The ESO Digitalisation Strategy and Action Plan

June 2021

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Contents

Foreword

Our mission as the Electricity System Operator (ESO) is to enable the transition to a sustainable energy system and deliver safe, reliable, affordable energy for all consumers.

We have committed to be able to operate a zero-carbon system by 2025, which supports the UK's plan to achieve net zero greenhouse gas emissions by 2050. This is an exciting and challenging time for the energy sector as we all work together towards a decarbonised and decentralised energy system.

We will reduce our reliance on traditional energy sources and move to a more inclusive energy system with hundreds of connected generation, storage, and consumption assets. Over 600,000 heat pumps could be installed per year by 2028; and with all new cars and vans required to be zero emissions from 2035, the number of electric vehicles connected to the energy network will soar.

Pivotal to the successful delivery of these initiatives is ensuring we have a robust digitalisation strategy and action plan that outlines our approach and details a roadmap of how we will deliver to plan. The ESO's digital transformation is not just an enabler, but a core component of our transition as we progress on our journey to reach zero carbon operability.

Digitalisation and 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 this enables, as well as the developing customer-centric digital capabilities.

We're excited and proud of the role we are playing in the decarbonisation of the energy system to help mitigate climate change and the opportunity to bring about greater value for consumers through digitalisation.

Norma Dove-Edwin
ESO Chief Information Officer

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1. Document purpose

1.1. This document sets out our approach to digitalisation to deliver benefits for our stakeholders. It shares our understanding of stakeholder needs, the customer experience journey they have with us, and the products and services we provide to meet those needs.

1.2. Part one is our digitalisation strategy. Section 3 sets a vision for future digitalisation – the 'what', and section 4 shows our tactics – the 'how'. We have also highlighted where we support the recommendations of the Energy Data Taskforce[1] (EDTF) as we recognise the leading role we will play in their delivery.

1.3. Part two of this document is our digitalisation action plan which shows our progress towards achieving the vision in our digitalisation strategy.

Part one – digitalisation strategy

2. Introduction

2.1. The environment in which we operate is undergoing a level of disruption as electricity generation is decentralised and decarbonised. Our customers need us to digitalise data and processes as we head towards a democratised marketplace which is more accessible to more people. Our independent role in the electricity industry requires us to be increasingly transparent in all our activities.

2.2. Our mission is to enable the transformation to a sustainable energy system and ensure the delivery of reliable, affordable energy for all consumers. Success in 2025 looks like:

    2.2.1. An electricity system that can operate carbon free.

    2.2.2. A whole system strategy that supports net zero by 2050.

    2.2.3. Competition everywhere.

    2.2.4. The ESO is a trusted partner.

2.3. We have an ambitious five-year business plan[2] that is supported by our stakeholders. To achieve this, and provide the value and experience our customers desire, we need to become more digital in the way we design, develop, and provide the products and services articulated in our business plan.

2.4. We have aligned with Ofgem's definitions of digitalisation published 25 May 2021[3] where our digitalisation strategy is the strategic approach taken to digitalise our products and services. We will use technologies to change our ways of working and provide new value-creating opportunities. This is the process of becoming a digital business.

2.5. Harnessing digital technology will enhance our operations, whether that is ensuring reliable, secure system operation to deliver electricity when consumers need it; transforming participation in smart and sustainable markets; unlocking consumer value through competition; or driving towards a sustainable, whole energy future.

2.6. The digital organisation is about having a fanatical focus on people – their needs, wants, desires, expectations, and experiences. It will no longer be acceptable to deliver technology solutions that just do the job, or to provide solutions that the user finds difficult, clunky, or stressful to use.

2.7. Digital means that we will think about and reimagine our processes, products, services, and the way we get things done. We will do this without constraint and without the bias of our predetermined assumptions to really understand the needs, wants, or expectations of the people we serve and future scenarios we might encounter.

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[1] EDTF Recommendations - https://es.catapult.org.uk/reports/energy-data-taskforce-report/
[2] See our December 2019 Business Plan - https://www.nationalgrideso.com/our-strategy/riio/riio2-business-plan
[3] Definitions taken from Ofgem's Digitalisation Strategy and Action Plan, Supporting Information (25 May 2021), p.9

2.8.   In response to Ofgem's seven principles (See Figure 1), and in support of the EDTF recommendations, we have structured our Digitalisation Strategy and Action Plan (DSAP) around three key themes: the digital mindset, product model, and agile. These are summarised in section 3 where we define 'what' we will achieve in our digital strategy. Section 4 provides our tactics as to 'how' we will active this. Sections 7 and 0 list the detailed activities, deliverables, milestones, and technology investments delivering the products and services that will realise our DSAP and EDTF recommendations.

2.9.   In previous iterations of our DSAP, we structured around three pillars – pillar 1: deliver open data and digital market enablement, pillar 2: build our core capability through digital technology, and pillar 3: transform our organisation culture and digital ways of working. While we still intend to deliver these outcomes, we found a level of duplication between pillar 1 and 2. The investments and activities that underpin these pillars are often the same investments. In the spirit of continuous improvement, we felt that there was an opportunity for greater customer centricity and have restructured our strategy accordingly.

2.10. While not explicitly referenced in this document, increasing our digitisation capability comes with a requisite increase in our cyber security response to ensure ongoing reliable and safe operation. We continue to invest in our cyber security proficiency and are working with all key stakeholders and competent authorities including Ofgem, the National Cyber Security Centre (NCSC), and the Department for Business, Energy, and Industrial Strategy (BEIS).
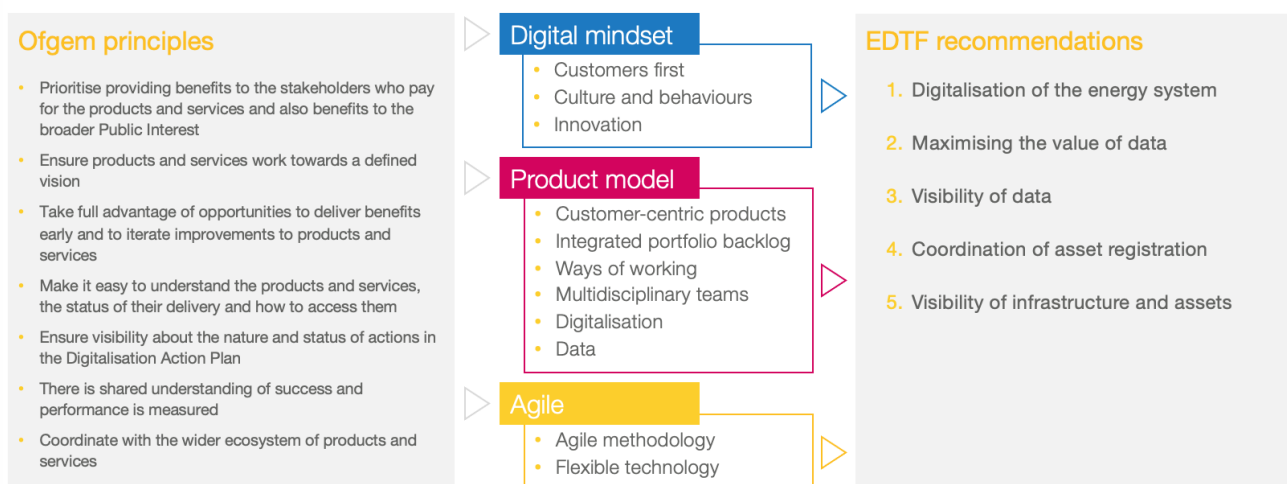
Our digitalisation strategy and action plan

Ofgem principles

- Prioritise providing benefits to the stakeholders who pay for the products and services and also benefits to the broader Public Interest
- Ensure products and services work towards a defined vision
- Take full advantage of opportunities to deliver benefits early and to iterate improvements to products and services
- Make it easy to understand the products and services, the status of their delivery and how to access them
- Ensure visibility about the nature and status of actions in the Digitalisation Action Plan
- There is shared understanding of success and performance is measured
- Coordinate with the wider ecosystem of products and services

Digital mindset
- Customers first
- Culture and behaviours
- Innovation

Product model
- Customer-centric products
- Integrated portfolio backlog
- Ways of working
- Multidisciplinary teams
- Digitalisation
- Data

Agile
- Agile methodology
- Flexible technology

EDTF recommendations

1. Digitalisation of the energy system
2. Maximising the value of data
3. Visibility of data
4. Coordination of asset registration
5. Visibility of infrastructure and assets

Figure 1 – Our DSAP is informed by Ofgem's principles and supports the EDTF recommendations.

