challenging to conduct any technical discovery work in this quarter.
A6.7 Fixed BSUoS tariff setting D6.7 Enhanced delivery of the recommendation from the BSUoS taskforce around reducing the volatility of BSUoS forecasting. ***Deliverable Description****: It is envisaged that the BSUoS taskforce decision will require significant system changes and hence would be implemented on a new Charging and Billing solution.* ***Deliverable Value Add:*** *It will provide certainty and visibility up front of the associated costs of balancing the system to our customers.*	610 Settlements, Charging and Billing	On track	• Continued investment in our forecasting capability and build on our existing capability for BSUoS forecasting. • 22/6 - Balancing cost model improvements: We are working with the Hartree Centre to investigate whether state-of-the-art machine learning techniques could be employed to improve our forecast of balancing costs. Wholesale electricity price is a key input to our model. We continue to investigate the best way to represent the forward curve of these prices in our model.
A6.8 Digitalisation of codes D6.8 Implementation of digital solutions ***Deliverable Description:*** *Investment to transform the stakeholder experience of the code management process through enhanced navigation,*	330 Digitalised Code Management	On track	• Milestone 1: Implementation has commenced -The Digital Code management (DCM) project delivers the ESO the technology capability to make industry codes accessible and consumable for customers. It will transform customer experience for the code management process through:

and document and workflow management tools.

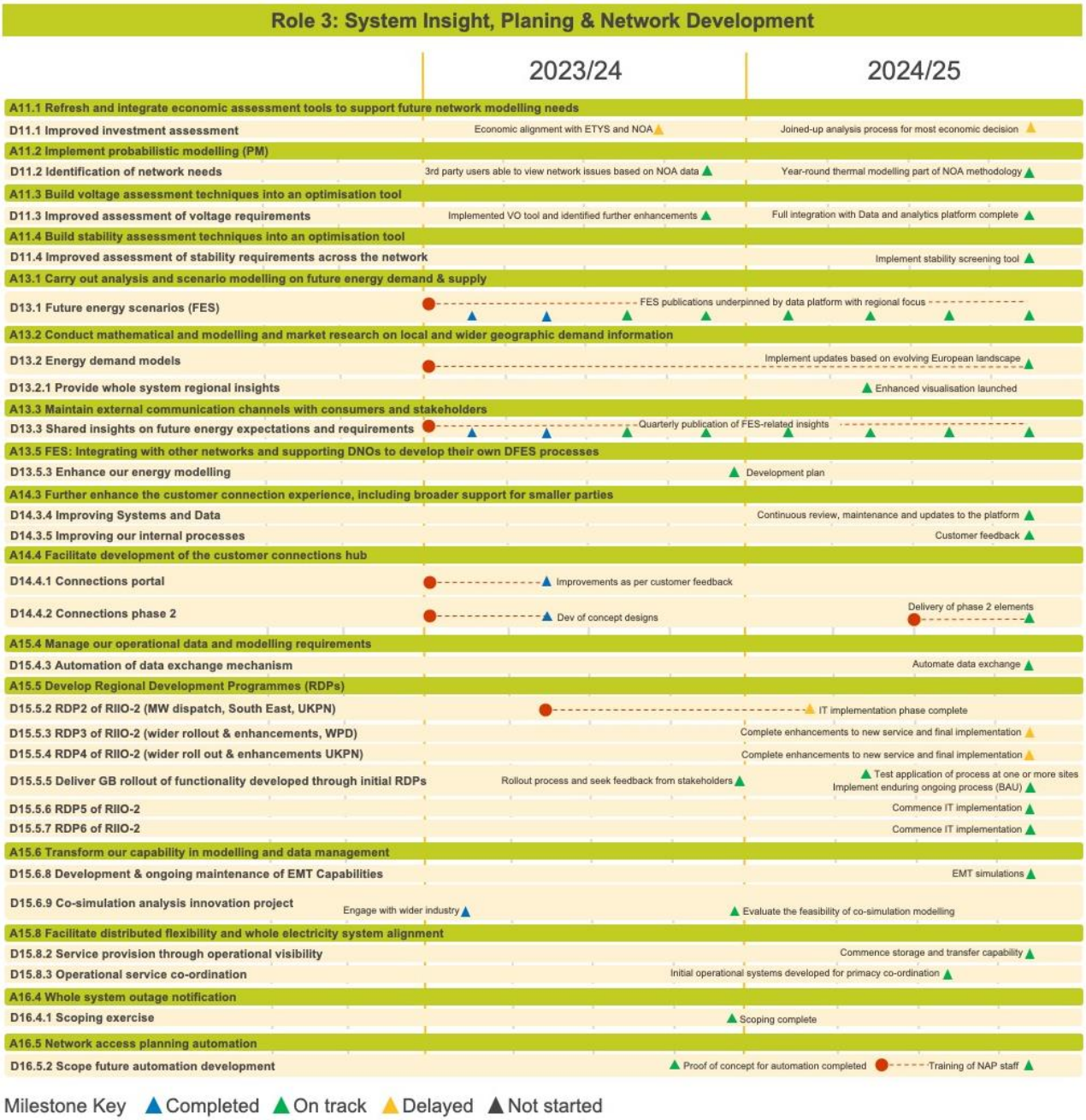
Deliverable Value Add: *It allows users to navigate more efficiently whilst minimising risks of missing relevant information. It also supports a more efficient customer journey which encourages new entrants to the energy system.*

- Digitalisation of codes.
- Contextual guidance and relevance for customers.
- Provision of enhanced navigation capabilities.
- Greater clarity on relevant sections using metadata tagging, document and workflow management tools.

Project Progress to date:

- Project setup/stakeholder engagement.
- Scoping.
- Industry Engagement and User Research.
- Requirement definition.
- Conceptual Solution Design.

