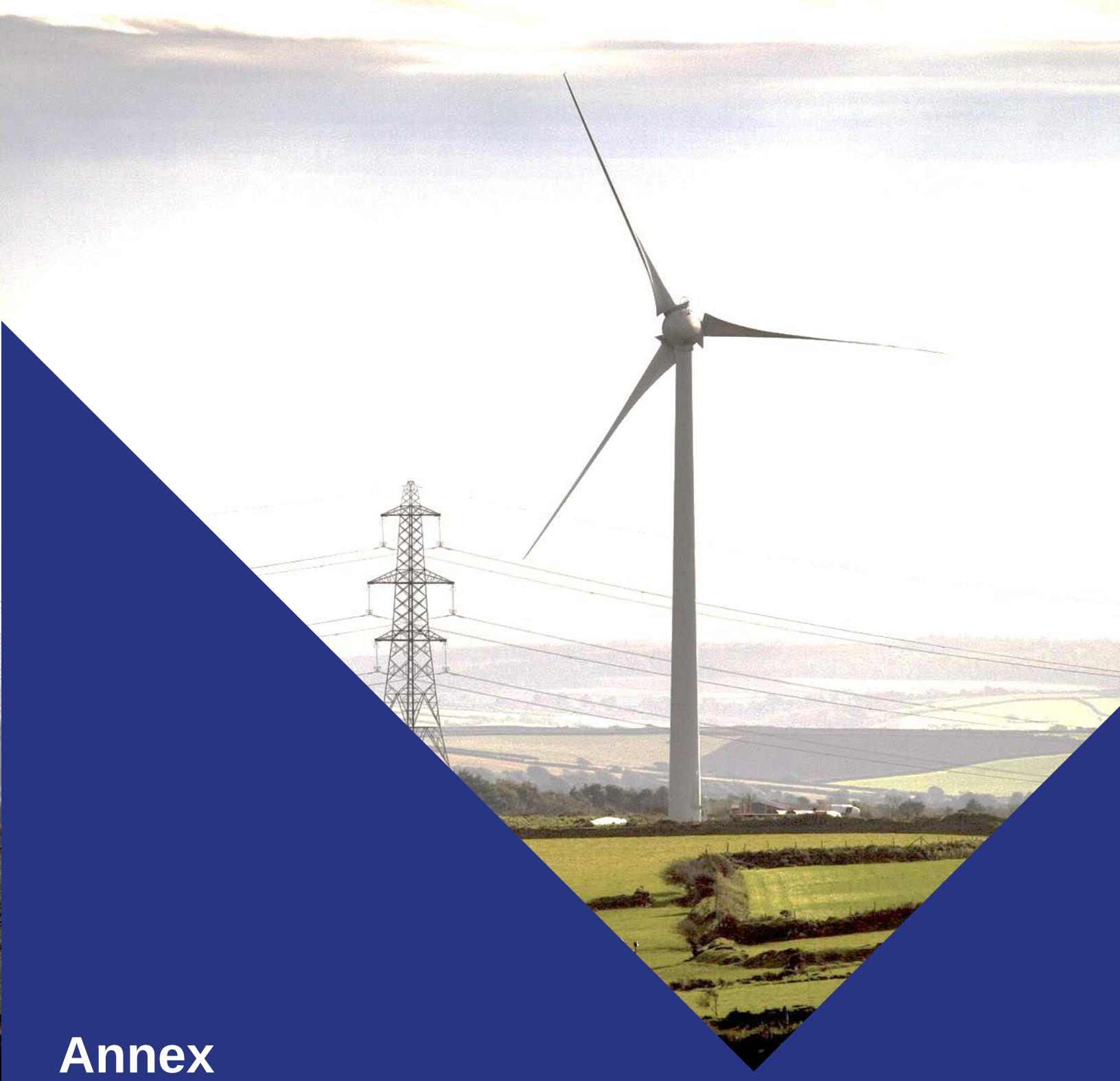


Annex
NGET A14.08 IT Strategy
December 2019

As a part of the NGET Business Plan Submission

nationalgrid

Information Technology

IT Strategic Direction

Contents

1 Foreword from CIO

Information Technology is a fundamental part of any organisation and National Grid is no different. Our department plays a vital role in ensuring that everyone gets access to the energy they need, when they need it. Our ability to safeguard that the lights remain on, through adverse weather, cyber threat, unforeseen incidents or business change is vital to delivering on the priorities of our stakeholders.

We have worked closely with each area of the business and supported the largest ever engagement exercise with our customers, stakeholders and consumers to create this draft plan. Our stakeholders and customers have told us they want safe, secure and reliable networks, efficient energy market operations and greater transparency of data; and above all, to be protected from external threat. It is clear that IT underpins the multitude of priorities across National Grid, and we are committed to continue improving the service we offer to our stakeholders as we move forward.

For the sake of clarity and completeness, our draft plan has been scrutinised by independent IT experts as well as by independent stakeholder groups across each area of the business. We are confident this approach has led to a well-justified and vetted plan.

These are exciting times for the energy industry and with technology changing faster than ever before, our organisation needs to constantly adapt and evolve to meet these new challenges. Our focus on digital capabilities is a critical enabler to achieving the vision for our company, its customers and all stakeholders.

To this end, I'm very pleased to introduce you to this draft version of our IT submission. We will continue to listen to your views ahead of our final submission in December and we will ensure that our people, data, processes and technology enable us to deliver on the priorities of our stakeholders.

2 Executive Summary

National Grid owns and maintains the high-voltage electricity and natural gas transmission networks in England and Wales. We move electricity and gas from where it's generated, through their respective systems, to our direct customers and to the distribution companies who deliver that power to homes and businesses.
We are building a business plan, led by our stakeholders' priorities, for the next RIIO regulatory period from 2021/22 to 2025/26. We will submit this to our regulator, Ofgem, later this year. Our primary aim is that this business plan meets the needs of our customers and stakeholders. That's why we have been carrying out an extensive programme of stakeholder engagement to listen to what our stakeholders want, so we can build a realistic plan collectively.
This paper specifically relates to our investments in IT over the RIIO T2 period and sits alongside several other documents that describe and evidence the rigour behind our proposed investments for the period as well as our alignment with our stakeholders' priorities and the broader needs of the business.

A strategy has been created to respond to the energy market, political and environmental trends and to cater for exponential growth in data volumes and transaction frequencies. We have also addressed an increased demand for the digitalisation of our business. This paper details the strategic pillars and foundations that will enable IT to deliver in the most cost-efficient manner whilst being able to scale the organization and technology to meet: fluctuations in demand; IT asset health; innovation needs; demand for new business models.
The elements include:

- Consolidation and exploitation of fewer strategic core platforms, applications and infrastructure services
- IT foundational capabilities including: Cloud and Data Centre Hosting; IT Networks; Compute and Data Storage Services; Communication and Collaboration services; Modern Workplace technology and services; IT Operation Services

- Transition to services being consumed in subscription-based models such as IaaS, PaaS, SaaS (Infrastructure, Platform and Software as a service) or cloud services.
- Optimised asset health policy such as an 'Evergreen' approach to maintaining current estate with refreshes prior to end of life / end of vendor support to minimize risk, complexity and cost.
- Greater collaboration, data exploitation, automation.
- Increase the use of machine learning to further improve efficiencies through self-learning automation
- Providing shared capabilities to support each entity and its business objectives in our IT Operating Model. This drives economies of scale through shared IT expertise and common enabling services leveraged in contracts with vendors and suppliers. Our Business Partnering model within IT will continue to deliver the flexibility to meet the unique and differentiating requirements of each business.

This document covers the overall IT strategy and operating model, leveraging economies of scale to deliver common needs with the flexibility to meet individual direct entity requirements for the following:

- IT Systems and capabilities that provide business services, e.g. Finance, Procurement, HR, Governance Regulatory and Compliance.
- IT Capabilities required to deliver direct entity investments:
    - Data Centres; IT Networks; Compute and Data Storage; Modern Workplace Technology and Services; Communication and Collaboration Services; IT Operational Technology and Services
    - Common platforms and capabilities required by entities direct investments
    - People and Organisation

The following are set out in detail in their respective theme papers.

- Detailed justification and financial information for direct IT investments for ET, ESO and Gas

3 Introduction

Through RIIO-T1, we have made significant progress in improving business performance through investments in technology. We have mobilised the field force through investment in work management applications and infrastructure that have enabled us to digitize key processes around the way we carry out and capture work. We have begun to understand the condition of our assets in a much more nuanced manner through investment in platforms that can capture accurate data enabling efficient day-to-day decision making based on the health of our assets. We have also continued to invest in the underlying health of our core systems so that we can continue to be world-class in managing our assets. We have transitioned from the role of being solely driven by business demand to an integral part of achieving business outcomes. The IT strategy has therefore become a fundamental component of the business strategy by providing 'enablers': which are reflected throughout this and our direct investment papers.

As illustrated in the diagram, the future role of IT within National Grid will be both an enabler for business strategy driving growth, future proofing our business and a driver of core performance delivering a safe, secure, reliable, and cost-efficient network. We recognise that the energy and technology environments are both changing, requiring us to invest in our core systems and IT infrastructure capabilities whilst continuing to explore opportunities to automate and digitize our business, provide a rich and immersive experience for our customer and stakeholder groups and innovate by exploiting new technologies. The aim of this document is to explain how we plan to make investments in our core functional systems and IT Infrastructure capabilities over the course of the RIIO-T2 period. These systems include all infrastructure and related security, our CNI capabilities, cross-organisational systems such as HR and Finance, IT systems used by IT to enable faster, more efficient planning, implementation and deployment of solutions for our lines of business. This document will detail how we are investing during the T1 period, discuss our plans across key investment areas for T2 and detail each investment we expect to make.

