Architectural Guidance for Digital

Keith J. Vargas
Shannon Soland
Nick Maiello
Anil Podduturi

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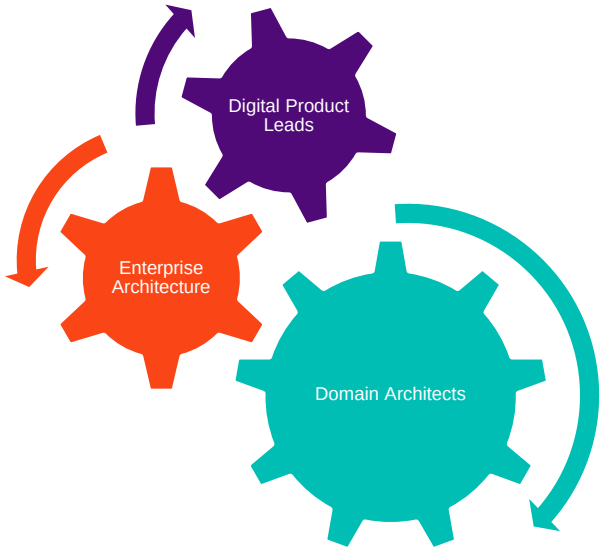
Enterprise Architecture – Enabling Digital

Purpose – To enable and accelerate Digital from design to delivery via close partnership & guidance

Close Partnership and Collaboration

- Ensure Digital Solutions and Products are considerate of guidance, National Grid environment and IT Strategy



Guidance

1. Global IT Principles
2. IT Policies
   - Application Rationalization & Technical Debt
   - Technology Lifecycle, Roadmaps and Reporting
3. Standards
4. Guidelines & Procedures

Guiding Framework

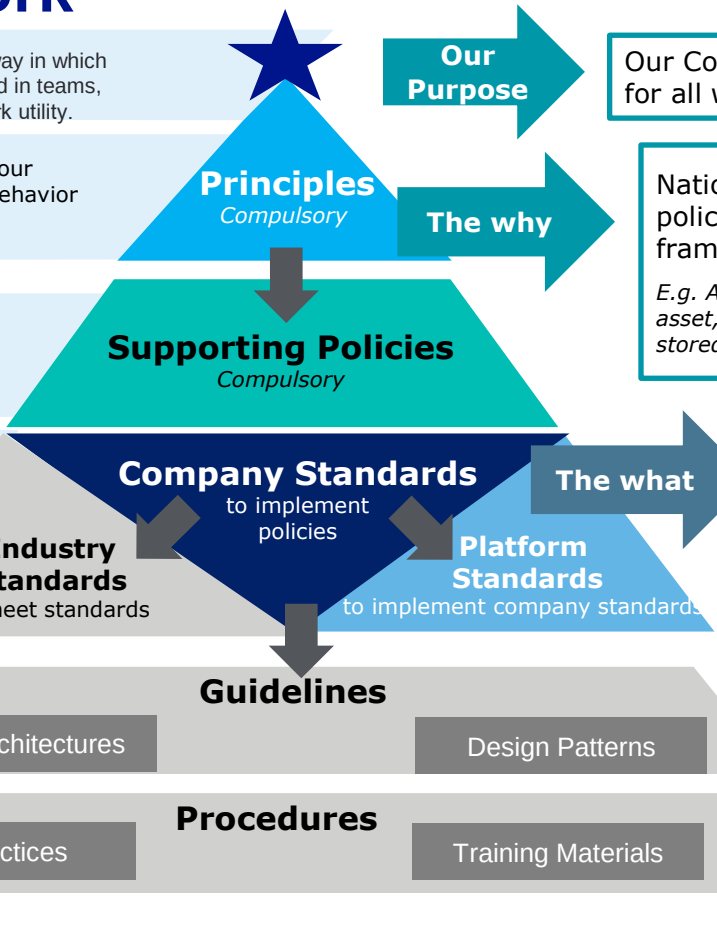
Company Values – Our Core Values define the way in which National Grid expects us to act both as individuals and in teams, to deliver our goal of being the world's premier network utility.

Principles – A stated position that translates our business / IT strategy in to a foundation for behavior when making decisions on policies, standards, architecture guidance and solutions

Supporting Policies –Define a set of requirements to guide decision making and architecture definition.

Standards – Define what must be implemented. Capability standards don't define products. Platform standards implement specific vendor standards

Guidelines & Procedures – Bring together numerous Technology Standards, Procedures and Guidelines.