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3. Our strategy – the 'what?'

3.1. As outlined above, our digital ways of working consist of three elements: a digital mindset, product model, and agile methods (see Figure 1). We expect these changes to be fully embedded by 2025.

The digital mindset

3.2. We will generate a people first mindset and put our customers, clients, stakeholders, suppliers, workforce, and users first in designing our end-to-end processes and technology solutions. Putting people first will enable us to think about what people really want to create value in the form of new products and services, or to create new user experiences, in the form of different more effective ways of doing things.

3.3. Our customers tell us that the experience of participation in energy markets it too complex, there is no step-by-step guidance for how to participate, information is diffuse, rules and frameworks are ambiguous requiring interpretation and discussion, and they don't know who to talk to.

3.4. They need a more seamless experience when interacting with the ESO – friction free with minimal clicks to get what they need. Engaging with the ESO will become more intuitive and user friendly through the provision of a consistent and personalised user experience including access to information, data, codes, connections, and market participation. We want to make it fluent, easy, and actively engaging to take part in the energy market.

3.5. Customers want processes to be automated, data to be machine readable, collected once and reused. They want an engaging experience with high levels of automation. This helps them to be more efficient, to be more proactive, and provide the value that consumers need.

3.6. We will better understand the customer journey and the required products/services. Our vision is for this to be a co-creative process where we will better understand their needs and improve the experience.

3.7. We will use external best practice through the Technology Advisory Council (TAC) [4], our vendor partnerships, and strategic influence from organisations like HM Government, BEIS, Ofgem, the Climate Change Committee, and the Energy Networks Association.

3.8. The Technical Advisory Council (TAC) was launched in December 2020 with an independent Chair. Engagement from all members is extremely high and we will be benefit from the experience, skills, and contacts of the Council members. The TAC will support us in various ways including:

   3.8.1. Help set the strategic direction of the ESO transformation journey in systems (including process and technology) development.

   3.8.2. Provide stakeholder input into the ESO transformation, ensuring the changes we make reflect wider market needs.

   3.8.3. Bring transparency around our decision making and help the ESO communicate change externally in the appropriate manner. This will help stakeholders plan their own IT system changes, including those that will interface with the ESO.

   3.8.4. Ensure accountability from the ESO for delivering on its promises and proactively communicating changes.

   3.8.5. Allow us to consult and engage on the experience of interacting with the ESO and invite input into key design, development, and testing phases of our solutions development. It will also provide transparency of the decision-making logic behind our systems.

3.9. In addition, suppliers from our application development and maintenance framework (ADAM) and general management consultancy framework (GMC) advise and provide insight from other sectors and introduce innovative solutions.

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[4] The terms of reference and minutes for the technology advisory council can be found on our website here https://www.nationalgrideso.com/who-we-are/stakeholder-groups/technology-advisory-council/documents

3.10. We will nurture a culture of 'we're all in this together' based on shared risk, accountability, ownership and, importantly, success. This is built on a foundation of true empowerment of teams, creating a bias for decision making and action across all levels.

3.11. Embedding innovation in our daily operations embodies the spirit of the aggregation of incremental gains – small changes made daily which, over time, create significant benefits.

Product model – customer-centric and data driven

3.12. Using the principles behind design thinking (see Figure 4), we will develop customer-centric products and services that are built with the user in mind. Integrating our customers into the design and development of products allows us to develop greater understanding. This insight helps us to offer better solutions, and when combined with agile methods, allows us to deliver value incrementally at speed and scale.

3.13. Sections 7 and 0 (Part two – digitalisation action plan) list the specific activities, deliverables, milestones, and technology investments that will deliver the customer-centric products. These have been tested extensively with stakeholders, are all detailed in our RIIO-2 business plan and will be tracked and reported on a quarterly basis as part of our incentives reporting.

3.14. Our ambition is to be fully data enabled, demonstrating the policy of 'presumed open' and making data available to facilitate new and efficient markets, zero-carbon system operation, innovation, and unlock further value for our customers and stakeholders. This includes closer coordination with stakeholders to increase the volume, accuracy, timeliness, and types of data.

Agile

3.15. We will use proven technologies and methodologies to transform traditional models of doing business within the energy sector. We will bring together applications as components of a modular, platform-based architecture. Creating these platforms will lay the foundations that enable consistent adoption of digital initiatives. We will introduce multiple platforms, including a digital engagement platform, insights and data platform, integration platform, and engineering services platform (including network operation, control, and development; energy balancing; and commercial and markets).

3.16. Within our platforms, we will embed modelling and simulation using digital twin and artificial intelligence technologies. The platforms will be designed to grow in line with customer priorities. We will use cloud computing and on-premise services to achieve this.

3.17. We will change the methods in which we implement change to make us more agile and flexible in adapting to market changes. We launch sprints that are short, two- to four-week activities, after which, we review and feedback – 'Is this what you want?', 'Is this what you are after?'. If we're not meeting the customer need, we will iterate, continuously improving until we delight our customers.

4. Our tactics – the 'how?'

Digital mindset – customers first

4.1. Our customers and stakeholders (see Figure 2) span the electricity industry from generation to consumption. We balance Great Britain's electricity system and ensure that, whatever the generation mix, electricity is always there when it's needed[5].

Electricity Charges

Symbol	Service	Charges
	Building and maintaining the transmission network	TNUoS
	Operating and balancing the transmission network	BSUoS
	Building & maintaining assets to connect customers to the transmission system	Connection Assets

Generators
e.g., Engie, Ørsted
Generators create the electricity which is transported around the electricity system.

Transmission (TOs and OFTOs)
National Grid owns and operates the high voltage transmission network in England and Wales. Our counterparts in Scotland and Offshore are Scottish and Southern Energy Networks Transmission (SSEN Transmission), Scottish Power Transmission (SPT) and the 12+ Offshore Transmission Owners (OFTOs).

DNOs and Interconnectors
e.g., UKPN (UK Power Networks) Fablink
Distribution Network Owners and interconnectors own and operate the lower voltage and interconnector networks which link the transmission system to homes, businesses and other countries.

Suppliers
e.g., Scottish Power, OVO Energy
Suppliers charge domestic and business consumers for the electricity they use.

Consumers
End consumers do not directly purchase our products and/or services; however, we aim to exceed our direct customer's expectations so that together we can Bring Energy to Life for end consumers.

Directly Connected Demand
e.g., Network Rail, Tata Steel
Directly Connected Demand – large industrial and transport customers that are connected directly to the transmission network for their electricity.
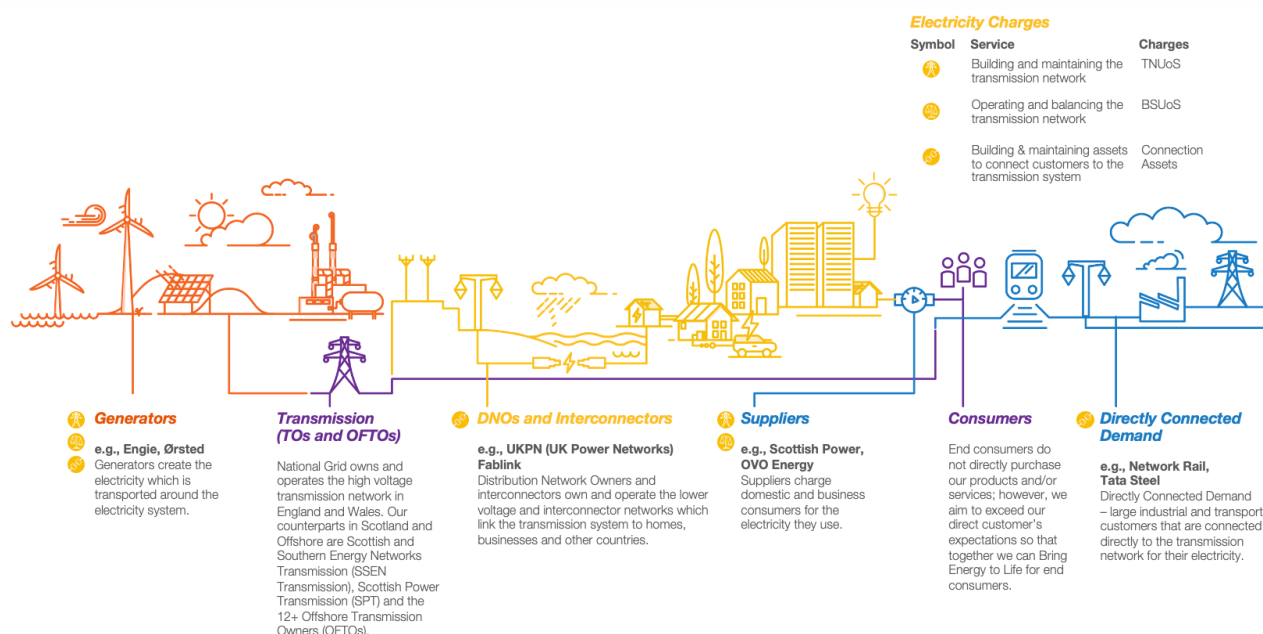
Figure 2 – Customers and stakeholders explained

4.2. We will build technology solutions that people want to use and that get the job done. Solutions that maximise productivity and increase wellbeing.