Role 3 Activities, Deliverables, and Investments



Activity/Deliverables	Related Investment	Status	Update
A11.1 Refresh and integrate economic assessment tools to support future network modelling needs			
D11.1 Improved identification of when is the most economical time to invest and the most efficient solution ***Deliverable Description:*** *Develop a new EA tool, which reflects the latest modelling approach and technologies.* ***Deliverable Value Add:*** *As the transmission network evolves to facilitate the transition to a zero-carbon economy, having the tools to make timely and appropriate decisions about the investments on the transmission network ensures that these investments are in the best interests of consumers.*	220 Data and Analytics Platform 390 NOA Enhancements	Delayed internal reasons	• Milestone 1: Integration with our network assessment tools - We have refreshed the economic assessment tools that we use to interact with our pan-European market dispatch model. These will be fully signed off at the same time as our new pan-European market dispatch model, which is a delayed milestone from BP1. • Milestone 2: Full integration with Data and analytics platform complete, enabling a joined- up analysis process that allows us to stack different network needs and adjust the level of detail in the analysis, to deliver the most economic decision. - Based on an initial review of the benefits of this project, we have decided to pause work in this space until we have greater clarity of the functionality of the digital analytics platform and how it may be of use to managing the inputs and outputs for our pan-European market dispatch model. For now, we continue to work using our existing processes to manage the flow of data and are prioritising enhancements to our modelling, such as the inclusion of hydrogen and the use of the capacity expansion module, above this project. This will provide greater consumer benefit and aligns with work on the Central Strategic National Plan (CSNP) and Spatial Strategic Energy Plan (SSEP).
A11.2 Implement probabilistic modelling			
D11.2 Improved identification of network needs ***Deliverable Description:*** *Develop year-round thermal modelling tools and processes utilised within BAU activities and form part of the NOA methodology.* ***Deliverable Value Add:*** *As the transmission network evolves to facilitate the transition to a zero-carbon economy, having the tools to make timely and appropriate decisions about the investments on the transmission network ensures that these investments are in the best interests of consumers.*	220 Data and Analytics Platform 390 NOA Enhancements	On track	• Milestone 1: Developed and implemented digital experience platform. This will provide an interactive platform to allow stakeholders to view network needs and see the impact selected generic options will have on addressing those needs from a technical perspective. - Activity is on track and we are scoping the project plan. • Milestone 2: Full integration with Data and analytics platform complete, enabling a joined-up analysis process that allows us to stack different network needs and adjust the level of detail in the analysis, to deliver the most economic decision. - Our in-house tool, POUYA, has gone live and we have started working closely with DAP for the full integration.
A11.3 Build voltage assessment techniques into an optimisation tool			
D11.3 Improved assessment of voltage requirements, and ability to look across a range of network needs at the same time. ***Deliverable Description:*** *Develop year-round voltage modelling and processes utilised as part of a stack of network assessment tools and are used within BAU activities and form part of the NOA methodology.* ***Deliverable Value Add:*** *As the transmission network evolves to facilitate the transition to a zero-carbon*	220 Data and Analytics Platform 390 NOA Enhancements	On track	• Milestone 1: Implemented VO tool and identified further enhancements. - We have started an IT project and collected user stories for the tool. The team is in place and sprint planning is ongoing. • Milestone 2: Full integration with Data and analytics platform complete, enabling a joined- up analysis process that allows us to stack different network needs and adjust the level of detail in the analysis, to deliver the most economic decision. - We have started working with the DAP team for the full integration.

economy, having the tools to make timely and appropriate decisions about the investments on the transmission network ensures that these investments are in the best interests of consumers.			
A11.4 Build stability assessment techniques into an optimisation tool			
D11.4 Improved assessment of stability requirements across the network. ***Deliverable Description:*** *Develop year-round screening of different network conditions for stability conditions is available and is used in ad-hoc studies working towards full use within the NOA methodology.* ***Deliverable Value Add:*** *As the transmission network evolves to facilitate the transition to a zero-carbon economy, having the tools to make timely and appropriate decisions about the investments on the transmission network ensures that these investments are in the best interests of consumers.*	220 Data and Analytics Platform 390 NOA Enhancements	On track	• Milestone 1: Proof of concept for a stability screening tool - We are working on the PoC based on the NIA project on stability and in house tool developed in Network. • Milestone 2: Implement stability screening tool - We will start the project after PoC completion.
A13.1 Carry out analysis and scenario modelling on future energy demand and supply			
D13.1 Published Future Energy Scenarios (FES), Winter Outlook and Review, Summer Outlook, and other regular external commentary such as blogs from ESO employees on our website. ***Deliverable Description:*** *The Data and Analytics Platform will store the data and provide analytical capabilities to support the FES modelling. This includes use of tools like Power BI to allow greater "user interaction" with data (e.g., at greater regional granularity).* ***Deliverable Value Add:*** *FES benefits consumers by both providing a data-centric basis on which policies and investments can be designed and delivered at lowest cost to them. FES is an industry priority due to the high and increasing importance of decarbonisation. The Outlook Reports benefit consumers by mitigating the risk of security of supply issues by providing the market the information it needs to ensure delivery of electricity and gas to consumers. The Outlook documents are industry priorities as they provide trusted information on the level of risk expected in relation to operating the electricity and gas systems over the forthcoming winter or summer. This allows them to make operational decisions on asset availability or trading approaches.*	220 Data and Analytics Platform	Milestone 1-2 – Complete Milestone 3-6 – On track	• Milestone 1: Publication of Summer Outlook Report. Publication of Winter Review and Consultation - 2022 Summer Outlook Report published on 13 April. 2022/23 Winter Review and Consultation published 15 June alongside an early view of winter 2023/24 • Milestone 2: Publication of FES suite of documents (including data) - 2023 FES was published on the 10 July. • Milestone 3: Publication of Winter Outlook Report - 2023/24 Winter Outlook Report expected to be published on 28 Sep. • Milestone 4: Publication of Summer Outlook Report. Publication of Winter Review and Consultation - 2024 Summer Outlook and 2023/24 Winter Review and Consultation expected to be published in Q1 2024-25 in line with well-established annual processes. • Milestone 6: Publication of Winter Outlook Report - 2024/25 Winter Outlook expected to be published in Q3 2024-25 in line with well-established annual processes.
A13.2 Conduct mathematical modelling and market research on local and wider geographic demand information			

D13.2 Update pan-European and country level electricity and energy demand models ***Deliverable Description:*** *The Data and Analytics Platform will store the updates to our electricity supply and demand data for several European countries to reflect the changes within the EU as they continue to evolve their economies to meet net zero decarbonisation. This will provide analytical capabilities to support the FES modelling.* ***Deliverable Value Add****: As the GB power market is connected to other European countries via a series of interconnectors, it is important that we keep the data for Europe up to date. This ensures that the analysis we undertake continues to be of high quality and includes the latest market intelligence for Europe as the continent continues to evolve to meet net zero carbon emissions.*	220 Data and Analytics Platform	On track	• Update electricity our supply and demand data for several European countries to reflect the changes within the EU as they continue to evolve their economies to meet net zero decarbonisation. The European countries to model include those that are interconnected to the GB market in addition to a number of additional countries which, whilst further away, still have an impact on the GB market. Data to be benchmarked against the latest Ten Year Network Development Plan from ENTSO and incorporated within our pan-European dispatch model so that the FES, EMR and NOA analysis benefit from it. • Due in 2025
D13.2.1 Provide whole system regional insights ***Deliverable Description:*** *ESO to provide insights from FES and related publications in strategic conversations (government, regulator, industry) in relation to the energy system and decarbonisation.* ***Deliverable Value Add:*** *Enhancing the FES to provide whole system regional insights will improve the overall scenarios, as local factors will significantly impact GB scenarios. This will provide more insight and clarity on a regional level, supporting local policy makers and industry stakeholders in their decision making, as well as improving whole system planning processes and investment. By proactively bringing together industry parties, leading experts and under-represented voices, FES regionalisation will provide more robust analysis and consistent whole system scenarios.*	220 Data and Analytics Platform	Milestone 1-2 – Complete Milestone 3 – On track	• Milestone 1: Starting to work with Local Authorities to understand the feedback loop between FES / Distribution scenarios / Local Area Energy Plans. Starting to work with gas networks to agree the granular breakdown of FES scenarios (Natural Gas and Hydrogen) - Work has started to understand the Feedback loop between FES / DFES and Local Area Energy Plans and the granular breakdown of FES scenarios (Natural Gas and Hydrogen). Engagement with the network companies has commenced through the network forum and bilateral discussions. The Call for Evidence for FES 2023 requested stakeholder views on the feedback loop and the regional breakdown of our gas and hydrogen pathways which included engagement with both network companies and local authorities. A project has been kicked off to understand the potential role for the FSO as Regional System Planner. This has included direct engagement with Local Authorities. • Milestone 2: Whole system regional data and insights provided alongside FES in July. Enhanced visualisation launched. Regional data and visualisations added to our Website throughout the year as an appropriate and alongside the annual FES launch. User configurable FES view available for Electricity supply and Demand - FES 2023 was launched on July 10th which included regional data and insights. Our visualisation platform was updated alongside the FES and included a user configurable interface for Electricity supply and demand. • Milestone 3: Whole system regional data and insights provided alongside FES in July. Enhanced visualisation launched. Regional data and visualisations added to our Website throughout the year as an appropriate and alongside the annual FES launch. User configurable FES view available for Electricity / Gas / Hydrogen supply and Demand - Due in July 2024.
A13.3 Maintain external communication channels with consumers and stakeholders			

