

nauisp

An enabler supporting European competitiveness in the PNT sector



What is nauisp?



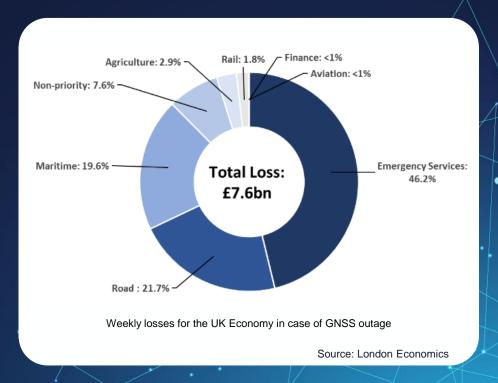
nauisp: NAVigation Innovation and Support Programme:

- ESA's programme focusing on PNT (Position, Navigation, Timing) innovation and competitiveness
- Supporting Participating States' PNT champions sharing and mitigating R&D and market risks
- Leveraging on ESA's heritage on European GNSS

Some highlighs on PNT:

- In 2023, GNSS was approximately 65% of the total downstream space market..
- GNSS is today the dominant PNT technology
- PNT systems serve as a fundamental component of modern infrastructure
- PNT disruption poses major negative consequences across the economy.

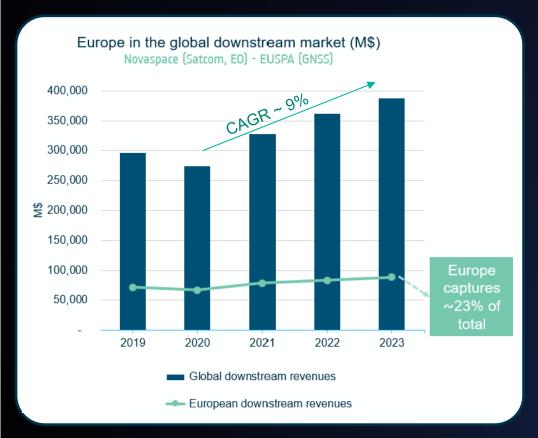






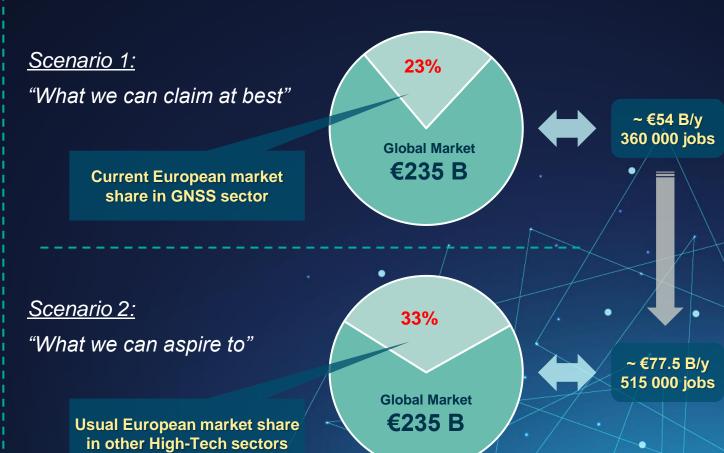
The European Context





- Global downstream market ~\$400 B (€361.5 B), 65 %
 for GNSS (2023)
- > 90 % is commercial and accessible to European industry
- Europe losing market share in PNT (EUSPA / EIB)

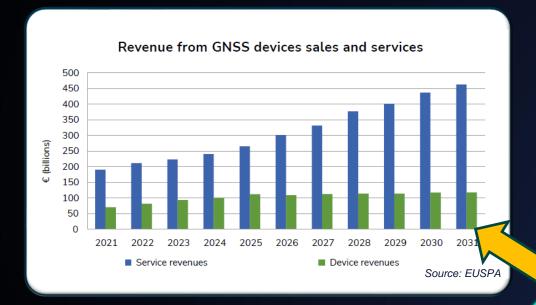
European GNSS Downstream Global Market Share



