# NAVISP- Increasing Competitiveness Element 2

NAVISP Industry Days – ESTEC – 16th and 17th June 2022

16/06/2022

# Element 2 Agenda

## NAVISP Element 2: "Increasing Industrial PNT Competitiveness"

| Topic | Speaker | Organization |
|---|---|---|
| Introduction | A.Fiumara | NAVISP Element 2 Manager, ESA |
| Key Speaker | B.Deisting | Director Space and Space Application, bavAIRia e.v. |
| 105-5G Drone Positioning | D. Hudson | CGI (UK) |
| 103-PPP-RTK High Precision Solution | B. Marciniak | Rx Networks (CND) |
| 115-Road Sounder | M. Mattioli | Arpsoft (IT) |
| 034-Interference Monitoring and Detection System | E. Obiols and L Tortajada | INDRA (ES) |
| 010-PNT Cyber Response Center | L. Canzian | Quascom |
| Q&A | | |
| Networking Cocktail | | |

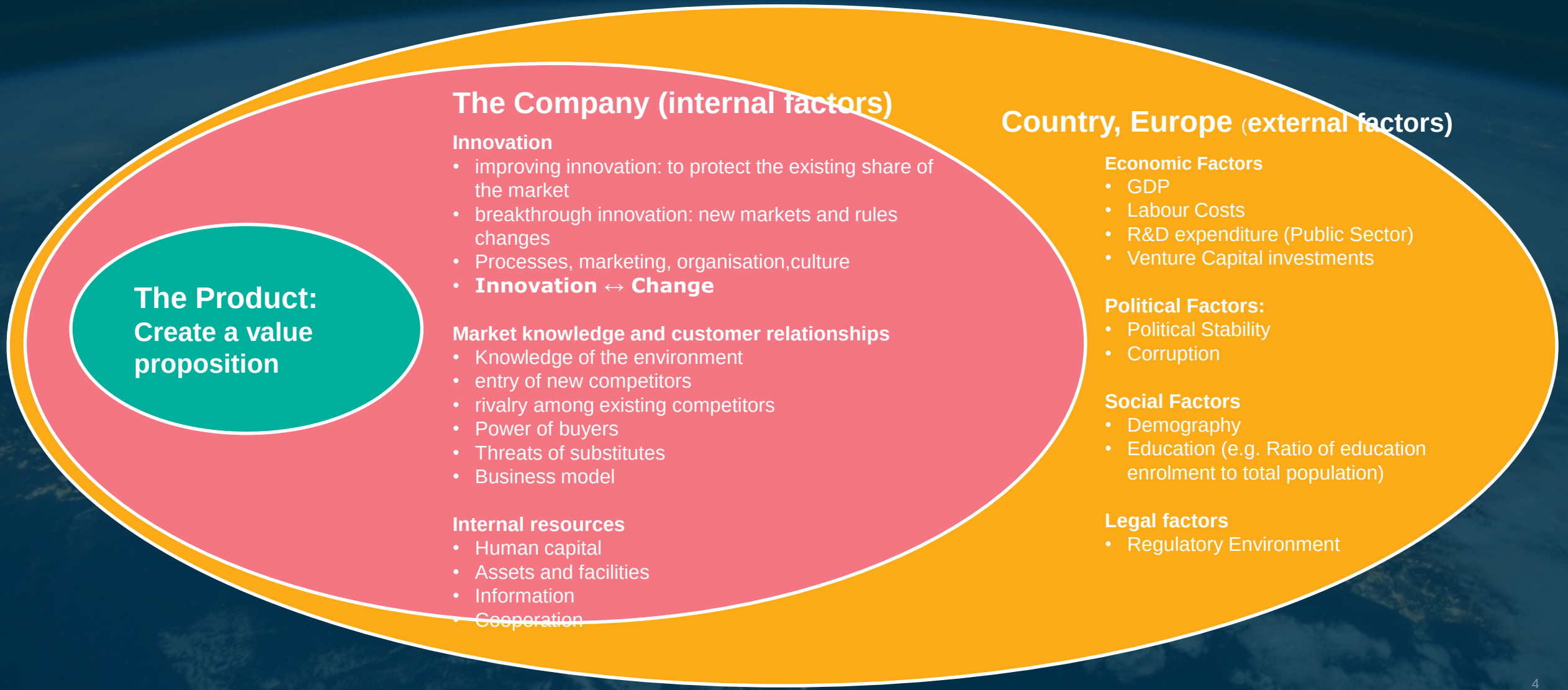
# Increasing competitiveness

"Never compete, create."— Earl Nightingale

"Competition is overrated. In practice it is quite destructive and should be avoided wherever possible. Much better than fighting for scraps in existing markets is to create and own new ones."— Peter Thiel

"Competition should not be for a share of the market-but to expand the market."— W. Edwards Deming

# Increasing Competitiveness: The European Innovation System



# Increasing competitiveness: the PNT context

**Alternate commercial PNT upstream**
Competing PNT companies are joining forces to accelerate efforts to back up global navigation satellite systems (GNSS).The **Open PNT Industry Alliance (OPIA**) was formed last December growing support for alternative capabilities to improve the resiliency of satellite navigation systems that increasingly underpin modern life.It comes as the U.S. government steps up measures to **encourage more companies — particularly those in telecoms, utilities, transportation, defense and other critical infrastructure sectors — to implement some form of protection for GPS-based services.**
Reston, Virginia-based Satelles
Satelles' Satellite Time and Location solution

**Downstream in every sector of the economy**
The global GNSS downstream market has seen considerable growth and will continue to grow rapidly. According to EUSPA's market report, the overall installed base of GNSS devices will grow from 6.5 billion units in 2021 **to 10.6 billion units in 2031**. Further, the global GNSS downstream market revenues from both devices and services is forecasted to grow from €199 billion in 2021 to €492 billion in 2031.