D13.3 Shared insights on future energy expectations and requirements ***Deliverable Description:*** *Improvements to the website will allow more insights from FES to be delivered directly to stakeholder (i.e., in addition to separate documents).* ***Deliverable Value Add:*** *The ability to generate insights from FES data allows "what if" questions to be answered ahead of policy or investment decisions. It also brings together whole energy system considerations and interactions between different fuels (e.g., hydrogen) and sectors (transport).* *The benefits for consumers are that policies and decisions impacting costs and emissions are made on a solid understanding of the whole energy system and the insights provide information (directly and indirectly) to end consumers to improve their understanding of the energy market and how their actions are important.* *This is in line with industry priorities as future FES themes of "greater regionalisation", "increased consumer engagement" and "whole system thinking" are developed alongside stakeholder engagement to ensure cohesion.*	250 Digital Engagement Platform	Milestone 1-2 – Complete Milestone 3-8 – On track	• Milestone 1: Publication of FES-related insights via website and FES / ESO Newsletter - Launch date communicated early with Ofgem and in line with previous years. (At time of writing it is now complete, launched on 10 July as agreed). • Milestones 2 through 8: On track and feeding into engagement plans.

A13.5 FES: Integrating with other networks and supporting DNOs to develop their own DFES processes

D13.5.3 Enhance our energy modelling to reflect stakeholder feedback and changes to the credible pathways to net zero. ***Deliverable Description:*** *Continue to evolve energy models to deliver additional accuracy and functionality reflecting the needs of the industry and other stakeholders.* ***Deliverable Value Add:*** *Ensuring that these models continue to provide meaningful and realistic views of future energy demand provides a foundation for ESO and EMR delivery body processes to procure efficient levels of network and generation capacity on behalf of consumers.*	220 Data and Analytics Platform	On track	• Development plan in place. • Our energy modelling has been updated for FES24 to enhance our ability to reflect H2 supply locations. We are continuing to work through the modelling requirements to support CSNP with internal and external stakeholders.

A14.3 Further enhance the customer connection experience, including broader support for smaller parties

D14.3.4 Improving Systems and Data ***Deliverable Description****: Enhance our connections systems to be more informative, user friendly and interactive to improve transparency and give stakeholders easy access to relevant data.* ***Deliverable Value Add:*** *Improved systems and data will set the ESO up to manage increasing volumes of*	380 Connections Platform	Milestone 1-2 – Complete Milestone 3-8 – On track	• Milestone 1: Submit IT investment paper through internal governance process and obtain approval of scope and expenditure. Engage with customers on ways to improve connections journey and ways of enhancing the portal - Future releases of the Connections portal are planned and the functionality backlog has been agreed. Sessions with industry stakeholders are ongoing with some smaller targeted sessions with specific groups of stakeholders already held and larger stakeholder events planned for the end of July 2023.

increasingly complex connection applications. This will improve transparency and make it easier for new parties to connect, facilitating decarbonisation and competition.			• Milestone 2: Further develop concept of new register, platform, and connection with other systems [salesforce and customer portal]; Liaise with relevant internal stakeholders to verify concept and requirements - The functionality for the Connections portal is constantly being developed, with more functionalities being added every 2-3 months throughout the BP2 period. The functionality being added is underpinned by stakeholder feedback. • Milestone 3: Further development and testing - engage with relevant focus groups - This is an ongoing activity. We are currently carrying out feature development sessions with industry parties such as consultants, DNOs and TOs to enhance portal functionality. • Milestone 5: Obtain feedback on the new platform from internal and external stakeholders - Stakeholder feedback sessions planned for July 2023 and functionality being introduced directly into the portal to obtain customer feedback.
D14.3.5 Improving our internal processes ***Deliverable Description:*** *Update our connections processes to reflect code and policy changes, as well as developments in the customer portal.* ***Deliverable Value Add:*** *As connection applications increase in volume and complexity, processes need to be streamlined to ensure the best use of industry time and the reduction of potential barriers to decarbonisation.*	380 Connections Platform	On track	• Improved customer feedback indicating customers welcome changes to connections processes. • Ongoing activity.
A14.4 Facilitate development of the customer connections portal			
D14.4.1 Implement first phase of the ESO connections portal, including online account management and integration with other network organisation websites ***Deliverable Description:*** *This is the IT investment that will enable delivery of the connections portal and electronic management of the connections contracting process, providing an interface for customers, TOs and (ultimately) DNOs.* ***Deliverable Value Add:*** *Phase 1 of the portal will digitise the connection application process and introduce process efficiencies and automation. This will lead to more efficient use of industry resources, saving costs for consumers.*	380 Connections Platform	Complete	• Milestone 1: Deliver changes based on customer feedback - Two further releases have been implemented since the launch of MVP in March 2023 including new functionality for calculation of application fees as well as other front end and back-end enhancements. • Milestone 2: Deliver changes based on customer feedback – Complete.
D14.4.2 Phase 2 of the connections portal concluded ***Deliverable Description:*** *Further develop concept of phase 2 deliverables along with key stakeholders to work with to create concept designs.* ***Deliverable Value Add:*** *Phase 2 of the portal will bring increased automation*	380 Connections Platform	Milestone 1-2 – Complete Milestone 3-8 – On track	• Milestone 1: Submit revised IT investment paper through internal governance process and obtain approval of scope and expenditure - IT investment paper submitted. • Milestone 2: Further develop concept of phase 2 deliverables and identify different stages of deliverables along with key stakeholders to work with - Future releases of the Connections portal are planned and the functionality backlog has been agreed.