4.3. Digital technologies are a piece of technology where the user's interaction or experience with the technology is paramount. Users don't care, and nor should they, about the actual underling code or system – they want a personalised, friction-free, seamless start-to-finish experience that delivers the right outcome to them. Equally, our organisational structure will not be visible in the product/service as we increase interdepartmental collaboration through multidisciplinary teams.

4.4. It is important for us to provide digitalised products and services in an inclusive way. We intend that digitalisation of our products and services should not become a barrier to any of our stakeholders.

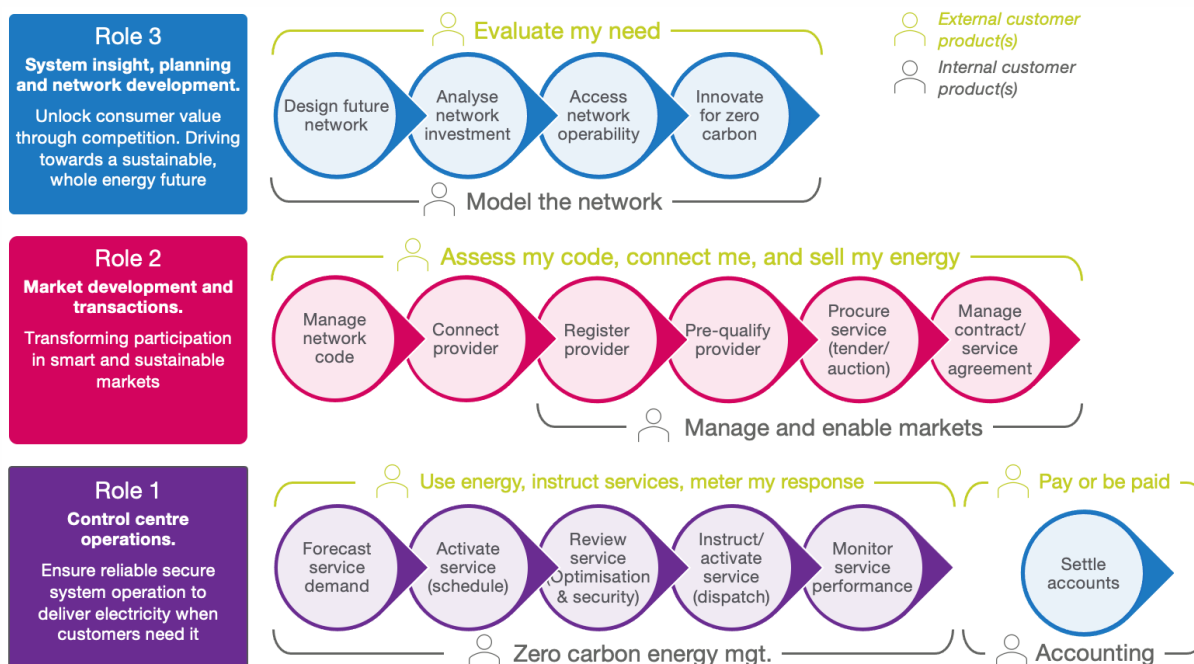[5] Read more about what we do on our website https://www.nationalgrideso.com/who-we-are/what-we-do

Figure 3 – A high-level example customer journey

4.5.   Core to this is the customer journey (see Figure 3 for an example). A more apt name is the customer experience journey as it is a map of how and what people experience when they interact with ESO to achieve their outcome. The usability of our systems for both internal and external users is critical for our success.

4.6.   During 2021, we are working to map our personas and customer experience journey to better understand the needs of our customers. We will achieve this using three methods. The first is our digital transformation programme where we will map all our high-level, end-to-end customer experience journeys. This is complemented by a parallel activity in our digital engagement platform development[6] which will detail elements of those journeys to a greater depth and begin to realise the journey as a seamless experience in the supporting technologies. Our customer team will also develop any journeys not captured by the former activity. This will then become a process of continuous improvement.

4.7.   We carry out regular customer surveys using online tools to capture immediate feedback following events and key milestones. We also run a biannual customer satisfaction survey to gather feedback on our Role commitments and general performance. We look for themes to turn these insights into actions that deliver customer value. We will publish this insight and action in 'you said / we did' documents. From 2021/22 we will report our customer satisfaction (CSAT) and stakeholder satisfaction (SSAT) scores as part of our licence.

4.8.   Our digital engagement platform is also one of the leading programmes to integrate the customer into the development lifecycle through interviews, questionnaires, and workshops. We then share this insight more broadly through webinars to access further feedback. A summary of that process is shown in Figure 4 below. This is a model that we will embed in all digital delivery.

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[6] For more detail about our digital engagement platform, see investment '250 – digital engagement platform' in Annex 4 of our December 2019 Business Plan https://www.nationalgrideso.com/document/158071/download
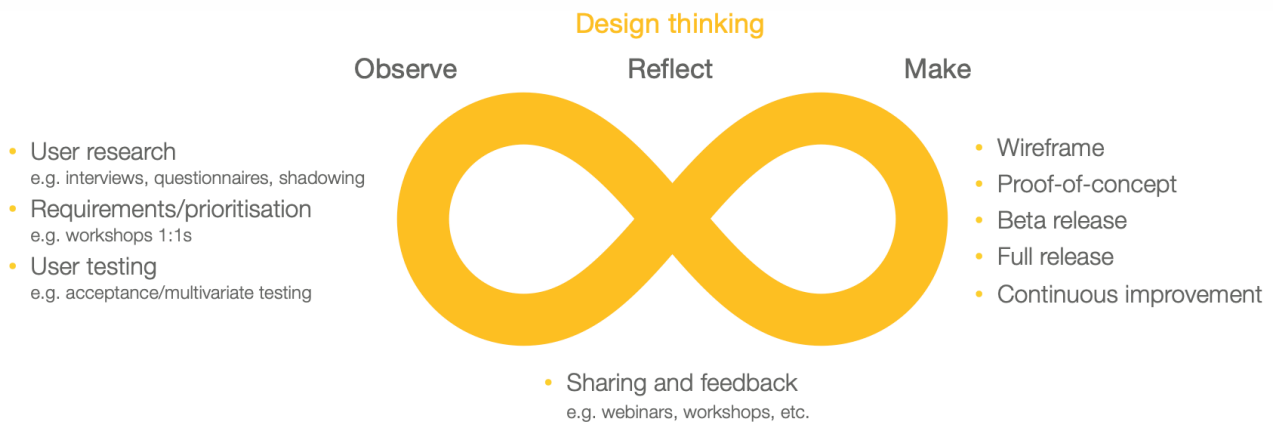
Figure 4 – Customer engagement and design thinking approach used within our digital engagement platform development

Digital mindset – culture and behaviours

4.9. Culture is a critical enabler of the digital mindset and there are characteristics of our culture that we want to encourage. Developing the right capabilities and skills in our workforce alongside a supporting culture and behaviours will foster an agile, innovative, collaborative, and experimental operating environment.

4.10. Enabling cultural principles are:

  4.10.1. Open, transparent, and inclusive – so people can see what we're doing and be part of it.

  4.10.2. Shared purpose and vision to give clarity and focus.

  4.10.3. Empowered teams with defined roles and accountability that reflects and supports the way in which we create value.