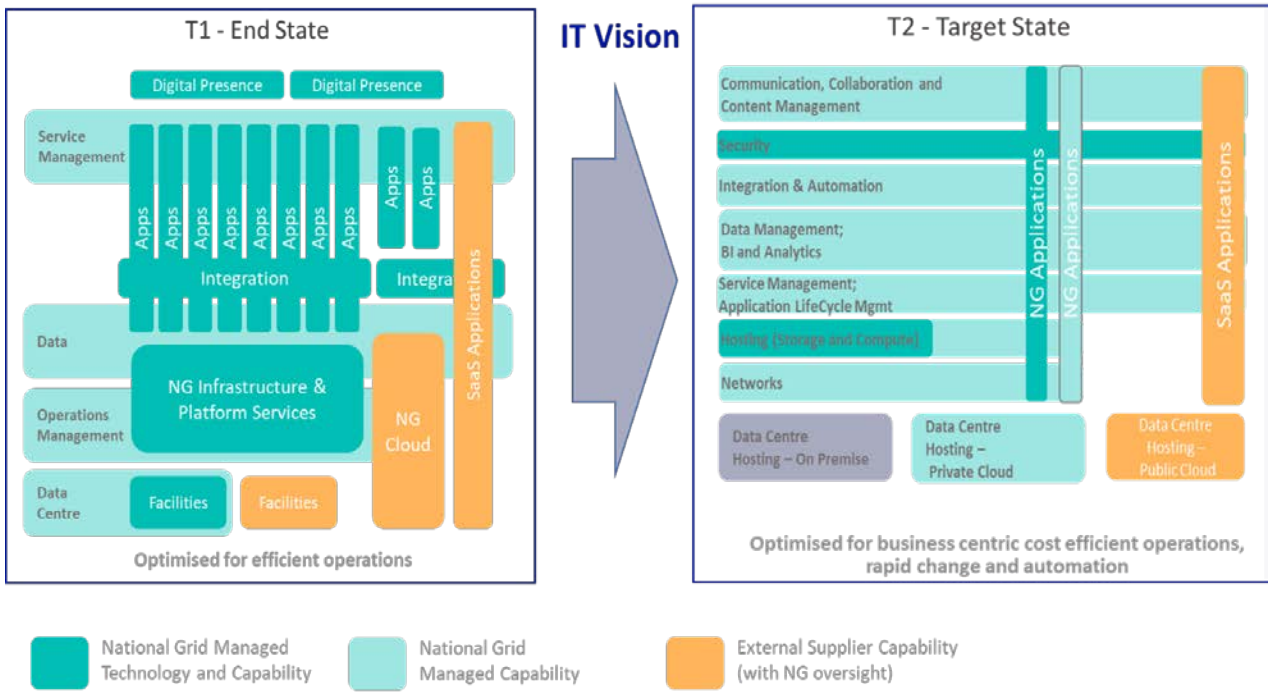
4 Vision for IT in T2 for National Grid

4.1 Introduction

The RIIO-T1 period has seen an increase in the rate of energy market change. To respond to this, we defined four IT Focus Areas in T1: Fix the Foundation, Address Reliability, Grow and Future Proof the Business, and Strengthen our Security. These formed the anchors for our strategic transformation of the IT function during the T1 period. In that period, we made significant progress on these themes by refocusing the roles and responsibilities of the IT leadership team, making changes to our partner ecosystem, restructuring the role of the business partner and further evolving our IT operating model. In addition, changes to Solution Delivery and Enterprise Architecture will further enhance the IT capabilities and improve our overall throughput of services.

We expect this rate of change to continue to increase throughout the RIIO-T2 regulatory period. This is being driven by numerous factors including consumer demand to maintain energy costs at acceptable levels, continued evolution of the UK energy landscape with numerous factors driving the way that we need to grow and change to continue providing the right services, increased competition, regulatory changes, cyber-threats and environmental imperatives such as decarbonization.

To respond to this pressure for change and deliver the outputs required in the next regulatory period we need to continue to evolve our current IT Infrastructure capabilities and core system solutions. This will support the National Grid entities in meeting these challenges while continuing to provide efficient services closely aligned to business demand. Our overall aim is to support and drive the National Grid 2030 objectives, acting as technology thought leaders focused on customers and end users as well as delivering reliable and secure IT services. The diagrams below show how the IT Landscape will develop over the T2 period to utilise common, consistent IT Capabilities, that can be utilised by NG owned and managed applications and Software as a Service (SaaS) solutions. Each of our business entities will leverage these IT Capabilities.



Appendix A includes a copy of our IT Capability model (Level1) for reference.

4.2 Key Pillars of the T2 Strategy

To achieve the vision set out in this document we have carefully: assessed the needs of our business units; extensively assessed the technology market through analyst benchmarking; tested the market through formal tender processes; and, leveraged our partners to define the key pillars of our strategy that will drive the correct capabilities to deliver the desired outcomes. The following table describes the key elements of our IT capabilities and the outcomes our target capability model will deliver.

Capability area	Outcome
People	The correct mix of retained knowledge, partners and commodity IT services and providers will deliver the most cost efficient and innovative workforce. There is a focus on strengthening our internal technical skills and owning our IP, and a need to strengthen our skills in the areas of: cloud, analytics, artificial intelligence, agile delivery methodologies, IoT and mobility tools, these Digital skills will enable us to effectively deliver Digital Platforms and approaches.
Process	Automation, agile methodologies, streamlined business process re-engineering, and end-to-end architecture will enable cost efficiency and complexity reduction.
Technology	Operating our IT Assets and Services at optimal capacity to achieve acceptable reliability, performance and security while growing and adopting new services quickly; leveraging current monitoring tools to maintain IT asset health and resilience.
Data	As set out in the Energy Data Taskforce report "A Strategy for a Modern Digitalised Energy System" [1] commissioned by the government and Ofgem, data will become an increasingly important asset over the next regulatory period. Access to secure, accurate, well-structured data will ensure optimum decision making, drive cost out of the energy network and provide greater value for the consumer. It will also be key to identifying new opportunities and business models

From this analysis and structure of our capabilities, we have identified five critical components to the successful delivery of our T2 vision.

Optimized Technology Health Policy

A change in our approach to technology health will drive cost out of the IT environment, improve cyber risk posture and improve productivity and employee engagement. A 2017 Gallup poll [2] found that actively disengaged employees cost the US between $483 billion and $505 billion in lost productivity each year excluding the cost of attrition estimated at around 6-9 months of salary, aging technology was cited as a key area of employee disengagement. A survey of 35,000 companies by Bitsight [3] also found that those companies running out of date software were 2 to 3 times more likely to experience a security breach. For some systems, moving from longer refresh cycles that drive change complexity in the landscape, to smaller incremental regular changes, will reduce the overall change complexity of systems and platforms, improve security and user experience. Reliability is also a key theme that underpins our business plans. We have a range of business processes, many of which require high integrity and high levels of IT system availability. In line with our identified key stakeholder priority to provide a safe and reliable supply

[1] A Strategy for a Modern Digitalised Energy System" https://es.catapult.org.uk/news/energy-data-taskforce-report/

[2] Gallup - State of the Global Workplace http://www.gallup.com/workplace/238079/state-global-workplace-2017.aspx?utm_source=link_wwwv9&utm_campaign=item_231668&utm_medium=copy

[3] Bitsight - A growing risk ignored. Critical updates https://info.bitsight.com/bitsight-insights-a-growing-risk-ignored-critical-updates

of energy, we intend to continue investing in the asset health of our CNI and operationally critical systems and data centres to ensure they are secure, reliable and well supported. To ensure reliability and resiliency of our gas and electric networks, we need to keep our systems current and up to date with supplier standards. This will ensure when incidents do occur, they can be rectified in a timely manner and that we support our cyber security aim by keeping our systems current and secure.

Common Platforms, Infrastructure and application rationalization

The IDC market forecast for Public Cloud services[4] stated that public cloud will be the primary route to IT innovation in 2023. Leveraging this and targeting skills and resources to fewer providers and platforms will provide the necessary focus to reduce costs and increase innovation. Investment across our IT Infrastructure Capabilities are required to exploit and manage these service models efficiently. Our technology and application landscape contain some complexity and duplication, rationalising the landscape and associated infrastructure capabilities through governance, consolidation and decommissioning will also drive additional efficiency. Several critical applications and Infrastructure capabilities are reaching end of life and are impacting the organization though high operational costs (e.g. cost to make changes) and intense manual processing, resulting in higher risk of errors and system outages. To keep our costs under control, it will be critical to consolidate our application and infrastructure capabilities portfolio. Focusing on fewer strategic partners and platform ecosystems will reduce overlap and reduce cost.

Group Strategy Alignment

As our organization spans both the UK and US we have defined a group wide strategy that covers all businesses in all regions, this enables us to leverage economies of scale and consistent processes to both drive out cost and leverage best practice and innovation across all business entities. With the implementation of our IT operating model, we have put in place highly capable Business Partners who can work collaboratively with our business stakeholders to set strategic IT roadmaps that balance our existing IT landscape with new technologies that we can leverage across our businesses.

We also recently established a new “enterprise architecture” team that defines best practices, standard tools, processes and architectural roadmaps of existing systems. These maps help the Business Partners navigate the integration of new capabilities clearly and with reduced mis-steps into an existing landscape of systems.

The expansion of ngDigital Labs, gives us the opportunity to quickly trial new technologies and processes and then scale the most promising candidates and the formation of National Grid Partners has created a new window into understanding advances in the technology and Energy start-up communities.

A key cultural change in the IT organization has also established a clear focus on the end user. Historically, we have led with technology delivery which created situations where we introduced changes that resolved technical issues and risks but negatively impacted the end user. Keeping our commitments is a key cornerstone of how we expect IT to act going forward. Outwardly, this will be exhibited through our focus on the end user in reliably delivering solutions and services on-time, within budget and with agreed quality. To address this for our business and customers during T1 we invested in our customer management platforms and capabilities across the group enabling our business entities to deliver up to date information to customers to improve decision making, we will continue to build this throughout the next regulatory period making more information available and further improving the speed and accuracy of decision making for customers. Internally, this will drive accountability across our operating model ensuring that each part of the IT organization is accountable for the services they provide and ensures that our front-line staff are fully supported in delivery to the end user.

With the increasing threats to our business a core tenet of IT must be: remaining secure and compliant. Cyber and

[4] IDC Market forecast for worldwide and regional public cloud service 2019 to 2023 - https://www.idc.com/getdoc.jsp?containerId=US44202119&pageType=PRINTFRIENDLY

physical security remain at the top of our agenda as does remaining compliant with the various regulations governing how we run our business and manage the energy network. Operating as a group we can leverage best practice across the organization ensuring we meet, and where appropriate exceed the standard required.

