



NAVISP

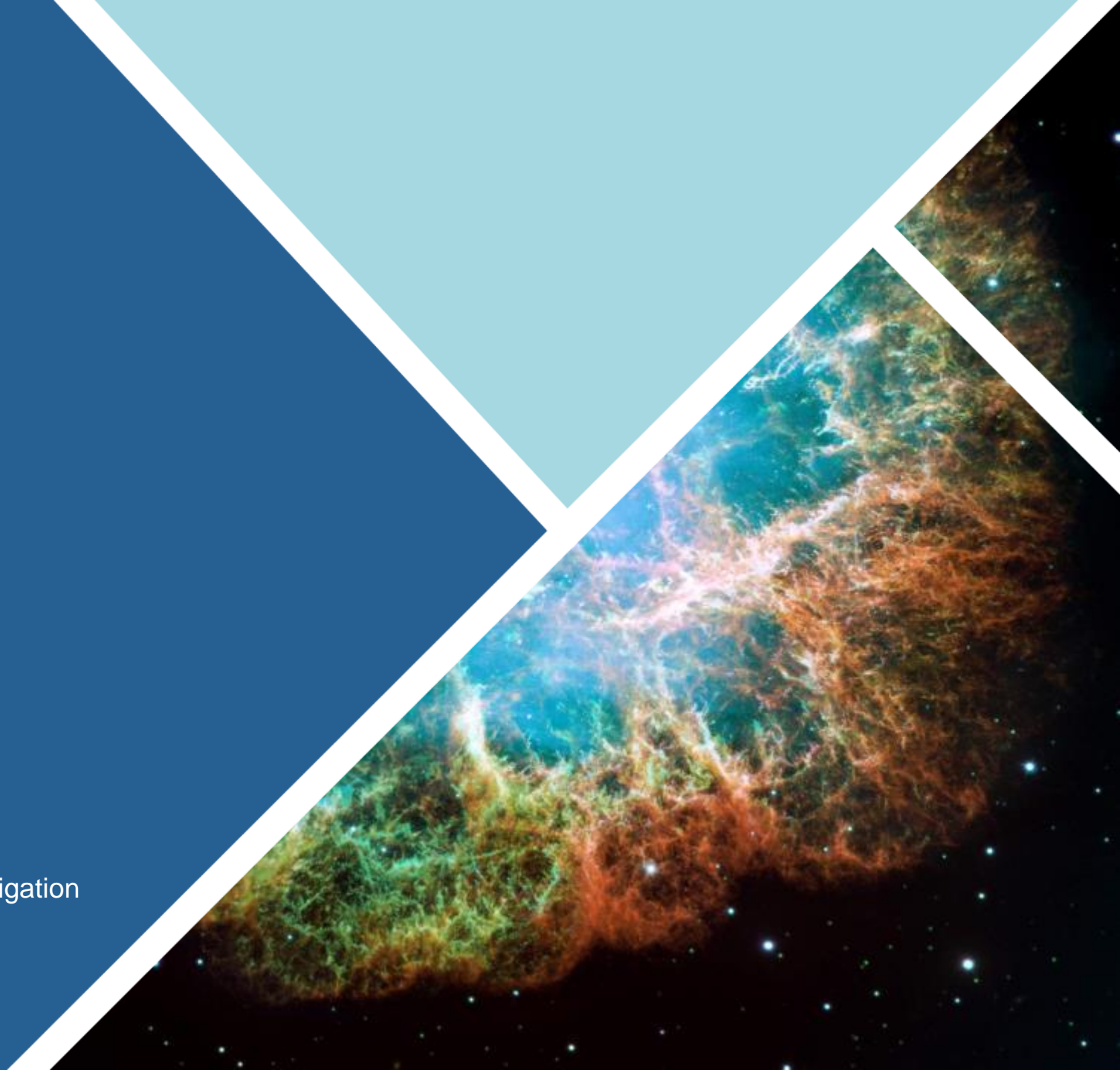
UK Presentation

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UK Space Agency



# Importance of NAVISP in the wider PNT area

## Position Navigation and Timing (PNT) technologies underpin our society

- 13% of UK GDP directly underpinned by GNSS (>£264bn) (£1.8bn/year direct income CAGR 3% on 1.7bn)
- Loss of GNSS would cause ~£1bn day economic impact (Road, maritime, Emergency/Justice biggest losers)
- The GNSS global landscape is changing, technology moving rapidly
- Extent of UK dependency highlighted by Blakett review into GNSS dependency
- Non-GNSS PNT technologies evolving – PNT is not all about GNSS