  4.10.4. Quick, efficient, and continuous decision making.

  4.10.5. Coaching style leadership incentivised on purpose or mission.

  4.10.6. Learning culture with a continual rapid iteration of thinking, doing, and learning to innovate and operate in an agile way.

  4.10.7. Ask 'Why?' – create an inquisitive organisation that is connected to outcomes.

4.11. Working with the Katzenbach Center[7], we will establish a culture baseline including strengths to accelerate transformation and pain points to address. This work in Q2, 2021/22 will help us to align on culture aspirations, and prioritise critical behaviours that will drive greater alignment between culture, operating model, and strategy.

4.12. We will consider how our approach to decision making, motivators, commitments, mindset, and our structure all contribute to our culture. This work will deliver a culture evolution roadmap. There will be opportunities to make progress in the remainder of 2021/22 and we see the cultural transition being fully embedded over the RIIO-2 period.

Digital mindset – innovation

4.13. Digital transformation is the number one priority in our 2021 innovation strategy[8]. It has been prioritised by stakeholders and external subject matter experts for innovation funded by the network innovation allowance (NIA). Our 2021 innovation strategy provides a comprehensive overview of initiatives in this category.
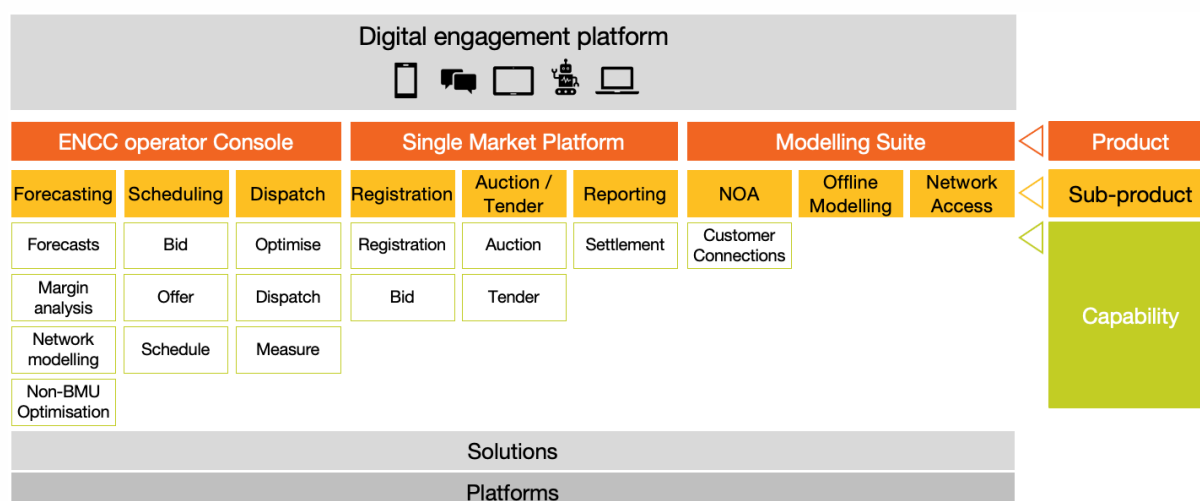
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[7] https://www.strategyand.pwc.com/gx/en/insights/katzenbach-center.html

[8] Read our full innovation strategy on our website https://www.nationalgrideso.com/innovation/strategy

4.14. Innovation is not confined to these investments. On a day-to-day level innovation comes in the form of questions like 'is my customer happy?', 'how can I make this better?', or 'how can I improve on my previous best?'. In these marginal gains we will improve our products and services, and the way we deliver them.

Product model – customer centric products and services with integrated backlog

4.15. We will build customer centric products and services. A product is a self-contained item that is created and delivered to address people's needs, fulfil an outcome, or provide a specific value. Example products include the electricity national control centre (ENCC) operator console, the single market platform, or the network modelling suite (see Figure 5) as they are items that people consume or interact with to complete an action or achieve an outcome.

4.16. We can view products as being a whole thing. All the capabilities or applications, from infrastructure to the graphical user interface (GUI), required to deliver it are brought together and managed as a whole and delivered by a multidisciplinary team under one person's accountability. They might be made up of many applications or components but to the user it is a single product.

4.17. The cross-cutting activities including innovation, customer and stakeholders, regulation, assurance, and business change, will either be part of a product within our key product areas or have standalone products that suit their needs.

4.18. Products can exist within products as part of a product family. Thus, our product model, along with our accountabilities, will be a hierarchy. This will ensure that the sub-products integrate within the product family and that the consumer's experience is same across all products and is simple, seamless and friction free.

4.19. For example, the ENCC operator console product enables engineers to visualise and manage the entire network at an appropriate level of detail. The ENCC operator console product is made of other products (like forecasting, scheduling, and dispatch) and multiple applications but comes together in a single solution that meets the engineer's needs.

4.20. Each product and service will have a prioritised backlog of functionality and features with closely managed dependencies.

Digital engagement platform									
ENCC operator Console			**Single Market Platform**			**Modelling Suite**			**Product**
Forecasting	Scheduling	Dispatch	Registration	Auction / Tender	Reporting	NOA	Offline Modelling	Network Access	**Sub-product**
Forecasts	Bid	Optimise	Registration	Auction	Settlement	Customer Connections			
Margin analysis	Offer	Dispatch	Bid	Tender					**Capability**
Network modelling	Schedule	Measure							
Non-BMU Optimisation									
Solutions									
Platforms									

ENCC – electricity national control centre
NOA – Network options assessment
BMU – Balancing mechanism unit

Figure 5 – Example customer-centric products

4.21. Our Business Plan is structured by roles/themes, activities and deliverables that define the measures of success. In October 2020, we developed a comprehensive delivery schedule that breaks down our ambition into activities, deliverables, and milestones (see Figure 6 below).

A17 Transparency and open data

Our proposals for Transparency and Open data drive progress towards our Trusted Partner ambition as well as our ambition to be able to operate a zero carbon system. Through transparency of our actions, stakeholder and market participants will be able to understand, and have greater confidence in, the decisions that we take to balance the system in real-time. In addition, by providing far greater diversity and volumes of operational and market data we anticipate that we will stimulate a fresh wave of innovation in low carbon and whole electricity system operation solutions. These solutions may mature into tools that will help us to operate the zero carbon system of the future.

Sub activity	Deliverable	Related IT investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First year success	Second year success	Expected final delivery date and what success looks like.	Notes on changes to Dec 2019 Business Plan
A17 Transparency and Open Data	*Transparency Roadmap* This new deliverable defines the outcomes, timescales and steps to achieve the ESO's ambition to provide the highest level of transparency possible. Further detail on the	220 - Data and analytics platform: It will be the key technology underpinning all our internal and external data management, pulling together data from a variety of sources and ensuring there is only one source of the truth.	Continuous	Initial *Transparency Roadmap* published with feedback on scope and methodology received.	Q1 – Publish *Transparency Roadmap* refresh. Q3 – Publish *Transparency Roadmap* refresh.	Q1 – Publish *Transparency Roadmap* refresh. Q3 – Publish *Transparency Roadmap* refresh.	ESO *Transparency Roadmap* refresh published informed by stakeholder feedback. This will provide clarity on information that we share and future developments. Positive stakeholder feedback received.	ESO Transparency Roadmap refresh published informed by stakeholder feedback. This will provide clarity on information that we share and future developments. Positive stakeholder feedback received.	N/A	This is a new deliverable, not included in December 2019 Business Plan.

Figure 6 – Excerpt from our updated ESO RIIO-2 delivery schedule (9 October 2020)

4.22. In our digitalisation action plan, we show the relevant activities and deliverables from the ESO RIIO-2 delivery schedule. Each deliverable has detailed 2021/22 and 2022/23 milestones, success criteria, and outcomes.

4.23. The ESO RIIO-2 delivery schedule shows the related technology investments. This includes the scope, architectural approach, deliverables, timelines, work breakdown structure, risks, and resourcing. These are detailed in our December 2019 business plan: Annex 4 – Technology investment report[9] and our ESO RIIO-2 consultation response – Technology investment detail parts 1-3.

4.24. We are tracking progress against detailed milestones, deliverables, and activities. This is published on our website quarterly starting from July 2021 and aligns with our incentive reporting[10].