IT Business Management Transformation

To balance efficiency and the need for rapid change we will continue to invest in the people, tools and processes needed to execute and manage IT optimally and continue to move services to the cloud where appropriate. An IDC study[5] found that many IT foundational and operational services that were once delivered by internal IT or partners are moving to cloud service providers, this shift has created the need for an entirely new set of IT Technical skills, IT digital shared services and management processes. Gartner 2019 IT predicts[6] has cited IT automation as driving many benefits around efficiency, addressing talent shortages and enabling the delivery of data. To ensure we are leveraging these benefits we are focusing on the following areas. Firstly, establishing cloud aware cost transparency for all IT cost across the business will enable accurate decision-making. Secondly, we will invest in tools, automation and streamline our processes so that the IT estate can be managed as cost efficiently as possible. Lastly, we have created parts of the IT organization that give us the ability to rapidly prototype new, innovative technologies and approaches. We have aligned these to our governance structures for all IT decision making to ensure we can introduce them into our architecture in the most cost-efficient manner and have clear visibility of their wider impact if transformation of the existing architecture is required. IT will have a keen focus on opportunities to extend existing platform eco-systems whilst looking for opportunities to reduce redundancy in applications providing "like" capabilities. In addition, application and technology rationalisation and modernization remain a focus of the organization to increase cost savings whilst ensuring technology currency. It is expected that we will need to work with HR to continue to upskill the workforce with focus on areas such as: cloud configuration, cloud security and management; creative problems solving; artificial intelligence; business process automation; data management; and, multi-discipline skilled individuals. To enable this, our proposed YouConnect upgrade / refresh will review and potentially re-tender during the T2 period.

Technology Risk

Technology failures, data losses and other incidents are increasingly in the news and National Grid has a significant responsibility for managing the risk associated with its use of Technology and to demonstrate and enable customer trust. As National Grid embrace digital and other opportunities, this needs to be matched by investments in assessing, managing, mitigating and monitoring the associated risks. National Grid cannot afford to be complacent and considers the impact of Technology Risk an integral and fundamental part of the T2 plan.

National Grid sees technology sitting at the centre of the value chain and its core operations. The fact that technology is at the heart of everything we do, makes it all the more crucial for National Grid to understand the risks associated with IT – first their cause, but just as importantly, how they can be managed, mitigated or avoided.

National Grid on a day to day basis, face risks that impact our environment, be it with systems, processes, people, governance or projects. These are operational risks and we must have appropriate controls that are designed and operate successfully to holistically manage those risks. In IT we have grouped Technology operational risk into **seven** key risk categories, each with an IT Leadership owner, and a set of controls:

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[5] IDC Study - KPIs for a Cloud-Based Shared IT Services Organization - https://www.idc.com/getdoc.jsp?containerId=US44243818
IDC Research Findings: CIOs Identify IT's Operational Strategies for 2018 and Beyond - https://www.idc.com/getdoc.jsp?containerId=US43292219&pageType=PRINTFRIENDLY

[6] Summary of the Gardner 2019 Predicts papers by Advansys - https://info.advsyscon.com/it-automation-blog/gartner-it-automation-2019

1. Cyber Security
2. Physical Security
3. IT Operations & Performance Management
4. IT Resilience
5. Supply Chain
6. Data Management
7. Program Delivery

Underpinning these risk categories are the specific regulatory obligations that we need to remain compliant of; for example, SOx, GDPR & NIS-D.

We also manage Strategic risks to manage the risk of failing to achieve National Grid's overall strategic business plans and objectives. For IT this covers IT Strategy, Talent & Retention, Emergency Technology Adoption, Asset Health & IT in Mergers & Acquisitions.

4.3 Technology focus areas

We recognise that both customers and consumers see digital disruption as instrumental in National Grid transforming into the 'utility of the future' and this is clearly called out in our T2 submission papers. The future grid will be a communications-enabled network, able to increasingly act as a balancing entity, seamlessly managing two-way power flows and / or gas flows, complex demand management/ response, and asset health that dramatically reduces asset intensity and operating costs while increasing reliability. The utility will be a digitally enabled organisation that will provide fully automated and integrated services, predictive analytics, and forecasting, and will use robotics and other forms of automation to minimize manual intervention and optimize effectiveness. The realisation of intelligent grids, interconnected assets and enriched system information will drive operational efficiencies, produce a reduction of carbon footprint and provide consumers with more options regarding what energy they consume and how they consume it. To enable our business entities to realise these benefits IT will drive and support business objectives to

- Increase customer engagement through digitisation
- Increase command and control of grid operations,
- Mobilise our field force
- Leverage new and existing sources of data both to determine asset health as well as offer consumer's choice.

To support this our digital programme, established during the T1 period, will continue into T2. This programme is intended to go beyond digitalising our internal processes and the application of new digital technologies (e.g. AI, Machine Learning, Edge Computing, Cloud, etc.) to truly digitally transform National Grid through support in defining our digital ambition, recognising and implementing structural and cultural changes (such as agile working) and providing technology leadership to all business areas.

Our intention is to ensure that all the services that are used across the National Grid business areas are absolutely aligned to business need, drive innovation, efficiency and represent excellent value. The size of our portfolio means that we need to continuously assess the market, understand how both our employees and our customers want to interact with us and provide the right IT and Digital services and applications to support that. Having assessed business demand and technology trends during T1 and reviewed the business strategies and ambitions for T2, we have prioritised the following technology focus areas.

End User
The Y & Z generation have grown up in a connected, collaborative and mobile world and will account for over half the workforce before the end of the RIIO T2 period. This change in workforce balance will redefine corporate culture and expectations of work. These changes in demographics and user expectations are also reflected within our customers, suppliers and other external stakeholders. Our systems will need interfaces and accessibility to support flexible working, diversity, a more open and social approach to collaboration and simplified processes with richer management information. Ensuring our workforce have access to the technology and information needed through useable, familiar interfaces is a key enabler for addressing workforce resilience.

Customer
During T1 we defined our customer experience strategy and redefined our customer ambition, developed a multi-year roadmap based on maps of our customer journeys and are following an agile delivery approach to ensure we focus on those activities that deliver the most value to customers and our business. These are delivered in sprints to realise benefits quickly and maintain momentum. We started our investment in customer relationship management systems in T1 and will continue to invest during T2 to ensure we have platforms and solutions that meet business ambitions, provide engaging customer experience and services driven by customer demand and ensure value delivery.

Data
IDC's "Data Age 2025" whitepaper predicts that data will grow by 61% to 2025 with as much data stored in the cloud as on premise. This coupled with the increasingly important role data will play in the energy sector as set out in the Energy Data Taskforce report "A Strategy for a Modern Digitalised Energy System", emphasises the increasing importance of being able to use, store and manage data more efficiently and effectively providing the right insights at the right time both to our lines of business as we ensure we provide the most enabling, cost effective data services we will build common data platforms and data management processes that support all business entities. As an architecture principle we will leverage existing data repositories within each of our approved platforms and only move data when it needs to be enriched to provide additional proactive and predictive analytics.

Hosting (National Grid Hosting, Cloud and Software-as-a-Service (SaaS))
Data Centres that host National Grid data and provide compute power to run IT applications. This includes the management of infrastructure in On-Premise Data Centres, externally Hosted Data Centres and Hybrid Cloud environments. We will provide effective, fit for purpose capability across On-Premise, Private Cloud and Software as a Service models driven by the characteristics (such as Performance; Security; Availability; Bespoke; Pre-Built) of the applications required. We will adopt designs and models that have been proven to deliver the outcomes we require, including reduction in old technology constraints; accelerated delivery of change; best in class security compliance. We will embark on an infrastructure and application architectural roadmap review to ensure optimal decisions are made from an end-to-end and bespoke perspective.

Integration
Our systems and services constantly communicate with each other and with the systems and services of other organisations. As we anticipate an increasing mix of on premise and cloud services (such as Private cloud, leveraging PaaS connectors and Software as a Service) our system integration capabilities, across internal and external systems, will need to improve and reflect the external standards for communication methods adopted by industry and third parties (Application Programming Interfaces – API's). This will include secure edge gateways for these APIs to ensure protection of National Grid and customer data. Our focus will be to leverage Real Time data integration as appropriate in a secure manner.

IT Management & automation
As our businesses transform their capabilities through the RIIO T2 period there will be an increase in IT Programmes and Projects underpinning the outcomes and customer values we plan to deliver. Our IT operating model and our IT capabilities are already undergoing transformation to enable delivery of business initiatives in new ways, such as adopting 'Agile' methods and exploiting platforms though the use of configuration. We

recognise that wider adoption of these initiatives requires central tooling and automation to ensure that the transformation initiatives demonstrate consistency of investments, traceability of investments to business outcomes and customer value, consistency across design, consistency and transparency across governance and decision making and efficiency in programme and project teams. We will look for opportunities to leverage APIs for data feeds of real-time and near real-time system information. We have a significant opportunity to apply automation and perform rich diagnostics on our systems with a focus on better reliability and up-time of our systems.

4.4 Our IT operating model and culture

We are changing the National Grid IT organisation from being an order taker and service delivery organisation to a key partner with the business in developing strategies to address the most pressing business needs. This has resulted in us reskilling our IT workforce to become more customer and business focused, while also changing our engagement model with our suppliers, and building relationships with start-ups and academic partners to be able to leverage the latest technologies.

Throughout the remainder of the T1 period and the T2 period, IT will be positioned as the technology thought leader, bringing innovative ideas on how to apply technology to the business, collaboratively working with our stakeholders to conceive new business models and ways of working.

To fulfil this mission, IT will need to further transform our approach to our business and the wider industry. With the implementation of the IT operating model, we have put in place highly capable business partners who can work collaboratively with our business stakeholders to set IT roadmaps balancing the needs of the existing IT landscape with innovative technologies that can be leveraged across our businesses.