Our Company Values act as the ***Guiding Star*** for all we do.

National Grid's overarching principles and policies provide a prescriptive decision making framework

E.g. A principle may state that we treat information as an asset, a policy may then state that all customer PII data stored on NG systems be protected.

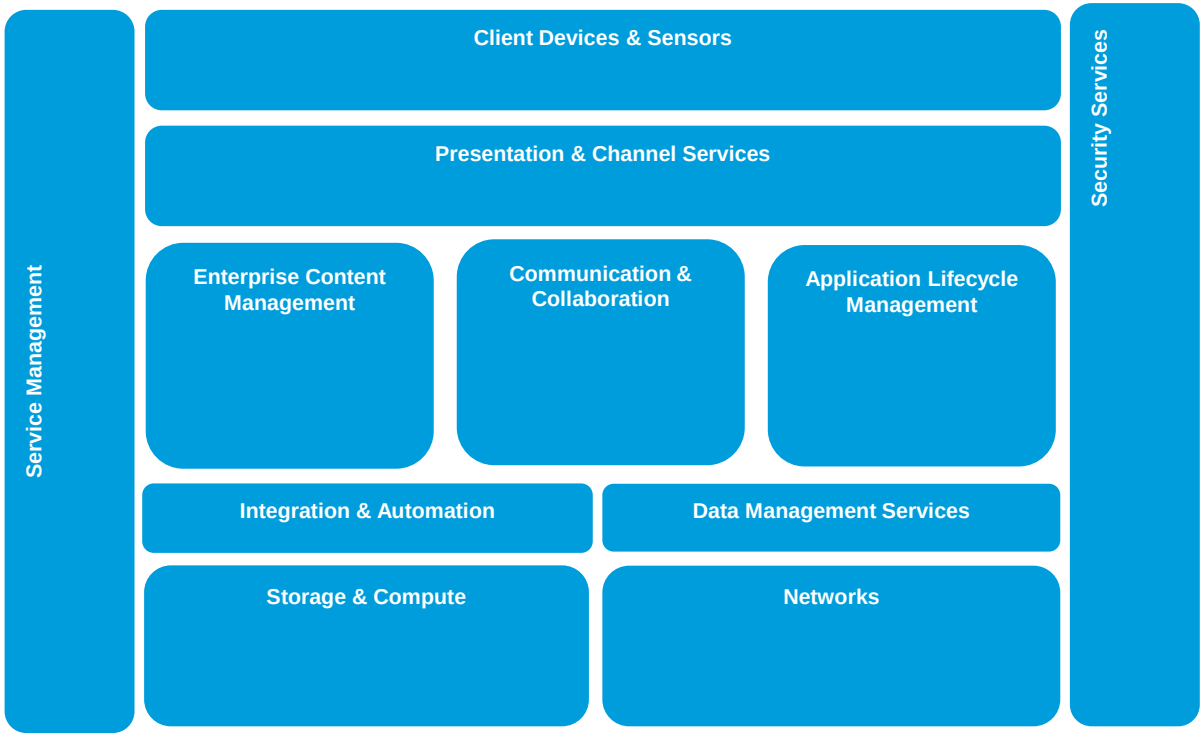
Stipulate the products or approaches to meet the policy statements, but without detailing the specifics of how.
E.g. a standard may require that stored data is encrypted using specific encryption methods, algorithms, vendor products and platform services.

Provide detailed method & steps on how to satisfy standard requirements.

E.g. a procedure may detail the steps required to manage encryption keys.

Digital Capabilities Model

Core Capabilities Supporting our Digital Ambitions - TBD



Specific Guidance

Please click on links for more details. Overtime these will be in EnterpriseHub

Global IT Principles

- IT Operating Model Playbook

Global IT Security Policies

- Security Policies & Standards.

Global Enterprise Architecture general guidelines/principles

1. Digital – “Grid Stack First” delivery approach
2. Hosting - Cloud First Where Possible – Leverage cloud where possible versus on-premise data centers. Use of EA approved of cloud offerings (IaaS, PaaS, SaaS, etc.) will likely offer a commercial and strategic advantage. Embrace a Cloud First mindset to help follow core EA Principles.
3. Delivery - CI/CD DevOps Where Possible – Especially for Agile projects
4. Delivery – An “Outside In” approach is best suited to introduce new technologies, so long as its considerate of existing capabilities
5. Integration - Stay In one Cloud – Use Native integration tooling
6. Integration - Cloud to Cloud – Use Mulesoft CloudHub
7. Integration - Into a Cloud – Use Mulesoft

