



KATS
Korean Agency for
Technology and Standards

ISO Open Consultation on Positioning, Navigation and Timing (PNT) Services

2025-01-21

Public

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Housekeeping

- You are **muted** until Q&A.
- Session is **recorded**.
- Please change your name to *Your Name (Your NSB)*.
- Ask questions using the **chat** option.
- To speak, **raise your virtual hand** using the option under “reactions”.

Agenda

- 01** Introduction to ISO Open Consultation
Sarah Parker/Valeriia Grekova
- 02** Introduction to Positioning, Navigation and Timing services
KATS/thought leaders (YJ Moon / Jinsil Lee)
- 03** Next steps and schedule
KATS (Sanghern Seo)
- 04** Q&A
ISO/KATS/thought leaders

Introduction to ISO Open Consultation

ISO/CS (Sarah Parker / Valeriia Grekova)



Welcome to ISO Open Consultation



What is it and why is it needed?

Discovering and tapping into stakeholder expectations of standardization at a global level.

Showcasing the benefits of standards and aligning with stakeholder expectations

ISO Open Consultation is an excellent opportunity to showcase standardization and the benefits of standards to a wider audience, to understand global expectations from standardization before investing in the standardization process.

Shaping ISO's engagement in emergent topics

ISO Open Consultation is a member-driven means of empowering the ISO community to prioritize topics for consideration by Council; you can help shape ideas and opinions into strategic, tangible actions, and help to optimize the position of ISO in these topics.

Council Resolution 53/2024

What was decided?

Under Council Resolution 53/2024, Council has **approved two proposals to ISO Open Consultation**

- **Resource-efficient software**, led by DIN (Germany)
- **Positioning, navigation and timing services**, led by KATS (Republic of Korea)



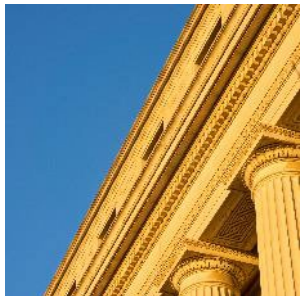
Open Consultation

What will be the Output?



Landscape and drivers of change

Scope and dependencies, global perspective, relative importance, legal / regulatory, technological, social, ecological



Standardization landscape

Presence / absence of national and international standards, coordination & cohesion of international standards



Expectations of standardization

Consolidation of the value proposition of standards in the Council-endorsed field, including inter alia testing, quality, safety, interoperability



Stakeholder representation and key players

Government, business, academia, civil society



Consolidated user stories

Summary of key actors, interactions and desired outcomes that could be supported with standards in the Council-endorsed field



Recommendations for ISO action

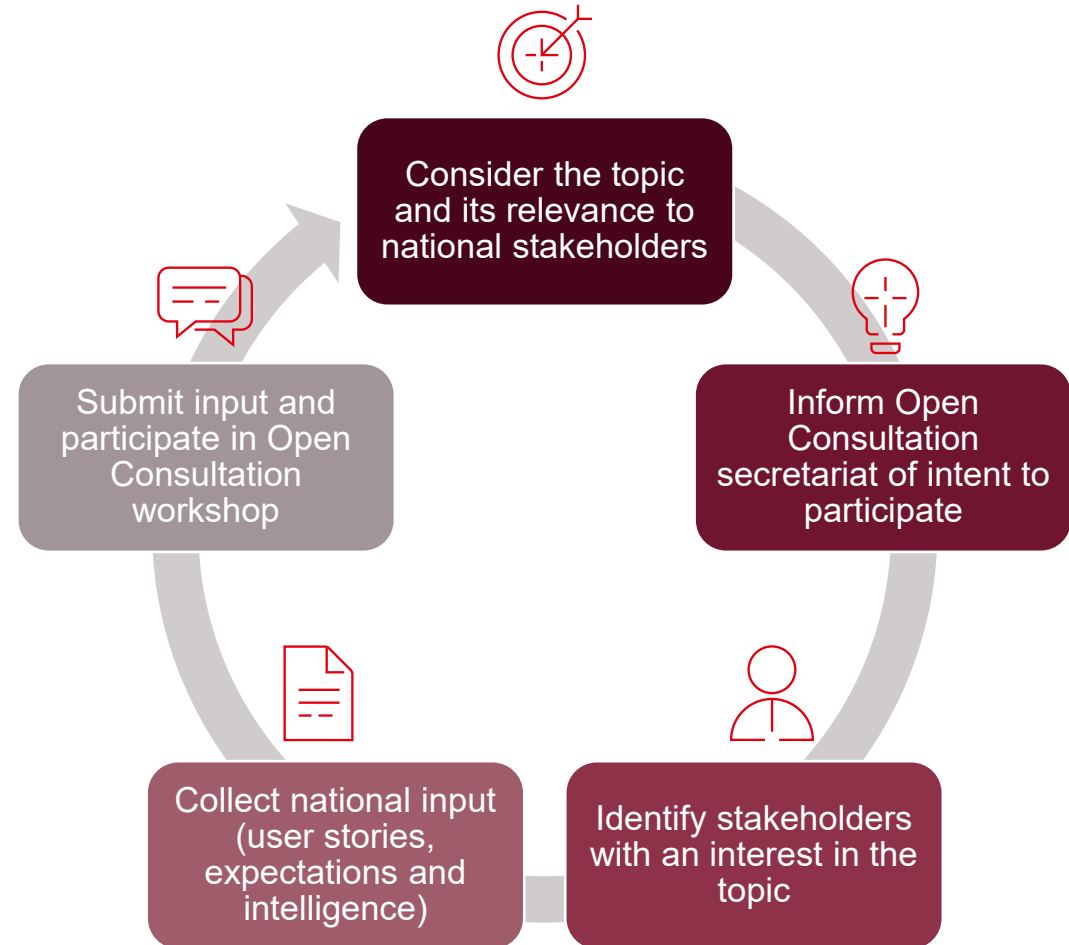
CSC/SP: strategic partnerships, projects

TMB: technical committee structure, ISO/IEC Directives, new work items

The way forward

How to participate?