Business capabilities are at the core of defining what must be done to achieve the enterprise strategy; their simplicity and stability make them especially effective at communicating actions in the value chain that are essential to achieving competitive advantage and business success. To achieve this, we are proposing the development of an Enterprise Strategic Planning Office with Business Architecture as a core deliverable of this office under the UK Transformation Office. Technology Architecture will play a part in this office by providing IT Strategies aligned to Corporate Strategies and Business Transformation. Together Business architecture and Technology architecture will mature our Enterprise Architecture posture

The expansion of ngDigital Labs, gives us the opportunity to quickly trial innovative technologies and processes and then scale the most promising candidates and the formation of National Grid Partners has created a new window into understanding advances in the IT and Energy start-up communities.

A key cultural change for the IT organisation will be establishing clear focus on the end user. Historically we have led with technology which has created situations where we have introduced changes that have resolved technical issues and risks but have negatively impacted the end user. We have listened to feedback from our

employee opinion survey and have implemented ‘Enablement’ initiatives to address identified issues, this will continue and be expanded during T2.

Keeping our commitments is a key cornerstone how we expect IT to act going forward. Outwardly, this will be exhibited through our focus on the end user in reliably delivering solutions and services. Internally, this will drive accountability across our operating model ensuring that each part of the IT organisation is accountable for the services they provide and ensures that our front-line staff are fully supported in delivery to the end user.

5 IT Themes and Drivers

The IT provision in National Grid is constantly evolving to support delivery of the priorities set by our stakeholders. Our mission is to be technology thought leaders focused on the end user, delivering reliable and secure services and solutions, which we deliver through 4 key focus areas:

1. Technology Thought Leadership
2. End User Focus
3. Delivering on our Commitments
4. Remaining secure and compliant

Delivering these commitments to our colleagues across the UK businesses around electricity and gas transmission and system operations means that we must focus on both cross-business functionality (such as core financial and HR systems) as well as more specific capabilities for individual business areas. To ensure that we are robust and consistent in making good decisions around technology and exploring opportunities to both drive efficiency and exploit new technology capabilities we have derived a set of principles:

5.1 IT Outcomes which set the Guiding Principles

Our IT outcomes are driven by our business goals and objectives; our experience of building and operating IT across our businesses; the wide range of expertise our partners provide and are guided by the principles defined below.

- Customer value and benefits aligned to all investments
- Projects will be justified with business cases including total cost of ownership and business benefit
- IT will build for today's needs as well as innovate for the future
- End user experience as well as cost will be at the forefront of IT designs
- Leverage out of box over proprietary solutions
- Re-Use existing platforms before buying new or building unless a strategic advantage can be gained
- Use open standards over proprietary solutions
- Be conscious of vendor lock in
- Leverage cloud technologies where possible versus on premise data centres
- Design for operations keeping security, scalability and disaster recovery at front of mind
- Information is an asset which is fundamental to the efficient and effective delivery of IT services

The guiding principles influence our outcomes and focus areas to help us ensure that we are investing in the right areas and driving IT forward in the critical areas that will help drive the National Grid business and openly support delivery of the key stakeholder priorities. The key drivers of IT investment to achieve these outcomes are: Providing the right platforms; Targeted innovation; Security:

Providing the right platform

- Hybrid co-location (Data centres and cloud); software-defined networks; Compute and Storage
- Integration and Automation
- Communication and Collaboration
- Applications and application monitoring
- Transformation Tooling
- IT Operation Monitoring and Management
- End User test tools and test environments

- User Experience tooling that can be leveraged on any device at any time

Targeted Innovation

- Automating and optimising processes and outputs to drive performance using digital tools
- Optimising field force performance using digital tools
- Digital inspections, and intervention planning, using digital solutions
- Automating and optimising network performance and planning using data-driven tools and processes
- Establishing a digital end-to-end customer / stakeholder journey
- Creation of new digitally enabled revenue pools and scale new, insights-based business activities
- Horizon scanning to piloting to programmes
- Need to support and drive the business to identify, understand and make effective use to new technologies to deliver efficiency and increase the value to both customers and consumers
- Integration of IT and OT data for analytics and insights.
- Continuous Integration Continuous Delivery

Security

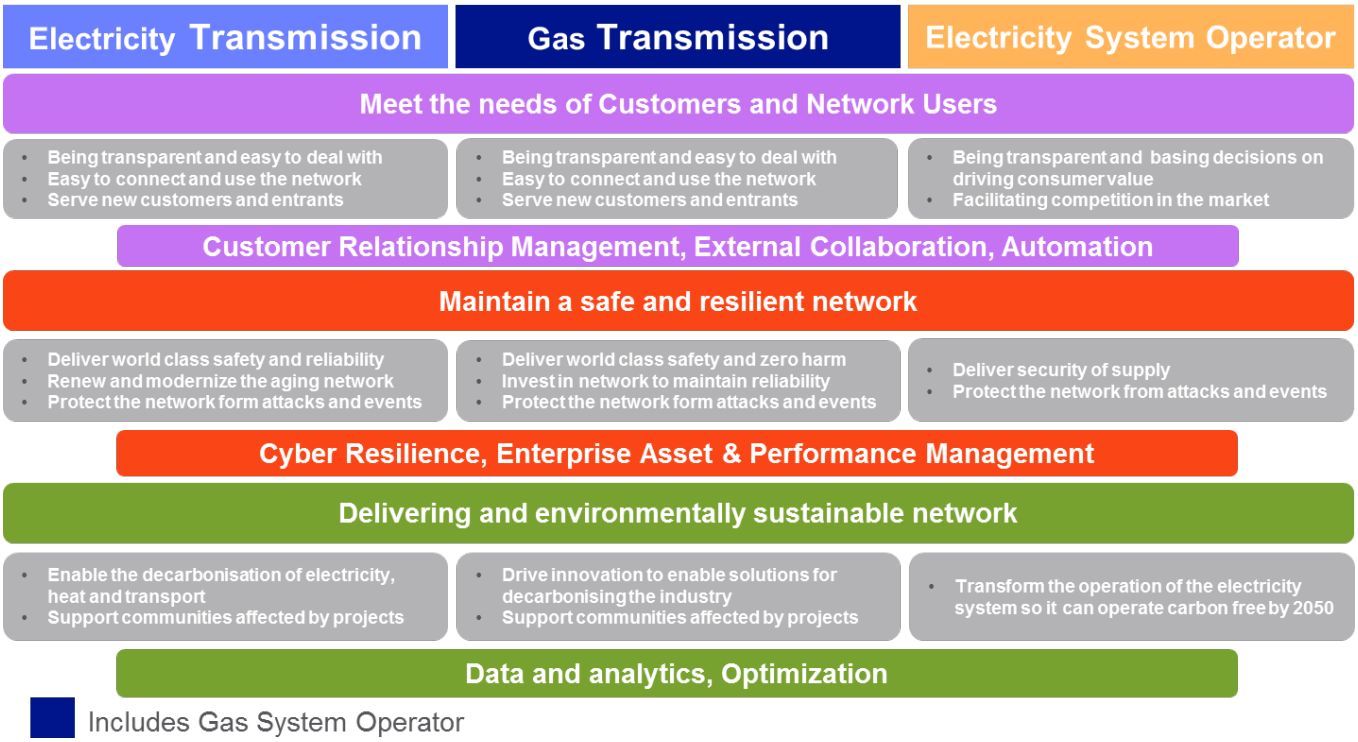
- Improvements across cyber governance and agile funding to enable swift reaction to evolving threats, minimising response times and increasing cyber resilience.
- Improve and simplify identity management across the enterprise for internal and external users.
- Strengthen endpoints (e.g. PCs, mobile devices, and OT) against attack, increase visibility of anomalous endpoint activity, and ensure only known devices are authorised to access the network
- Improved monitoring and discovery across data centres, networks and PCs.
- Implement greater network segmentation, continuing to build upon defence-in depth to improve redundancy and resiliency of networks
- Ensure energy and core business services that National Grid depends on to supply energy are adequately protected from disruption and compromise from cyber threats
- Improve cyber security culture and awareness across the enterprise
- Provide support to business operations and functions by understanding threats to better assess risk; balance benefits and costs of security controls against these risks
- Security assurance must be formalized and driven by the business
- Continue to build out and mature our NIS (Network Information and Security) controls

6 Strategic IT Investments for the RIIO-2 period: Direct Investments

As an IT organisation, we support the UK business in responding to the changes in the energy industry and meeting its Customer's needs. Our focus on technology is a critical enabler to achieving the vision for the company and although each entity has different priorities there are common themes that allow us to offer infrastructure and services efficiently across the business.

Both Electricity Transmission and Gas Transmission's priority is to maintain a safe and resilient network, meet the needs of customers and network users and deliver an environmentally sustainable network. In ESO, their priorities are similar in ensuring a reliable, secure system operation to deliver electricity when consumers need it, transforming participation in smart and sustainable markets, unlocking consumer value through competition and driving towards a sustainable whole energy future.

Our strategy is to provide common platforms and capabilities that underpin those priorities whilst partnering with each entity to deliver the specific needs of them and their customers.



6.1 Exploiting Common Platforms

Through our engagement on the development of our business strategies and submissions for RIIO 2, we have identified a consistent set of capabilities and use cases that can be addressed using shared IT solutions.

We recognise these shared solutions as 'Platforms' that will create efficient, consistent delivery of business capability, and create an opportunity to consolidate individual application solutions. The consolidation of specific application solutions onto platforms will drive cost reductions and promote the use of consistent repeatable services.

Through RIIO T1 we invested in 'Platforms' to deliver business capabilities. These platforms have established common

capabilities for areas such as Customer Relationship Management, Transmission Asset Management, Gas System Operation ERP Shared Services IT Process and Operations and Office Productivity and Collaboration with vendors such as Salesforce, ABB, SAP, Microsoft and ServiceNow.

We intend to reuse and extend these platforms though RIIO T2 introducing additional platforms to meet Business strategy, including Data Insights and Analytics, External Customer and Stakeholder Collaboration and IT Tooling.

A summary of the key RIIO T2 business initiatives is outlined below:

Data, Insights and Analytics

Our data platform includes several key capabilities that enable us to ingest, store and manipulate data and transform this in to information and meaningful insight that drive the decisions our organization needs to make. The structure of this data platform was built in T1 and we will continue to invest in a common platform for these services to ensure we are providing the most cost effective way of generating insights to support the decision-making of the organization.

