



NAVISP Element 3 Final Presentation

EL3-045 "PNT Innovation Institute"

Time	Topic	Speaker
10:30-10:35	Welcome	Stefano Binda ESA NAVISP Element 3 Manager
10:35-10:40	Project Introduction	Elizabeth Laier English Technical Officer, ESA
10:40-11:30	<ul style="list-style-type: none">• Introduction to the project• Institutes Review and Stakeholder Engagement• Business Case• Conclusion• Next steps	Andy Proctor, Managing Director RethinkPNT Dean Thomas, Head of PNT Satellite Applications Catapult Andy Proctor, Managing Director RethinkPNT
11:30-12:00	Question and Answers	<u>Moderator:</u> Elizabeth Laier English Technical Officer, ESA



PNT Innovation Institute

Andy Proctor
RethinkPNT

This project will conduct a detailed investigation into the feasibility for, and if feasible, propose a design for a non-governmental function - a PNT Innovation Institute (PNTII)



The National PNT challenge

PNT underpins finance, telecoms, energy, transport, emergency response and defence.

The National Risk Register identifies disruption to satellite-based PNT as a Tier 1 risk.

The UK faces exposure to jamming, spoofing, space weather, GNSS outages and geopolitical dependence.

Studies cite a £7.6bn impact from a five-day GNSS outage, with daily losses around £1.4bn.

Critical sectors

- Financial services
- Telecommunications
- Energy
- Transport
- Emergency services
- Defence

Current strengths

National Timing Centre, eLoran, quantum PNT research, GNSS monitoring, strong universities and specialist firms

Why this is strategic

PNT is both a resilience issue and an economic growth opportunity in a global market projected to expand from \$150bn in 2023 to \$320bn in 2033.



Current UK response: strengths and gaps

Capability exists, but system coordination does not

The strategic argument is that the UK does not need to build capability from scratch; it needs

- a neutral front door
- stronger brokerage; and
- a mechanism to connect existing assets.

This logic is what drives the preference for an institute-led model rather than a new standalone building.

Strengths already in place

World-class research; timing and quantum hubs; strong firms in GNSS, simulation and satellite systems; policy direction via the Framework for Greater PNT Resilience and the National PNT Office.

Structural gaps

Fragmentation across departments, agencies, universities and firms; weak visibility of facilities and expertise; limited cross-sector coordination.

Operational gaps

Difficult access to testing and validation, weak innovation translation from TRL 3–4, skills shortages, and no trusted standards/certification route.



RethinkPNT



What the institute would do

Five strategic objectives in the case

Enhance Resilience

Supporting the acceleration and adoption of alternative and complementary PNT and help critical users assess dependencies.

Drive Innovation

Supporting the improvement of translation from research to deployment and reduce time-to-market for UK solutions.

Build Skills

Assist in the creation of training pathways, CPD, knowledge transfer and a stronger talent pipeline.

Coordinate Standards

Act as a neutral front door and coordinate guidance, standards and UK input to international bodies.