ISO Open Consultation is a means to **capture new stakeholders' expectations** of standardization in emerging topics **before making critical decisions** and multi-year investments in standards development work.



Introduction to Positioning, Navigation and Timing (PNT) Services

Thought Leaders (Young-Jun (YJ) Moon / Jinsil Lee)

Thought Leaders



Prof. Young-Jun (YJ) MOON (Chair)

**Korea Advanced Institute of Science
and Technology (KAIST)**



Dr. Jinsil LEE (Co-chair)

**Korea Aerospace Research Institute
(KARI)**

Definition of PNT

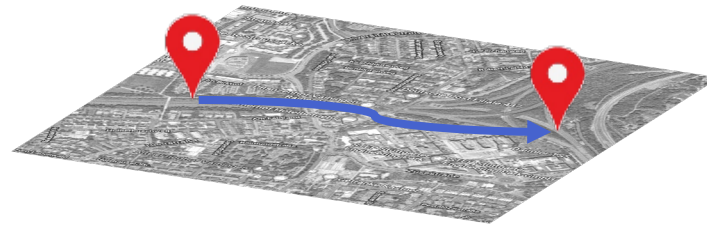
Positioning



“Where am I ?”

The ability to accurately and precisely determine one’s location and orientation referenced to a standard geodetic system

Navigation



“How should I get there?”

The ability to identify current and target positions and adjust course, orientation, and speed to reach any desired location

Timing



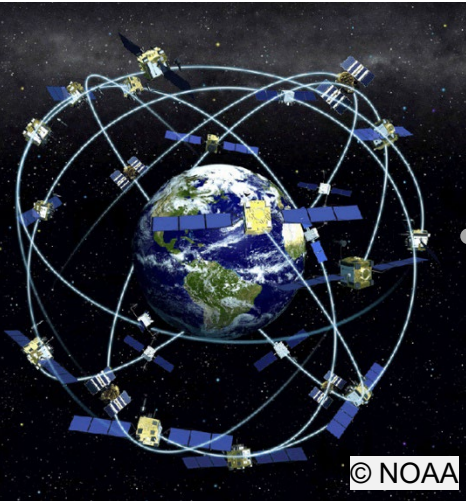
“What time is it exactly?”

The ability to acquire and maintain accurate and precise time from a standard (Coordinated Universal Time, or UTC) anywhere in the world

Worldwide GNSS development for PNT services

Global Navigation Satellite System

GPS (The united states)



Galileo (Europe)



Beidou (China)



NavIC (India)



KPS (South Korea)



QZSS (Japan)

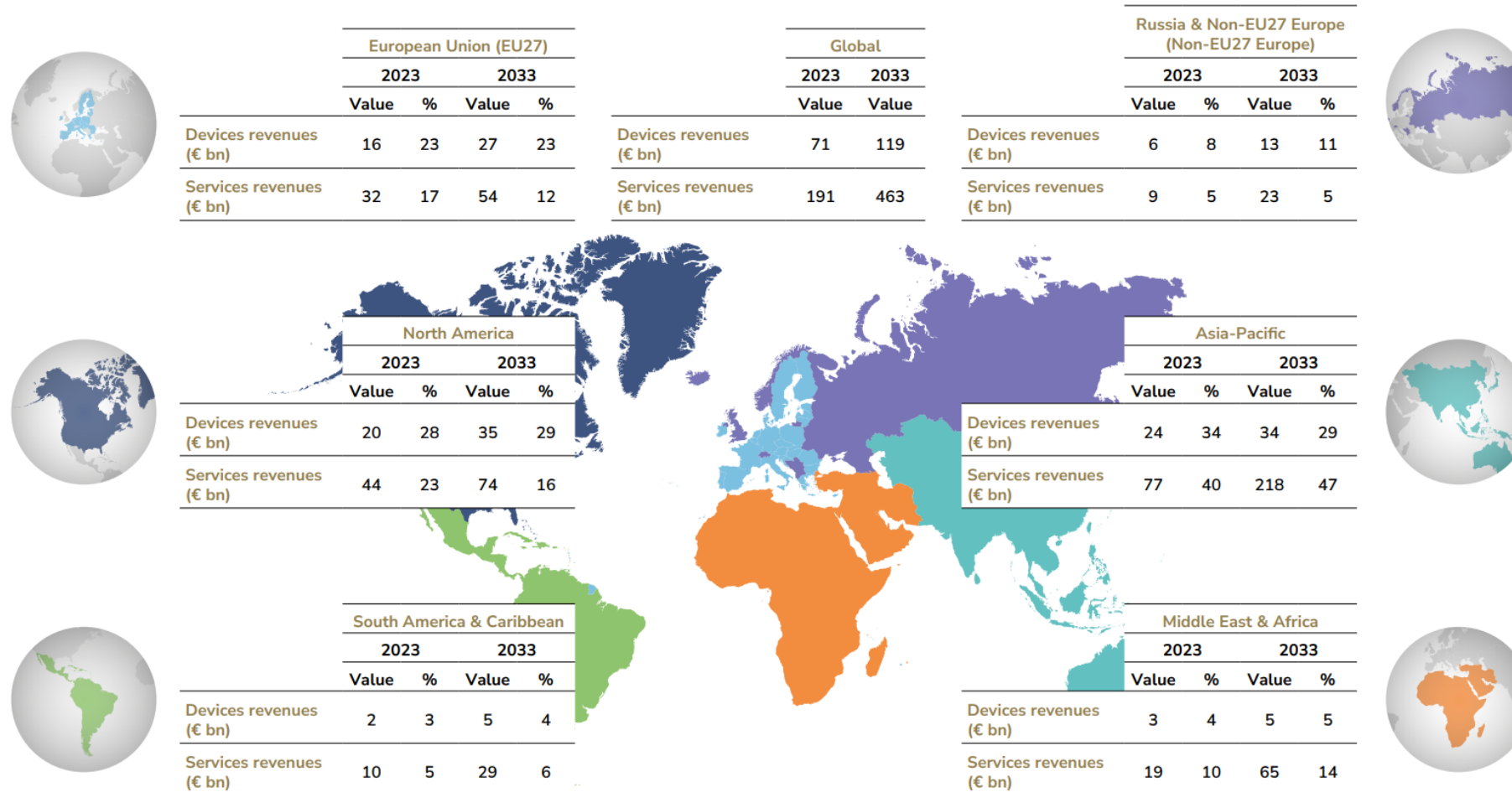


GLONASS (Russia)