Supporting Policies

Guidance for how IT makes determination. Will be captured in EnterpriseHub

Data (hyperlink)

1. Data is an asset – it has a purpose, cost-value and lifecycle
2. Data is managed and secure – all data is subject to ownership, governance and protection from unauthorised access throughout its full lifecycle (from planning and collection through to retention and disposal)
3. Data is fit for purpose – data should be of the quality required for its intended uses
4. Data is standardised – in terms of its definition, format, content and categorisation providing the ability to link differing forms of related data together
5. Data has a single authoritative source – for all data there shall be a single and identified authoritative (master) source
6. Data is accessible – we should all have the appropriate access to the data we need to carry out our roles
7. Data is published – any data we publish should be defined, appropriate, quality assured and verifiable.

Supporting Policies

Guidance for how IT makes determination. Will be captured in EnterpriseHub

I&O (hyperlink)

1. Zero Trust –We will embrace a Zero Trust access model which requiresall users(internal & external)to be authenticated, authorized, and continuously validating security configuration and posture, before being granted or keeping access to applications and data.
2. Adaptability -Infrastructure can be easilyprovisioned automatically and can dynamicallyadapt to user needs to ensure stability, security and ROI.
3. Elastic Scale – Allow for automated refactoring to support future growth, performance needs and changing business priorities, M&A, etc. Design for Scale, Performance, Capacity and End to End Monitoring (network & application)
4. Interoperability & Integration –Infrastructure exists to provide users a seamless integrated experience with data flows and global applications across our end to end digital business ambitions.
5. Composable Enterprise & Democratized Platforms – Infrastructure enables distributed platforms connected via an API Ecosystem. We embrace a hybrid cloud or multi cloud enterprise.
6. Agnostic – Chose agnostic implementations as a priority where possible.
7. Leverage/Reuse – Leverage global services, assets and investments such as Cloud, excess compute capacity, racks, etc.
8. Automation of Infrastructure as Code (IAC) – Embrace where possible to ensure consistency, faster provisioning and accuracy. To help meet Business Management System (BMS) Control requirements

Supporting Policies

Guidance for how IT makes determination. Will be captured in EnterpriseHub

I&O (hyperlink)

9. Proximity to end user – The Physical Location of Preference is within proximity to the primary customer/user. The less physical distance data moves across zones or regions the better. Edge computing devices can be used for caching, data manipulation, etc.
10. Compliance - Ensure adherence to National Grid Business Management System (BMS) Global IT Controls(People, process and technology to reduce risk)
11. Cloud First Where Possible – Leverage cloud where possible versus on-premise data centers. Use of EA approved of cloud offerings (IaaS, PaaS, SaaS, etc.) will likely offer a commercial and strategic advantage. Embrace a Cloud First mindset to help follow core EA Principles.
12. One Size does not fit all –Sometimes there is no silver bullet. Short list of approved approaches is preferred over forcing incompatible solutions.
13. Frictionless End user Experience -Friction free End User Experience and a robust service design which is ITIL compliant.
14. Software Defined – Leverage Software defined capabilities over hardware (e.g. networks) overseen by a National Grid Network Operations Center (NOC) will help us to more effectively build and dynamically adjust our infrastructure as needed.
15. Service Excellence – Delivering exceptional always on levels of service that are reliable, automated, secure, compliant (ITIL) and uses a continuous improvement feedback loop that leverages LEAN/best practices to help us achieve industry benchmarks and exceed end user expectations.

Supporting Policies

Guidance for how IT makes determination. Will be captured in EnterpriseHub

I&O (hyperlink)

16. Automation of Services – Leverage automation to ensure standard, secure and repeatable services that can be monitored and dynamically adjusted based on near real time feedback.
17. Lean & Agile – Our organization and processes embrace an Agile and LEAN mindset. Striving to always improve ways of working and deliver more effective outcomes. ScaledAgile, Kaizens and 5 why analysis are tools to help guide and measure improvements.