Lead Globally

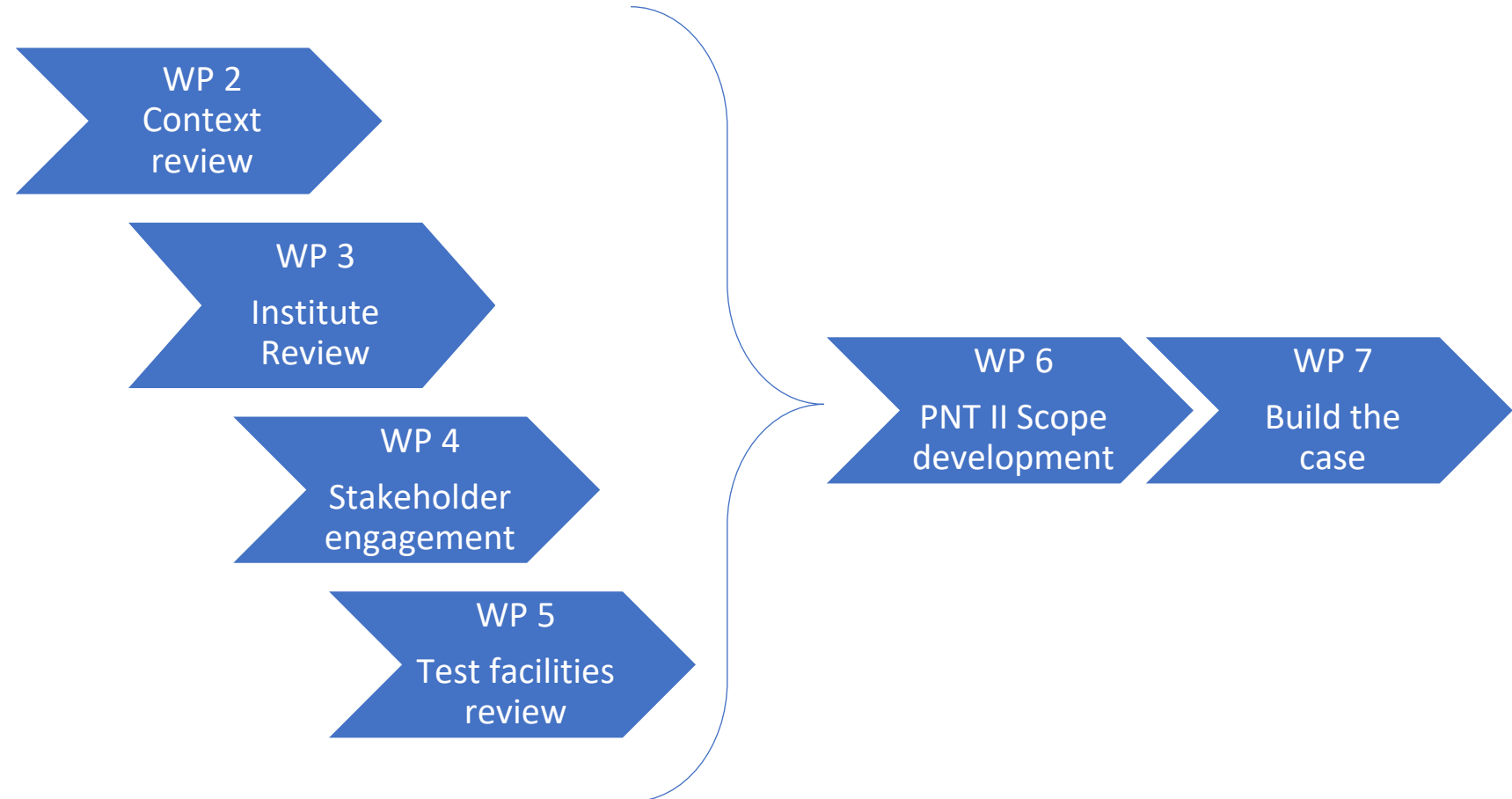
Support export success, alliances and international influence in resilient PNT.

Broker not Builder

A distributed operating model connecting users, facilities, innovators, standards work and skills programmes



The PNT Innovation Institute Project





Institutes Review

Dean Thomas
Satellite Applications Catapult

UK Institutes Reviewed

A longlist of ten institutes was analysed: including the Alan Turing Institute, NPL, Catapult Network, Royce Institute, NQCC, DSTL, Faraday Institution, Smith Institute, Hadley Centre, and Agri-Tech Centre. Followed by a more detailed shortlist of five:

**The
Alan Turing
Institute**

CATAPULT
Network

NPL 
National Physical Laboratory

HENRY : : :
ROYCE : : :
INSTITUTE

**UK
RI**

**National Quantum
Computing Centre**

International Institutes Reviewed

Five international examples provided global perspective:



Strengths across all institutes

**A clear national mission
with political backing**

**Stable, multi-year baseline
funding**

**Structured translation
infrastructure such as
testbeds and demonstrators**

**Convening power that unites
academia, industry, and
government**

**Evidence of impact on policy,
standards, ecosystems, and the
wider economy**

Challenges across all institutes

Volatility in funding and over-reliance on government settlements

Governance complexity in multi-partner models, slowing decisions

Weak longitudinal impact measurement: activity tracked but outcomes less clear

Pressures on talent retention in globally competitive areas

Ageing or capital-intensive infrastructure needing sustained refresh

Strategic Recommendations and Design Signals

1. Define and protect a clear national mandate

2. Secure a stable baseline of public funding

3. Create co-funding and partnership framework

4. Institutionalise translation and adoption

5. Balance frontier science and with applied services

6. Establish lean and accountable governance

7. Measure and publish impact consistently

8. Build a skills pipeline

9. Develop dual-use pathways for defence and civil markets

10. Position the PNTII internationally

11. Deliver early wins to build credibility

12. Invest in visibility and advocacy

Stakeholder Engagement – Key Insights & Methodology

- Methodology
 - Considered workshops, surveys, and interviews.
 - Chose semi-structured 1:1 interviews to obtain honest, detailed insight.
 - Compared stakeholder views against initial assumptions to validate gaps and priorities.
- Stakeholder Selection
 - Stakeholders identified through consortium workshops.
 - Interest/influence mapping used to prioritise groups.
 - Final shortlist included 22 individuals representing government, academia, and industry.