and self-service functionality, as well as integrating with other industry platforms. This leads to more efficient use of industry resources, saving costs for consumers.			Sessions with industry stakeholders are ongoing with some smaller targeted sessions with specific groups of stakeholders already held and larger stakeholder events planned for the end of July 2023.
A15.4 Manage our operational data and modelling requirements			
D15.4.3 Automation of data exchange mechanism and preparation for CIM implementation ***Deliverable Description:*** *The investment will enable enhancement to the current data exchange mechanisms.* ***Deliverable Value Add:*** *This deliverable will improve the mechanism for data exchange between industry participants. This will lead to more accurate data and a more efficient process. This will ensure that the correct planning and operational decisions are made, which promotes secure and efficient operation of the system.*	350 Planning and Outage Data Exchange	On track	• Milestone 1: Identify initiative which will automate the data exchange mechanism. Commence preparation for data exchange enhancements with network organisations - This is a Q4 2023-24 deliverable that it reliant on GC139 being agreed in D15.6.2 by Q3 2023-24. • Milestone 2: Implementation of data exchange automation. Prepared for data exchange enhancements with network organisations - This is a Q4 2024-25 deliverable.
A15.5 Develop Regional Development Programmes (RDPs)			
D15.5.2 RDP2 of RIIO-2 (MW dispatch, South East, UKPN) ***Deliverable Description:*** *Provide greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating new system operation tools and markets.* ***Deliverable Value Add:*** *This deliverable enables distribution projects to connect earlier than they otherwise might have done while providing the tools for the ESO to manage operability issues in the region as a result of any earlier connection of projects. The RDP process looks to determine, of the potential options to connect more low carbon generation, the most economic outcome for consumers.*	340 RDP Implementation and Extension	Delayed – External reasons	• IT implementation phase complete. • ESO Aug and Sept 2023 Registration functionality releases on track, however, Dispatch functionality delayed due to delay in closing out key design decision and late DNO Partner onboarding. Delivery anticipated Q1 2024.
D15.5.3 RDP3 of RIIO-2 (wider rollout and enhancements, WPD) ***Deliverable Description:*** *Provide greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating new system operation tools and markets.* ***Deliverable Value Add:*** *This deliverable enables distribution projects to connect earlier than they otherwise might have done while providing the tools for the ESO to manage operability issues in the region as a result of any*	340 RDP Implementation and Extension	Milestones 1-2 – Delayed, External reasons Milestones 3-5 – On track	• Milestone 1: Working with the DNO, continue to undertake IT requirements and design for new operability functionality and Milestone 2: Complete IT requirements and design - RDP3 is intended to be the vehicle to deliver the post MVP requirements and enhancements to our RDP1 (MWD service in the NGED DNO area). RDP1 delivery timescales were significantly impacted by the need to deliver a bespoke private Web service link for data exchanges to meet the NGED security protocols, having a resultant knock-on effect to the delivery timescales of this RDP. The RDP1 infrastructure is now in place allowing us to progress with the post MVP enhancements as intended.

earlier connection of projects. The RDP process looks to determine, of the potential options to connect more low carbon generation, the most economic outcome for consumers.			
D15.5.4 RDP4 of RIIO-2 (wider roll out and enhancements UKPN) ***Deliverable Description:*** *Provide greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating new system operation tools and markets.* ***Deliverable Value Add:*** *This deliverable enables distribution projects to connect earlier than they otherwise might have done while providing the tools for the ESO to manage operability issues in the region as a result of any earlier connection of projects. The RDP process looks to determine, of the potential options to connect more low carbon generation, the most economic outcome for consumers.*	340 RDP Implementation and Extension	Milestones 1-2 – Delayed, External reasons Milestones 3-5 – On track	• Milestone 1: Working with the DNO, continue to undertake IT requirements and design for new operability functionality, and Milestone 2: Complete IT requirements and design - RDP2 (UKPN MWD MVP) has been delayed from BP1 due to delay in agreeing MVP scope with DNO and is now due for go live late 2023 / early 2024. This is dependent on completion of that phase.
D15.5.5 Deliver GB rollout of functionality developed through initial RDPs ***Deliverable Description****: Provide greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating new system operation tools and markets.* ***Deliverable Value Add:*** *Wider rollout of functionality delivered in initial RDPs will provide greater tools to manage regional thermal constraints across GB. Rollout of tools that have been developed and tested on a small scale, thereby learning from that development, results in greater consumer value. Lower balancing costs from more tools to manage constraints*	340 RDP Implementation and Extension	Milestone 1 – Complete Milestones 2-4 – On track	• Milestone 1: Establish enduring process to determine needs at GSPs - Factoring in our ongoing work through the ESO's Five Point Plan to Accelerate Connections, we have now drafted a process to determine a needs case at each GSP. This is currently undergoing final internal approval prior to being shared with stakeholders for review and feedback. • Milestone 2: Rollout process and seek feedback from stakeholders - Following publication of the process, we will work with stakeholders to review and implement feedback, ahead of trialling at initial GSPs. • Milestone 3: Test application of process at one or more sites - Once feedback has been incorporated and the process is finalised, a number of sites will be selected to test its application. • Milestone 4: Implement enduring ongoing process (BAU) - Following successful tests at the nominated sites, BAU processes will be updated to reflect the relevant changes.
D15.5.6 RDP5 of RIIO-2 ***Deliverable Description****: Provide greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating new system operation tools and markets.* ***Deliverable Value Add:*** *This deliverable enables distribution projects to connect earlier than they otherwise might have done while providing the tools for the ESO to manage operability issues in the region as a result of any*	340 RDP Implementation and Extension	Milestone 1 – Complete Milestones 2-4 – On track	• Milestone 1: Go / No go decision to progress RDP implementation; If yes, commence detailed RDP development - We have identified a number of opportunities where RDP5 can support the roll-out of functionality necessary to support the ESO's Five Point Plan to accelerate connections. • Milestone 3: Complete detailed RDP development ahead of IT build - Following feedback on the proposed process for identifying needs at each GSP and the outcome of ongoing Strategic Connections Group work, the detailed requirements of RDP5 will be finalised.

earlier connection of projects. The RDP process looks to determine, of the potential options to connect more low carbon generation, the most economic outcome for consumers.			
D15.5.7 RDP6 of RIIO-2 ***Deliverable Description:*** *Provide greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating new system operation tools and markets.* ***Deliverable Value Add:*** *This deliverable enables distribution projects to connect earlier than they otherwise might have done while providing the tools for the ESO to manage operability issues in the region as a result of any earlier connection of projects. The RDP process looks to determine, of the potential options to connect more low carbon generation, the most economic outcome for consumers.*	340 RDP Implementation and Extension	Milestone 1 – Complete Milestones 2-4 – On track	• Milestone 1: Go / No go decision to progress RDP implementation; If yes, commence detailed RDP development - We have identified a number of opportunities where RDP6 can support the roll-out of functionality necessary to support the ESO's Five Point Plan to accelerate connections. • Milestone 3: Complete detailed RDP development ahead of IT build - Following feedback on the proposed process for identifying needs at each GSP and the outcome of ongoing Strategic Connections Group work, the detailed requirements of RDP6 will be finalised.
A15.6 Transform our capability in modelling and data management			
D15.6.8 Development and ongoing maintenance of EMT Capabilities ***Deliverable Description:*** *Increase our capability to carry out system analysis using Electromagnetic Transient (EMT) tool, such as PSCAD software purchase and maintaining the licences.* ***Deliverable Value Add****: Currently in general, only RMS simulations are carried out and this new deliverable will enable more advanced EMT modelling capabilities in addition.* *Provides more confidence and forward planning to reduce system risks.* *As the system moves towards zero carbon, to analyse the system issues such as voltage oscillations, control interactions and power quality issues, more advanced EMT simulations are required.*	360 Offline Network Modelling	Milestones 1-2 – Complete Milestones 3-6 – On track	• Milestone 1: Learning from NIA projects (such as TOTEM) to define the requirements for EMT modelling work - NIA project TOTEM led by SSEN, provided base case EMT network component model based on ETYS 2021 Year 1. This will be used as base model for ESO to develop GB wide EMT model. The learnings such as dispatch tool requirement to analyse multiple scenarios, computational performance required will be taken forward to build future model building activities. DETECTS is another innovation project, where the SE Coast model with Users model integrated has been obtained. The main learning is on the integration of Users model to wider EMT model. More innovation projects, such as developing tools to analyse the system, are ongoing. Based on these learnings, ESO in discussion with wider industry, to build and maintain the GB wide EMT model for future. • Milestone 2: Engage with wider industry and produce a roadmap to develop and maintain EMT models - ESO engaged with all onshore TOs through innovation project such as TOTEM to develop the base case GB wide EMT model. ESO is currently working with SSEN-T on EMT analysis. ESO is working in partnership with NGET on development of co-simulation NIA project. The JPC approved to form JPCMG subgroup on EMT modelling. ESO also having continuous engagement with wider industry (AEMO, G_PST, NERC, ESIG group) on learning and developing GB wide EMT model. • Milestone 3: Identify the data requirements and develop process to collect required data and build initial EMT model. - Learnings from all NIA innovation projects are being used by ESO to define these requirements. ESO also engaged with wider industry (AEMO, NERC EMTTF, ESIG) in the world and their learnings also being used to develop these requirements.