**Many more alternative PNT technologies have emerged in recent years** as improving GNSS capabilities is seen as a key enabler for autonomous cars, drones, ships and other emerging industries.

Stellantis today (April 24th)announced the launch of its first venture **capital fund that will invest €300 million** in early and later-stage startup companies developing innovative, customer-centric technologies that could be deployed within the automotive and mobility sector.
**Volkswagen and Porsche will launch their own constellation of satellites for sef-driving cars**

**PNT sector**

- **Open market, rapidly increasing**
- **New emerging businesses**
- **Multiple actors, non specifically belonging to space (ICT, big market owners)**
- **Wide variety of technologies (cloud technologies, IA, ML)**

**A highly competitive arena**

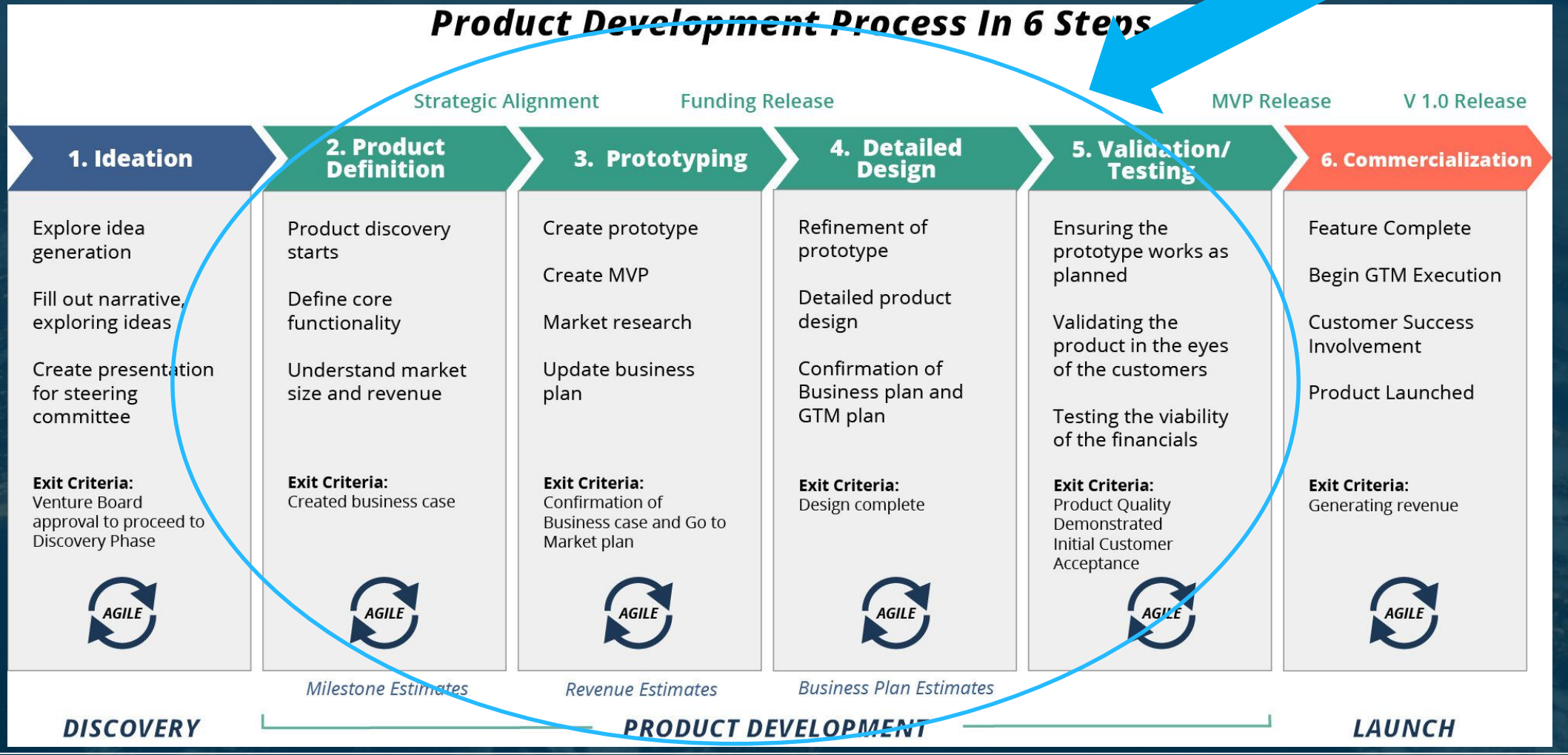
# NAVISP Element 2

"The **goal** of Element 2 is to **maintain and improve the competitiveness** of the industry of the **participating States** in the **global market** for Satellite Navigation, and more broadly **PNT technologies and services". (NAVISP Declaration-Annex A art.II.1)**