Product model – ways of working

4.25. We will partner and collaborate with our customers and truly include them in the product development lifecycle. As we bring together our own team to operate with a one-team mindset, we will be able to innovate faster and reduce the time between an initial idea and a product launch, thereby enhancing the customer experience.

4.26. We are moving to a product approach and away from a project approach (see Figure 7), where possible, to how we govern and manage business initiatives.

4.27. Products are people centric and developed with a holistic view to people's needs and expectations and are long term endeavours that are continuously improved. Projects tend to be one off endeavours with a narrow view, a set scope, a start/end date, and a defined goal, where change is not easily accommodated.

4.28. This enables us to focus on the product as a whole and the value and benefits it delivers to consumers as opposed to individual or groups of components or features delivered through a project.

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[9] See our December 2019 RIIO-2 business plan: Annex 4 – technology investment report here https://www.nationalgrideso.com/document/158071/download
[10] See our website 'How we're performing under RIIO-2' https://www.nationalgrideso.com/our-strategy/riio/how-were-performing-under-riio-2

ESO digital ways of working
What we are going to do differently

From project focused
- Siloed business operations and technology
- Closed culture and behaviours
- Waterfall requirements methodology
- Stick to the plan, difficult to course correct
- Bureaucratic governance
- Reactive and firefighting
- Escalation decision making

Product model
Outcome and continuous improvement

Digital mindset
Customer centric

Multi-disciplinary teams
Collaboration & communication

Partnership
Operations and technology

Agile delivery
Pace of change & focused delivery

Integrated portfolio
Resource and dependencies

Culture and behaviour
Accountability & inclusion

To product focused
- Customer first
- Leadership and accountability
- Collaborative, multidisciplinary teams
- Integrated big picture view
- Open knowledge sharing culture & behaviours
- Continuous improvement methodology
- Innovation and faster delivery
- Forward view and horizon planning
- Continuous work in enduring teams
- Lean governance

Figure 7 – What we are going to do differently – from project to product focus

4.29. A critical component of the new ways of working is the partnership between technology and operations (TechOps), building collaborative teams focused on outcomes. We will come together as equal partners in enduring, multidisciplinary teams to deliver this.

4.30. For the activities, deliverables, and technology investments referenced above, we will implement new ways of working with early adopters. These early adopters will trial the operating model, providing valuable feedback and lessons learnt, before it is rolled out across the teams (see Figure 12). There will be an engagement plan to take people along the journey form awareness to empowerment.

Product model – multidisciplinary teams

4.31. We will create cross-functional teams that foster collaboration and inclusion. Involving the relevant people connects the users to the people that design, develop and support the products and services. This leads to a higher quality outcome.

4.32. Individual sprint teams are purposefully built with ESO leadership and supported by high-calibre people from cross-functional teams. An example is shown in Figure 8 below. The team composition will vary depending on the product context. For example, in a data product, we would also include data engineers and/or machine learning engineers.

4.33. We will draw on deep technical competencies from our own teams and those of our framework partners and niche suppliers. This will allow a core/flex model, increasing our own competencies while allowing flexibility for scale or niche skills.

4.34. We will move to a model where development, security, and IT operations (DevSecOps) are integrated in the multidisciplinary teams to give high performance and throughput.

Figure 8 – Example multidisciplinary team

Product model – digitalisation

4.35. To fully embrace a digital culture, there are two key prerequisites – digitisation of data rather than analogue storage, and digitalisation to optimise processes through increasing levels of automation. This means removing paper, reducing manual processes, removing duplication, and making data transparent. We will use automation and workflow tools in combination with machine learning and artificial intelligence to optimise processes and procedures for our teams and for customers.

4.36. Examples includes energy forecasting, system operation and network planning to enable secure and efficient operation of the electricity system and markets.

4.37. As with customer centric products, digitalisation will be achieved through the technology investments that support our business plan ambition.

4.38. An important investment is '250 Digital engagement platform' as this will enable a single point of access for all ESO data and services, including the markets, connections, digitalised Grid Code management, and data and analytics platform. It sits at the heart of our vision for digital capability across all our themes, providing a common engagement experience for stakeholders.

Product model – data

4.39. Data is fundamental to digitalisation. We will set targets, measure, monitor, and take action to continuously improve our data. As we listen through data, we will better understand how our customers behave and under what conditions.

4.40. We anticipate vast growth in the volume of data, and an expectation from external stakeholders for our data and insights to be shared.

4.41. We will adopt the principle of 'presumed open' and make all our shareable data[11] available in an accessible format. Improving transparency is a key commitment within our RIIO-2 Business Plan 2021-2023. To support this, we will:

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[11] In accordance with Ofgem's open data triage process, defined on p.11 of 'Data best practice, supporting information' 25 May 2021.

      4.41.1. Publish a transparency roadmap every six months setting out the projects we are working on to improve transparency[12].

      4.41.2. Share data publicly wherever we can. This will help our stakeholders hold us to account by publishing information on how we operate and perform and will increase transparency of the decisions we make and how we make them. Increasing access to data we hold will encourage analysis, understanding and innovation.

4.42. We will increase transparency in compliance with all relevant guidance and legislation including (and not limited to,) data protection laws, licence obligations around disclosure of System Operator Functions Information (SOFI), confidential or commercially sensitive data, and the Utilities Act 2000.

4.43. Data will help us make better decisions through consolidation of information, machine learning, and artificial intelligence. This extends beyond control centre operations (Role 1) into all aspects of the ESO, including market development (Role 2) and system insight, planning, and network development (Role 3).

4.44. Gathering customer insight into how people use our products and services is also vital for continuous product improvement.

4.45. We've already begun evolving our data-sharing platforms to meet the demands of today's more data-intensive energy ecosystem. We're in the early stages of this journey, and our first milestone is the development and rollout of a new pilot data portal to support our ambition to make our data easier to discover, understand and consume.

4.46. Our investment '220 Data and analytics platform'[13] is foundational work to unlock the value of the data we hold (see Figure 9). It will be the technology underpinning all our internal and external data management, pulling together data from a variety of sources, and ensuring there is only one source of the truth.

4.47. As we engage with stakeholders, we will understand their roles and how data can support them. Through a process of standardisation and classification, we will make it easier for stakeholders to find and understand data. We will support data sharing at a greater volume and frequency as desire for transparency and insight increases.

4.48. Cloud-based data management and analytics are now universal and essential for modern data analysis approaches and even more so for artificial intelligence implementations. This investment will evolve ESO's traditional data management and analytics to the cloud. It is indispensable for much of the RIIO-2 change programme, including unlocking the value of our digital twin technology investments and hosting data from the asset register, fundamental for our single markets platform.

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[12] For more information visit our website 'Increasing the transparency of our operational decision making' here
https://www.nationalgrideso.com/news/increasing-transparency-our-operational-decision-making
[13] See p.40 of our December 2019 RIIO-2 business plan: Annex 4 – technology investment report here
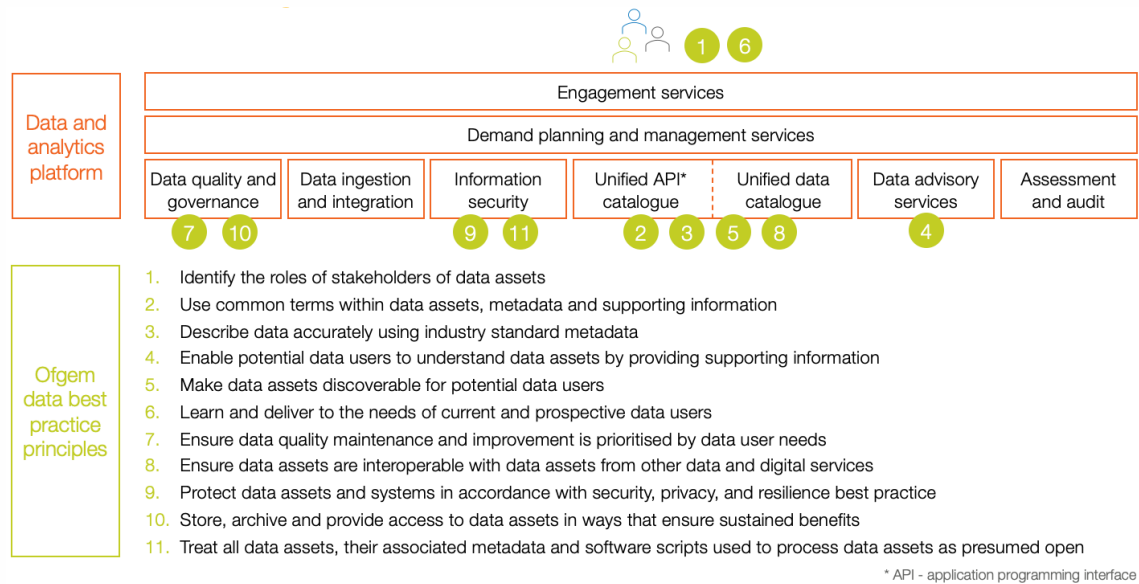https://www.nationalgrideso.com/document/158071/download

Figure 9 – Mapping between Ofgem's data best practice principles and our data and analytics platform approach

Agile – agile methodology

4.49. We want to delight our customers through early and continuous delivery of value.

4.50. Agile and iterative development methodologies will enable us to cycle through the design thinking loop where we observe, reflect, and make. By integrating the customer into the design and development process, we can focus on high-value outcomes that meet the customers need (see Figure 10).