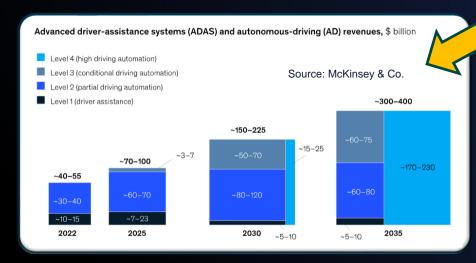
Source: Space Y / ESA

The PNT Opportunity









PNT is more than GNSS

...and others



→ THE EUROPEAN SPACE AGENCY

nauisp: Advancing commercial PNT





- Commercial / demonstrators
- Hosted payloads
- PNT-enhanced space operations

Commercial PNT Missions / Payloads



- GNSS receivers / components
- PTA Protect, Toughen, Augment
- Alternative PNT

PNT user segment products



Autonomous Mobility / Logistics



Geodesy





Timing Dual use



Value – added products / services for PNT markets



- Mitigate market leaders / owners R&D risk
- Establish coordinated action across market owner supply chain
- Support market owner ecosystem



Partnerships

nauisp: Commercial PNT Missions



ICING – Independent Critical Navigation:

 Understand satellite / terrestrial VDES capabilities as an alternative PNT system for maritime environment

MAPS – Maritime Alternative PNT Solution:

- Commercial demonstration of a hybrid space (4 satellites) / terrestrial VDES-based PNT system for maritime
- Full solution targeting GNSS independence in maritime environment



DOVER / PENRYN:

 Demonstration satellites to understand the commercial case behind selling PNT as a by-product out of different satellite capabilities



Satellite-based Quantum Time Transfer (QTT):

- QTT demonstration targeting picosecond accuracy between terrestrial and satellite clocks
- Develop the case for a global QTT hybrid system

nauisp: Partnerships



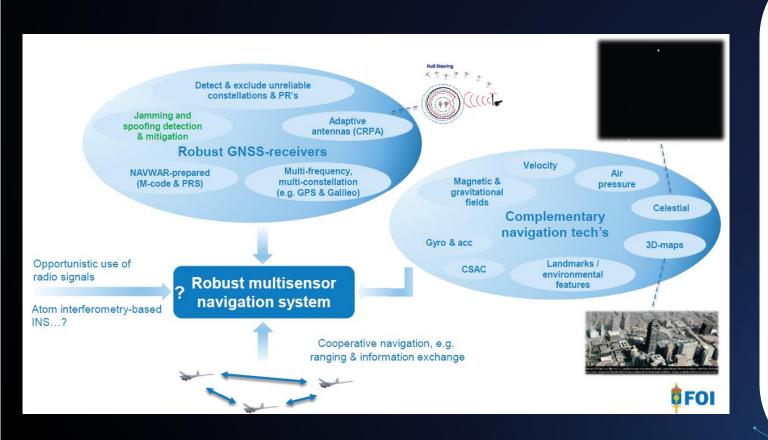
Market owners are the downstream markets gate keepers





Dual-use dimension in nauisp









Science & Technology Trends 2020-2040

Exploring the S&T Edge

NATO Science & Technology Organization

- Quantum sensors, timing
- PNT cybersecurity
- Precision Navigation Sensors
- UxV: Unmanned x Vehicles
- Robotics
- Al for PNT

PNT resilience – Timing & the UK Case



Timing is used in everyday life, but we don't notice:

- Financial services
- Power grids
- Telecommunication networks
- Data centres & cloud computing

Loss of PNT & Timing highlighted as the highest non-catastrophic risk in UK's National Risk Registry

PNT Resilience

PNT (Positioning, Navigation and Timing), is a technology vital to the functioning of Critical National Infrastructure and underpins many everyday activities in modern society.