# NAVISP Element 2 - the product development phases

**Element 2 will ensure the readiness of the industry to effectively respond to emerging market opportunities by focusing its activities on products ready for the market : retirement of technological, market and regulatory risks**

NAVISP Element 2



# NAVISP Element 2 : ex ante

- **Companies applying for Element 2 shall provide: Competitive advantages and market addressed**

| Product vs needs | Addressed market | Elements impacting product adoption |
|---|---|---|
| Key Product Characteristics<br>Identified addressable needs/ Customer benefits: … <br>Product Innovative Characteristics: … |  | ○ Product Viability<br>○ Customer Buying Process<br>○ Resistance to Change<br>○ Competitive affordable Products<br>○ Regulatory Barriers<br>○ … |

- **Companies applying for Element 2 shall provide: Business model and commercial strategy**

**Intended Business Model**

- Sale of IPR/licence
- Support in Market Introduction of the Product
- Support in Product Improvement
- Direct Sale of Product/Service B2B / B2C
- …

**The commercial strategy**

- To meet the new need of the major customer or
- To create a new product line or
- To increase the share of the traditional business model or
- To advance in the technology readiness of the product portfolio or
- To conclude strategic agreements

# NAVISP Element 2 : ex post assessment

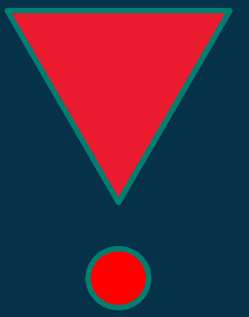
| | |
|---|---|
| **Market increase** | • Increased market share of existing market<br>• Access to new markets (new geographical markets for markets where the company was already accessing, Access to new sectorial markets, any competitive lead in a specific market acquired?) |
| **Technological advantages acquired** | • Technical innovation/ Most competitive product characteristics: (quality/performance, Costs, Increased product portfolio, Enhancement of the staff's skills and knowledge, TRL increase enabled by the project, Technology transfer for or from the project execution ( spin-in/spin-off) , IP/patents) |
| **Managerial Enhancements** | • Increased efficiency through improvement of internal processes and operations<br>• New management skills acquired according to Management requirements of the Call (including risk , register, test plan, validation plan, Gant, Business models methodology) |
| **Company's development** | • Additional sales<br>• Proportion in home country/ in EU/ WW<br>• New customers acquired (number/nature/names),<br>• Gross Value Added, New facilities/assets developed<br>• New partnerships established (in home country, in EU, WW),<br>• Jobs created or maintained by the project / Jobs created or maintained by additional sales (in home country, in EU, WW) |
| **Future of the Project** | • After conclusion of the activity with ESA, were additional funds/activities needed to put the product on to the market ? Value of these additional investments? Were these funds from external sources (external public/private) or own investments?<br>• Would a further support by ESA needed/helpful? What kind?<br>• What is the time after the conclusion of the project with ESA to have the product on to the market? |
| **Benefits working with ESA** | • What is the most important benefit from working for ESA?<br>• Would you benefit from partnering with other international entities to improve the effectiveness of the development?<br>• Would you benefit form a support by ESA to protect the IPR developed during the activity (e.g. definition of the strategy for the protection of the intellectual property and its commercialization, patent application, etc.) |

# NAVISP Element 2 implementation

- ✓ Participating States: AT+BE+CA+CH+CZ+DE+DK+ES+FI+FR+GB+HU+IE+IT+NL+NO+PL+PT+RO+SE
- ✓ Financial envelope for industrial activities (Ph1 and Ph2, mec): 85,5 M€
- ✓ Implemented through a permanent Open Call: the industry is the LEADER
  - ✓ **Streamlined procurement process: two step approach and contract award in 4 months**
  - ✓ **Direct negotiation framework with Letter of Support by Delegation**
  - ✓ Activities are **fully funded or co-funded** (80% for SME, 50% for large companies 100% for research centers and institutional actors)
  - ✓ **Advanced payment** upon contract up to 35% (for SME)
  - ✓ All information is treated as **sensitive**
  - ✓ **IPR** remains with the Contractor
  - ✓ **Transferable product ownership** upon contract completion
- ✓ ESA in facilitating mode

# NAVISP Element 2 implementation

- ✓ 70% of the funds engaged
- ✓ More than 90 M€ overall injected in the PNT European ecosystem
- ✓ 140 Outline Proposals received
  - ✓ 117 positively assessed
    - ✓ **100 Contracts awarded**
      - ✓ 34 completed
      - ✓ 66 on going
    - ✓ 8 Full Proposal under evaluation
    - ✓ 9 Full Proposal to be submitted
- ✓ Different sizes and duration of contracts
  - ✓ Cost from 60 k€ to 2 m€
  - ✓ Duration from 6 to 30 months
- ✓ Different stages of development (focusing on products ready for the market)