# Why NAVISP? What benefits does it bring?

- More space/non-space partnerships (**Grow sector**)
- More SME involvement and supporting the £100m / year **growth** in UK PNT sector
- **Develop** innovative new PNT technologies, products and services
- **Grow** the major downstream sectors, secure more business to UK companies and capture more of the market share
- Reduce technical risk (for industry and for the customer)
- **Deliver** confidence and establish trust in PNT systems for the UK
- Continue **ESA reform** and support ECSAT
- Access to ESA technical skills and international collaborative developments



# What has NAVISP done for us?



Low ESA overhead  
(15%)



Short time to contract  
(target 4 months) – agile  
and responsive



Improved IPR and  
product ownership  
contractual terms



60% SME prime overall



Strong commercial focus  
in line with UK approach



Very flexible programme  
– support, blue skies  
work, product and  
service development



15 new UK  
organisations into the  
programme



New space/non-Space  
partnerships created,  
new research orgs  
funded

# Why Element 1?

Perform feasibility studies and viability analysis for the emergence of new concepts in the PNT world



Contributing to the formulation and implementation of PNT technology innovation



Proof of Concept of promising PNT-based services

# Element 2

The activities will be relevant to :

- the space segment,
- the ground segment and
- [PNT] user segment

The activities may address:

- completely new disruptive products,
- upgrading or improvement of an existing product

The activities shall aim to

- result in a product ready for commercial exploitation.
- significantly accelerate a product concept through the valley of death

# What is Element 3 (for us)?

Has enabled us to address the most difficult challenges, a catalyst

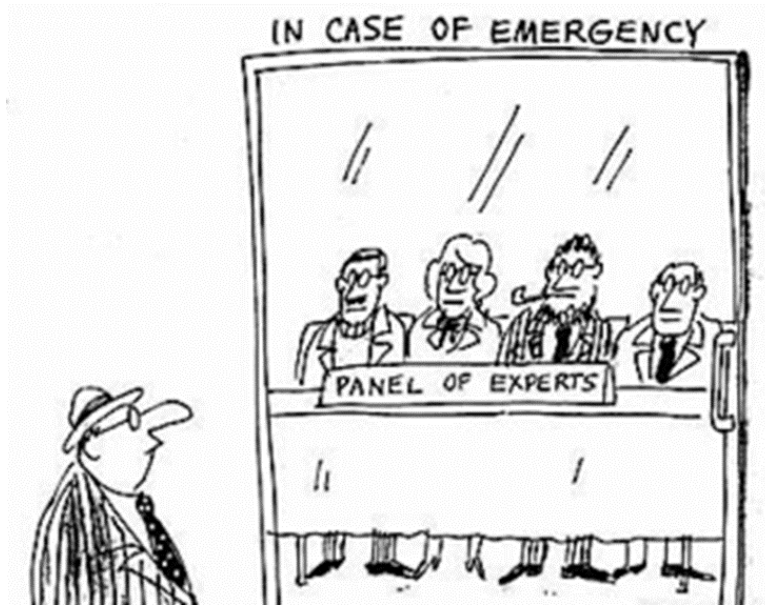
MARINAV the first funded work

Two or three other activities in early forming stage

Key areas are flexibility and agility

Although sometimes ESA is ahead of industry in this area!