For the storage of data, we have built out common repositories for structured data in the T1 period and will continue to build this out to include additional data types such as unstructured and time series data using traditional and more progressive database management technologies. To improve the insights to our customers and business stakeholders we will continue to build our capabilities to ingest and align more data sources and data. For data ingestion and transformation, we will enhance our existing capabilities for batch and real time integration, for alignment of data across disparate sources we will add mastering capabilities to our existing data governance tools and processes.

Analytics is the interpretation, analysis and communication of meaningful patterns in data. We propose to invest in our capability to apply analytics to business data-sets to describe, predict, and improve business performance and support business decision making. This will provide the foundation data-sets on which Artificial Intelligence (AI) can be built. An example of this is where we plan to increase the usage of analytics to have greater understanding of our workforce planning, procurement activities and in Governance Risk and Compliance (GRC) related activities. This will also support a strategic tool across multiple assurance providers within NG to meet the BMS assurance standard. This co-ordinates assurance across the organisation by standardising assurance methodology and reporting at the common touchpoints of risks, controls, finding ratings and remediation plans.

Automation

We will continue to invest in digital capabilities and solutions to automate and standardise our processes leveraging Robotic Process Automation (RPA), Machine Learning (ML) and Natural Language Processing (NLP). This will reduce the time taken to complete routine activities and drive higher and consistent quality of response to customers. We continue to look for the reduction in human hand-offs via leveraging workflow automation within our ecosystem of platforms including ServiceNow.

External Customer and Stakeholder Collaboration

Our T1 investment in a customer and relationship management (CRM) platform is the foundation we will build on to enhance and extend the customer and engagement ambitions across our businesses. Priorities will be the delivery of capabilities to enhance workflow between external and internal parties, for example ‘Connections Processes’; Enhanced Content management that is contextual based for relevancy and the use of digital capabilities to automate routine processes.

Artificial Intelligence (AI)

Artificial Intelligence is the concept of technology being able to think and learn. Several key technology trends are driving the advancement of AI which in turn are enabling technology to complete previously human tasks.

Key technology trends driving AI advancement and adoption are big data, machine and deep learning, natural language processing and sensory feedback.

In the short-term adoption of robotics and basic automation, particularly of data entry or low cognitive activities, will grow just to remain competitively efficient. We are already seeing the successful adoption of RPA in Business Services and we plan to invest to expand this usage. In the medium term, artificial intelligence will become more capable, becoming embedded in our systems and services. The cognitive and conversational capabilities that were too difficult to address or commercially unviable will no longer be out-of-reach and we intend to be well-positioned to make use of these as they become available.

Robotic Process Automation

We have invested in Robotic process automation technologies during the T1 period and we expect to extend this use throughout T2. We will determine an approach to ensure Enterprise worthy RPA development mandating secure execution environments for these technologies given the elevated levels of security needed by the technology when executing processes by introducing physical as well as logical security controls to these environments. We will ensure security by enabling Digital Worker identities that are configured within our Identity Access and Management systems no different than those of our employees. To further ensure security with will monitor Digital Worker system access and actions.

Robotics

As we introduce larger data sets and advanced machine learning we will expand the use of robotics to further areas than the basic use cases currently fulfilled by RPA.

Natural Language Processing

The introduction of natural language to our systems and digital channels will enable more cost-effective interactions with both customers and end users

Full AI solutions

Combining all elements of AI will ultimately enable us to implement further levels of automations into the operation of the transmission network. AI provides us with the ability to self-learn and recommend process and data improvements at scale.

7 Strategic IT Investments for the RIIO-2 period: Indirect Investments

The preceding sections describe the strategies and direct investments required by each entity. All business applications are dependent on common capabilities such as computing infrastructure which we manage as shared capabilities to leverage economies of scale. IT infrastructure is critical to National Grid's ability to run its day-to-day operations, while simultaneously supporting an environment conducive to innovation and the adoption of new technology. There are specific investments to maintain and extend these infrastructure services in line with business needs, and whilst the delivery, management and maintenance of these infrastructure services are considered separate to the direct business drivers, it is important to recognise that they are an integral part of IT delivery and foundational for building business capabilities.

We have linked our core indirect IT investments into the following IT categories to help understand and assess the proposed investments in the right context. The main categories are:

- **Business Services:** the common HR, Finance, Procurement, GRC and other business services used by all entities.
- **Hosting**: Data Centres that host National Grid data and provide compute power to run all IT applications. This includes the management of infrastructure in On-Premise Data Centres, externally Hosted Data Centres and Hybrid Cloud environments with the associated Operations Management tools, practices and processes (covering areas such as IT Service management; IT Asset Management; Helpdesk)
- **Networks:** National Grid's network is used to securely and efficiently connects our business users to internally and externally hosted systems, data and tools required to meet their objectives. The networks provide Wide Area Network (WAN), Local Area Network (LAN), Wireless (Wi-Fi) and Voice services.
- **Modern Workplace:** User facing devices, communication and collaboration services included within the indirect category are other enabling capabilities such as IT-for-IT tools for:
    - IT planning and delivery which includes investment planning, demand management, resource management, financial tracking and benefits management
    - Enterprise Architecture tooling leveraged to maintain application and technology rationalization and modernization and catalogues of principles, patterns and policies of our platforms, applications, security, data and infrastructure landscapes.
    - solution design and build, test and deployment tools
    - application performance monitoring, management and testing services
    - software licensing & asset management to optimise provisioning and de-provisioning of services to end users

Security, including the protection of our Critical National Infrastructure (CNI) assets are covered within a separate section.

We aim to provide effective infrastructure that supports the business in delivering greater value to customers with faster and smarter technology, ultimately gaining efficiencies for longer-term cost savings and service delivery advancement.

7.1 ERP and other Back Office systems

National Grid aims to provide efficient back office services which cost effectively enable the workforce and streamline how we work with suppliers. During RIIO-T1 we focused on modernising our core foundational technology platforms that would allow the efficient delivery of common business services across the UK functional entities. Our ERP suite is at the heart of our systems strategy in this area. We have now established our core ERP services on SAP S/4HANA, our Employee services on SAP SuccessFactors and our Service Desks function on ServiceNow. We have also consolidated all risk functions on to a single GRC platform (RSA Archer).
This strategy has met the immediate needs and efficiency improvements, but also provided the required foundations for continued growth. We will continue to modernise and integrate our SaaS systems for the most efficient and effective business outcomes. During RIIO T2 we look to continue investment to fully exploit these platforms as well as maintain to keep them current not just at the application layer, but at the infrastructure layer. This will require smaller and more frequent upgrades to our platforms that are dictated by the software and hardware providers.

There will be increasingly new ways for National Grid to work with its customers, drive innovation within the business, unlock more human potential and leverage new opportunities to harness data insights. National Grid plans to exploit and unlock the new functionality to further increase our efficiency in serving our customers and stakeholders, whilst maintaining a secure and controlled eco-system. This will deliver continued efficiency improvements as well as strengthening governance, risk and compliance controls.

Our core platforms are supplemented by other systems providing specialist capabilities in areas like Legal, Taxation reporting and Health, Safety and Sustainability where again our approach is to exploit and maintain existing solutions, leveraging core platforms wherever appropriate. Annex A14.15 Business Services, covers the detailed justification for the investments in these systems.

IT will engage our business areas to identify opportunities to leverage and reuse applications and technologies that we have made significant investments in. These include:

- SAP - HR, Finance
- Sales Force – Customer Engagement, Workforce Management
- ABB / IBM – Asset Management
- Esri – Geo Spatial
- Service Now – Workflow, Ticketing
- Microsoft – Modern Workplace Suite
- Microsoft – Azure Cloud

7.2 Governance, Risk and Compliance

Our Governance, Risk and Compliance platform remains an important foundation to all activities. Our GRC platform supports Sarbanes Oxley (SOX) compliance as well as multiple other legal compliance, assurance and compliance needs. GRC capabilities are also at the heart of our S/4HANA and SAP systems. We continue to extend this system to improve controls and efficiency. We have identified further manual GRC processes still in place and opportunities for further efficiencies in managing our compliance requirements such as SOX Controls through net new IGA (Identity Governance and Administration) solutions. This has been supported by external audit findings that have identified revised group-wide GRC processes and data alignment. The system is also due for replacement in 2023 to maintain vendor support, adopt latest best practice functionality and as part of our standard refresh cycles.

7.3 Modern Workspace (End User Computing)

The continual development of our Modern Workspace for end users will focus on the themes below throughout the T2 period, to provide our employees with the capabilities and tools required to support delivery of the business strategies:

- Modern Workspace End User Devices – Ongoing program of work to maintain currency and performance of end user devices and associated services
- Unified Communication and Collaboration – ongoing program to support efficient employee collaboration and communication
- Customer End User experience – ongoing program of training and education to ensure maximum value is driven from employee productivity tools
- Emerging Technologies – program of work to analyse and implement as appropriate disruptive/new technologies.

Annex A14.19 – Modern Workspace, covers the detailed justification for the investments in this area.

7.4 Hosting services

National Grid's strategy is to continue to mature our Hybrid cloud model in response to the workloads and ambitions outlined in our business strategies. Our hosting solution supports the platforms we have delivered in the T1 period. We will

further build out this model to address the business demand for: Growth in data and analytic capability; Customer and stakeholder collaboration; Enhanced engineering asset management solutions; and new operations command and control solutions.

During T1 we began building several key services on the Azure Cloud Platform and commenced a hosting request for proposal to re-contract our existing main hosting services. These initiatives will form the foundation for our T2 Hosting model.

As part of our Hybrid colocation strategy that includes Cloud:

- National Grid must determine if our existing application and technology platforms and services are engineered to not only support our current business requirements, but can they meet future state business capabilities and needs.
- Limit the amount of "re-hosting of existing applications" as is on cloud infrastructure as a service.
- Refactor (with a strategy towards re-architecting/re-factoring/recoding of an application to fully take advantage of native cloud environments to make the applications more agile or possibly less costly. This includes looking at opportunities to recode components/features within an application with more modern software languages/technologies.
- Determine when we can replace an existing system with a readymade SaaS application /Platform (Salesforce, Service Now, etc.)?
- Look at relinquishing former internal business processes to an external business process as a service provider (BPaas)?
- Look for opportunities to reimagine the role of the enterprise with a focus on building digital business technology platforms.