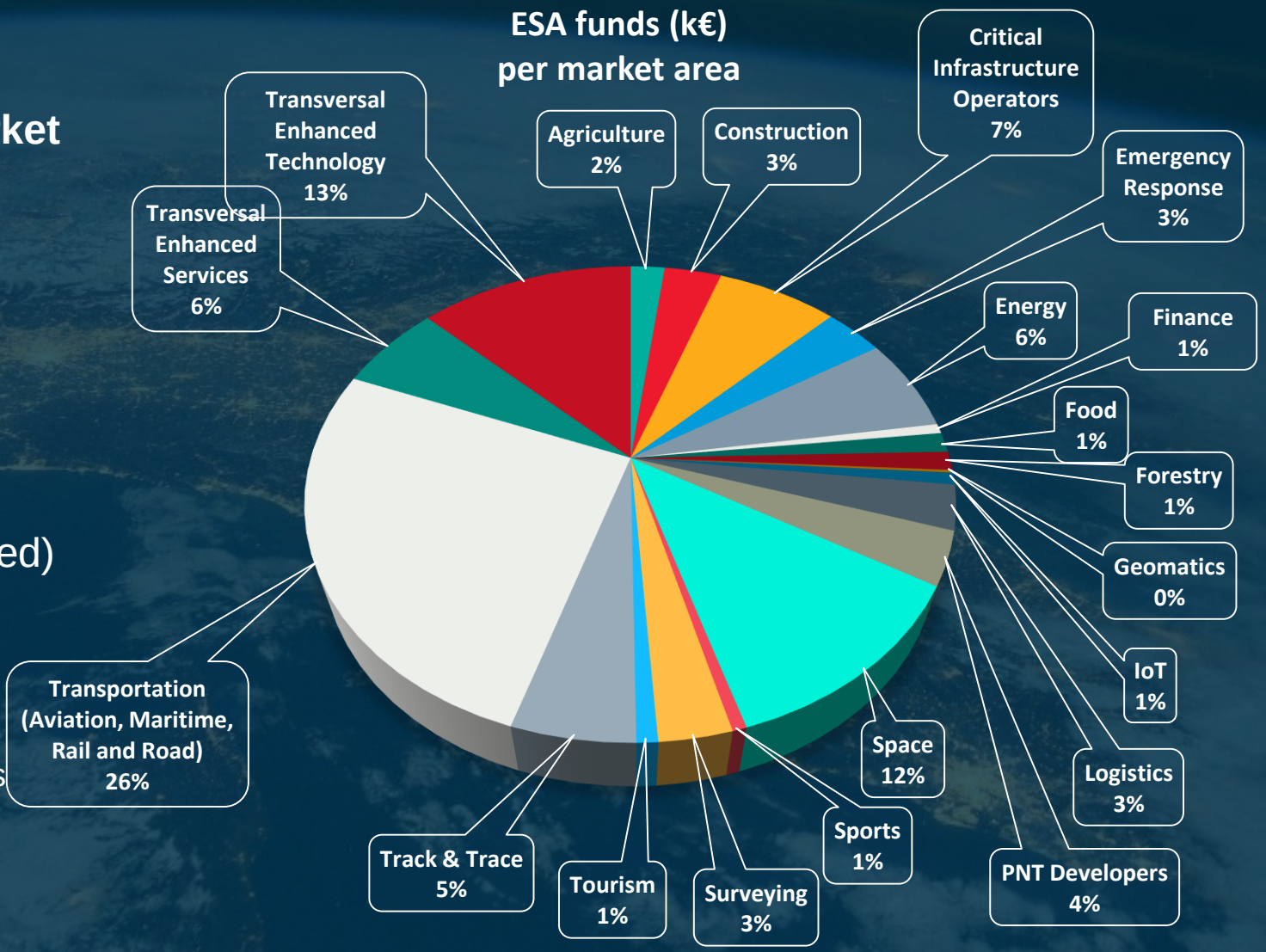


# NAVISP Element 2 : the markets addressed

- **The products address many different market areas:**
  - ✓ ~ 26% Transport (rail, road, maritime, aviation)
  - ✓ ~ 22% Transversal technologies and services
  - ✓ ~ 7% Energy and Finance (Time related)
  - ✓ ~ 12% Space

Each market sector is characterised:

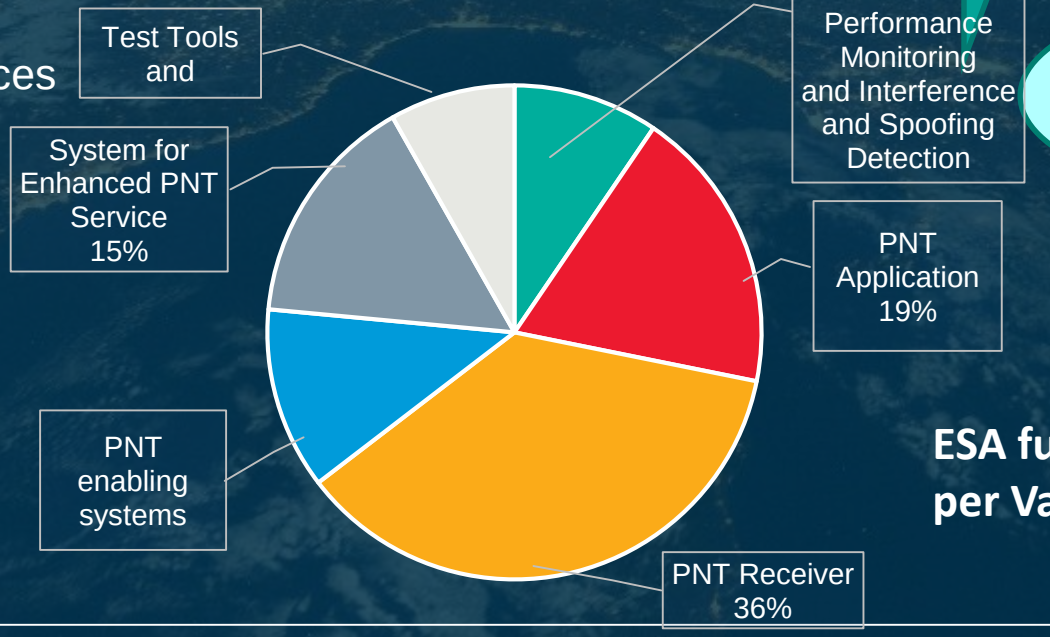
- different PNT applications/requirements/functions
- Key market trends
- customer and user perspective



# NAVISP Element 2: the products developed

**Wide spectrum of products, all along the value chain:**

- ✓ Receiver and chipsets: antennas, IA data fusion, machine learning techniques hybrid multisystem receivers
- ✓ PNT enabled solutions with complementary to GNSS/Alternate PNT Capabilities:
- ✓ GNSS interference monitoring systems
- ✓ GNSS Enhanced services: GNSS Augmentations for Integrity, Accuracy
- ✓ PNT applications and services
- ✓ Test tools and simulators