PNT demand – Worldwide trend (2024)

GNSS demand world map



The global demand for PNT will continue to grow:

- Global **PNT device** revenues will grow from 71 billion euros in 2023 to **119 billion euros by 2033**
- Global **PNT service** revenues will grow from 191 billion Euros in 2023 to **463 billion euros by 2033**

PNT Services Needs and Motivations

- 10 billion moving objects in the globe, including people, animals, goods, transportation means, etc.
- PNT services for



Infrastructure



Consumer solutions



Road and Automotive



Aviation and drones



Urban Development



Rail



Maritime and Inland Waterways



Climate and Environment

8 out of 10 moving objects are PNT customers

8 billion units of PNT devices including smart phones, nomadic devices, RFIDs, etc.

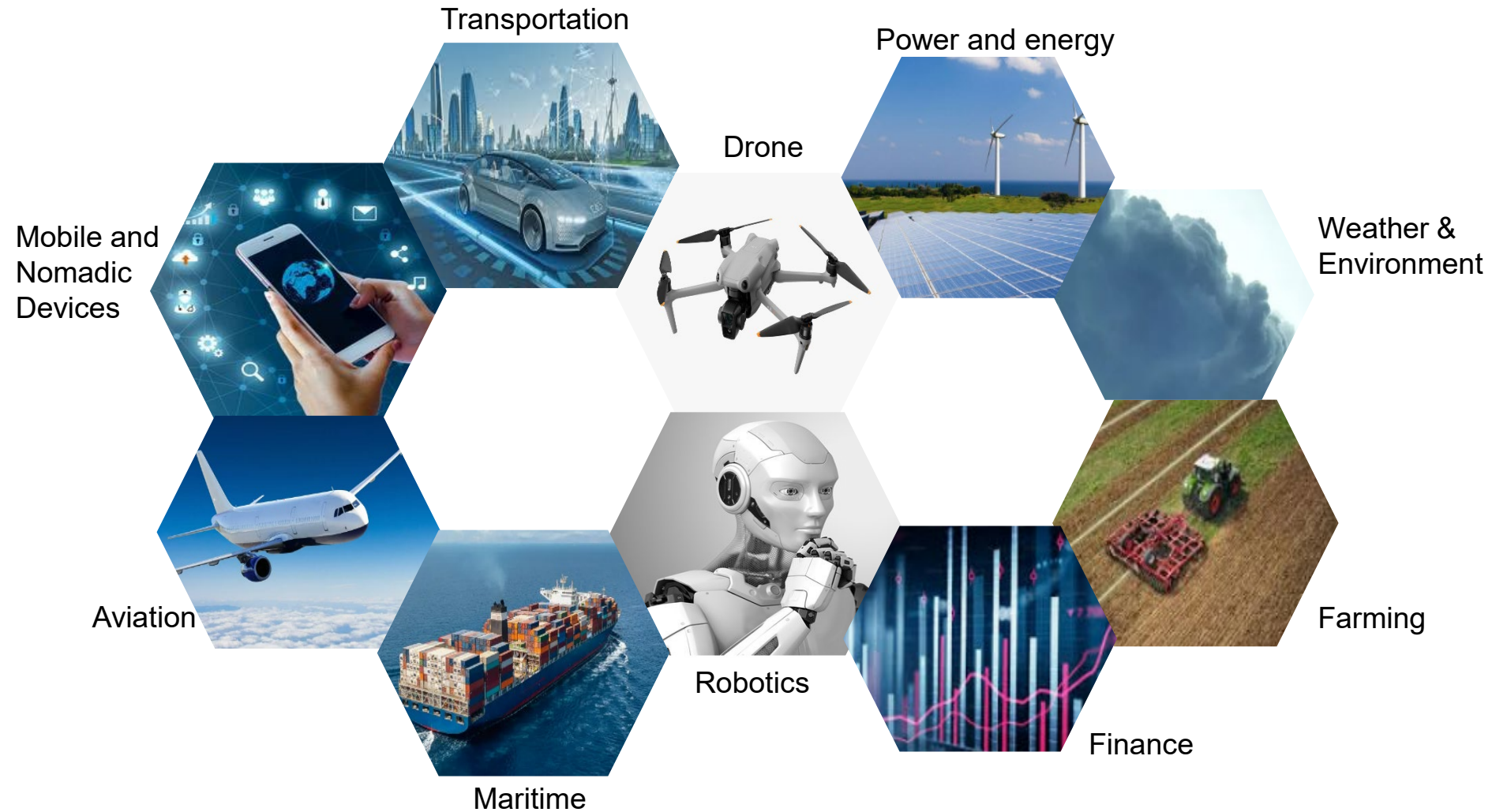


Market Drivers: Digital Transformation and Global Connectivity

■ Business Models

- Needs for complementary, high-performance & resilient commercial business models
- Focus user groups: Government to Commercial
- Higher accuracy, faster convergence, precision timing, integrity, indoor penetration, multipath resistance, scalable to mass market