22 interviews across 16 organisations captured the state of UK PNT capabilities and needs.

Key issues: increasing reliance on GNSS, fragmented governance, skills shortages.

Stakeholders see strong assets but persistent gaps in collaboration, visibility, and long-term planning

Capability and opportunities mapping

PNT domain	Current strengths & technical capabilities	Key gaps in skills / facilities / deployment	Opportunity for collaboration & growth
Precision timing	NPL as national timing authority; National Timing Centre with nodes at Strathclyde, Cranfield, Surrey; leading research in optical clocks and time transfer.	Limited uptake of resilient time in critical sectors; patchy distribution of timing infrastructure; few engineers with deep timing expertise.	Use NTC as a national testbed; co-design services with telecoms, finance, energy; joint training programmes in timing and synchronisation.
Alternative terrestrial PNT (eLoran, RF, ground systems)	Government commitment to eLoran network by 2027; lighthouse authorities and UK firms with proven Loran/eLoran know-how; early multi-signal receiver prototypes.	Only a single transmitter in operation today; limited test ranges; few commercial receivers; long-term funding and maintenance model not yet proven.	Co-fund national eLoran roll-out as shared civil–defence asset; open test ranges for academia and SMEs; accelerate dual-receiver and timing-over-eLoran products.
Satellite PNT & augmentation	Strong industrial base (e.g. sat manufacturing, GNSS test equipment); heritage from Galileo/EGNOS; OneWeb PNT trials with NPL; work on UK precise positioning augmentation.	No sovereign GNSS; dependence on foreign core signals; limited domestic chip-level production; uncertainty over long-term augmentation funding.	Develop high-accuracy augmentation services as UK speciality; exploit OneWeb and small-sat platforms for PNT payloads; build a UK supply chain for key GNSS components.
Quantum PNT (clocks & sensors)	>£1bn invested in quantum; QEPNT Hub linking 13 universities; global leadership in optical clocks and cold-atom inertial sensors; strong academic clusters in Scotland, Midlands, South East.	Devices still largely lab-scale; SWaP and robustness not yet at product level; shortages in quantum-skilled engineers; fragile supply chain for specialist components.	Use PNT as a flagship use-case for quantum commercialisation; joint industry–hub demonstrators (e.g. quantum INS on platforms); targeted skills and supply-chain programmes.
Multi-sensor, software & autonomy	Leading research in sensor fusion and AI for navigation (e.g. Bristol, Cardiff, Nottingham, London universities); rich open datasets; strong industry–academia partnerships (e.g. Spirent).	Lack of large-scale, real-world PNT testbeds; fragmented standards for integrity and cyber-security; slow transition from algorithms to products.	Create national “Assured PNT for autonomy” test sites; set UK-led standards for PNT integrity; support spin-outs and SMEs to commercialise navigation software.
Ecosystem & collaboration	National PNT Office and PNT Framework; active professional bodies (RIN, techUK); Catapults and NAVISP projects providing neutral convening space; successful one-off consortia.	Legacy siloing between defence and civil, and between sectors; inconsistent long-term funding for joint programmes; limited visibility of who is doing what.	Establish PNTI (or similar) as a permanent convenor; maintain a living UK PNT capability map; run regular cross-sector calls and demonstrator programmes.