Why PNT matters

PNT underpins the safe operation of Critical National Infrastructure and many everyday activities in modern

- · Our travel cars, trains and planes
- Our telecommunications phones and TV
- · Our computers and internet
- · Our emergency services ambulance, police and fire

· Our personal navigation -

- · Our finances mobile banking
- maps on mobile phones
- touch payments and

Why PNT is at risk

The UK's PNT is almost completely provided through Global Navigation Satellite Systems (GNSS), primarily the US Global Positioning System (GPS), which is operated by the US

There are many potential major disruptions to GNSS provided PNT, including hazards like severe space weather and catastrophic technical failure, and threats like cyber and physical attacks.

What is PNT?



Navigation, the ability to determine current and

Timing, the ability to acquire and maintain accurate and precise time from a standard anywhere in the world.

HM Government

What will HMG do?

Strengthen the resilience of the PNT services on which our Critical National Infrastructure and economy depend by scoping a new **Government Policy** Framework for Greater PNT Resilience.

Government Policy Framework for Greater PNT Resilience will scope the proposals below

National PNT Office

PNT Crisis Plan

National Timing Centre

MoD Time

Enhanced Long Range Navigation (eLORAN)

Next Generation PNT

PNT Growth Policy

PNT Skills

Satellite Based Augmentation System (SBAS)

Infrastructure Resilience





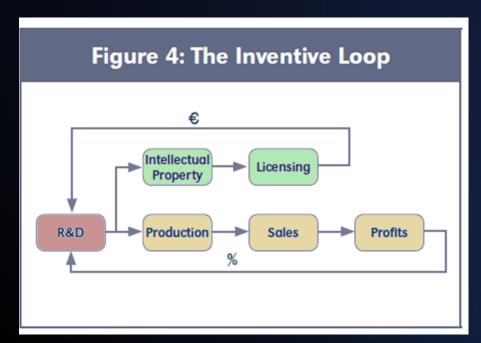
Intellectual Property

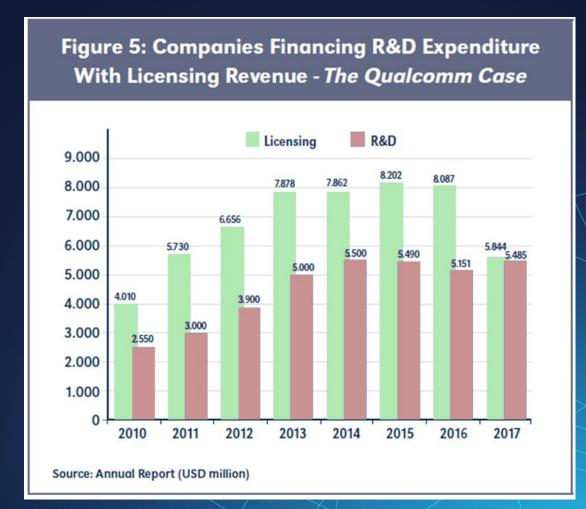


IP, key to finance future R&D and company growth

- Intangible assets like IP and brand represent 80 % of industry market value.
- Patents are key to productise and sell IP.

IP as a selling product financing industrial activity: royalty, licensing, rebating, ecosystem development