Applicable Industries

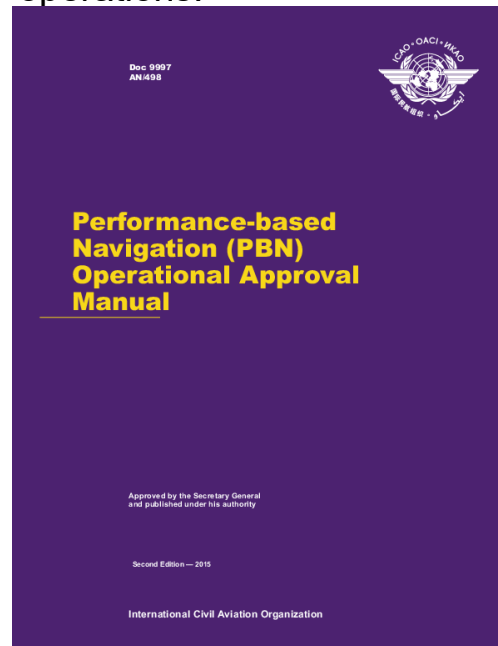


PNT Service for Aviation

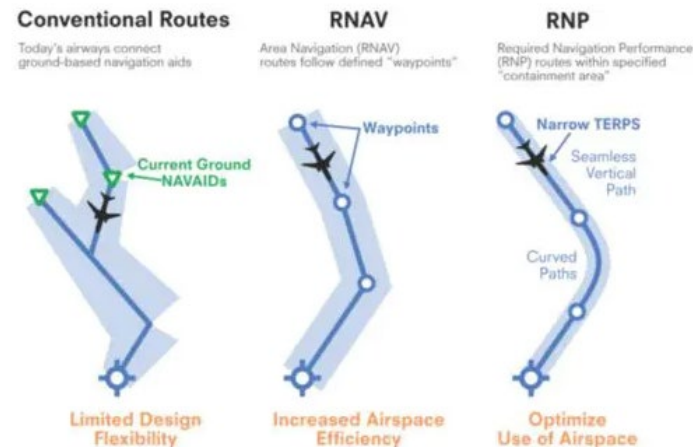
A representative example of existing PNT service standardization

Performance-based Navigation (PBN)

PBN aims to ensure the global standardization of navigation specifications for aviation. The ICAO PBN manual defines navigation performance requirements in terms of accuracy, integrity, availability, continuity, and functionality for each operations.



PBN manual © ICAO



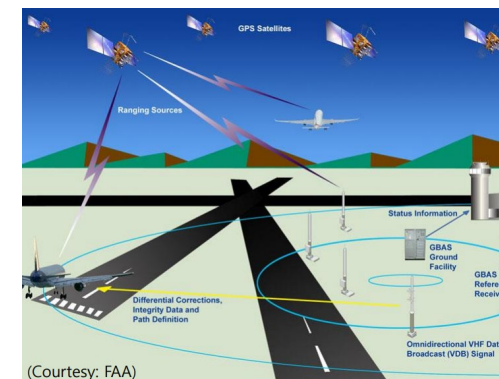
PBN concept © IALTA

GNSS augmentation systems for aviation

GBAS* and SBAS* are GNSS augmentation systems designed to meet stringent, pre-defined navigation performance requirements, including accuracy, integrity, continuity, and availability for safety-critical aviation applications.

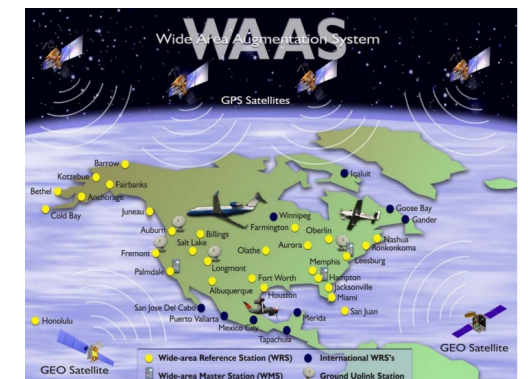
*GBAS: Ground based augmentation systems

*SBAS: Satellite based augmentation systems



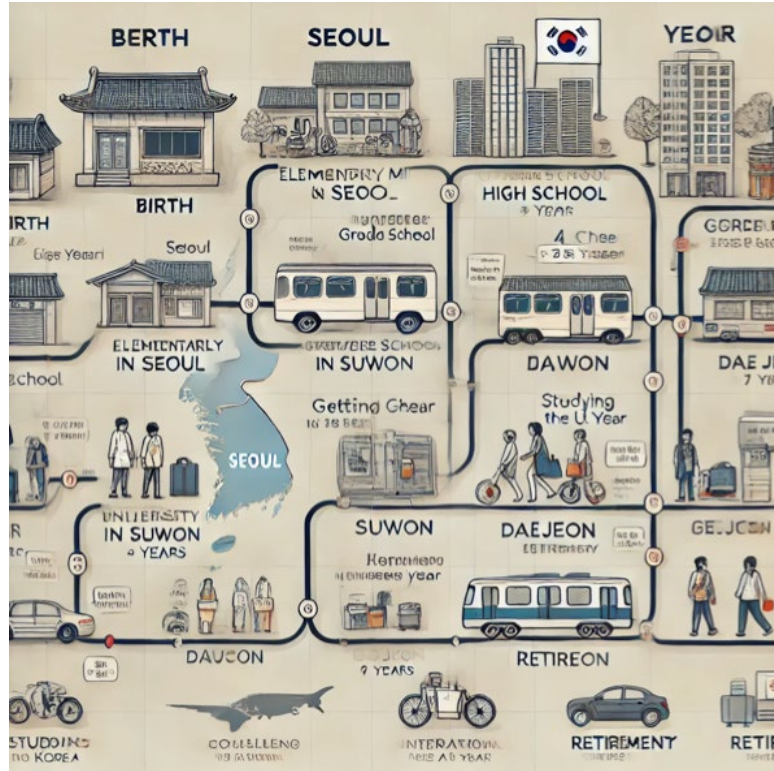
(Courtesy: FAA)