4.51. Using methodologies like SAFe[14] we will organise our teams in value streams to focus on outcomes and people's experiences. Working in mixed discipline teams to achieve timeboxed (weeks not months or years) results that enable stakeholders to continuously test against the relevant outcomes, user experience, and course correct the solution as required.

Figure 10 – From project to product. Prioritising the customer and delivering value sooner.

4.52. As part of our digital transformation, we are drawing on expertise from our agile transformation office. This team are focused on the practical implementation of agile methodology include agile scrum ceremonies, backlog management and development tools, and training.

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[14] See the Scaled Agile Framework website for more detail https://www.scaledagileframework.com

Agile – flexible technology

4.53. We will use modern game-changing digital technologies, which are architected in modular way in to enable flexibility, i.e. we can upgrade or change parts of the solution more easily to meet changing needs. It provides opportunities for a simplified, consistent, and accessible customer experience.

4.54. We will build solutions that facilitate and expedite change (easier and faster). Using a modular architecture approach will enable flexibility for change and growth – modules can be replaced/upgraded for more modern technologies without impacting other modules – and modules can be reused across the ESO, eliminating duplication (interoperability by design).

4.55. Our approach will be to consolidate applications and capabilities onto standard platforms. Creating these platforms will lay the foundations that move us away from interdependent systems and enable consistent adoption of digital initiatives.

4.56. This allows multiple enabling capabilities (activities) to be hosted on the same platform and consumed by customers via a product. For example, the balancing solution will host forecasting, scheduling, and dispatch. These capabilities will be exposed to the end-user through the ENCC operator console product (Figure 5). The single markets platform will host registration, auction participation, and reporting – all exposed to the end-user through the single market platform product.

4.57. An insights and data platform will embed modelling and simulation using digital twin and artificial intelligence technologies. The platforms will be designed to grow in line with customer priorities. We will use cloud computing and on-premise services to achieve this.

4.58. For openness of information and interaction, we will enable application programming interfaces (API) through our digital engagement platform.

4.59. Our non-CNI solution platforms will be hosted in the Azure cloud and CNI solution platforms will be hosted in the on premise CNI data centre. All shared IT infrastructure investments (e.g. data centre, networks, and identity access management) take into consideration the possible separation of the ESO from National Grid Group.

4.60. Rationalisation and decommission of legacy applications and technologies is a key focus for the following two to three years. On an enduring basis, we will dedicate a proportion of our capacity to removing the technical debt that is a normal part of technology evolution and change.

5. Who will do it?

5.1. ESO leadership is fully committed to ensure senior ownership and ESO Board accountability of our Digitalisation Strategy and Action Plan (see Figure 11). Across the Non-Executive Directors on the ESO Board there is significant experience in digitalisation and digital transformation[15].

5.2. In November 2020, we were joined by a CIO who brings a wealth of digital transformation experience. This role is part of the ESO executive team and takes accountability for digital transformation and technology delivery for the ESO.

5.3. In May 2021 we recruited a head of digital and data who will create a hub and spoke model to integrate digital strategy with our day-to-day delivery. Projects and programmes draw from this central expertise and have established multi-disciplinary teams who adopt agile practices to deliver customer-centric products incrementally.

Figure 11 – We have established a digital transformation capability at all levels of the ESO

Part two – digitalisation action plan

6. Digital transformation

6.1. We have established a digital transformation programme that will implement our digital approach to operations. Figure 12 shows our near-term roadmap. This first phase is focused on understanding, definition, and early adoption. The next phases will be to scale our digital operations, before moving into a period of continuous improvement. We have used the Scaled Agile Framework (SAFe) implementation roadmap to inform our scaled agile approach.

Figure 12 – Digital transformation roadmap

7. Tracking detailed milestones through incentive reporting

7.1. Success in achieving our digitalisation strategy is closely linked to successfully delivery of our Business Plan. Figure 13 shows the key activities, deliverables, and milestones that relate to our digitalisation strategy. Figure 14 shows the key IT investments that underpin the milestones.

7.2. We report against these activities, deliverables, milestones, and investments on a quarterly basis through the RIIO-2 deliverables tracker[16]. 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. The successful delivery of our DSAP is intrinsically linked to the successful delivery of our Business Plan.

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[16] Our deliverables tracker can be found here https://www.nationalgrideso.com/document/189141/download

Figure 13 - Activity and deliverables roadmap relating to our digitalisation strategy

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7.3. Table 1 below provides a progress update for the activities and deliverables that specifically relate to our DSAP.

Table 1 - Activities and deliverables that support our DSAP

Activity/Deliverable	Status	Update
A1.1. Ongoing activities		
D1.1.7 Detailed forecasts and analysis 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. Provide data and insight to inform control centre decision making and performance review and integrate relevant IT projects into business as usual. Our forecasting enhancements will provide the control room with better quality, more frequent forecasts, allowing them to make better operational decisions. This helps minimise balancing costs and reduce carbon emissions. *See also section 8, Table 2 technology investment '260 Forecasting Enhancements'*	On track	We are on track for our 2021/22 implementation of forecasting products and sharing outputs from mature products externally where possible: • Implementation of core forecasting capability (demand, wind, and solar power generation forecasts at national and grid supply point levels) in our platform for energy forecasting. • Embed additional input data into internal forecasting processes – embedded generation metering data, weather data. • Build further on digital forecasting foundation to deliver improvement in large data processing, model training and forecast prediction time. Decommission existing legacy forecasting capability and system.
A1.2 Enhanced Balancing Capability		
D1.2.1 Enhanced balancing tool Enhanced balancing tool built and developed in a modular fashion that will incorporate machine learning and artificial intelligence. It will enable us to schedule and dispatch a greater number of market participants than today. *See also section 8, Table 2 technology investment '180 Enhanced balancing capability'*	On track	• We have started developing the foundational technology to support this deliverable.
A1.3 Transform Network Control		
D1.3.1 Situational awareness tool 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. Modules will integrate with the new Network Control tool to provide advanced situational awareness. *See also section 8, Table 2 technology investment '110 Network control'*	On track	• We have defined our procurement approach for the new real-time situational awareness tool.
D1.3.2 Network modelling Enhanced network modelling capabilities with online analysis of voltage and power flow profiles closer to real time. This deliverable outlines the potential modules that will be incorporated into the new Network Control tool (D1.3.1). *See also section 8, Table 2 technology investment '150 Operational awareness and decision support''*	On-going	• Workshops completed to define modules for situational awareness toolset. • Modules will be delivered as part of D1.3.1 Situational awareness tool
A1.4 Data and analytics platform		
D1.4.1 Data and analytics platform Creation of a data and analytics platform that will act as the foundation for our new Control Centre architecture. It will house all ESO internal data, including from the Control Centre systems, and allow users to access it in the timescales they need. External stakeholders will be able to access it through the data portal. *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	On track	• High-level design to be presented to TAC in September. • Data model(s) design and data catalogue compilation underway.