			• Milestone 4: To carry out initial EMT simulations for the GB network - ESO have already started to carry out EMT simulations for single plants/ HVDC. ESO obtain the initial model from DETECTS innovation project and started the regional analysis on GB. • Milestone 5: To define the requirements for full GB system EMT simulation using learning from NIA projects (co-simulation analysis innovation project in D15.6.9) - After completing the feasibility of co-simulation analysis (between PowerFActory and PSCAD) through innovation projects, requirements will be defined. • Milestone 6: To carry out EMT simulations to analyse control interactions, system oscillations and power quality studies. Developed plan for ongoing maintenance of EMT model(s) - ESO started to carry out EMT simulations for single plants/ HVDC. ESO obtain the initial model from DETECTS innovation project and developing the analysis skills. Different system analysis with wider GB model, obtained from TOTEM project, will be carried out.
D15.6.9 Co-simulation analysis innovation project ***Deliverable Description:*** *Engage with wider industry (all TOs) and develop capability to carry out co-simulation using RMS and EMT packages.* ***Deliverable Value Add:*** *This new deliverable will enable more advanced modelling capabilities to combine RMS and EMT simulation together.* *Ability to analyse the complex system efficiently with less time to simulate.* *As the system move towards zero carbon, co-simulation provides capability to carry out analysis with reduced networks but has the ability to carry out RMS and EMT studies.*	360 Offline Network Modelling	Milestone 1 – Complete Milestone 2 – On track	• Milestone 1: Engage with wider industry (different TOs) to start the potential innovation project for co-simulation works. - Engaged with NGET TO on requirements of co-simulation (between PowerFactory and PSCAD model). ESO is working with NGET to set up a new NIA project called Co-Simulation. Co-simulation NIA project is expected to start in 2 weeks. ESO also engaging with OPAL-RT and other academia on possible NIA projects as well. • Milestone 2: Evaluate the feasibility of co-simulation modelling between OLTA (PowerFactory) and PSCAD. - With the NIA project on co-simulation, working with NGET, ESO will evaluate the feasibility of co-simulation between PowerFactory and PSCAD. ESO also will explore on other opportunities.
A15.8 Facilitate distributed flexibility and whole electricity system alignment			
D15.8.2 Enabling whole electricity flexibility service provision through operational visibility ***Deliverable Description:*** *Facilitates the discovery and design phase to enable distributed flexibility visibility in ESO markets.* ***Deliverable Value Add:*** *We need to facilitate smaller assets into ESO markets and have the operational tools to allow us to understand their impact. CBA figure - £150m pa. DER want to provide services to ESO and we must remove blockers and demonstrate value.*	460 Restoration 650 Accelerating Whole Electricity Flexibility (formerly Facilitating Distributed Flexibility)	Milestone 1 – Complete Milestone 2 – Delayed, consumer benefits Milestones 3-6 – On track	• Milestone 1: Initiate project scoping with external stakeholders to enable operational visibility of DER - We have initiated Project scoping with internal stakeholders to identify DER visibility use cases. Identified relevant external stakeholders. Next step to engage externally to produce a high-level view of External stakeholders' expectations. • Milestone 2: Complete project scoping with external stakeholders to enable operational visibility of DER - Reasons which have led a decision to report status on this deliverable as 'Delayed' given below. De-risk / adding Consumer benefits by taking holistic approach: During our work in Q2 it was identified that DER Visibility requirements are complex, broad and need to be defined with more granular detail. In addition, the external stakeholder engagement at present is primarily through the Open Networks project. Progression at present is slower than desired for reasons not directly under ESO control. The breadth and pace of change needed to deliver this programme requires ESO to broaden the milestone in plan and adopt a holistic approach. We have therefore initiated work on producing a DER Visibility Roadmap strategy.

			We are undertaking a cross functional view to produce detailed user requirements across ESO and external stakeholders as well consider regulatory, data and technology architecture aspects needed to deliver DER visibility. We have reprioritised to a later date as the holistic approach is expected to reduce risk and maximise consumer benefit. This work is now planned for completion by Dec 2023. • Milestone 3: Initiate IT discovery phase to understand impacts on required changes to systems and define change strategy - Support for business led high level scoping of business impacts, within DER Visibility Vision and Roadmap work. High level scoping of the DER Visibility Technology Discovery stage. Mobilisation of the DER Visibility Discovery stage project team, engagement of internal stakeholders and initiate the stage. • Milestone 4: Complete IT discovery phase and identify costs of implementation - Expected completion date remains, subject to the scale of work which will be scoped from the findings of the DER Visibility Vision and Roadmap work. • Milestone 5: Commencement of requirements and design phase to develop detailed IT solution to enable DER visibility, and Milestone 6: Commence building the storage and transfer capability to utilise bigger volumes of data associated with a larger number of operational metering data points - Support for business led high level scoping of business impacts. High level scoping of the DER Visibility Technology Discovery stage. Mobilisation of the DER Visibility Discovery stage project team, engagement of internal stakeholders and initiate stage.
D15.8.3 Enabling whole electricity system operational service co-ordination ***Deliverable Description:*** *Facilitates the discovery and design phase to implement agreed systems and processes to co-ordinate flexibility services across whole electricity system.* ***Deliverable Value Add:*** *Action from BEIS SSFP. Required to manage service conflict and optimisation efficiently and transparently.* *The order of despatch of services to be influenced by whole system value and ensure that the division between market/price-driven actions and the electricity system hierarchy of operations/needs is clear and transparent.* *Flexibility providers want to be able to stack services across ESO/DSOs.*	650 Accelerating Whole Electricity Flexibility (formerly Facilitating Distributed Flexibility)	Milestones 1-3 – Delayed, external reasons Milestones 4-5 – On track	• Milestone 1: Initiate IT discovery phase for primacy implementation to understand impacts on required changes to systems and define change strategy - Delayed due to lack of clarity around Primacy rules, Open Networks and Market Facilitation. We continue to work with the DNO's to implement ways of working but a lot depends on enabling works. • Milestone 2: Complete IT discovery phase and identify costs of implementation - Dependency on completion of discovery phase which can't be started until we have more clarity on the Primacy rules planning which is in part dependent on DNO's and Market Facilitation consultation. • Milestone 3: Commencement of requirements and design phase to implement primacy rules into operational IT systems - Dependent on outputs of Discovery which is delayed in part due to lack of direction around Open Networks but we are exploring sensible new ways of enabling primacy rules. • Milestone 4: Continue to lead on Open Networks work to deliver primacy rules - Proactively engaged and driving changes needed. • Milestone 5: Initial operational systems developed for primacy co-ordination based on outputs of requirements and design phase - Project remains on track and confident that it will deliver on time. (these are the solutions for the initial use cases which are being implemented in line with a new two track approach for Primacy).