GBAS © FAA



SBAS © FAA

PNT Services for All Moving Objects

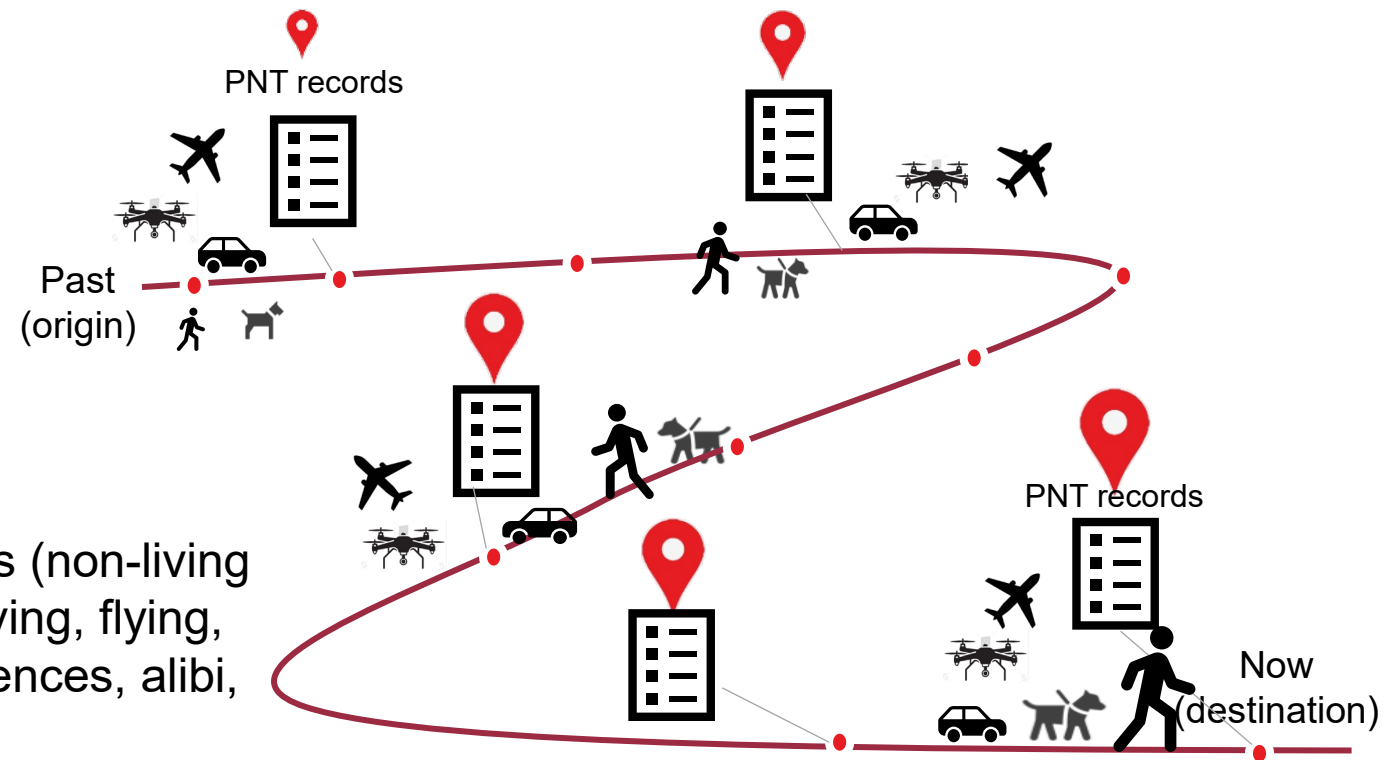


Monitoring moving objects

for ensuring they are safe, efficient and environmentally sustainable during the process of staying and moving from the origin (birth) to destination (death)

Certification of moving records

including life records (living things), aging records (non-living things), mobile (moving) records (by walking, driving, flying, delivering, etc.), biography, traces/vestiges, evidences, alibi, eco-records (mileage, CO2 footprint), etc.

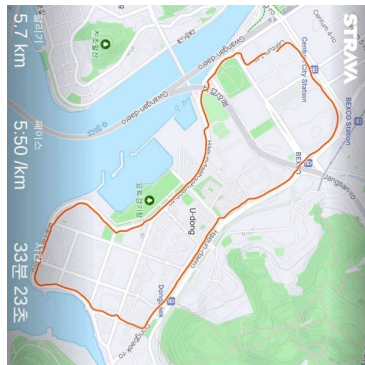


PNT Services for future

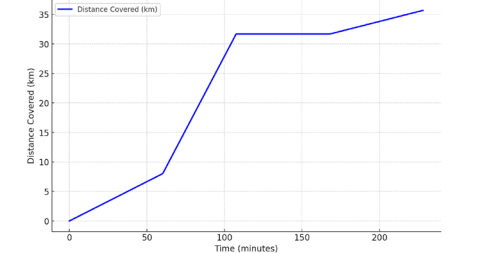
PNT based management and services

Public and commercial services in all global industries with PNT information in the birth and death process of specific objects, by private sectors, public organizations, and/or governments in local, regional, national, and global

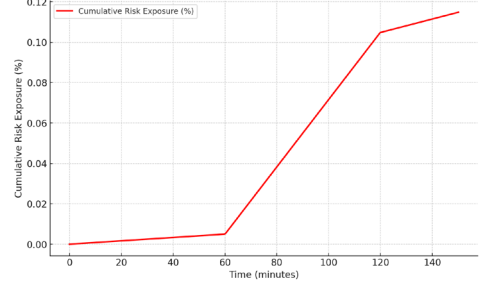
PNT-based time-distance-CO2 domains



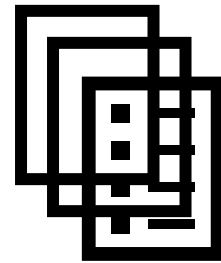
Time-Space Diagram: Groom's Journey on Wedding Day (Jogging, Driving, Walking)



Cumulative Risk Exposure for Entire Journey (Jogging, Car, Walking)



PNT collection

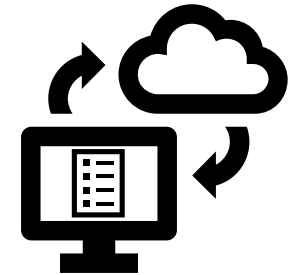


Single, Group, etc.