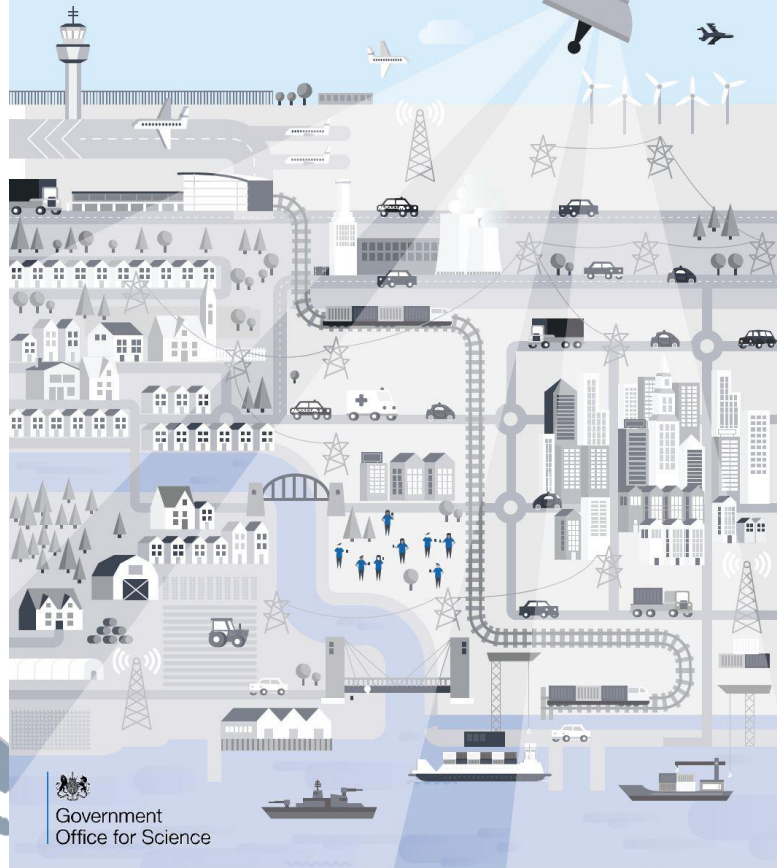
# PNT Government Landscape



- Lets remember...
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## Satellite-derived Time and Position: A Study of Critical Dependencies



## Recap

- Why and how to we use GNSS?
- What sources do we *actually* use?
- What standards & regulations apply?
- Resilience, existing and future?
- 12 recommendations...

# Recommendations recap

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Improve understanding and awareness of dependence on GNSS



Change the way the Government approaches PNT and its guidance to critical services. Mitigating dependence



Improve and strengthen the legislative framework. Prepare for the future



# Key Findings

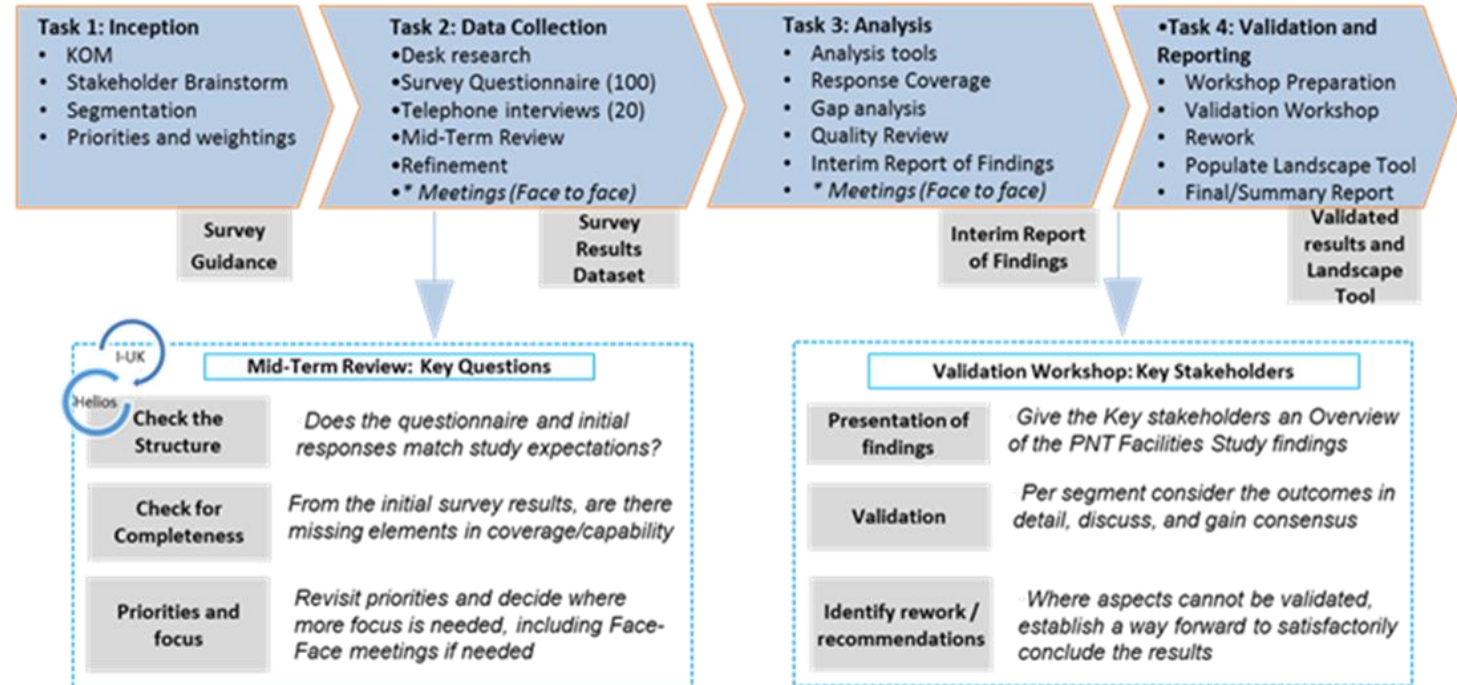
- GNSS awareness out of step with dependence
  - Knowledge of vulnerabilities and weakness of GNSS not widespread enough
  - Resilience improvement is needed across all critical services (inc CNI) including philosophy of approach. No magic single solution.
  - We must prepare now for future technologies, skills and product needs to secure future PNT services
- 
- Protect spectrum and address risks & interference issues
  - Have a formal internal (government) advice system and deploy GNSS backup systems where appropriate
  - Address common terminologies, procurement approaches, legislation,
  - The UK is well placed globally to actually do something about it

