Developing a PNT Architecture Framework

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For WSTS 2022, Denver CO.

Bottom Line Up Front

RethinkPNT

- Adopting a **strategic approach** to PNT management is **essential to** delivering **Resilient PNT**
- This proposed **Architecture Framework** can be used to bring together policy, strategy, threats, risk and delivery of capabilities.
  - **Flexible** as a framework to adapt to different situations
  - **Agile** enough to incorporate existing and new regulation, standards, frameworks and approaches
  - Can bring organisational **competence** and deliver resilient PNT services to those who need PNT data
- There are **opportunities** for the PNT sector, but the window to capitalize is closing fast.
- **This is NOT someone else's problem!**

Broad situational analysis

Nations are critically dependent upon PNT information

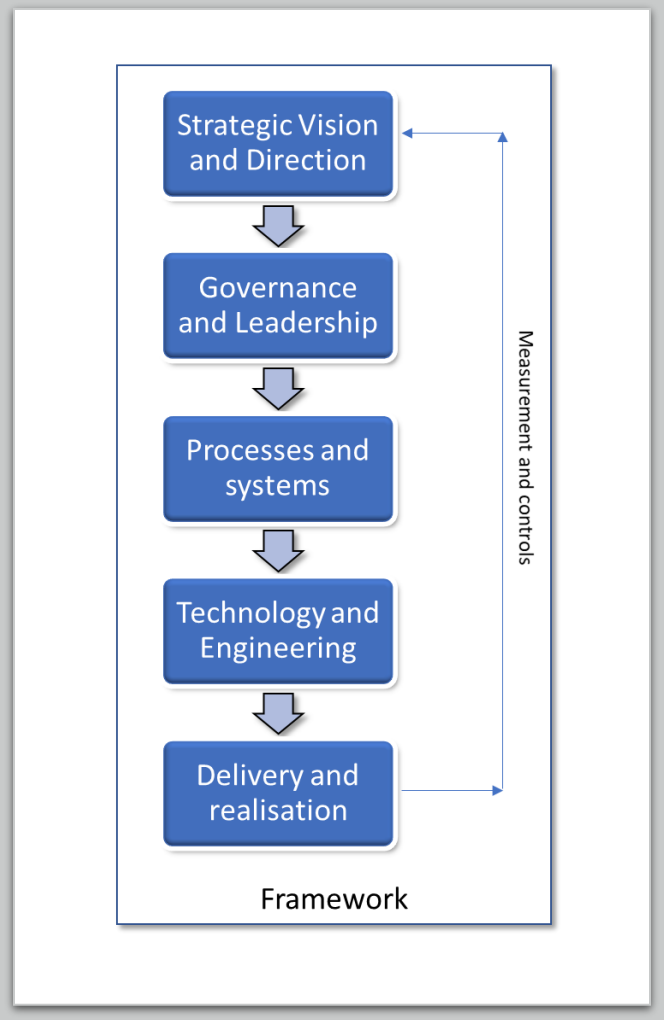
PNT strategic approaches nonexistent

Clear need to coordinate and a need for specialist resources

Low level of user understanding of risk, dependencies & impact (unwillingness?) Threats and vulnerabilities developing & increasing

Resilient PNT will only be achieved with a balance of different technologies & services; and standards/legislation and skills development

Tendency to admire the problem rather than face it head on



What is an Architecture Framework?

- A means of providing structured approach for achieving current and future goals
  - Allows for governance, strategic planning relationships, hierarchy, diversity of approach – to achieve a solution more than the sum of its parts
- Ensures that contributing organizations, partners, users, and other interested parties can determine their relationship to all parties, as well as “the whole.”