A16.4 Whole system outage notification

D16.4.1 Scoping exercise concluded for delivery of enhancements to outage notifications ***Deliverable Description:*** *Understand requirements for the delivery of enhanced outage notifications.* ***Deliverable Value Add:*** *Enhancements to outage notifications will support whole electricity system solutions and allow working across the transmission -distribution interfaces to unlock value for consumers.*	350 Planning and Outage Data Exchange	On track	• Milestone 1: Dependent on outcomes of A16.3 deliverables - Work supported by PODE workstream 1. API links between eNAMS outage management app and NGET's NCIS app commissioned both reading and writing data. Delivers resource planning and efficiency savings for the TO. Working with Scottish Power TO on API proof of concept. Exiting Proof of Concept for Conga, an enhanced reporting tool which may enable users to self-serve outage queries and analyse outage planning performance. TOs have been provided with access to an ESO outage tracker, the ""ROB"" (Regional Outage Board) enabling TOs to track the progress of their outage requests through the ESO outage planning process. Activity completed 16 June 2023. • Milestone 2: Scoping complete, and Milestone 3: Dependent on outcomes of A16.3 deliverables - Work supported by PODE workstream 1
A16.5 Network access planning automation			
D16.5.2 Scope future automation development ***Deliverable Description:*** *Develop sandbox environments (test systems) to test automation tools for NAP teams without interruption to live systems.* ***Deliverable Value Add:*** *As the network becomes more complex, with new asset and user types connecting to facilitate net zero, automation tools are a key enabler for optimising the network to deliver outages at the lowest possible cost to the consumer.*	360 Offline Network Modelling	Milestones 1-2 – Complete Milestones 3-8 – On track	• Milestone 2: Proof of concept for agreed automation commenced, and Milestone 3: Proof of concept for automation completed - Work has started and we are on track for delivery. • Milestones 4-8: Training programme for teams in NAP developed and delivery schedule planned - Training has already started with multiple session organised across networks. This will be a continuous activity.

Appendix A: Customer Engagement and Feedback

We are committed to working with our customers to help shape the digital future of energy in Great Britain and to understand how the ESO can best deliver value. Throughout the development of the DSAP, we have continued to listen and take on feedback from customers.

We met with the TAC on three separate occasions during 2023 to discuss this DSAP, once in March, again in June, and finally in September. Members of our TAC, as well as the slides and minutes from those meetings, can be found on our website.[22] Additionally, we created and met with a new TAC subgroup to advise specifically on our DSAP going forward.

We also met individually with organisations that represent key customer groups like technology vendors, regulators, fellow system operators, natural gas services, and end consumer groups, to get an understanding of the digital and data challenges they are facing.

Below is a summary of key customer comments and how we have addressed them throughout this strategy.

Customer Group	What we heard from customers	How this has been addressed in our DSAP
Technology Advisory Council	The timeline of the Digital Strategy is too far in the future.	Overlapping Modernising Technology, Digital First, and Digital Leader horizons better demonstrates how progress is moving forward on the building blocks for new technologies (e.g., AI) while ongoing and long-term initiatives are still being completed.
	The strategy would be more powerful linked to business deliverables over the timeframe.	The **Digitalisation Action Plan** incorporates roadmaps of existing Busines Plan deliverables as well as new crosscutting deliverables resulting from this updated strategy.
	ESO should embed this digital vision at all levels and in all roles.	We aim to embed our Digital Culture into our future FSO culture. We created this digital culture through 40+ internal interviews and close alignment with FSO strategy development, garnering leadership commitment through dedicated discussions on required organisation-wide commitment.
	As well as looking at other models, the ESO should consider how they can lead the market rather than being responsive.	Before we can become a credible Digital Leader, we need to make internal progress as Digital First. The Future Technology Led Accelerator works closely with industry and academia to understand potential industry use cases for emerging technology while the Digital Customer Experience Accelerator aims to gather more industry feedback. Future strategy updates will elaborate on how the FSO will lead the market and will be discussed with relevant industry customers through the TAC.
	ESO could get caught short due to the rest of the industry implementing AI at a faster pace and the ESO unable to respond to market needs closer to real time.	The Future Technology Led Accelerator works closely with industry and academia to understand potential industry use cases for emerging technology while the AI Driven Accelerator creates a pathway for AI and subsequent new technologies to get from pilots to wide-scale business operationalisation.
	The people at the ESO implementation level are not working in the same way as these slides.	The enablers have been created to allow our workforce to move at pace, giving them the skills they need to be successful, career pathways and defined roles, and avenues for safe innovation and implementation testing. These enablers then combine with our efforts to provide more reliable data

[22] ESO Technology Advisory Council (TAC) | ESO (nationalgrideso.com)

		through our Data and Information Ecosystem Accelerator and a Digital Culture that strives for progress at pace.
	Change this big can scare people into disengagement.	We are linking our Digitalisation Strategy closely into the developing FSO strategy to ensure change messages are consistent and approaches are combined when opportunities arise. Digital Culture efforts will be instrumental to facilitating workforce engagement through a period of massive change.
Technology Advisory Council DSAP Subgroup	Technology/software vendors and competitors bringing potential solutions should be engaged.	The Future Technology Led Accelerator not only socialises new technology and how the ESO thinks it can be used in the industry, but it works with innovators, academia, investors, and other industry players on how to progress that technology. Our strategy was tested with a key technology provider and their feedback has been incorporated accordingly.
	The strategy is very ambitious and wide ranging, for example the ask with generative AI and quantum computing is huge. (October TAC Subgroup)	It is imperative that the ESO has an understanding of the building blocks for emerging technologies such as quantum. The Innovation Strategy addresses use cases for these technologies and tracks their readiness, while the Digitalisation Strategy creates a pathway to scale, including procuring the talent and ensuring the Modern Architecture Accelerator has visibility into the needs of emerging technology for rapid operationalisation.
	The ESO Digitalisation Strategy needs to reference and consider the current industry initiatives related to the digital spine and how the FSO's data catalogues will fit into the wider industry. (October TAC Subgroup)	Our Data and Information Ecosystem Accelerator was designed to interact with and be mindful of industry digital initiatives.
System Operator Peer	We have similar themes, but the hardest part is making it real and bringing it to life at pace.	Our Digital Culture and our enablers have been created to allow our workforce to move at pace, giving them the skills they need to be successful, career pathways and defined roles, and avenues for safe innovation and implementation testing. The transition to the FSO gives us a new independent beginning and an opportunity to remake the way we do business.
Regulator	Need to better show engagement with stakeholders, how Products and Services are developed using stakeholder views, how these Products and Services support Digitalisation of their organisation and the wider energy sector, and what performance measures will dictate these successes	This Customer Engagement and Feedback appendix aims to show how we have gathered and incorporated feedback from our customers in the development of our Digitalisation Strategy. Additionally, our Digital Customer Experience Accelerator shows the process we utilise to incorporate customer feedback throughout our solution development process.
	Lack of access to archived information about completed Products and Services mentioned in the Action Plan	As mentioned in our **Digitalisation Action Plan**, we have created a new 'Completed DSAP Related Deliverables' file, which can be found here: nationalgrideso.com/document/299261/download
	Need to engage those who are digitally excluded or digitally disadvantaged or those who prefer to use analogue channels to communicate.	In our Digitalisation Action Plan, we have created **DS2.3 External Customer Digital and Data Capability Programme** to not only ensure our products are accessible and user friendly, but that those that want to access them have routes to develop the skills needed to do so.
	We're hearing a lot about AI but are seeing less clarity on how it will add value. It's generally a force multiplier, making everything faster and bigger, including risk. The threat level concerns	Our AI Driven Accelerator work begins with deliverable **DS7.1 Develop and Implement AI Foundations**, which aims to develop, publish, and apply policy around AI ways of working, coding, ML and Data standards as well as AI Ethics throughout the organisation. Additionally, we recognise there is no one-size fits all approach to AI. We plan to do a thorough analysis of whether areas can be automated in our response and where human intervention is essential. From a data standpoint, our **DS6.1 Data**