Derive initial PNTII Requirements

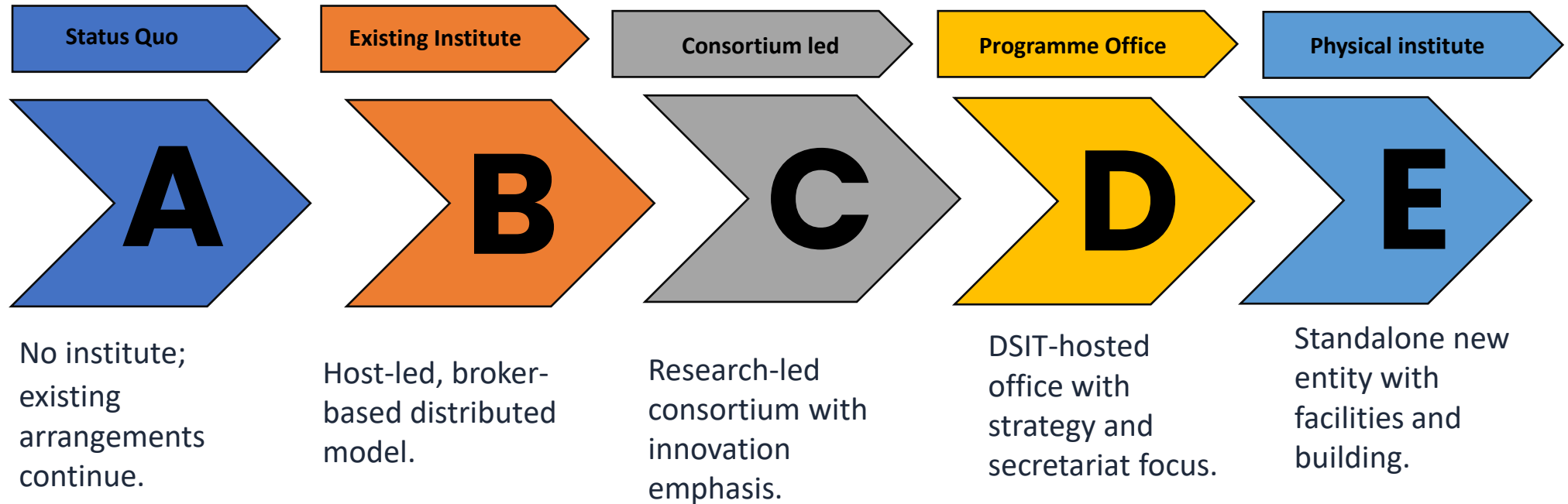
Requirement	Description
R1. Coordination over duplication	The PNTII shall improve coordination, visibility, and alignment across the UK PNT ecosystem (Industry, Academia and RTOs) without duplicating existing organisational roles, facilities, or capabilities.
R2. Single point of access to national PNT capability	The PNTII shall provide a clear and accessible single point of information (“front door”) for UK PNT capabilities.
R3. Tangible value for engagement	The PNTII shall offer measurable, organisation-specific value to stakeholders, such as facilitated access to testing, validation, funding pathways, or influence over standards and roadmaps.
R4. Neutral and trusted convening role	The PNTII shall operate as a neutral, trusted convenor across industry, academia, and regulators, supported by a transparent governance and decision-making processes and coordinated with the NPNTIO in their mirror role in coordinating Government policy.
R5. Support transition from R&D to deployment	The PNTII shall reduce barriers between research, testing, assurance, and operational deployment of PNT solutions.
R6. Facilitate access to testing and validation	The PNTII shall improve access to PNT test environments and facilities by addressing scale, discoverability, access conditions, cost transparency, and consistency of processes.
R7. Enable confidence, assurance, and trust in PNT solutions	The PNTII shall contribute to improved confidence in PNT solutions through support for assurance, validation, and certification pathways appropriate to safety- and mission-critical applications.
R8. Align policy, standards, and operational needs	The PNTII shall act as a mechanism to improve alignment between policy objectives, standards development, and operational user needs within the PNT ecosystem.
R9. Outcome-driven and time-efficient engagement	The PNTII shall prioritise time-bounded, outcome-focused activities rather than open-ended forums or discussion-only engagement models.
R10. Proportionate scale and operating model	The PNTII shall adopt a proportionate operating model, scaling its activities and resource commitments in line with clearly defined objectives and demonstrated stakeholder demand.
R11. Non-competition with industry	The PNTII shall not directly compete with industry for work on delivery programmes as a prime contractor but rather shall assist industry to win funding and deliver on funded projects.
R12. New facilities	The PNTII shall assist industry, academia and government with the set-up of new PNT testing facilities in the UK, with the intention for these to be run by said industry, academia and/or industry.

PNT Innovation Institute Business Case

Andy Proctor

Five delivery options were assessed

The Economic Case compares alternative models for intervention



Why A was rejected

It avoids new direct costs but leaves fragmentation, duplicated effort, slow innovation and national vulnerability untouched.

Why C and D were rejected

C is stronger on demonstrators than neutrality; D aligns government activity but does not deliver brokerage, facilities access or skills.

Why E was rejected

A physical institute offers visibility but is costly, slower to deliver, and risks duplicating existing distributed capability.