Relevance to PNT

PNT is a complex landscape of multiple systems and technologies (a system-of-systems)

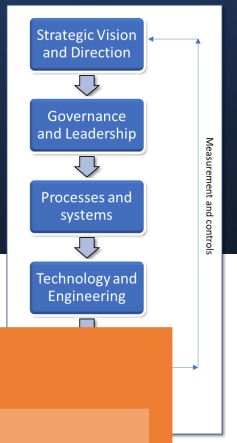
Introduction of common terms and definitions

Promotes a strategic approach to address PNT resilience

Allows for operational service independence but a same direction of travel

Enables coordination and reduces duplication (cost)

Strategic Architecture Function



Strategic Architecture

Strategic Vision, Mission & Objectives (PNT Strategy)

Threats and Vulnerabilities, Artefacts, Evidence, International landscape, policy dependencies

National PNT Requirements

User Requirements Measures of Effectiveness

Use Cases

[Architectural] Drivers and Constraints

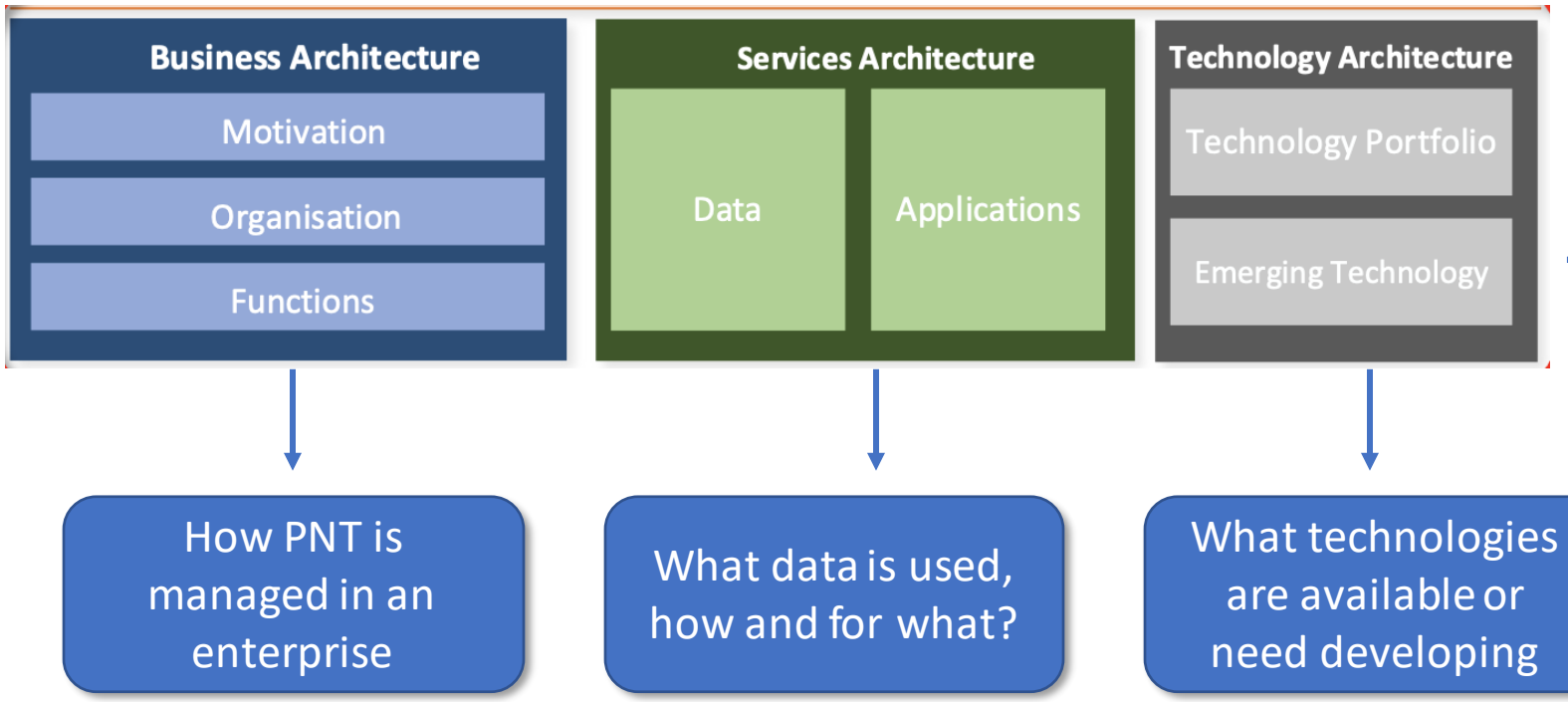
System Requirements and System of Systems approach