Gartner: 7 Elements for Creating a Pragmatic Enterprise Cloud Strategy- 3 June 2019

Annex A14.03 – Hosting Services, covers the detailed justification for the investments in technology area.

7.5 Networks

National Grid's network strategy has several key components to ensure continued, secure and efficient operation of the network. Firstly, we will leverage the National Grid operational telecoms Optel network to avoid duplicated costs when connecting to operational sites and shift from expensive private/dedicated connections to leverage lower cost shared public connections. Secondly, we will move to a software defined networking approach, removing our reliance on expensive specialist hardware, simplifying upgrades, and shifting focus from hardware to software-based solutions ensuring flexibility in the choice of technologies and the adoption of future technologies. Thirdly, we will move away from wired networks towards wireless to remove duplication, reduce cost and improve security. Lastly, we will leverage investments in laptops and mobile devices to provide traditional collaboration services such as telephones. This focus will ensure that we can maximise the useful life of our data network assets in line with our network refresh policies to balance the cost of data network services and the performance for customers and provide the flexibility to adapt the network as we increasingly adopt cloud services and network based collaboration technologies.

Annex A14.18 Enterprise Networks, covers the detailed justification for the investments in this technology area.

8 Security

The size and complexity of our portfolio means that we need to continuously assess threat and risk, ensuring we have appropriate controls and cyber technology services with the ability to react quickly to deploy new services and safeguards as the need arises.

To assess our priorities in the wider context of providing essential national infrastructure services we regularly engage with stakeholders from the National Cyber Security Centre (NCSC), Ofgem and BEIS on initiatives such as the Network and Information Systems (NIS) Directive as well as more broadly on the wider threat landscape we face.

Successful delivery of cyber investments over the RIIO-T2 period will further our ability to identify, protect, detect & respond and recover from cyber-attacks. The investments will allow for mitigation of risks to critical systems, ensuring continuous improvement of cyber security capabilities, enabling more secure and resilient grid operations, allowing for safe and reliable delivery of energy services.

In delivering our RIIO-T2 plan, the following benefits will be delivered for both National Grid and consumers:
Robust protection of IT systems

- Enhanced management of the Cyber Security risks
- Timely identification of threats and vulnerabilities
- Advanced detection and response to cyber-attacks, both targeted and untargeted
- Recovery preparedness in the event of cyber disruption
- Improved reliability of digital infrastructure in relation to confidentiality, availability and integrity
- Increased confidence in the resilience of energy provision
- Compliance with new internal and external security policies

8.1 Our plans

Throughout the RIIO-T2 period, we will strengthen our cyber posture through efficient investment, organisational transformation, focus on culture, preparedness and agility. To deliver this, we have categorised our ten priorities as follows:

Vulnerability Management	Further developing sustainable processes for the identification, classification, prioritisation, remediation, and mitigation of software vulnerabilities
Identity & Access Management	Enhancing a centralised IAM function responsible for the design and delivery of access management and authentication solutions across the organisation (user and privileged access). Implementing identity governance and administration platforms and processes to ensure ongoing control and governance of identities.
Response & Recovery Planning	Establishing improved levels of resilience preparedness functions, with scenario based planning, responsible for the development, drilling, and continual improvement of our response and recovery processes.

Security Operations (Security Orchestration, Automation and Response)	Delivering additional Security Orchestration, Automation, and Response capability to further automate and accelerate our detection and response capabilities.
Network Security	Growing further a centralized function responsible for the design & delivery of network security
Platform Security	Growing further a centralized function responsible for the design & delivery of platform security
Data Protection	Enhancing the design and delivery of data protection practices across the organisation in a sustainable manner.
Awareness and Training	Strengthening our function responsible for the design and delivery of cyber security awareness and training across the organisation.
Third Party Management	Establishing enhanced capabilities for the management of security risk associated with our supply chain third parties
Cyber Risk Framework	Establishing comprehensive and prioritised cyber security risk framework, to assess risk and prioritise improvement actions and demonstrate return on investment
Performance, Threat & Specialist Services	Ensuring ongoing monitoring and tracking of threats; priotitisation of investments and ensuring efficient delivery. Provision of specialist services to support critical activities.

Further details covering our approach and how we deliver cyber Security investments is outlined in the 'UK Cyber Security Strategy' Annex document.

9 Critical National Infrastructure

Critical National Infrastructure (CNI) are those facilities, systems, sites, information, people, networks and processes necessary for a country to function and upon which daily life depends. In the UK, there are 13 national infrastructure sectors of which energy is a critical one.

Gas and Electricity energy services are identified as Critical National Infrastructure and are recognised by the Centre for the Protection of National Infrastructure (CPNI). These critical elements of national infrastructure, the loss or compromise of which would result in major detrimental impact on the availability, delivery or integrity of essential services, leading to severe economic or social consequences including the potential for loss of life. The following National Grid systems have been designated as CNI:

9.1 Our plans

Our plans for the UK CNI IT over the T2 period cover all aspects of managing the data centres, networks, storage, compute and applications that deliver the CNI and near CNI environments that run the UK gas and electricity transmission networks. We define "near CNI" as those systems and networks that provide data through interfaces or connectivity that enable the CNI applications to function. Management of these systems includes cyber response and event management across the UK CNI and near CNI environments. We will build on the advances made during T1 and continue to ensure the availability of systems and solutions and enabling business strategy. Our proposed investments are focussed on:

- Evolving the UK IT CNI Operating Model
- Striving to be a 'right fit' run the business organisation
- Exploring opportunities to use third parties to improve operability and delivery of services
- Ensuring our technology footprint is the right size

We consider the security of CNI systems to be paramount and expect them to continue to be a target for disruption. Working in conjunction with cyber and physical security teams there is an option to align all these functions into one. Where possible IT CNI systems needs to integrate the same tooling as Cyber to provide and holistic view of the CNI estate.

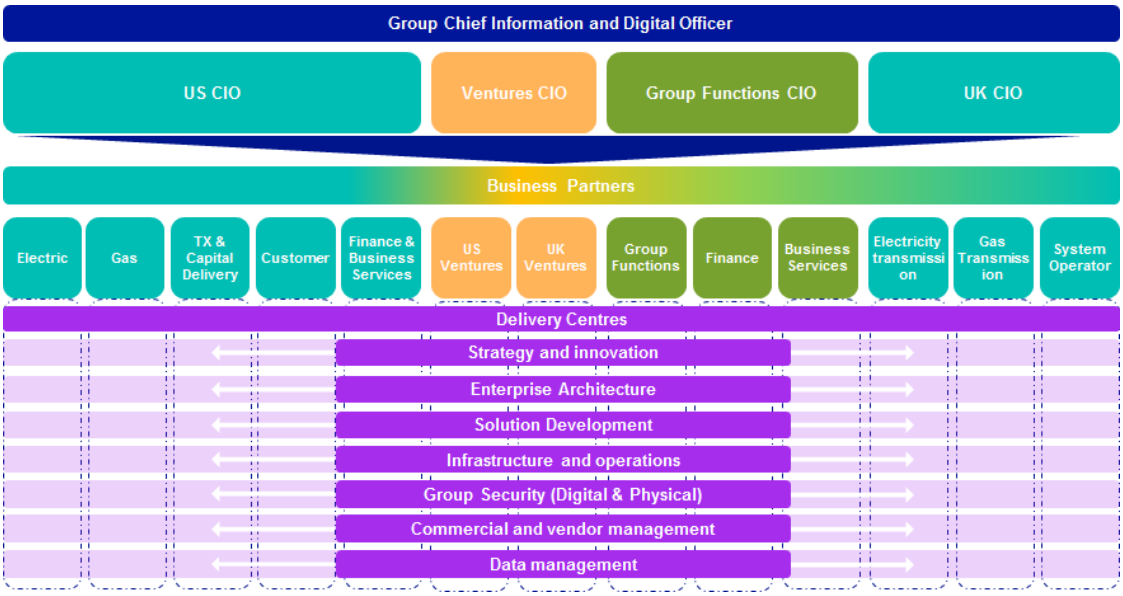
We also need to consider the business separation of the System Operator and the Transmission Owner which is likely to introduce challenges to provide the required physical and logical separation of these services. This potentially could lead to separate services for the System Operator and Transmission Owner.

One of our key investments will be to complete our move to modern CNI data centres that will make the technology more resilient and secure as well as more modular to allow opportunities to provide more cost-effective solutions.

Our other investments are based on the continued availability of the CNI environments ensuring they are secure physically and virtually, but also exploiting relevant innovations to provide cost effective solutions that improve end user experience such as using tooling and automation to seek opportunities to reduce the need to have IT CNI engineers supporting complex processes, for instance self-learning tools (AI) may be used to identify potential risks and issues. We will make significant investments in a number of other key areas. Our Electricity Management System (currently shared by SO and TO) will be upgraded delivering separate systems, designed to meet the specific requirements of the two differing roles. This will also deliver the required separation for the Independent ESO. Our Optel Fibre low latency Network that connects the electricity network, substations and energy partners will reach end of life and be upgraded to ensure we continue to deliver a safe and reliable electricity transmission network.

10 IT Operating Model

Our IT organisation is responsible for support of and change to all IT applications and infrastructure in both our UK and US businesses. Our IT Operating Model is built around centres of delivery, which house the expertise we need to deliver National Grid's strategic priorities and enable them to deliver energy to the customers we serve.



There are three primary roles within the structure of the Operating Model. They are CIO, Business Partners and Delivery Centres.

The CIOs and Business Partners own the relationships with the business stakeholders, and they sit on the management teams of the business. They are accountable for the whole of the business domain to which they are assigned. This includes business capability road maps, long term investment planning, and development of annual budgets. They are responsible for ensuring that projects are delivered on time and on budget for all consumption management. In addition, they work with their domain architects to identify and define roadmaps leveraged by delivery centres on the identification of application, infrastructure and cyber risks and upgrades for that business domain area.