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Activity/Deliverable	Status	Update
A4.4 Deliver a single, integrated platform for ESO Markets		
D4.4.1 Market platform A market platform through which market participants will be able to participate in balancing and capacity markets. The markets platform will cover the end-to-end process for market participation including communications, data input and management, messaging, and validation *See also section 8, Table 2 technology investment '400 Single markets platform'*	On track	Elements of the foundational single markets platform deployed and operational in Q1 2021/22 as part of the day ahead frequency response auction trial include: • Service providers have a single log-in for the auction platform and associated functionality • Automatic loading of service provider registration information into the auction platform where users can view it • Bids are submitted via the platform as opposed to spreadsheet or email
D4.4.2 Common standards 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. *See also section 8, Table 2 technology investment '400 Single markets platform'*	On track	• See D4.4.1 Markets platform
A5.3 Improve our security of supply modelling capability		
D5.3 Enhanced modelling/data sets Use of enhanced modelling and more granular data sets to improve security of supply modelling. In a world of rapidly evolving energy systems, we will need to deploy the latest modelling techniques to ensure we can keep pace with these changes. We will need to develop new data sets, models, and methods to correctly model the growing interactions of new generation and the demand side. This will ensure their contributions to security of supply remain appropriate and help to ensure the Great Britain reliability standard is met. With growing interconnection across Europe and between Great Britain and other countries, our pan- European modelling needs to be able to better model different markets. We will improve our pan- European modelling in 2021 and 2022. This will include participation of interconnectors and/or European generators in the CM. It will require significant development of the model and data collection to model the interactions of future plant mixes within Europe. It will have to factor in the different operating regimes and security of supply standards across the various European capacity markets. *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	On track	• Our first milestone for Q1 2021/22 'Production of the Electricity Capacity Report' was submitted to BEIS on 28 May 2021. • The report is considered confidential electricity market reform (EMR) information until it is published (expected to be between 9-13 July 2021)
A6.5 Work with all stakeholders to create a fully digitalised, whole system Grid Code by 2025		
D6.5 Digitalised grid code The Grid code combines transmission and distribution codes in an IT system with AI-enabled navigation and document and workflow management tools. *See also section 8, Table 2 technology investment '330 Digitalised code management'*	On track	• Engagement at Grid Code Development Forum (GCDF), Industry Technical Codes Group (ITCG - DNOs), Ofgem (technical Codes Representatives) and Major Energy Users Council undertaken to introduce the project. • We will engage with DNO Code User, Trade Associations (FGG, ADE, Renewable UK) and Wider Industry (Birmingham University).

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Activity/Deliverable	Status	Update
A11.1 Refresh and integrate economic assessment tools to support future network modelling needs		
D11.1 Improved investment analysis Improved identification of when is the most economical time to invest and the most efficient solution. *See also section 8, Table 2 technology investment '390 NOA enhancements'*	On track	• We have started bilateral discussions with suppliers
A11.2 Implement probabilistic modelling		
D11.2 Identification of network needs Improved identification of network needs. *See also section 8, Table 2 technology investment '390 NOA enhancements'*	On track	• We have started to capture requirements for the design of probabilistic modelling
A13.1 Carry out analysis and scenario modelling on future energy demand and supply		
D13.1 Future Energy Scenarios (FES) 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. *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	On track	• FES launch is scheduled for 12 July 2021 and will be delivered as several virtual sessions across the week. • Documents and associated publications will be available on the ESO website in line with the launch. • Winter Review document was published on ESO website on 24 June 2021.
A13.2 Conduct mathematical, modelling & market research on local and wider geographic demand information		
D13.2 Energy demand models Created pan-European and country level electricity and energy demand models. *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	Not started	• Timeline is on-track with work starting Q2 2021/22 • First deliverable is end of Q4 2021/22
A14.4 Facilitate development of the customer connections hub		
D14.4.1 Connections hub phase 1 Implement first phase of the ESO connections hub, including online account management and integration with other network organisation websites. *See also section 8, Table 2 technology investment '380 Connections portal'*	On track	• We have commenced project start up and are engaging with the Transmission Owners around portal proposals
D14.4.2 Connections hub phase 2 Phase 2 of the connections hub concluded. *See also section 8, Table 2 technology investment '380 Connections portal'*	Not started	• Starts in 2023/24
A15.6 Transform our capability in modelling and data management		
D15.6.1 Phase 1 data mgt. scope Phase 1 data management scoping complete to feed into data and analytics platform (see D1.4.1) – modelling and data expertise will be used to scope planning data requirements for the data and analytics platform *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	Delayed	• Phase 1 modelling scope to be started in Q3 2021/22 (rather than Q2) and to align with D1.4.1 Data and analytics platform

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Activity/Deliverable	Status	Update
D15.6.2 Grid Code modifications Further Grid Code mods (arising, for example, from O/N 2020 work programme, discussions with industry participants and/or in response to Ofgem's Call for Evidence on Distributed Generation visibility) *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	Not started	• Work will start when new grid code changes are identified
D15.6.3 Phase 2 modelling scope Phase 2 modelling scoping complete to feed into data & analytics platform extension *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	n/a	• See D1.4.1 Data and analytics platform
D15.6.4 Data analytics platform Data analytics platform foundation in place *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	n/a	• See D1.4.1 Data and analytics platform
D15.6.5 Data platform extension Data platform extension complete (please see deliverable D1.4.1 for further details) – once the data & analytics platform foundation is complete, an extension will be developed as new tools are delivered. *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	n/a	• See D1.4.1 Data and analytics platform
D15.6.7 Outage planning Deeper Outage Planning go live in Offline Network Modelling - this will enable higher volumes of network data, regional models, and outage planning data to be exchanged, used, and shared by network companies. D15.6.7 Deeper Outage Planning go live in Offline Network Modelling enables higher volumes of network data, regional models, and outage planning data to be exchanged, used, and shared by network companies. *See also section 8, Table 2 technology investment '360 Offline network modelling'*	Not started	• We are on track to start this deliverable in Q4 2021/22 • We are developing the outline process and once complete, will start this activity • First deliverable is Q4 2021/22
A17 Transparency and Open Data		
D17.1 Open data portal with limited data sets Open data portal with limited data sets (go live 2019) This deliverable refers to the foundational data portal acting as a proof of concept for the RIIO-2 data portal which will be powered by the Data and analytics platform and utilise the user interface of the Digital engagement platform. *See also section 8, Table 2 technology investment '220 Data and analytics platform'*	On track	• 2019 foundational portal launch complete • Enduring solution will be delivered by the data and analytics platform • See D1.4.1 Data and analytics platform
D17.2 All published data in machine readable format All published ESO data in machine readable format. *See also section 8, Table 2 technology investment '250 Digital engagement platform'*	On track	• We are on-plan for our Q2 2021/22 target for all ESO data to be published in a machine-readable format.

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8. Technology investments supporting digitalisation

8.1.   Figure 14 below shows the high-level timeline for the IT investments that support our activities and deliverables shown in Figure 13. There is a many-to-many relationship between the activities and the enabling IT investments. Given the importance of these enabling investments, we have provided a progress update in Table 2.
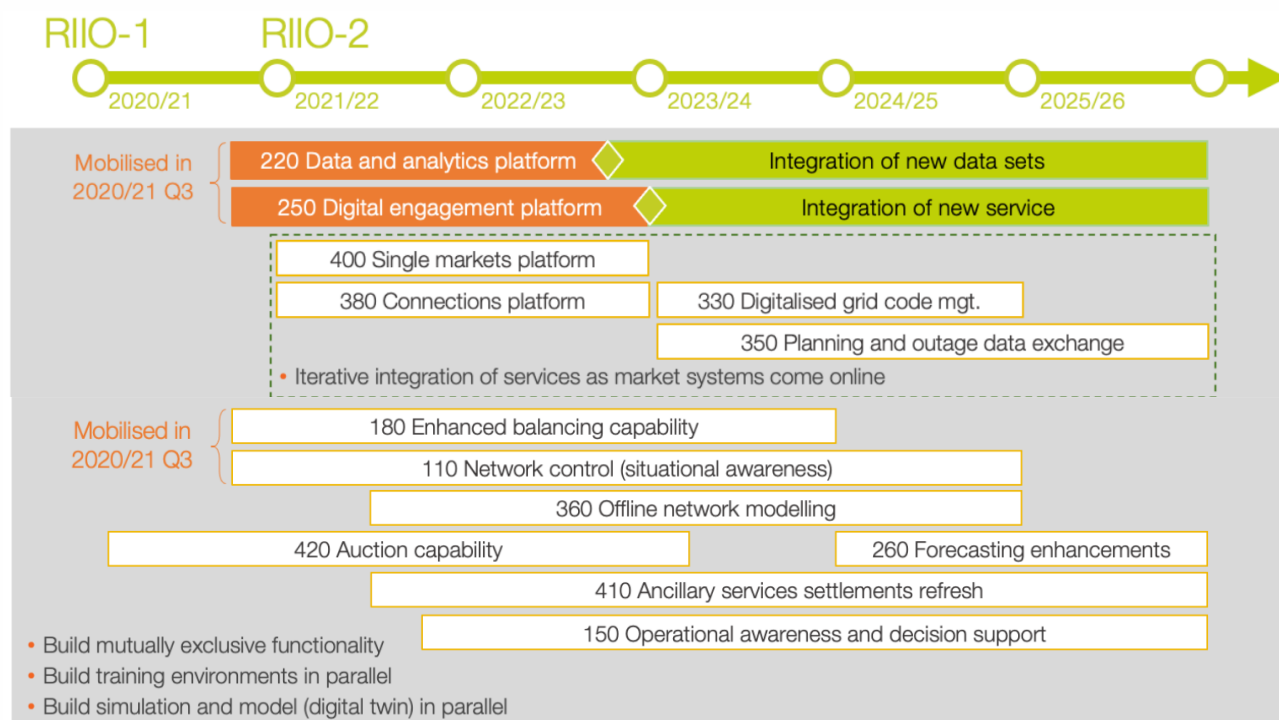