	need to be addressed and for AI to be useful, data needs to be clean.	**Governance Maturity** deliverable will establish an internal data quality programme while **DS3.3 Facilitation of Industry Common Frameworks** works with industry to determine the best path forward for interoperability.
	The ENA's Data and Digitalisation Steering Group (DDSG) has some ongoing efforts on interoperability standards where the ESO should provide its unique perspective.	As part of **DS3.3 Facilitation of Industry Common Frameworks** we will participate in industry interoperability working groups and where additional whole energy system efforts are needed, facilitate Great Britain energy industry discussions on the adoption of common frameworks.
	Given the speed of change in data and technology, a principles based approach is a good strategic direction.	We have designed our Digitalisation Strategy around a set of Digitalisation Strategy Principles to guide our investment and prioritisation for technology decisions, rather than hardcoding goals.
Technology Provider	From a regional planning perspective, it has been difficult to get industry players to see eye-to-eye on what level of data to share. the future of the system, and the assumptions that should be used to develop our software and data science products further.	**DS3.3 Facilitation of Industry Common Frameworks** includes working with interoperability working groups to identify additional interoperability efforts that are needed for the industry and determine a course of action to address them.
	Culture really will be the sticking point. As technology becomes more user friendly utilising natural language rather than coded language, fewer advanced technical skills will be needed to leverage it and the core efforts will need to be around increasing awareness, understanding foundational usage guidelines, and increasing adoption.	Our Digital Culture is at the heart of our strategy. As the ESO's and the world's technology becomes easier to use, we need to continue to ensure our workforce is aware of what technology is capable of and understands how we will use it within our business and our industry. Our Digital Skills and Learning Enabler will work hand-in-hand with our socialisation efforts in our Future Technology Led Accelerator to ensure our workforce is prepared for and quickly adopts digital innovations.
Battery Storage Aggregator	We use all of the API endpoints that NG provides and it can be quite painful when the data format changes without any notice.	Through our Digital Customer Experience Accelerator, and specifically, **DS3.1 Enhance Customer Digital Services**, we will prioritise and socialise customer challenges in quarterly delivery plans with identified next steps for addressing them. This feedback will be included in that process.
	It is quite slow to get any questions answered - a lot of the employees jump around so I'm not sure who the right person is to go to.	As we work to include more self-service options through **DS3.1 Enhance Customer Digital Services**, like a self-help content knowledge library and chatbots, we hope to increase the speed at which customers can get to the information they need. Additionally, we will streamline query management processes to ensure customers can submit requests for assistance consistently, simply and seamlessly.
	We need more regional data – more detailed location data with real time power flow to create business cases.	As part of **DS6.1 Data Governance Maturity**, we are developing a data quality programme that will enhance our datasets, such as those with geospatial qualities. Additionally, through **DS6.3 Scope New FSO Digital and Data Needs**, we will be reviewing the industry need for regional data as part of our Regional Energy System Planning FSO role.
	Non-firm grid detail is also needed for connections, but this is incredibly location dependant and none of that granularity exists. It is quite thorny - transitioning between too many parties and difficult to get your hands on the data.	In our ESO data portal, we aim to make ESO datasets available to industry. Through **DS6.1 Data Governance Maturity**, we are creating an open data triage process that will systematically identify issues which limit potential openness and identify what techniques can be used to mitigate these issues.

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	What the industry needs is consistent and well documented real time data with testing environments that others can plug into.	In our ESO data portal, we aim to make ESO datasets available to industry. Our Data and Information Ecosystem Accelerator leverages our Data and Anlytics Platform (DAP) and Digital Engagement Portal (DEP) to provide industry with the data it needs in the way that it is needed.
	The Virtual Energy System is too electricity focused – we need to be taking a whole energy system approach and looking at how the gas digital twin and other vectors will be interoperable with it.	Our approach to our Future Technology Led Accelerator aims to include players from around the energy industry and seeks to understand technological use cases from others. As our whole energy system mindset grows, we will continue to inform and include other vectors in our forward looking efforts.
Gas Operator	We need to ensure interoperability for the whole energy system where we can. The ENA's Data and Digitalisation Steering Group efforts have said Gas will need to adopt whatever Electricity determines is the path forward on this - we need clear timelines for data ontology and structuring.	As part of our **DS3.3 Facilitation of Industry Common Frameworks** deliverable we will participate in industry interoperability working groups and where additional whole energy system efforts are needed, facilitate Great Britain energy industry discussions on the adoption of common frameworks.
Consumer Advocate	The industry needs to ensure energy services are accessible and high quality for everyone by maintaining good offline contact channels, making digital services accessible and raising customer service standards overall.	In our Digitalisation Action Plan, we have created **DS2.3 External Customer Digital and Data Capability Programme** to not only ensure our products are accessible and user friendly, but that those that want to access them have routes to develop the skills needed to do so. This programme will aid in change management for the ESO's digital and data initiatives for all, from the technologically savvy to the digitally disadvantaged.
	Existing support systems are too complex and an expanded priority services register is needed to meet thee needs of consumers in vulnerable circumstances.	Through our Digital Customer Experience Accelerator, we aim to devleop collaborative solutions while engaging effectively and proactively to build strong customer relations and psychological trust, understanding that collaboration capacity and success metrics look different for each customer.
	To build consumer trust in the energy system and to help to facilitate the transition to net zero there needs to be transparency for consumers on who is accessing their data, for what purposes, and over what time period.	As part of **DS6.1 Data Governance Maturity**, we are establishing an ESO Data Council that upholds data management standards and policies, enforces processes on data archival and retention, assigns data roles (e.g., owners and stewards), and oversees a data quality programme for the business.
	Energy networks and suppliers need to continue to provide accessible alternatives (including letters and phonelines) for consumers and not "cherrypick" desirable customers and leave others without an adequate choice of services and poor level of provision.	Through our Digital Customer Experience Accelerator, we aim to optimise our customer efforts utilising design thinking to map customer journeys, including those of vulnerable customers and the digitally disadvantaged. Additionally, through our new deliverable **DS2.3 External Customer Digital and Data Capability Programme** we will ensure access to materials that enable greater public usage of open data and our services and keep them informed of digital developments.
	Cleverly using regional data and fuel poverty data to inform investment decisions for new resources can ease financial burdens for vulnerable customers.	As part of **DS6.1 Data Governance Maturity**, we are developing a data quality programme that will enhance our datasets, such as those with geospatial qualities. Additionally, through **DS6.3 Scope New FSO Digital and Data Needs**, we will be reviewing the industry need for regional data as part of our Regional Energy System Planning FSO role.