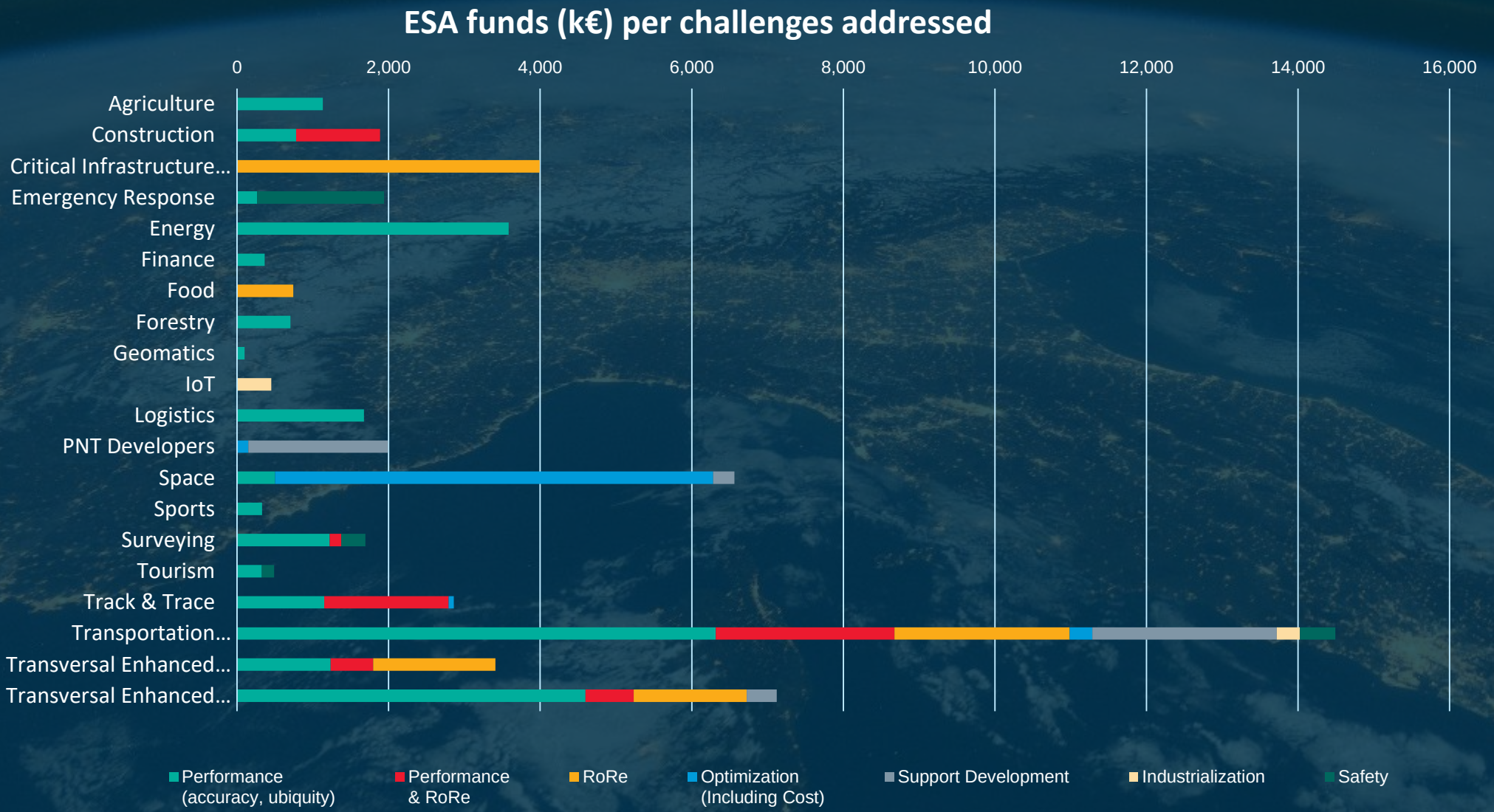



**ESA funds (k€) per Value Chain Position**

## The challenges

- Increase accuracy, integrity
- Protect against Cyber attack
- Reduce receiver power consumption and mass
- Reduce multipath effects
- Increase resilience and robustness for ubiquity and continuity
- Face changing environments
- Protect against jamming and spoofing
- Identify and locate interference

# NAVISP Element 2: The challenges of each sector



# NAVISP Element 2: the actors

- **Across the different market segments, the core of the GNSS industry value chain is centred around the following categories of stakeholders:**
  - Component manufacturers -> CDS, Saphyrion, Taoglas-Antennas, Tallysman, Cobham, Sagax Communications
  - Receiver manufacturers -> CGI-NL, Albora, U-BLOX, Syderal, FDC, TeleOrbit
  - System integrators -> TAS, OHB
  - Added-value service providers -> Rx Networks, INTECS SOLUTIONS, GMV-NSL, Taoglas-IOT
  - End users/users of positioning information -> CPC UNIF (Civil Protection Centre of the University of Florence)
  - (Inter)national organisations and standardisation bodies -> The Swiss federal railways (SBB), Hitachi (former Ansaldo STS)

- **More than 170 different actors : LSI, SME, Research Centers and Universities**
  - 62% of the companies belong to other economic sectors.
  - 65% of the Prime are SME
  - 55% have never worked with ESA before.
  - 26 Consortia with at least 2 different actors types SME/Large Company/University
  - 10 Consortia with members from different countries

# Autonomous Mobility: Covering the value chain

## Needs

- Autonomy SAE Levels (Society of Automotive Engineers)
- Safety Integrity Levels (SIL) as defined by ISO standards

## Challenges

- Increased positioning accuracy down to cm level
- Reduced latency in positioning down to realtime
- Ubiquitous positioning / Seamless environmental transitions
- Robust and resilient positioning
- Environmental awareness

### PNT Receivers

- Development of receivers for ITS (CEN/CENELEC architecture)
- Hybrid GNSS/5G for seamless indoor / outdoor transitions and ubiquitous positioning
- Sensor fusion: inertial, images (satellite, aerial), 3d models
- Navigation and piloting algorithms
- Advance techniques for high accuracy, robust (multipath and interference mitigation) positioning and navigation

### Antennas

- Automotive, maritime, aerial suited
- Multiband / wideband for GNSS multi-frequency and alternative PNT systems exploitation (5G, UWB, WiFi …)
- CRPA and digital beamforming against interference and spoofing

### Test and Simulation

- Automotive environment oriented
- Aerial realist environment (for drones)
- Innovative techniques for reference trajectories (images, 3D models)

### Systems and Transversal Technologies & Services

- Alternative PNT system increasing accuracy and enabling higher integrity levels (radar based, satellite and aerial images, ..)
- System enabling autonomous navigation and providing high accuracy service for autonomous vehicles

Space | Non Space

| NAVISP ID | Activity | Prime |
|---|---|---|
| NAVISP-EI2-019 | DRACONAV | FDC (FR) |
| NAVISP-EI2-020 | MISSATO | TAOGLAS (IE) |
| NAVISP-EI2-027 | SoSA | Spirent (UK) |
| NAVISP-EI2-031 | AGBP | ACCUCOM (UK) |
| NAVISP-EI2-037 | HAAS | RX Networks (CA) |
| NAVISP-EI2-055 | Autonomous Working machines and GNSS | Meluta (FI) |
| NAVISP-EI2-057 | A-PNT Solutions | TAS UK |
| NAVISP-EL2-065 | VAGAD | NAVCERT (DE) |
| NAVISP-EL2-009 | VOLIERA | OHB Systems AG |
| NAVISP-EL2-075 | DGAP | NAIS |
| NAVISP-EL2-088 | AGCBOX | Agreenculture (FR) |
| NAVISP-EI2-092 | RelyMap enhance | Envisage Space |
| NAVISP-EI2-101 | MEDEA | ST4I |
| NAVISP-EI2-105 | 5G Drone Positioning | CGI (UK) |
| NAVISP-EI2-111 | NAV-SSHE | Vitrociset ( BE) |
| NAVISP-EI2-114 | HYPER 5G | GReD Srl (IT) |
| NAVISP-EL2-118 | VANTIGE-3 | COBHAM (UK) |
| NAVISP-EL2-122 | GSAB Phase 1 | Grimaldi Group |
| NAVISP-EL2-124 | POLArIS | Capgemini (ES) |
| NAVISP-EL2-132 | Vision-RTK's Positioning Enhanced | FixPosition (CH) |