So what....

- First up: Recommendation #9
  - What are the UK's PNT facilities?
  - How do people access them?
  - Are they sufficient?

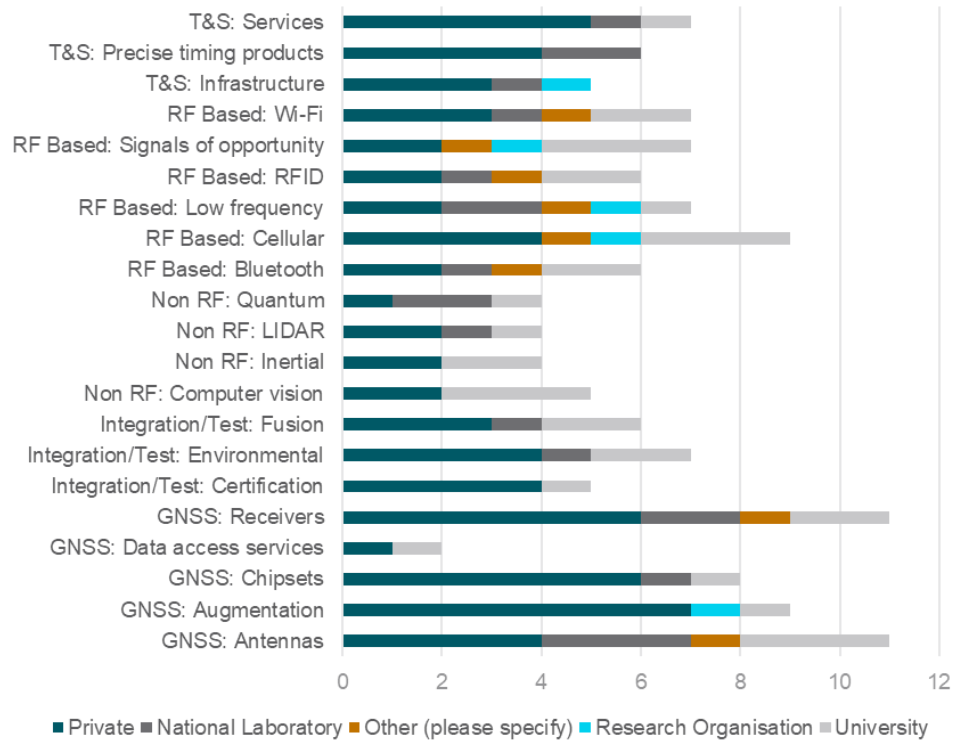
## Overview of the PNT Facilities Study Methodology