PNT Security

PNT storages



Monitoring

Records

Various applications of PNT data

👉 **“Making lives easier, safer and better” by PNT services !**



**Different PNT services and
system architectures**

require

Different PNT requirements

PNT Service Levels (Service Accuracy)



PNT Service Requirements

Accuracy

Measure of PNT output deviation from truth

Integrity

Ability of a service to provide timely warnings when the system should not be used for service

Continuity

Likelihood that the PNT service supports accuracy and integrity requirements for duration of intended operation

Availability

Fraction of time PNT service is usable (as determined by compliance with accuracy, integrity, and continuity requirements)

PNT Services Standardization

Digital PNT records by location with respect to timing

Living things (human being, animal, livestock, pet, etc.): From birth to death in their lifetime (or from origins to destinations while moving in a certain amount of time)

Non-living things (transport means, goods, infrastructure and facilities, etc.): From birth (the time of being manufactured/constructed) to death (to be disused/junked/demolished) in their lifecycle

PNT Service Levels

Location accuracy:
centimeter(feet)/meter/decameter/
hectometer/km(mile)

Timing accuracy:
millisecond/second/minute/hour/day/
week/month/year

Navigation interval: real-time or
non-real-time

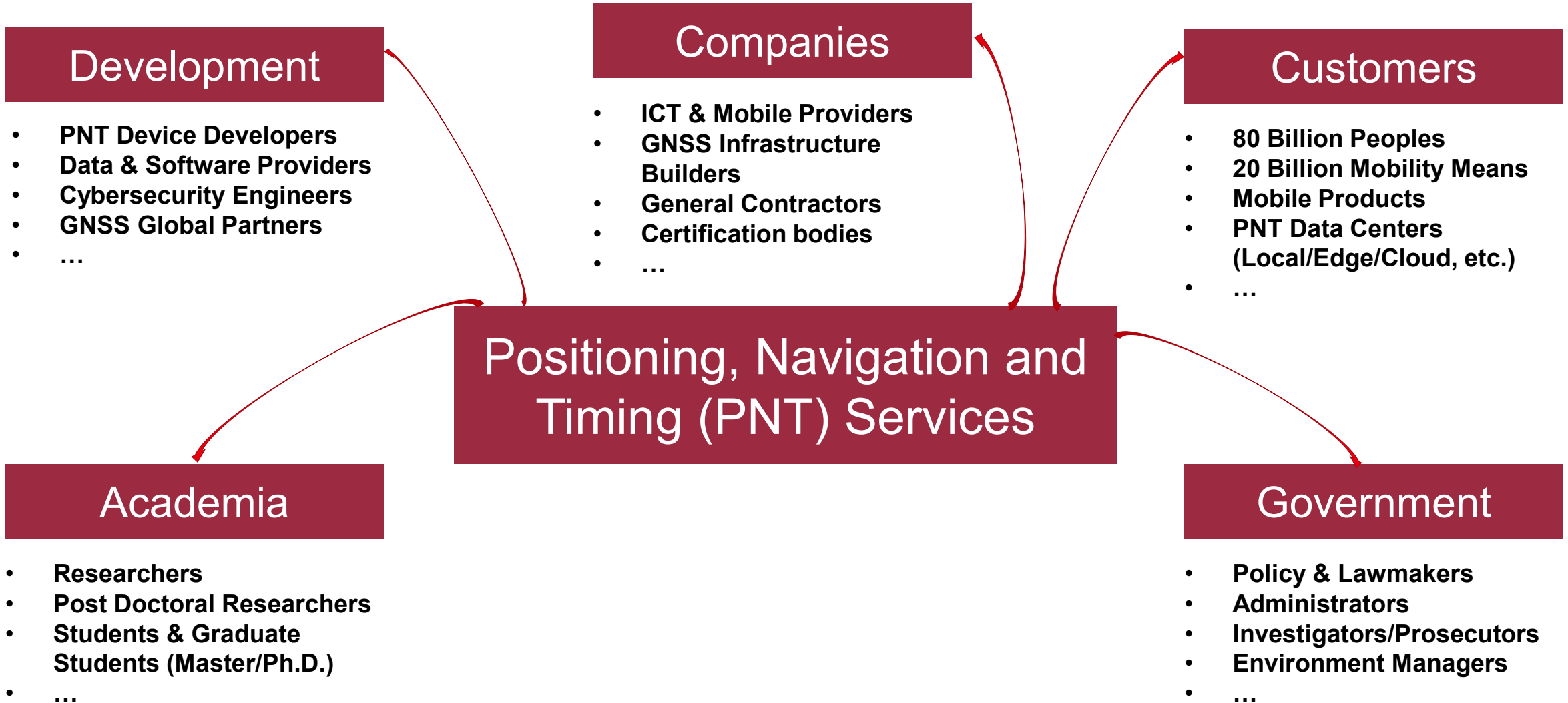
PNT Service Requirements

Accuracy, integrity, continuity,
availability, applicability,
maintainability

Resistance to interface: privacy
and cybersecurity

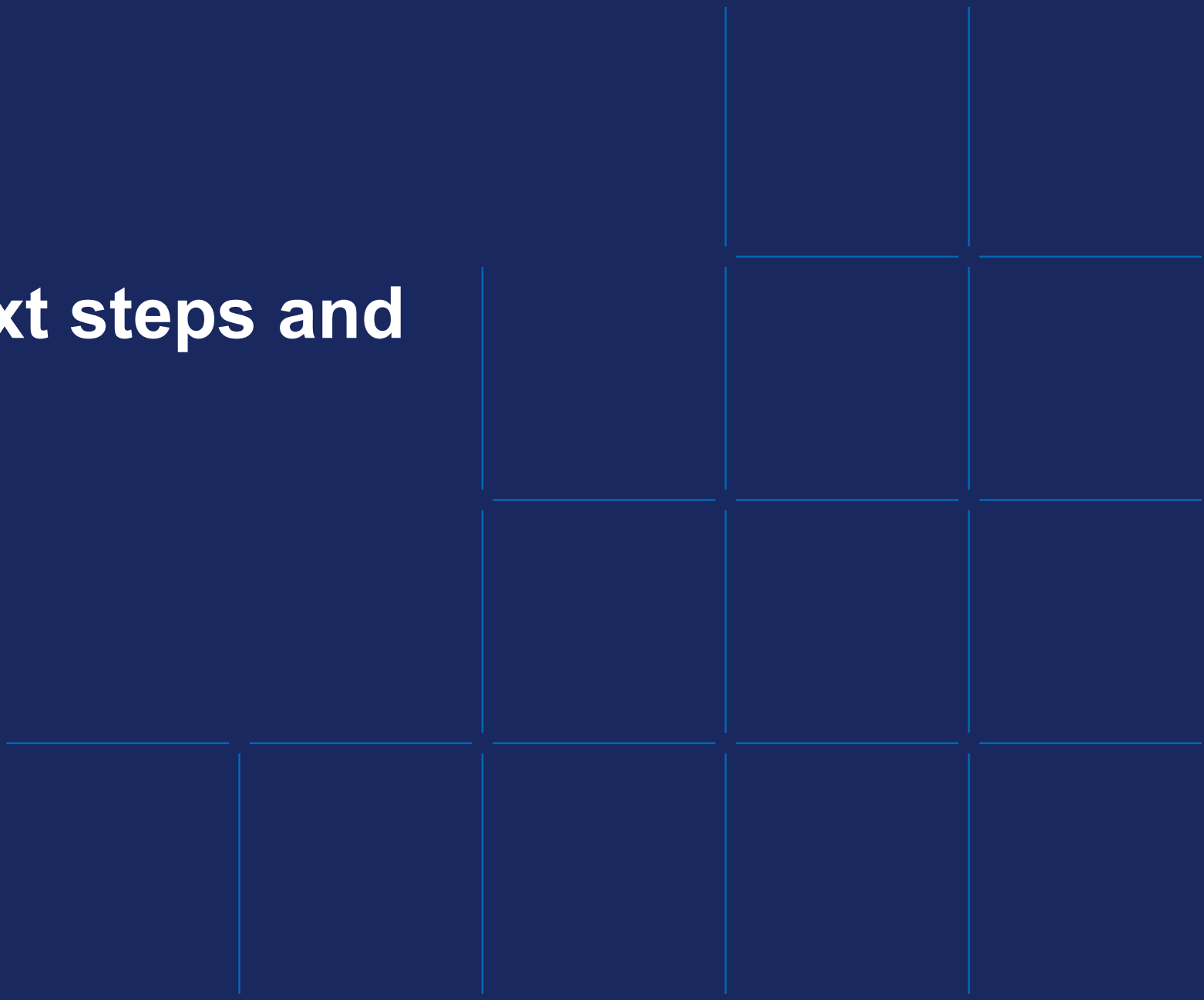
Independence: user equipment
and ground infrastructure

Relevant Stakeholders



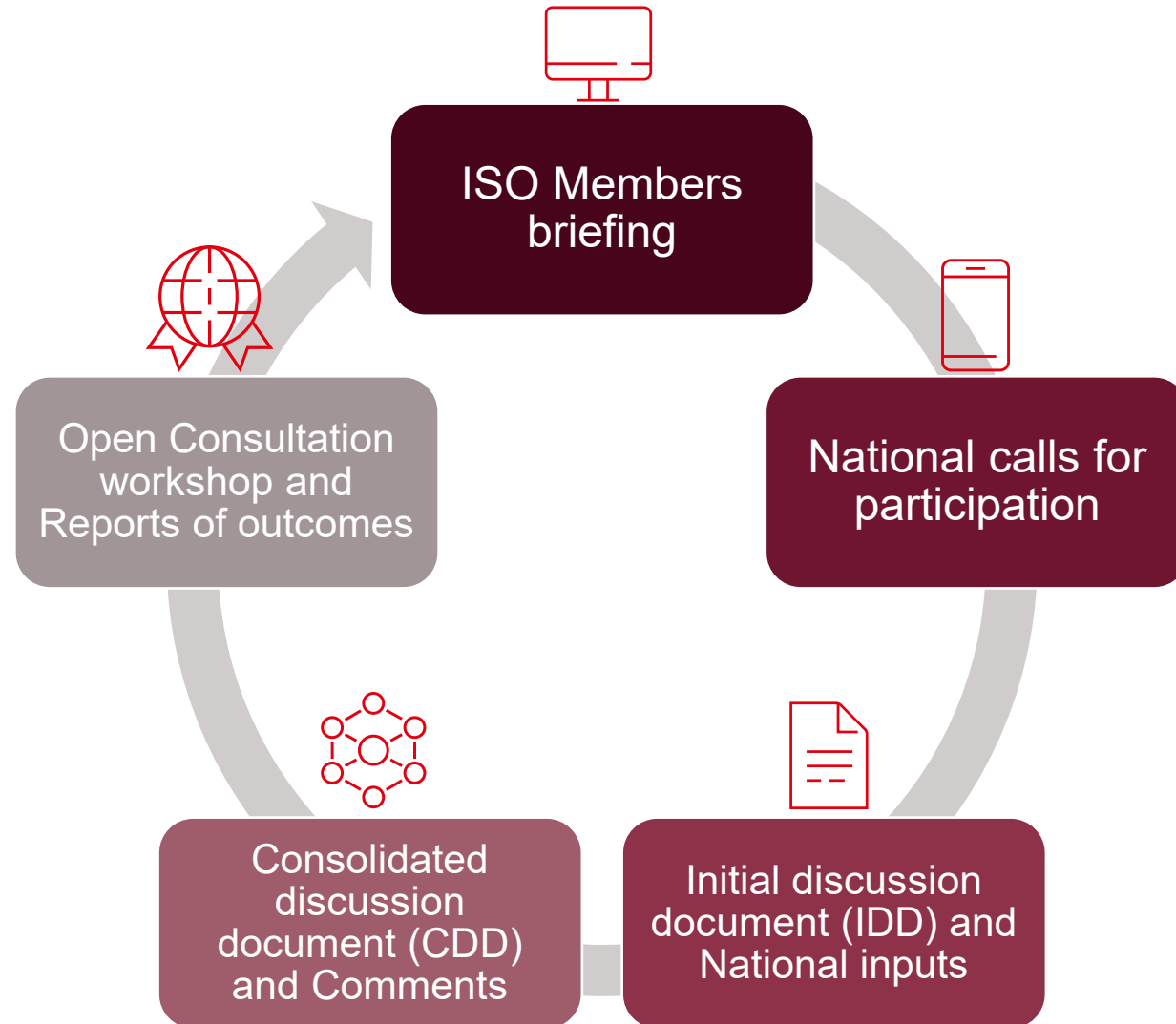
Introduction to next steps and schedules