navisp DAYS 2025 INDUSTRY

MARCH 04-05, 2025 LONDON

INNOVATE, INTEGRATE, ELEVATE: **POWERING GLOBAL PNT COMPETITIVENESS**













NAVISP: a programme with high impacts



240 M€ ESA 54 M€ cofund 350 projects 300 E.O. > 1300 jobssustained35% new> 370 student

> 90% commercial success in EL2

70% of commercial revenue from exports

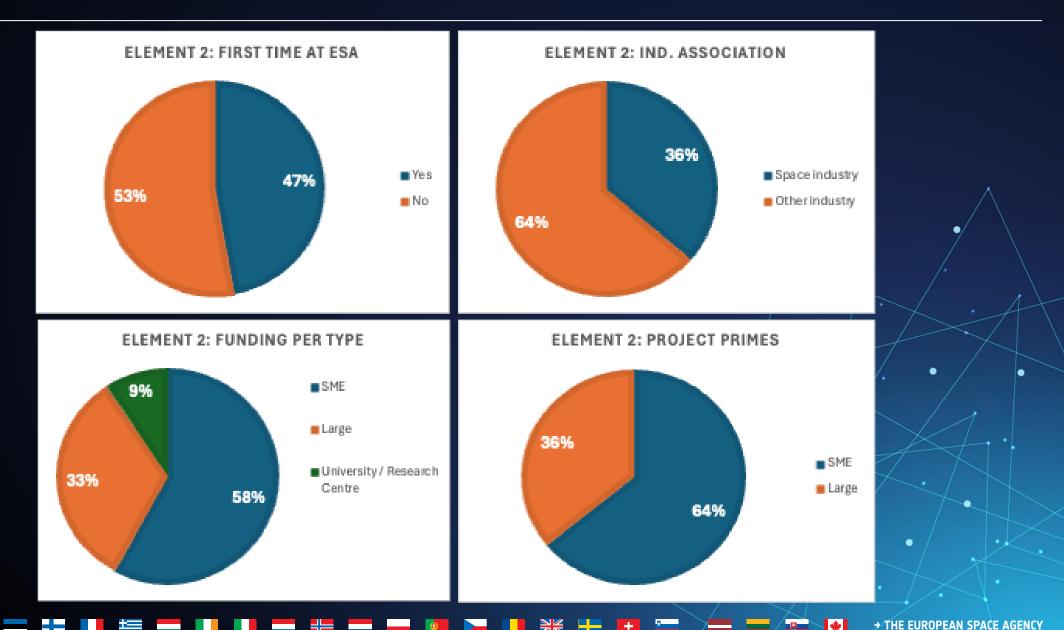
1 M€ NAVISP results in 1.8 M€ in GDP

> 55 % ROI over 10 years



NAVIPS succeeds in enlarging the PNT ecosystem





NAVISP EL1 firsts in PNT

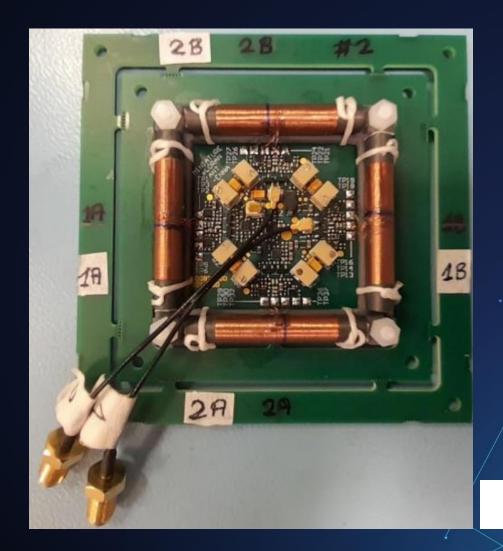
esa

- 2018: first LEOPNT studies
- 2018: first crowsourced smartphone PNT applications
- 2019: first quantum sensor studies
- 2019: first AI studies applied to PNT
- 2020: first lunar GNSS receiver studies
- 2021: first crowdsourced ionosphere mapping app, referenced by Google Research
- 2022: first application of photonics to PNT user equipment
- 2022: first miniature eLoran antenna
- 2023: first minituarized GNSS/Low RF receiver
- 2024: first study on verifiable Al for PNT
- 2025: first study using Muons for underwater and underground PNT
- 2025: first study of a quantum PNT receiver





EL1: Miniature eLoran antenna = 50 mm x 50 mm x 35 mm





NAVISP EL2 supports market owners to meet their demands for advanced PNT





NAVISP EL2 supports Alt-PNT commercial opportunities





EL2 project being initiated by a consortium of NO, DE and UK companies to develop a "Maritime Alternative PNT Solution (MAPS)" based on VDES-R technology