Appendix B: Digitalisation Metrics

Aspiring to be a more data-driven organisation, we are increasing the quantification and transparency of our digitalisation efforts. We are in the process of creating a list of metrics to track our DSAP progress and will update the metrics summary below in our DSAP updates going forward. New metrics will help us understand which areas we need to focus on and where we may need to shift our efforts when we are not seeing the desired impacts from our efforts.

Metric Name	Metric Calculation	Target	Current
DSAP Plan Progression	Number of completed deliverables / Number of deliverables planned to be completed	100%	74%
Digital Quotient (DQ)	To be determined when DQ survey is in place (see Digitalisation Action Plan DS1.1 Digital Quotient)	To be determined	New metric being established
Feature Delivery in BP2 Investments	Number of features delivered / Number of feature planned	95%	77%
Digital Customer Experience	New metric to be created (see Digitalisation Action Plan DS3.1 Enhance Customer Digital Services)	To be determined	New metric being established
Data Maturity	New metric to be created (see Digitalisation Action Plan DS6.1 Data Governnance Maturity)	To be determined	New metric being established
Cloud Coverage	Number of digital services being managed in the cloud (IaaS, PaaS, SaaS) / Number of digital services	95%	70%

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Appendix C: Current Digital Products and Services

The list below includes the current digital products and services that our customers can benefit from as well as where to access them. Please see our **Digitalisation Action Plan** for updates on our digital products and services that will be coming available in the near future.

Products and Services Currently Available

Product	Description	Where to access
Open Data Portal	The ESO Open Data Portal is a central library of published data that aims to make ESO datasets available to all to enhance industry transparency and enable innovation.	ESO Data Portal
Connections Portal	The Connections Portal has digitalised the connections journey and account management for all customers. Functionalities include applying for connections and other agreements online, monitoring live applications and tracking their progress, accessing signed contract documents, viewing key milestones/milestone management, and communicating directly with your designated Connections Contract Manager.	ESO Connections Portal
Single Markets Platform (SMP)	The SMP drives consistency across a number of different ESO markets such as ancillary services and capacity markets. It provides an end-to-end customer journey allowing users to access data and services through the following capabilities: market entry, unit management, market participation, contract management, scheduling and dispatch, performance monitoring, and settlements.	ESO Single Markets Platform
Electricity Market Reform (EMR) Delivery Body Portal	EMR aims to deliver low carbon energy supplies whilst maintaining security of supply and minimising the cost to the consumer. Within this platform, customers can find annual Electricity Capacity Reports that advise on capacity requirements. Additionally, this portal administers key elements of the Capacity Market (including registration, prequalification, auction, the Capacity Market Register, and agreement management) and the CfD regime (including registration, application and qualification, valuation, and allocation).	ESO EMR Portal
Innovation Projects	The ESO utilises the Energy Networks Association's (ENA) Smarter Networks Portal as a repository for regulation-funded innovation projects and associated outputs, data, knowledge, news, and dissemination events.	ENA Innovation Portal (energynetworks.org)
Research and Publications	Our website offers a wide range of publications that provide energy insight and analysis, such as the Future Energy Scenarios (FES), Electricity Ten Year Statement (ETYS), season outlooks, and more.	ESO Research and Publications
ESO App	Our mobile app allows users to monitor the generation types that make up your electricity supply as well as see the carbon impact level of electricity generation and how it compares to other regions of GB.	Download the app from Apple's App Store or Google Play

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Appendix D: Addressing Ofgem's Data Best Practice Guidance Principles

The table below shows where we address each of Ofgem's Data Best Practice Guidance Principles throughout this DSAP submission.

	Ofgem Data Best Practice Guidance Principle	How this is addressed in the ESO DSAP
1	Identify the roles of stakeholders of Data Assets.	Our new ESO Data Council, explained in our Digitalisation Action Plan **DS6.1 Data Governance Maturity**, will be responsible for assigning data related internal roles. These roles will be operationalised through our new hub-and-spoke data operating model from our BP2 deliverable **D19.1.1 Data and Analytics Operating Model**. For external roles, we will continue to consult with the groups mentioned in our March 2022 Digitalisation Strategy and in this DSAP's **Appendix A: Customer Engagement and Feedback**, as well as manage through **DS3.3 Facilitation of Industry Common Frameworks**.
2	Use common terms within Data Assets, Metadata and supporting information.	Our ongoing BP2 **D17.9 Open Data Catalogue** will ensure that terms from each newly added dataset are defined and consistent with other datasets. Additionally, enhanced data governance policies and procedures pertaining to metadata management coupled with the development of a Common Terminology Forum (**DS6.1 Data Governance Maturity**) and our own internal CIM implementation (**DS6.2 Operationalisation of Common Information Model**), will ensure accurate usage of industry standard metadata. We also plan to take a greater role in establishing industry standards through **DS3.3 Facilitation of Industry Common Frameworks.**
3	Describe data accurately using industry standard Metadata.	
4	Enable potential Data Users to understand Data Assets by providing supporting information.	Our ongoing BP2 **D17.9 Open Data Catalogue** provides external users with a detailed inventory and catalogue of ESO data, including supporting information. Additionally, as we enhance our data governance policies and procedures through **DS6.1 Data Governance Maturity**, we will develop clear rules for the supporting information needed for each Data Asset.
5	Make Data Assets discoverable for potential Data Users.	Our ongoing BP2 **D17.9 Open Data Catalogue** provides external users with an inventory and catalogue of ESO data. Additionally, through our Digitalisation Action Plan **DS6.1 Data Governance Maturity**, we are developing an open data triage process to reduce barriers to opening up more data.
6	Learn and deliver to the needs of current and prospective Data Users.	We will continue to gather feedback from the groups mentioned in our March 2022 Digitalisation Strategy and in this DSAP's **Appendix A: Customer Engagement and Feedback**, as well as manage through **DS3.3 Facilitation of Industry Common Frameworks**.
7	Ensure data quality maintenance and improvement is prioritised by Data User needs.	Through our Digitalisation Action Plan **DS6.1 Data Governance Maturity**, we are developing a data quality programme that includes creating prioritisation criteria for remediation of data quality issues.
8	Ensure Data Assets are interoperable with Data Assets from other data and digital services.	Through our efforts on **DS3.3 Facilitation of Industry Common Frameworks**, we want to help the industry coordinate on the interoperability of data assets and plan to align our data and digital services accordingly.
9	Protect Data Assets and systems in accordance with Security, Privacy and Resilience (SPaR) best practice.	Through our Cyber Security Enabler efforts to protect data and innovation, and our Digitalisation Action Plan **DS6.1 Data Governance Maturity**, we will continue to ensure SPaR compliance in our organisational data policies, procedures, and controls.

10	Store, archive and provide access to Data Assets in ways that ensure sustained benefits.	Through our Digitalisation Action Plan **DS6.1 Data Governance Maturity**, we will review existing organisational data policies, procedures, and controls and ensure our new ESO Data Council enforces processes on data archival and retention in our DAP and across the business.
11	Treat all Data Assets, their associated Metadata and Software Scripts used to process Data Assets as Presumed Open.	Through our Digitalisation Action Plan **DS6.1 Data Governance Maturity**, we are developing an open data triage process to reduce barriers to opening up more data.