Preferred Option B

Leverage an existing institute as the host organisation

1

What

A targeted grant and clear mandate to an existing neutral institute, with a small central team, virtual front door, UK capability map, facility brokerage, innovation de-risking support, and skills/standards coordination

2

Why

Stakeholders like it:
Fast to establish
Neutral and trusted
Avoids competing with industry
Uses existing governance and networks
Fits the distributed UK landscape

3

Why

For the UK:
The case draws on international lessons but adapts them to a UK-specific broker-not-builder model that coordinates access to existing facilities instead of creating a large new campus

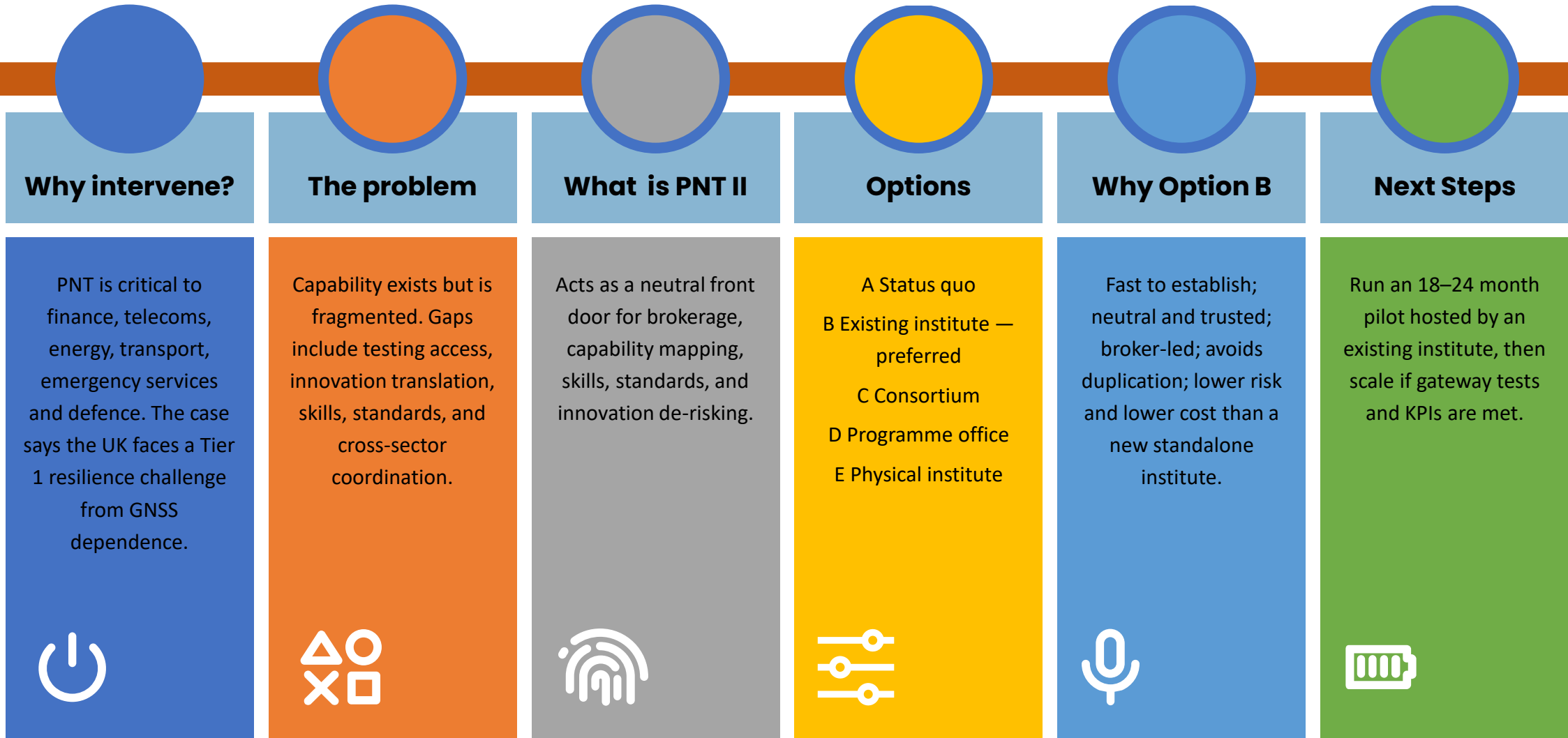
4

How

Host institute:

- Virtual
- 8FTE
- Neutral
- Scaleable

PNT Innovation Institute: Executive summary



£7.6bn
5-day GNSS outage cost

40:1
Option B BCR

£372m
Option B NPV

18–24m
Pilot duration

£5.56m
5-year profile