NAVISP EL2 supports Alt-PNT commercial opportunities

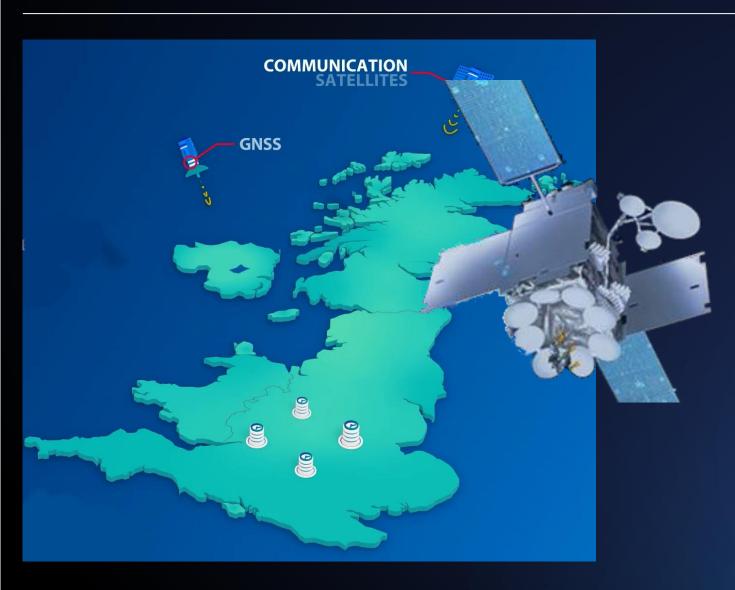


The "5G Broadcast PNT" project demonstrated the first European real-world test of 5G broadcasts from TV tower stations to deliver PNT information.



NAVISP EL2 supports Alt-PNT commercial opportunities





EL2 project 'Global Xpress
Precision Time Transfer from GEO'
is a proof-of-concept for a new
GNSS independent time service by
Viasat

NAVISP EL3 supports national strategies on PNT Resilience



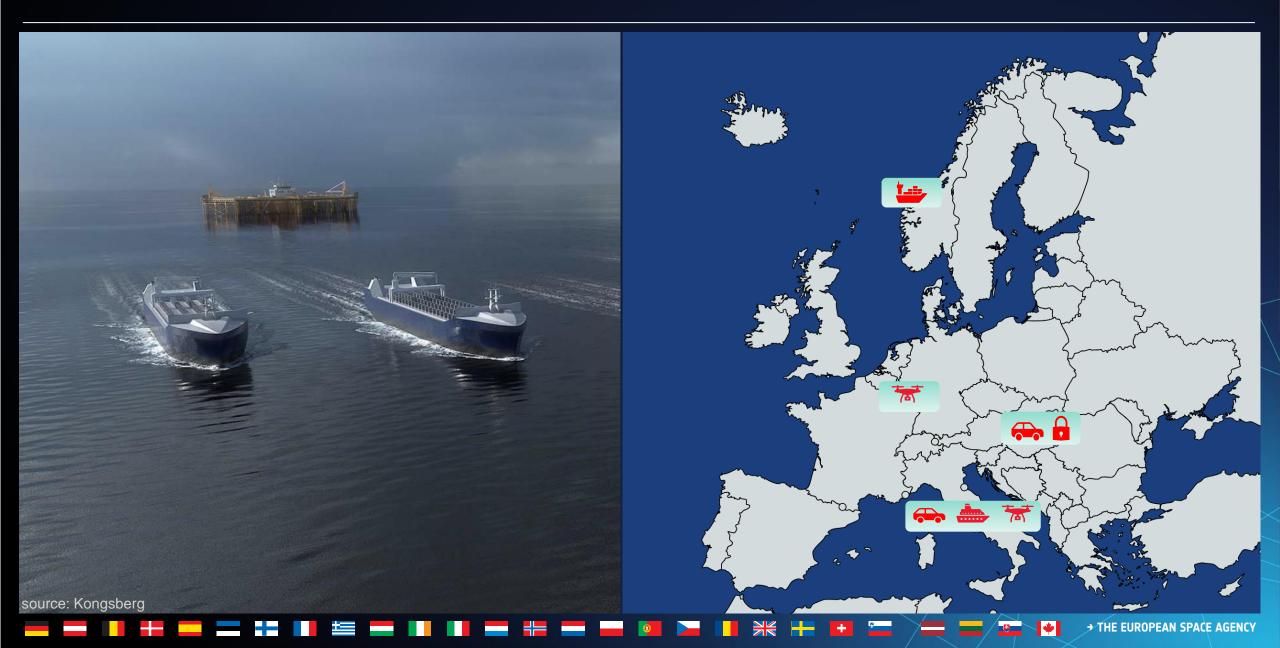
 Main projects in support of UKPNT Office:

- GNSS RF monitoring
- eLoran
- TWSTF
- SBAS



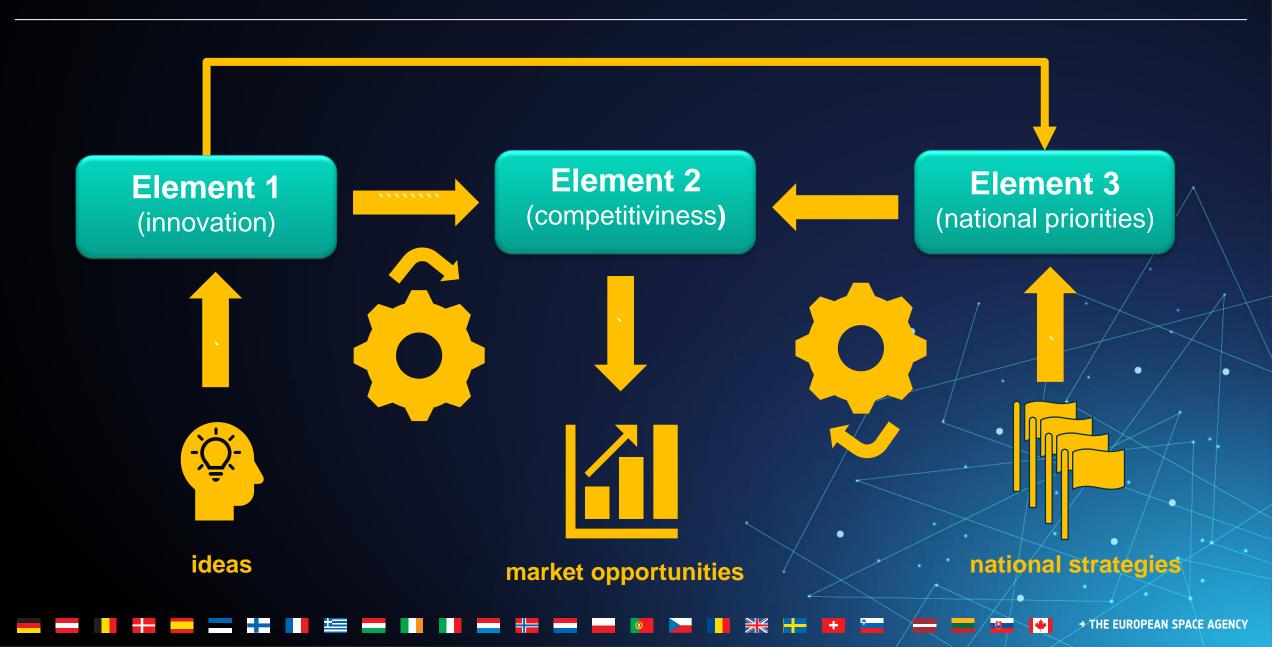
NAVISP EL3 is establishing PNT Test-Centers across Europe





The NAVISP machine is working







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