# NAVISP Element 2- Feedback from industries

- ✓ Majority of companies hired two or more employees, some activities even led to the recruitment of up to 10 new employees.
- ✓ **Some companies stated that they were able to maintain their employees, which would not have been possible without the NAVISP programme**
- ✓ Commercialized activities gained access to **new geographical markets** and **new sectorial markets**. In Europe but also globally, for example in North Ameri

*"We were able to address a new domain for the company, to create new competences and generate experience. These, in turn, led to further projects that directly benefited from the experience accumulated in our activity. We were encouraged to employ more people with experience in developing mobile applications and marketing."*

*"Our ESA TO was very supportive, offered his huge technical expertise, was open for discussions and thus helped us to come up with a viable product. In our opinion this activity was a true success"*

*"The activity required us to build and maintain a very specific skill set - this skill set is crucial to the continued development of the technology"*

*"In our view, the main risk is technological, vs. commercial and regulatory. The development involves relevant technical challenges; it could be (hopefully) used as soon as it is achieved."*

*We believe that the NAVISP-Element 2 programme should be further extended to other disciplines other than PNT. And to favor a technical liaison between rail and satellite experts. Rail ecosystem is evolving and PNT and Satellite technologies are key to improve industrial competitively and provide tangible benefits to train operators and passengers."*

# NAVISP Element 2: feedback from the industries

**<u>From Design to commercial product Development</u>: El2-007 Flightkeys (AT) a RAIM prediction system**

- Active commercial customers; Airlines in Europe, US and Asia.
- Two major Worldwide flight planning companies direct API integration.
- Integration with two Flight Following systems.
- The company sits on US Congressional ADS-B/RAIM review committee


**<u>Add new products to commercial portfolio</u>: Precision GNSS receiving antennas for the mobility applications, TAOGLAS (IE)**

- Growth in robotic lawnmowers and delivery bots solely due to the requirements of multiband GNSS antennas.
- New growth in new applications that require multiband technology, coupled with the reduced price for multiband modules has allowed for adoption for multiband GNSS antennas

**<u>Capture New Customers,</u> El2-037 HAAS, HIGH ACCURACY ASSISTANCE SERVICE, Rx Networks (CA)**

- The service is now on the market : « A corrections layer of GNSS assistance data that enables precision positioning accuracy".

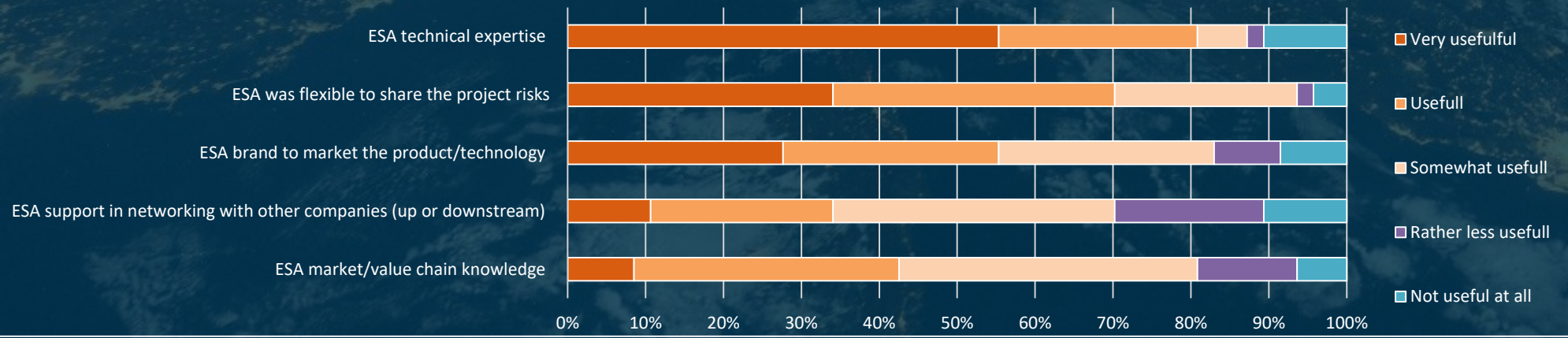
# Feedback from industries/Cooperation with ESA

- Cooperation with NAVISP is clearly a success: > 60% state that participation in the NAVISP programme increases probability of success compared to other funding programs

Strong appreciation for ESA technical expertise. Over 80% of the participants found the technical knowledge offered by ESA useful or even very useful.