A four-step approach from Inception to Validated Results

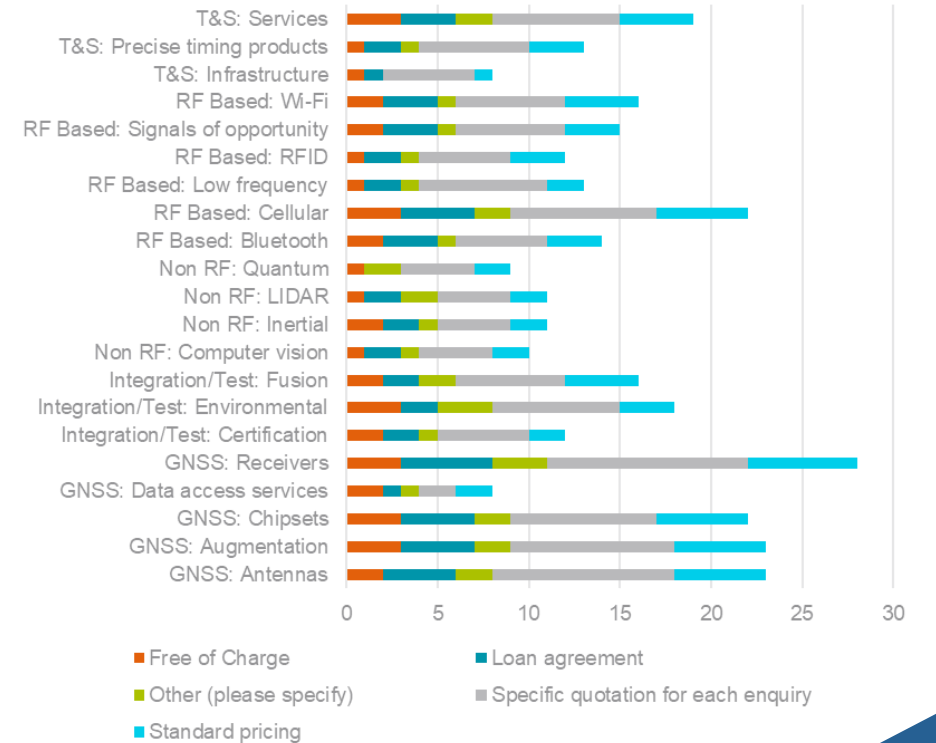


# PNT Facilities Study

PNT technology coverage by facility provider type



Terms of accessing test facilities



# Blackett Review Implementation Group



Policy focused cross-government formal group



Chaired by the Cabinet Office



Reporting to the National Security Framework

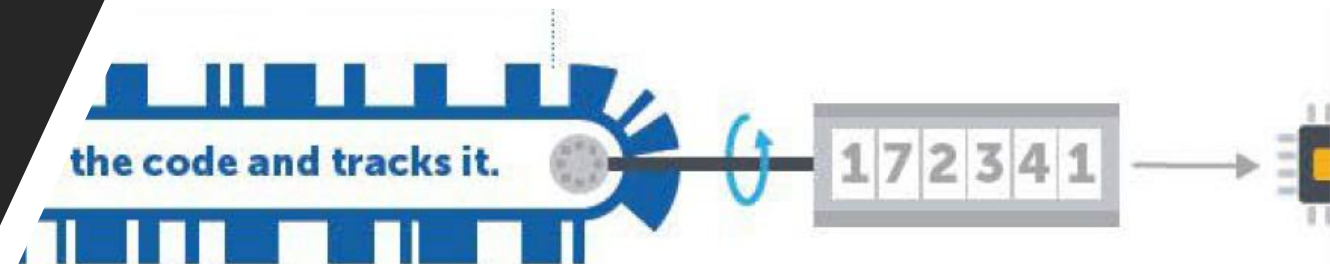


MI Government

# Other work - PNT Technical Group

- Fully formed
- Academia, Industry & Government Partnership
- Currently addressing awareness, guidance standards and evidence
  - Will be via Element 3
- Co-Chaired by Royal Institute of Navigation

Time to first fix	
Re-acquisition time	
Operation in non-GNSS conditions, including timing outputs	
Long-term operation	
Operation in poor RF environments	
Operation under conditions of GNSS data/system errors	
Ability to flag when subject to interference	
Continuity	Ability to switch between PNT sources, as necessary Continuous output, regardless of environmental conditions
Accuracy	Position and time accuracy within required parameters Accuracy specifications in harsh conditions



**By multiplying the time of a signal's flight from a satellite by the speed of light, a receiver can determine the distance between it and the satellite. The difference between the actual distance and the distance calculated from the time measured at the receiver is called a pseudo range.**

# Summary



The UK continues to support all elements of NAVISP



Element 3 is a catalyst to getting things done

Not always at my speed



Need to address coherently new PNT technology development to ensure continued UK leadership and economic success.



Programme is PNT (not GNSS), and combines space and non-space technologies (unique in ESA).



Complimentary with UK GNSS ambitions, and exploitation of space systems.



It's working!