Figure 14 - technology investments supporting our digitalisation strategy

Table 2 - Technology investments underpinning our activities and deliverables

Technology investment	Status	Update
110 Network control (situational awareness) This investment will introduce new real-time situational awareness capability giving control centre operators a better understanding of changing network limitations, leading to a more efficient risk-based operation of the system. This capability will need new alarm management, modelling and visualisation tools. We will also deliver training simulation tools combined with artificial intelligence and digital twin technology relevant to this investment.	On-plan	• Strategy and technology approach documentation completed. • Completed invitation-to-tender process and started competitive dialogue with short listed suppliers. • Technical support contract extension agreed.
150 Operational awareness and decision support This investment will enhance our network modelling capabilities by giving online analysis of voltage and power flow profiles closer to real-time. This will ensure the network is run securely and data exchanges with TOs and DNO / DSOs are timely and correctly assessed.	On-plan	• 'Fault level analysis' and 'Look ahead forecasting' are being delivered as part of this project. These will deliver Network and Information Systems Directive (NISD) security alignment and improve the economical operation of the network, respectively. • Commercial discussions are underway with the supplier with a forecast completion date of December 2021.

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Technology investment	Status	Update
180 Enhanced balancing capability Our core balancing systems enable the real-time balancing of electricity supply and demand and are classed as critical national infrastructure (CNI). A major failure of these systems would result in widespread loss of supply, which would lead to economic and societal damage to the UK and put ESO's licence at risk. It is essential that we invest in our core balancing systems to manage the rapidly evolving electricity market. We will also deliver training simulation tools combined with artificial intelligence and digital twin technology relevant to this investment.	On track	• Initiated in April 2020 and mobilised in October 2020, the programme completed the Foundation phase in April 2021. • This delivered a problem statement, user experience principles, design thinking approach, customer journey, technology approach, and high-level module map of the solution. • By the end of Blueprint phase in October 2021, we plan to complete a detailed functional roadmap, end to end technology design, and a dispatch module prototype based on customer journeys. • Core system development sprints are planned to commence from November 2021.
220 Data and analytics platform This is foundational work to unlock the value of the data we hold. It will be the key technology underpinning all our internal and external data management, pulling together data from a variety of sources and ensuring there is only one source of the truth. This includes CNI and non-CNI data and analytics platforms as well as their associated integration platforms. Cloud-based data management and analytics are now universal and essential for modern data analysis approaches and even more so for artificial intelligence implementations. This investment will evolve ESO's traditional data management and analytics to the cloud. It is indispensable for much of the RIIO-2 change programme, including unlocking the value of our digital twin technology investments and hosting data from the asset register, fundamental for our single markets platform.	On track	• Strategy and technology project approach documentation completed. • Project team mobilised, including 3rd party resources, who will assist with design production. • ESO data strategy and conceptual solution architecture documented.
250 Digital engagement platform This investment, mentioned in the chapter 8, Digitalisation and open data unlocking zero carbon system operation and markets, will enable a single point of access for all ESO data and services, including the markets, connections, digitalised Grid Code management and data and analytics platform. It sits at the heart of our vision for digital capability across all our themes, providing a common engagement experience for stakeholders.	On track	• Initiated early April 2021, the programme is going through an enablement (start-up) phase to articulate its strategic vision, clarify scope, and choice of technology, so as to start the next phase of the programme in August 2021. • A procurement phase (request for proposal) may be required before design and development can commence if the technology is new to ESO. • Initial Foundation functionality is expected to be delivered by Q4 2022/23.
260 Forecasting enhancements Continuing with the investment made under RIIO-1, to enhance our mathematical forecasting models and refresh the forecasting system in line with our policies.	On track	• Development of national demand forecast models, process, and dashboard delivered a circa 20% improvement in accuracy. • In testing, development of grid supply point (GSP) net demand models delivered 36% improvement in forecasting accuracy versus the legacy energy forecasting system (EFS).
330 Digitalised grid code management Investment to transform the stakeholder experience of the code management process through artificial intelligence enabled navigation, and document and workflow management tools.	Not started	• Pre-project discovery phase started. • Technology investment timelines to be defined in D6.5 (see Table 1)
350 Planning and outage data exchange Enhancement of outage planning and data exchange systems to enable a whole system approach to access networks, manage significantly increased data volumes, and provide interactive stakeholder engagement.	Not started	• Project due to commence August 2021.

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Technology investment	Status	Update
360 Offline network modelling Transmission analysis is carried out from ten years ahead through to real-time and post event to help design and run the network as securely and economically as possible. The offline network modelling tools deliver the day-to-day analysis required to operate the transmission system in a safe and secure manner, as well as deliver the Electricity Ten Year Statement (ETYS) and ENTSO-E reporting	Not started	• Due to commence Q3 2021/22, following the upgrade to the offline transmission analysis tool.
380 Connections platform We propose building a customer connections hub, providing a single point of contact for connections to electricity networks that will guide customers through the connection process. The hub will advise customers of capacity opportunities on both the distribution and transmission networks.	On track	• Project initiated in May 2021. • High-level scope and plan for the initial phase agreed targeting a phase 1 delivery in March 2022. • The team is being mobilised to develop customer journeys and use cases and baseline the phase 1 backlog.
400 Single markets platform The single markets platform will provide a full end-to-end customer journey allowing market participants to access the data relating to how to become a provider (obligations, sign up, test, application progression), contract tender (see contracts status and manage contracts), unit management (see what units are registered for, see and change aggregation configurations), dispatch (access instructions), performance monitoring (see how units behaved under instructions), payment. This will include all ancillary service products plus EMR and CfD. This investment includes a market sandbox to enable faster and more efficient trial of new products through the ability to integrate with the core systems.	On track	• Project initiated early April 2021. • The programme is going through an enablement (start-up) phase to define its strategic vision, clarify scope, and choice of technology, so as to start the design and development phase of the programme by early September 2021. • Initial Foundation functionality is expected to be delivered by Q4 2021/22.
410 Ancillary services settlements refresh Replacement of, and ongoing investment in, the ancillary services settlement system, to manage the increased number of market participants and increasing rates of change	On track	• Mobilised in December 2020, the project is completing design and requirements phases • Following a competitive tender, the Oracle Market Settlement Management (MSM) product was selected to be used to replace the charging and billing system. • Creating one product roadmap and combined backlog will reduce overall costs and create opportunities for future efficiencies. • The Oracle MSM product will be established in July 2021 and the first release is planned for January 2022.
420 Auction capability We will invest in common auction capability and apply economies of scale for more efficient action-based procurement activities. This capability will be expandable to all types of auctions and allow for appropriate running frequency: EMR, CfD, reserve, response, reserve and response, reactive power. Where possible, efficiency benefits from auctions will also be implemented in tender- based service procurements.	On track	• Initiated in January 2021, the programme is now in a start-up phase. • A request for proposal (RFP) process will identify the supplier and technology to provide the Auction capability. • The requirements capture and overall procurement process is delayed to ensure high level requirements are confirmed, and the programme will now select a vendor in March 2022 and is aiming to deliver an early solution in Summer 2022.