The CIO and Business Partners contribute to key strategic, commercial and financial performance decisions within the business segment they support. They work closely with senior management teams providing input, thought leadership and guidance into the long-term business plans. They review operating costs and IT services and bring to their business stakeholders, potential cost savings ideas and trade-offs by working with enterprise and domain architecture. Finally, they represent the IT function in delivering insightful and easy to understand representations of IT performance.

Our Delivery Centres are committed to delivering high quality and efficient services. They are accountable for providing their services at the agreed level of cost, time and quality by leveraging standard practices across the US and UK and our outsourced development and support partners.

10.1Business Partnering

The Business Partner is the first line of IT technology thought-leadership, talking to the business about the standard platforms that address their IT needs and working through systems of differentiation. We work directly with the business to determine “pain points” and gaps in capabilities needed to improve business efficiencies. Working with Enterprise and Domain architecture in the selection of and prioritisation of the right tools and platforms for the organisation.

As a trusted Business Partner, the IT BP provides thought leadership and guidance into the short and long-term business and technology plans. The BP is responsible for:

- Owning the Technology Strategy of what capabilities and when and associated IT Investment Plan
- Managing the annual and long-term financial budgets for their Portfolio
- Acting as an extended business leadership team member, contributing to the leadership, strategy and overall operation and performance of the business they support.

In addition, the overall accountability for delivery of IT Programmes and production operations, lies with the BP's.

Strategic Analysis and Consultancy

- Providing thought leadership and guidance to deliver the long-term business and technology plans. Build relationships with other utility companies and create opportunities for knowledge sharing
- Working with Enterprise Architecture to identify opportunities for IT innovation, disruptive technologies and emerging IT trends, discuss and explored for viability on a regular basis and for bringing together subject matter experts as and when needed, to drive the innovation agenda
- Proactive identification of opportunities for existing IT solutions to drive business value
- Owns the Strategic Business Plan (SBP) for support function and facilitate regular updates with business on strategy, roadmap progress and operational metrics
- Develop and maintain multi-year technology and process vision, together with implementation strategy

Planning and Governance

- Providing oversight and management of the IT Investment plan for their business area
- Responsible for developing the current and future capabilities and skills of the IT Business Partner team and working with Delivery Centre leaders to ensure the required skills are available in the leveraged resource pools, to deliver against IT commitments

Portfolio & Performance Management

- Demand Management including determination of high-level future funding needs (coordination of annual planning process)
- Focus on cost transparency, to review operating costs of IT services and bring to their business partners potential cost--savings ideas and trade-offs
- representing the IT function in delivering insightful and easy to understand representations of IT performance
- Management of IT consumption for respective business area – end user computing, application rationalisation
- Stewardship of operational metrics, ensure appropriate action plans in place to drive improved operational performance
- Conduit to business on IT driven changes e.g. Office 365, IT changes impacting business managed applications increase IT value proposition and take action on key pain points
- With cNPS as a foundation, determine opportunities to increase IT value proposition and

take action on key pain points
- Escalation management

Programme Management

- Accountability for delivery of IT solutions with direct responsibility for Programme/Project management activities partnering with Business Sponsors and Delivery Centres.
- Time, budget, quality management of IT deliverables to deliver expected business value.

10.2 Strategy & Innovation

The Strategy and Innovation delivery centre is focused on the longer term organisational and technology strategy for the IT function. It is responsible for:

- Developing IT Strategy
- Driving the innovation agenda
- Defining and delivering technology innovation projects and assessments outside of the delivery teams and structure.

10.3 Enterprise Architecture

Enterprise Architecture maintains the overarching 'map' of the system landscape. Much like a geographic map, enterprise architecture maintains all inputs, process and outputs of current systems and assists business partners to define the 'as-is' starting points and 'to-be' target states for new capabilities and helps develop the sequencing and steps that must be taken to successfully achieve business needs. By doing this, a full understanding of current state, future state, and the road that joins one to the other is understood and risks or mis-steps are avoided. Further, they work to help achieve maintain standards, reuse of common systems and best practices. It is responsible for:

- Defining a structured method to think about the future, how that future might unfold, and how this might affect the organisation
- Avoiding misalignment between proposed and implemented solutions versus solving the critical concerns of individual stakeholders
- Ensuring risks are reasonable and would not outweigh the anticipated benefits while also ensuring risk aversion does not restrict innovation and better outcomes

By driving our investments into common platforms and ecosystems, we can achieve the following benefits:

- Simplify and standardise, by reducing application and technology proliferation
- Lower cost of adoption and ownership, by reducing technology delivery and operating cost
- Provide the best possible experience to our end users
- Turn our attention towards innovation rather than solving similar problems with different, overlapping technologies
- Do so while still maintaining a high level of security and support
- Drive knowledge management

The value proposition for Enterprise Architecture lies in the ability to turn business strategies into navigable roadmaps that can make those strategies a reality. Enterprise Architecture provides a holistic approach to develop strategies, identify risks, and define roadmaps that best achieve business and technology goals. Through our defined Architecture Delivery Lifecycle (ADL), IT will be able to ingest ideas from all areas of our organization—including Business Partners, NG Ventures, NG Partners, and Digital. Enterprise Architecture ADL artefacts include Solution Visions and Conceptual Architecture Design documents. The architecture artefacts are leveraged by:

- Business partners to develop business technology roadmaps

- Solution Delivery teams to develop physical views for project execution
- Operations teams to better understand root causes and prevent repeat incidents

Our Solution Vision:

- Will frame the request against a solution hypothesis, including technologies that we can reuse, extend or detail how we can support technology evaluations for any gaps
- Determine viability from a business and technology perspective
- Identify necessary operational and financial inputs that will help determine prioritization within pre-Sanction processes
- Identify the proper sequencing across major programs and the enterprise estate to ensure our ability to properly leverage strategic platforms and technology investments. For example, continuing to leverage SAP, ServiceNow and Microsoft.

10.4 Solutions Development

The solutions development organisation is organised into functional towers. These towers are responsible for the development of technology solutions based on business need. The towers are defined by the type of technology, products and platforms they use to develop solutions and are mirrored across the UK and US. There are five core towers:

- Engineering Systems tower provides solution engineering and development services for Control Systems, Asset & Work Management, GIS, Contract & Project Management, and Ancillary platforms. In the UK, the tower is split: Engineering Systems 1 covers Control Systems, Balancing and Commercial platforms; Engineering Systems 2 covers Asset & Work Management, GIS, Contract & Project Management and Ancillary platforms
- SAP tower provides solution engineering and solution development services for SAP (ECC & S4/Hana), SuccessFactors, Ariba, Coupa platforms and all other connected applications in our back-office application ecosystem
- CRM & Digital Enablement tower provides solution development services for Web, Mobile, Cloud, Data Analytics & RPA, Salesforce and Contact Centre technologies and platforms.
- Quality Engineering tower provides quality related services including test strategy, planning and automation; test environment management and test data management to all development towers. This tower is based out of the UK but scope is global
- Employee Services tower will provide solutions for Business Services through the Service Now platform.

Solution Development develop a diverse range of technical solutions driven by deep understanding of user needs using a variety of approaches optimized for the relevant technology implementation approach. Our project drivers vary immensely from small changes and bug fixes, through to large scale programme due to internal or external changes.

We work across a standardised project lifecycle comprising start-up, requirements, design, development, testing and implementation resulting in a system going live.

We develop projects in a variety of ways, sometimes sequentially (known as “waterfall”), as well as delivering in shorter stages (sprints) with multiple releases (known as “agile”) or ongoing releases within hours or days (known as “devops”).

10.5 Infrastructure & Operations

Infrastructure & Operations design, plan, build and manage all underlying infrastructure that enables the business to meet their internal needs and the needs of our customers.

The vision for IT Infrastructure & Operations is to drive system and application availability through a current and supported hardware and software platform environment. This will deliver a seamless and reliable end user experience which will bring energy to life.

Infrastructure & Operations design, plan, build and manage all underlying infrastructure (end user, compute, data storage and connectivity) that enables the business to meet their internal needs and the needs of our customers.

We deliver, manage and maintain all infrastructure services that are needed and consumed by the business.

- **Modern Workplace Services***:* Enables employee usage of applications and access to data and work products. A wide range of end-user devices and services are required to support business operations including desktops, laptops, virtual devices, ruggedized devices, mobile tablets and smartphones, communication and collaboration tools. End User devices and technology form an important part of our overall digital workplace strategy, which enable employee usage of applications and access to data and work products
- **Cloud & Hosting:** Data Centres that host National Grid data and provide compute power to run mission-critical applications. This includes the management of infrastructure in a Hybrid Cloud environment, On Premise Data Centres and Hosted Data Centres. We are striving to provide more effective, fit for purpose solutions with the cloud, reducing old technology constraints
- **Network:** National Grid's network securely and efficiently connects our business users to internally and externally hosted data and tools required to meet their objectives. This includes Wide Area Network (WAN), Local Area Network (LAN), Wireless (Wi-Fi) and Voice

These services are managed to be efficient and reliable in line with expectations and SLAs, laying the foundation for a National Grid digital transformation, and improved quality and customer experience. Our KPIs are aligned to business performance and our success is measured in terms of business outcomes.

The Infrastructure & Operations Team works very closely with all suppliers in the ECO-System to deliver, manage and support all infrastructure strategies. The Supplier base is changing as the consumption of Cloud SaaS, PaaS and IaaS services are increasing. The goal of improving the end user experience is changing, not only National Grid IT, but, the suppliers we choose to do business with as well.

Infrastructure Delivery Centres, Cloud & Compute, Managed Workplace Services & Network	End to end accountability and ownership of our Infrastructure. Partnering with the Infrastructure Solution Delivery Organization that delivers new and improved services as designed by the Infrastructure Delivery Centers and the Enterprise Architecture Team.
Global Infrastructure Solution Delivery	Develop, maintain and deliver the Global Investment Plans which deliver new and improved services and capabilities.
Global Service Delivery Operations Teams	They bring expectations, desires and reality from the business' perspective into the Infrastructure & Operations Team while providing 7X24 support. The Customer Service Managers within the regional Service Delivery Operations Teams work very closely with the Business Partners and provide business perspective to infrastructure projects to streamline deployments and minimize disruption, while properly setting business expectations.
US and UK CNI Teams	These teams support regional Critical National Infrastructure. An in-sourced team in both regions supporting Gas and Electric Systems.
Business Support & Performance and Integration Services	The engine rooms behind the management and running of the entire Infrastructure & Operations Organization.