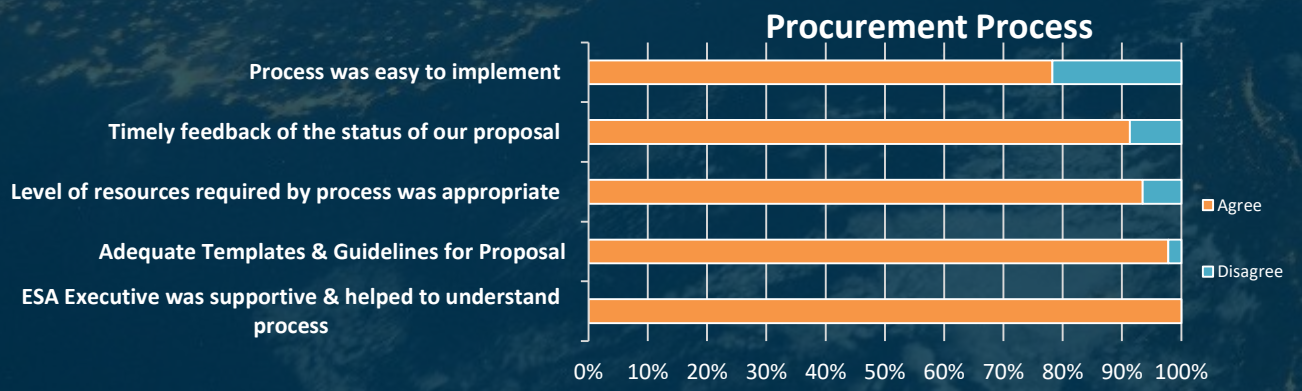
**“Rigorous Validation and Verification with ESA unrivalled expertise in subject matter and external Quality”**

- Participants appreciated the flexibility of ESA to share project risks
- **Some SME would request more ESA support**
- **Many companies have expressed their need for more funds: 30% believe that the level of funding limits the feasibility of projects**



# Feedback from industries/Efficiency of the Procurement Cycle

- Overall, NAVISP participants very satisfied with the procurement process
- Professional support provided by the ESA executives was positively received by all participants.
- Templates and guidelines also seem to be easily accessible and applicable for a large part of the participants (>95%).
- **Some companies pointed out that parts of the proposal could be shortened & that the process between the Outline and final proposal could be improved**




*"Some more detail needed in templates/guidelines in some areas. Some parts of proposal could be shortened."*

- **Room for adjustments in design of the procurement process especially for newcomers:**

*"Once the process has been completed one time, it is easier to go through it a second time. The most challenging with the process is the amount of repetitions in the full proposal documents. When changes are required e.g. after the negotiation meeting, it is a risky and big job requiring updates in many documents for small changes."*

*"More detailed guidelines on the use of the esa-p platform"*

*"The process is correct. It takes time and information, but it allows us to think on what we want to achieve."*

# NAVISP Element 2 Lessons learnt and way forward

- ✓ The PNT opportunities are blooming at a very fast pace . The community is fragmented in different market sectors, each one with its own trends, needs, users

  → ESA to improve market knowledge and networking support in non space sectors

- ✓ Some markets (safety related) to be unveiled

  → ESA to push for activities involving standardisation bodies and partner with non space institutions and operators

- ✓ Thematic calls have demonstrated to be an effective mechanism to raise the awareness on the programme in some communities.

  → ESA to issue more thematic calls will come focused on non-GNSS centric activities

- ✓ Some activities do no reach the commercialisation phases

  → Companies to put more emphasis on achieving a higher industrialization level

# NAVISP Element 2 Lessons learnt and way forward

- ✓ Further streamline the procurement process:
  - → ESA to further simplify the templates for the preparation of the proposals
  - → Companies to
    - interact with Delegation at the very first stage
    - fully satisfy requirements/guidelines and time for submission of Full Proposal
  - → Delegations to simplify the procedures to provide the LoS

- ✓ A specific competitiveness support
  - → ESA to Incorporate mechanisms that allow supporting SME in the protection and exploitation of the IPR generated within the scope of the project

- ✓ Element 2 is appreciated and more demand exists , same companies submit follow on activities and new initiative.
  - → Subscription to Phase 3 shall be adequate to the expectations

# Conclusions

- Element 2 is an opportunity for the companies to develop their competitiveness benefitting from:
  - ✓ The ESA technical and managerial expertise
  - ✓ Its capability to escort national PNT stakeholders in exploiting upcoming markets opportunity
  - ✓ Its international networking and partnering opportunities
  - ✓ Its capability to support test, validation and standardisation
  - ✓ The high flexibility of the Programmatic Element
  - ✓ The streamlined procurement process and favourable contract conditions
  - ✓ Close cooperation with ESA in the facilitating mode
  - ✓ The nature of the Programmatic Element that makes Industry and Delegation the leaders

- Element 2 is also an opportunity for ESA to pursue its mission:
  - ✓ to boost activities at the front line to optimize the use of GNSS
  - ✓ to grow its competence in space application sectors
  - ✓ to support the penetration of space in other strategic sectors that are shaping the evolution of our societies ( green mobility, safety, autonomous transportation)
  - ✓ to increase the new role in the space commercialization, support entrepreneurship, start ups

# Conclusions

**Thank you very much for your attention**

www.navisp.esa.int

**Contact us at**
**Navisp.element2@esa.int**

**to transform**
**your ideas into valuable NAVISP activities !**