KATS (Sanghern SEO)

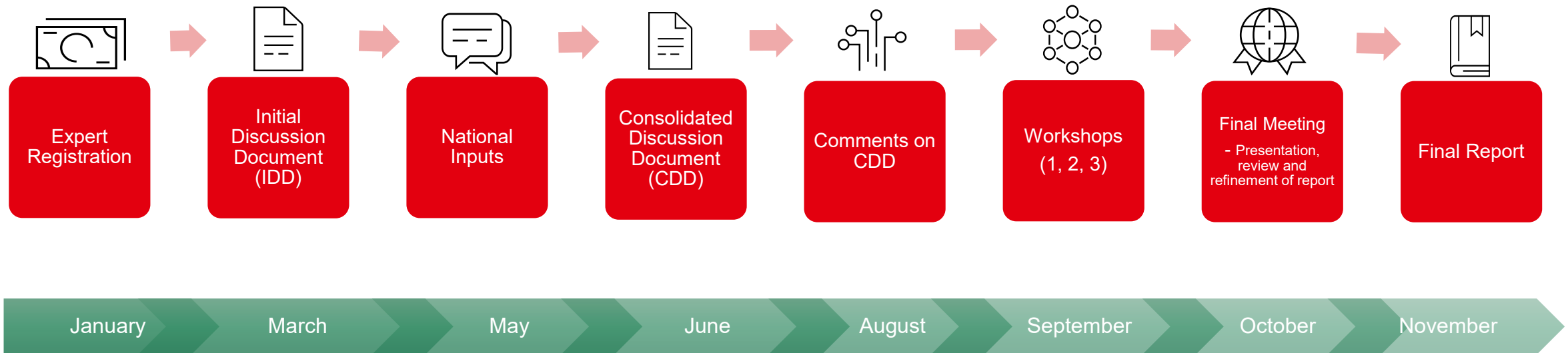


Open Consultation

Major milestones



Open Consultation Timeline



Schedule (preliminary)

Event	Date	Aim
Members briefing	21 st January 2025 9:00-11:00 CET	Introduction to ISO Open Consultation and the topic
Call for participation	21 January – 4 th March 2025	Call for NSBs to join and to reach out to their stakeholders
Initial Discussion Document (IDD)	By 4 th March 2025	Circulation of IDD, which will form the basis of the discussions on the topic
National inputs	4 th March – 5 th June 2025	NSBs collect national inputs through national public commenting and consolidation
Consolidated Discussion Document (CDD)	By 27 th June 2025	Circulation of CDD, which will incorporate national inputs
Comments on the CDD	27 rd June – 28 th August 2025	Receive NSB inputs on CDD in advance of workshop
Workshop(s)*	September 2025	Exchange ideas and prioritize recommendations for ISO (exact format and agenda to be determined)
Report of the outcomes	by 8 th November 2025	Final report to be prepared for Council submission

Call for participation



ISO Open Consultation KATS Call for Participation
2025-01-21

ISO OPEN CONSULTATION – CALL FOR PARTICIPATION

KATS (Korean Agency for Technology and Standards) is seeking **experts in the field of “positioning, navigation and timing (PNT) services”**. PNT services are a largely invisible system used for the benefits of humans and nature, technology and infrastructure, and arts and industries, including peoples with nomadic and mobile devices, all modes of transportation, communications infrastructure, the electrical power grid, precision agriculture, weather forecasting, and emergency response. In order for all moving objects globally (approx. 10 billion units) to be essential to modern life, enabling a wide array of applications that improve safety, efficiency, and economic performance, the expectations from the PNT services are growing. However, it is an area that has not yet been considered in detail in standardization.

To address these challenges, KATS is launching an **ISO Open Consultation**. ISO Open Consultation is a new mechanism designed to explore an emerging topic with a broad range of stakeholders, and to document and consolidate global stakeholder expectations into an analytical report with recommendations for ISO action. The aim is not to reach consensus and develop a standard. The aim is to **consolidate and define stakeholder expectations before investing in a standardization process**. KATS is inviting experts to discuss their expectations of standardization in the field of PNT services and collaborate in developing recommendations to ISO on how to address the topic most effectively. Information on the registration can be found below.

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* The workshop(s) will be repeated for different time zones.

Registration[↵]

The ISO Open Consultation targets a diverse audience involved in PNT services for all moving objects globally, throughout their entire lifecycle. These services enhance efficiency, safety, and environmental sustainability across various sectors. The Open Consultation is particularly relevant for PNT service professionals in leadership roles, as well as practitioners such as product owners, requirements engineers, and developers. Additionally, it is intended for a broader group of stakeholders, including representatives from academia, government bodies (digital departments), administration, and procurement. [↵]

We encourage you to reach out to the relevant stakeholders in your country, especially those not yet involved in the standardization system. [↵]

Please register your NSB to join: <https://forms.gle/kprQixgrCKCrYZXn7> [↵]

Deadline for registration: 4th March 2025 [↵]

Contact[↵]

For more information on this Call for participation or the ISO Open Consultation being led by KATS on positioning, navigation and timing (PNT) services, please contact Ms. Jiyoun RYU at standard@korea.kr. [↵]

For more information on ISO Open Consultation generally, please contact openconsultation@iso.org. [↵]

Registration:

<https://forms.gle/kprQixgrCKCrYZXn7>

Please distribute the call for participation among

- PNT service professionals in leadership roles, as well as practitioners such as product owners, requirements engineers, and developers,
- broader group of stakeholders, including representatives from academia, government bodies (digital departments), administration, and procurement, etc.,
- other interested stakeholders.

Q & A

Please raise your virtual hand or use the chat to ask your questions.



Thank you.

Making lives *easier, safer* and *better*.

ISO Open Consultation team
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