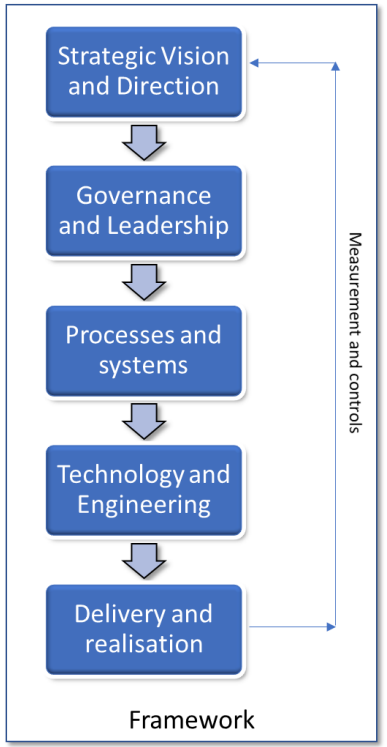
Constituent Systems

Legislation, Regulation, Standards

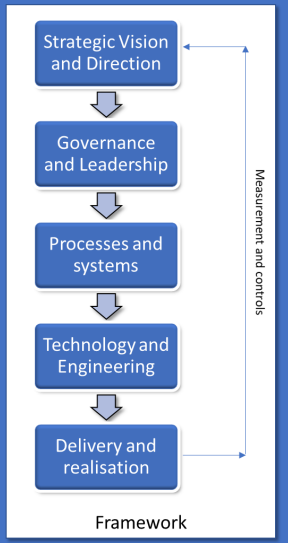
Skills, Education, Training

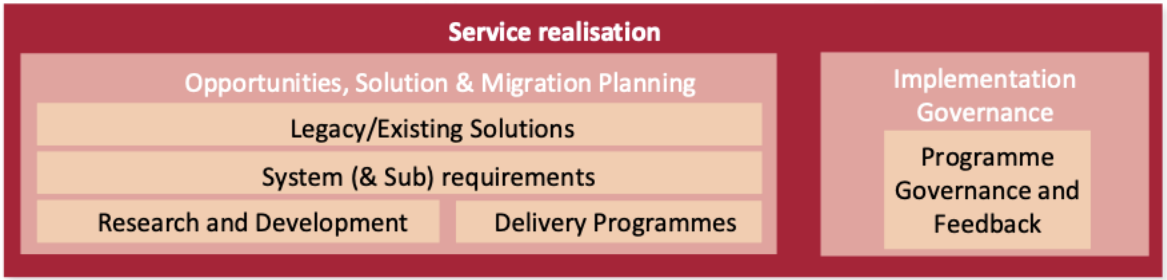
Governance, processes and capabilities





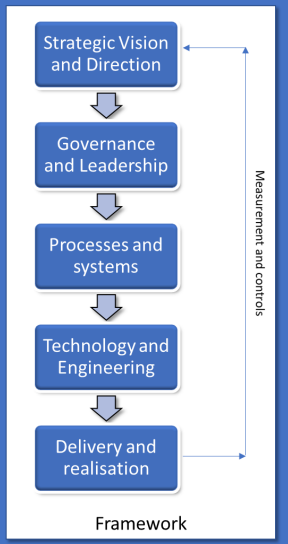
Delivery & Realization