Within the IT Operating Model, we engage with:

- Enterprise Architecture Team on our strategies
- Finance on our cost
- Business Partners on Business consumption, needs and satisfaction
- Security for compliance on our services delivered
- HR with the care, progression and management of our team members
- Solutions Development Teams
- We touch and work with every organisation within the Operating Model

10.6 Security

National Grid continues to be faced with a multitude of security threats which will continually change and increase in sophistication and persistence. It is the security organisation's responsibility to understand these threats and how they affect business performance, and then devise a balanced security strategy to mitigate the risks these threats present.

The Group Security Team identifies threats, vulnerabilities and resultant risks across all National Grid operations and works to reduce risk via transparency, policy, implementation support and the provision of operational services.

10.7 Commercial & Vendor Management

IT Commercial derives maximum value-for-money from National Grid's technology spend by providing thought leadership from a contracting and vendor management perspective. We support our business partners through the spend lifecycle and create a work environment that our team members are proud to be a part of. We are a global team located in both the US and UK. We are organised across Contract Management (CM), Hardware and Software, and Services. Each tower reports to our ITLT representative, the VP of IT Commercial. Roles within the team include:

- Senior Contract and Commercial Managers
- Contract and Commercial Managers
- Commercial Analysts
- Transition Director

IT Commercial supports our customers throughout the spend lifecycle, including ongoing vendor management. We support all IT spend and the management of vendors, optimizing capacity, use, cost and quality. We manage the software contracts and renewals budget, software licenses and related software license audits. We challenge vendors to partner with us to drive operational excellence and identify innovations meet our strategic objectives. We manage commercial disputes and performance issues, and work with internal customers and suppliers to remedy the issue. Our focus remains on optimizing contracts and building collaborative relationships with our suppliers. We are committed to standardising performance measures to drive the right supplier behaviours.

IT Commercial delivers agreements that balance value-for-money and performance quality for National Grid, while providing commercial support throughout the contract lifecycle. For several of our largest suppliers, we manage a suite of performance measures that provide insight into supplier compliance with contractual performance requirements. CM underpins our team, supporting the management of the larger “ecosystem” type contracts. CM also maintains direct responsibility for smaller value contracts that fall outside of our ecosystem-type suppliers. Additionally, CM manages Supplier Quotation Requests for services from current suppliers not covered by existing contracts. The CM team utilises an intake process to have visibility to upcoming demand.

IT Commercial’s success is dependent upon its relationships with many internal groups, as well as the vendor community. We work with Procurement, ensuring that sourcing processes are followed, timings coordinated, and regulatory requirements are adhered to. Procurement maintains full responsibility for the sourcing event (issuing Request for Proposals, Purchase Orders, etc.). Internally, we work closely with these critical partners and Delivery Centres to successfully deliver our services:

- IT Business Partners: Provide their understanding of requirements from National Grid business areas
- Global Solutions Development: Engages the services of our key suppliers for the development of many projects
- Infrastructure and Operations: Utilises our suppliers for application maintenance and other key services
- Enterprise Architecture: Identifies the appropriate technological roadmap to follow when new projects are being considered

We play a key role with suppliers during the sourcing process and after contract implementation. When commercial issues arise, we are the connection point between internal customers and suppliers. A successful working relationship allows our internal customers to focus on their “day job,” while we deal with concerns regarding contract interpretation, disputes and escalations.

IT Commercial has a keen focus on costs, measuring savings negotiated through sourcing events. Savings include actual cost reductions (e.g. reduced costs on an absolute basis) and cost avoidance (e.g. contracted software license cost increases that are negotiated downward). Our Supplier Performance Management (SPM) team creates a robust set of supplier scorecards for many of our biggest suppliers. These scorecards monitor supplier performance against contractually obligated Service Level Agreements, which serve as a basis for periodic performance/KPI meetings with suppliers. These scorecards provide a fact-based method of highlighting successes and opportunities for improvement. SPM plays an integral role when escalations are necessary with suppliers, as they provide a "just the facts" context for broader operational discussions. Our Invoice Management team monitors the accuracy of supplier invoices, and potential erroneous billings avoided. We continually evaluate risk as a function of commercial disputes, software license audit reviews, etc., and quantify the risks as appropriate for purposes of establishing risk reserves in conjunction with Finance.

In summary, IT Commercial supports the National Grid purpose of "Bring Energy to Life" by helping ensure that National Grid derives maximum value from its technology spend, allowing IT to support the overall business as efficiently as possible for the benefit of our customers, employees and other stakeholders.

11 Efficient Delivery

The IT function has restructured to meet the evolving demands of the future energy utility, created an operating model designed to leverage group wide efficiencies in delivery, sharing of best practice and economies of scale.
The end to end delivery governance process is structure to ensure consumer value is maximised and costs are contained. Enterprise Architects protect the integrity of the IT estate ensuring maximised reuse of strategic platforms and prevent the proliferation of tactical point solutions that add complexity and cost to the operation of the IT Estate. Dedicated IT commercial teams ensure that our delivery partner frameworks offer efficient delivery options, and that our procured solutions maximise the economies available from our scale.
The sanctioning processes ensure that there are robust examination of the business case for each investment proposed, and our Prince 2 based solution delivery framework ensures that project boards continue to hold delivery teams to account for time cost and quality throughout the delivery cycle.

11.1 Sanctioning and sequencing investments

Each year our businesses publish strategic plans focused on what we will deliver and the corresponding cost implications of these plans. We will use the investment model portrayed below to outline the different demand streams on each of the businesses enabling us to sequence investments accordingly. We also implement quarterly rolling forecasts across the portfolio's and have increased the cadence of our sanctioning processes to ensure they are agile and able to respond to and plan for demand changes.

This continuous process of sanctioning and planning coupled with our operating model and ability to scale ensures we can deliver.

Risks to achieving the plan

The following risks have been identified as potentially impacting our ability to deliver in T2.

Risk	Description	Mitigation
Cost Savings Targets not achieved	The UK cost reduction targets do not match the current business demand for new projects.	Deep-dive sessions are ongoing to establish options
IT do not have the capacity to deliver	Our US plan calls for significant growth in spend over the next three years with capital spending expected to increase significantly. The UK are streamlining operations to hit the desired RoE targets through the end of the RIIO T1 period. If there is then an increase in both CAPEX	Our IT Transformation streamlined our supplier sourcing, insourcing of key skills and establishing credible partnerships with other business functions. IT will continue to streamline internal governance processes, minimize bureaucracy to increase throughput without

	and OPEX expenditure there will be capacity issues	compromising quality.
The business does not have the capacity to deliver	While called IT projects, many of the initiatives will require significant business involvement. This was well recognized in major T1 change initiatives where dedicated business teams were assigned to achieve these critical programs. Planned initiatives detailed in the strategy document will require similar dedication from the business functions for multiple years.	Monitor the impact of driving efficiency in the UK on the ability of allocated resources to meet the appetite for new business initiatives across the UK business. To meet the UK plan, we are looking at driving significant efficiency gains annually for the remainder of T1. To achieve, we must make choices on business demand and level of service.

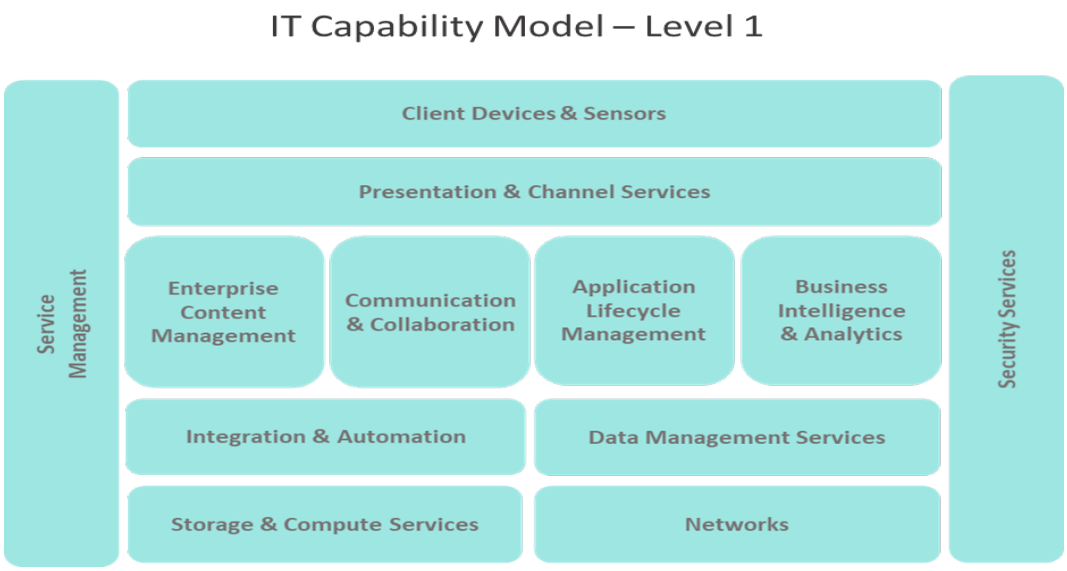
11.2 Architecture Governance (Technology Strategy Execution Guidance)

Towards the end of the T1 period a revised governance model was implemented to enable the execution of our IT Strategy. This governance structure enhanced the existing structure focused on financial and commercial controls by adding enterprise architecture to the core governance process. This structure will continue to be enhanced in to T2 period to cater for the increased rate of change and adoption of agile processes and methodologies for software development and business change initiatives. Agile architecture methodologies and processes will be implemented to support the IT strategy ensuring architecture decisions can be effectively made at the velocity needed to support

12 Conclusion

Within this document, we have acknowledged the rapid change taking pace in the UK energy market, described how our business entities intend to respond to this challenge delivering on the priorities of our stakeholders and detailed how our indirect IT investments underpin the entity responses. We have set out the key elements and focus areas for Information Technology that will ensure successful delivery and we have provided solid justification for all investments and provided detailed financial analysis and option assessments for major investment areas.

13 Appendix A – IT Capability Model



14 Appendix B – References and research

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