Decision Making Key Criteria

Considerations for how TTF makes determination

	Key Considerations
1	Is there a critical mass of use cases behind a proposal?
2	Is this a significant enterprise standard differentiation?
3	Is this a ring fenced solution or a use case exception?
4	Is the business trying to make technology decisions without involving IT
5	One size does not fit all. We need to be open to other use cases where appropriate
6	What is the risk to our business if we do this?
7	Are we strict our flexible in our interpretations of 3rd party regulations (e.g. OFGEM, NERC, FERC)
8	TCO
9	Should a BU have a separate/duplicate managed instance of a capability for their needs? What is the differentiator?
10	

IT Principles Summary

Guidance for how TTF Makes determination

	Principle
1	Projects will be justified with business cases including total cost of ownership and business benefit
2	IT will build for today's needs as well as innovate for the future
3	End user experience will be at the forefront of IT designs
4	Leverage out-of-box, over proprietary solutions – adopt and fully exploit Platform Solutions
5	Re-use existing platforms before buying new or building unless a strategic advantage can be gained
6	Leverage Out of the Box Solutions over proprietary solutions
7	Be conscious of vendor lock-in
8	Leverage cloud technologies where possible versus on premise data centers
9	Design for operations keeping security, scalability, resilience and disaster recovery at front of mind
10	Information is an asset which is fundamental to the efficient and effective delivery of IT services
11	Data must be securely maintained, accessible and easy to integrate

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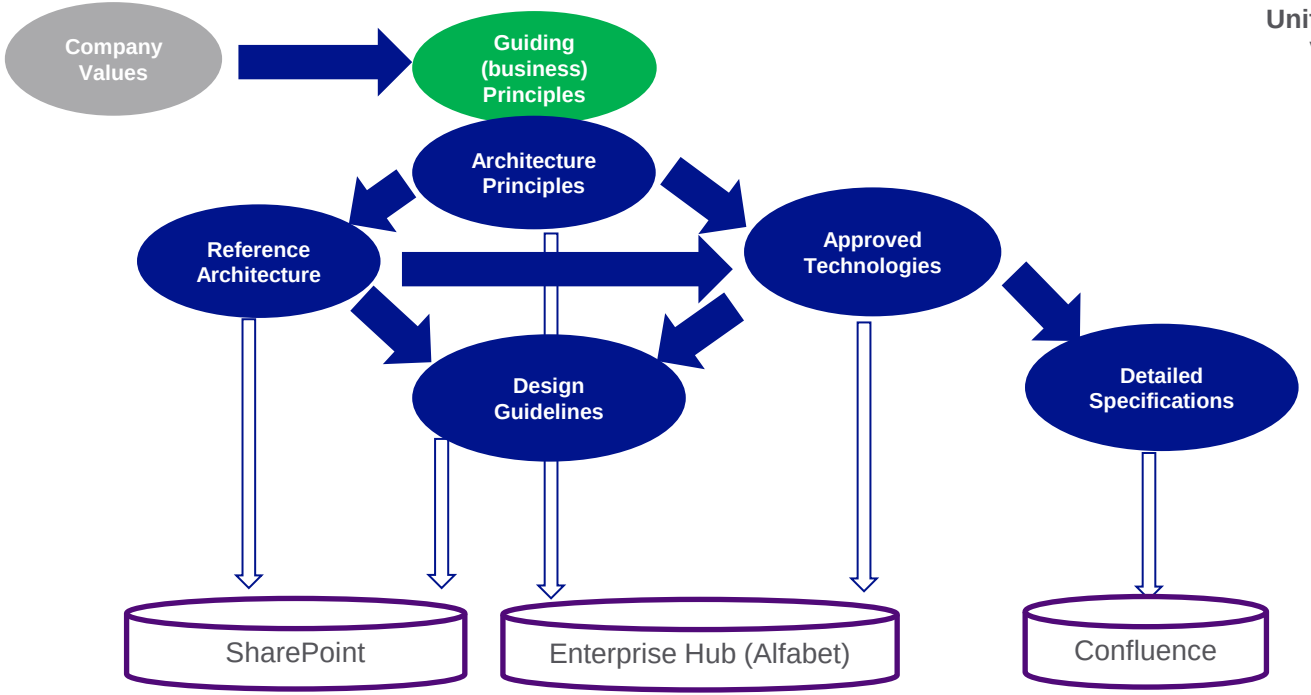
Types of Standards

Federated but centrally managed



Uniformity of Vision

Uniformity of Execution

- **Guiding principles** -guide decisions on project issues & other standards
- **Approved Technologies** leverage existing technology investments and fulfill the guiding principles
- **Details specifications** provide essential details supporting the use of approved technologies
- **Design guidelines** promote best practices and uniformity inf the usage of approved technologies and reference architectures
- **Reference Architecture** – contains sets of standards, providing complete, proven solutions based on one ore more approved technologies.

(*) Standards = Reusable component, short list or best practice in Alfabet