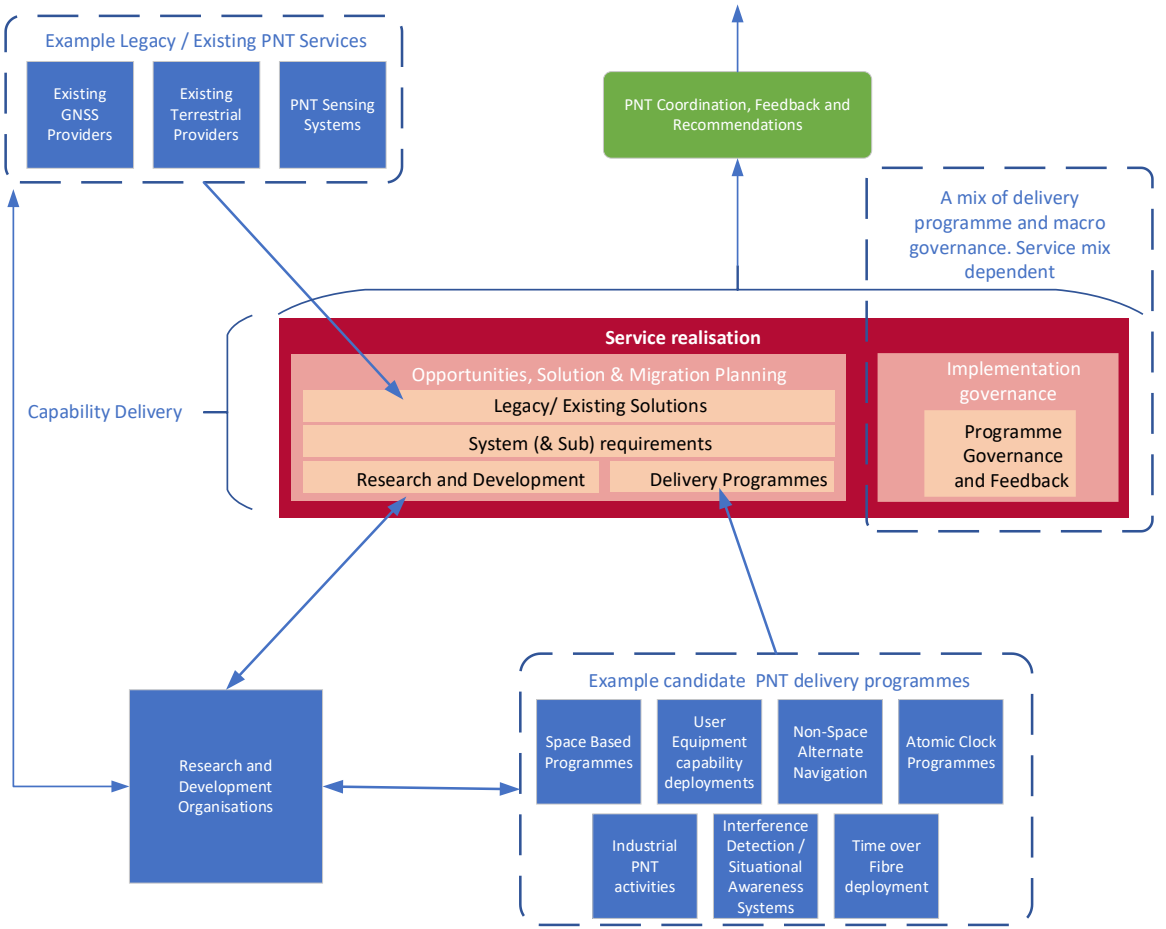




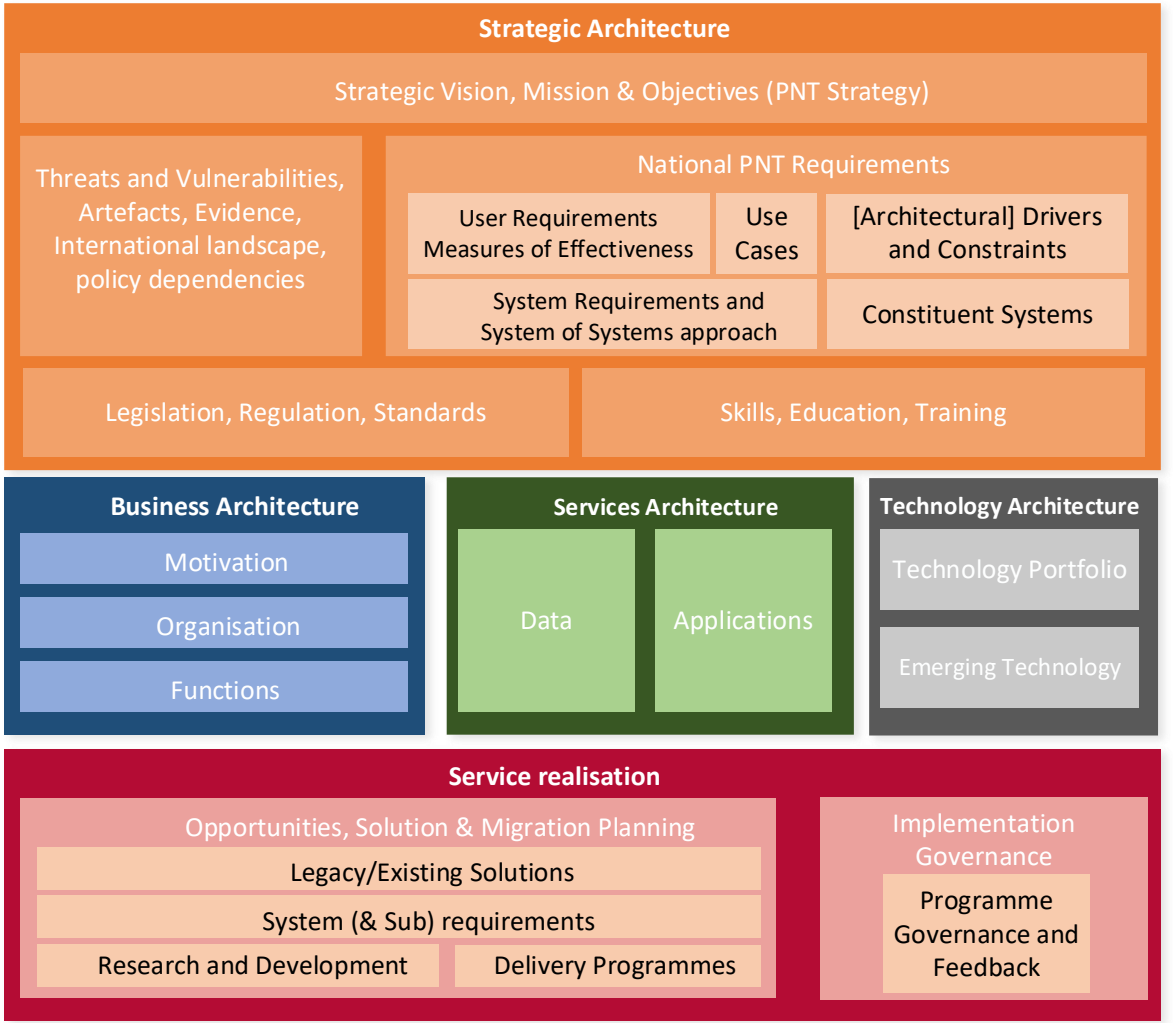
Realization

Solution Mix to deliver Resilient PNT

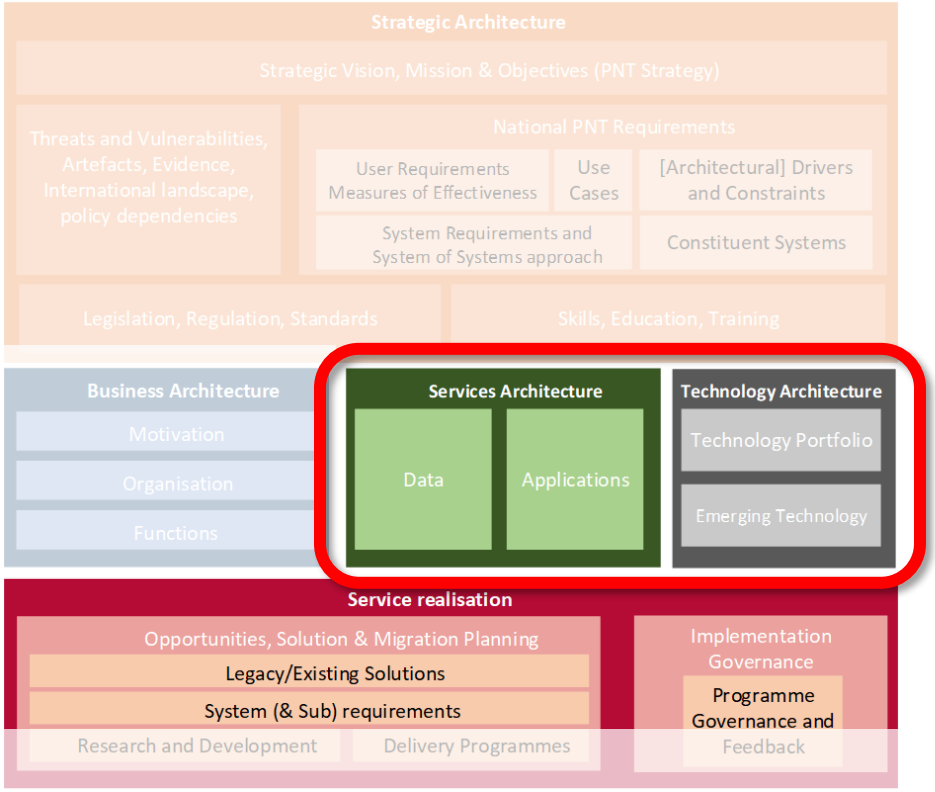




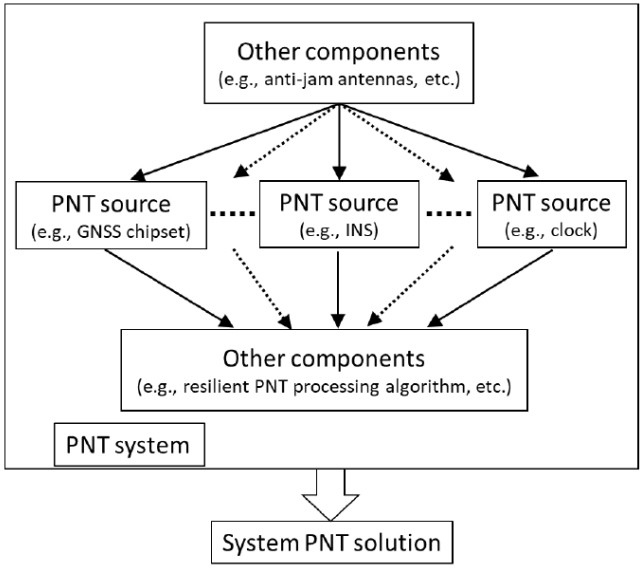
Proposed PNT AF



US PNT Conformance Framework



PNT Conformance framework relationship diagram



Example Delivery Programme

UK National Timing Centre

National Timing Centre (NTC) programme

Develop a resilient timing infrastructure for the UK by building and linking a new atomic clock network distributed geographically in secure locations

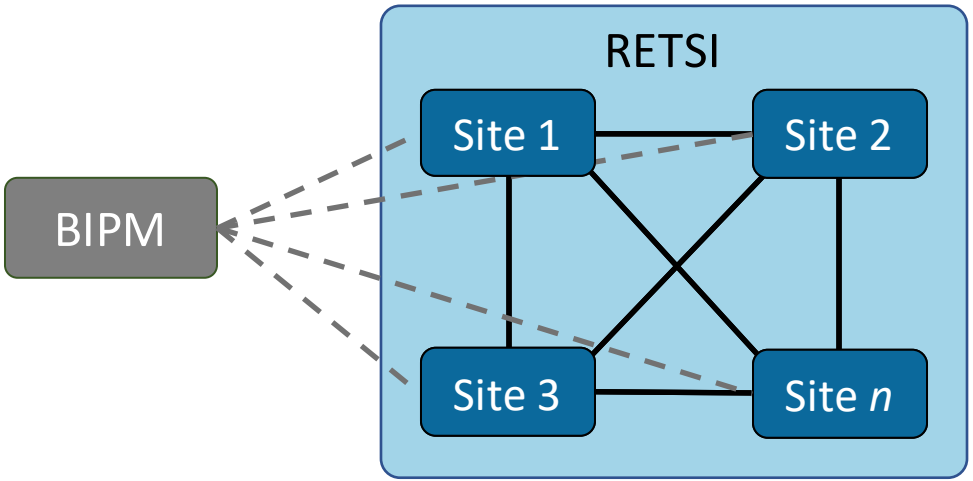
Provide innovation opportunities for UK companies by funding projects in partnership with Innovate UK

Respond to the specialist skills shortage in timing and synchronisation solutions through training opportunities for specialists, postgraduates and apprentices

National Timing Centre (NTC) programme

Resilient Enhanced Time Scale Infrastructure (RETSI)

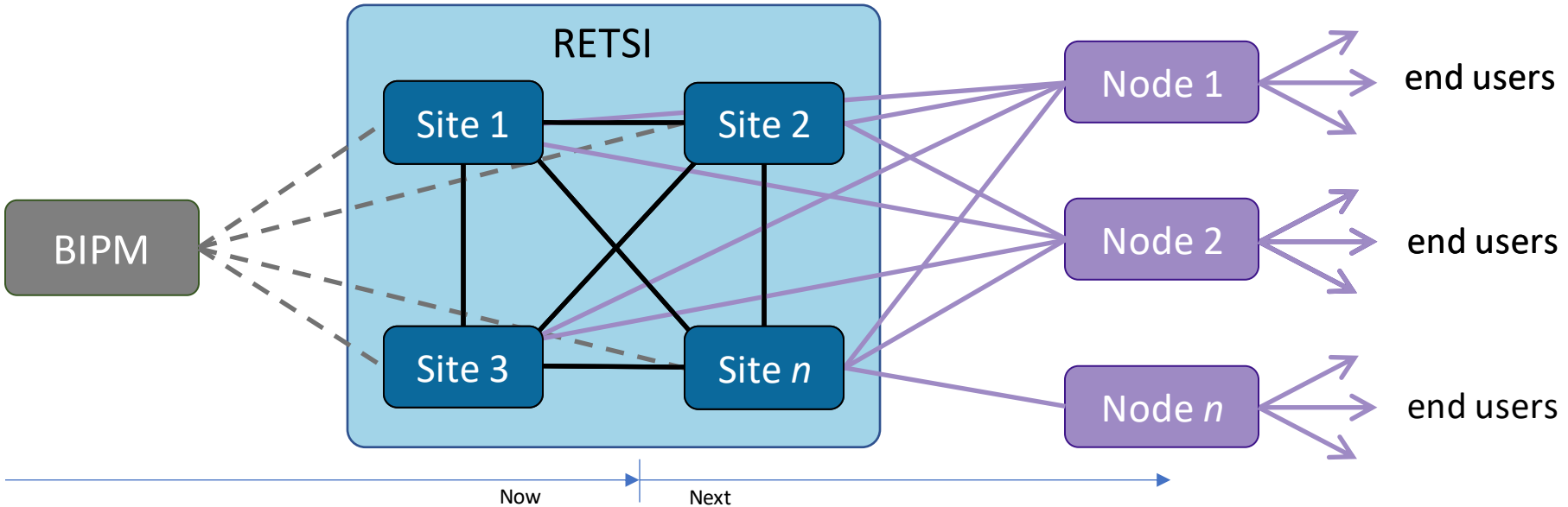
- The resilient core underpinning the National Timing Centre programme
- A mesh of multiple, geographically distributed, linked sites with atomic clocks and other time scale hardware
- Will become the **source of UTC(NPL)**, providing signals traceable to UTC(NPL), and hence to UTC



National Timing Centre (NTC) programme

Access for end users

- Dissemination points (nodes) connected to RETSI will allow end users to access time and/or frequency references traceable to UTC(NPL)
- Testbed developed within the NTC programme will inform the approach to scaling up to deliver services to users across the UK



Take away's

- **This is not someone else's problem**, everyone in the room can act
- Adopting a **strategic approach** to PNT management is **essential to** deliver **resilient PNT**
- This proposed AF can be used to bring together policy, strategy, threats, risk and delivery of capabilities
  - **Flexible** as a framework to adapt to different situations
  - **Agile** enough to incorporate exiting and new regulation, standards, frameworks and approaches
  - Can bring **organisational competence** and deliver resilient PNT services to those who need PNT data
- There are opportunities for organizations and Governments;
- Who will adopt this? **What are "you" going to do** about it.
- If we believe in resilient PNT, **we must act** and lead to capture the opportunities
- Leadership in resilient PNT is there for the taking, but the window to act is small.

There are risks and costs to action. But they are far less than the long-term risks of comfortable inaction.

– John F. Kennedy

Thank you

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Rethink PNT systems and systems engineering

Link to long form paper: Download at RethinkPNT