

The NAVIS Centre: EU-South East Asia Collaboration

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NAVIS Centre, HUST

ASEAN Multi-Country Workshop on Space Applications
Bangkok, 18-19 September 2018



European
Global Navigation
Satellite Systems
Agency

HORIZON 2020

bavAIRia

ISM B
Istituto Superiore Mario Boella

NSTDA

NSL

IFEN



ANavs
Advanced Navigation Solutions

SPACEARTS
TECHNOLOGY

International Collaboration Centre for R&D on Satellite Navigation Technology in South East Asia



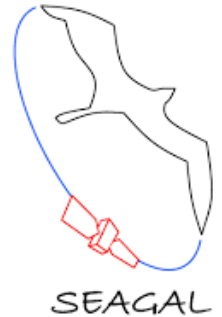
"The mission of Navis is to boost the R&D of satellite navigation technology, especially the European Galileo System, in South-East Asia."

<http://navis.hust.edu.vn>

Milestones

- 2005 – 2007 JEAGAL Project: *Train-the-trainer action on GNSS*
- 2009 – 2010: FP7 SEAGAL Project: *Setup of the NAVIS Centre*

October 1st, 2010: Navis Centre opening!



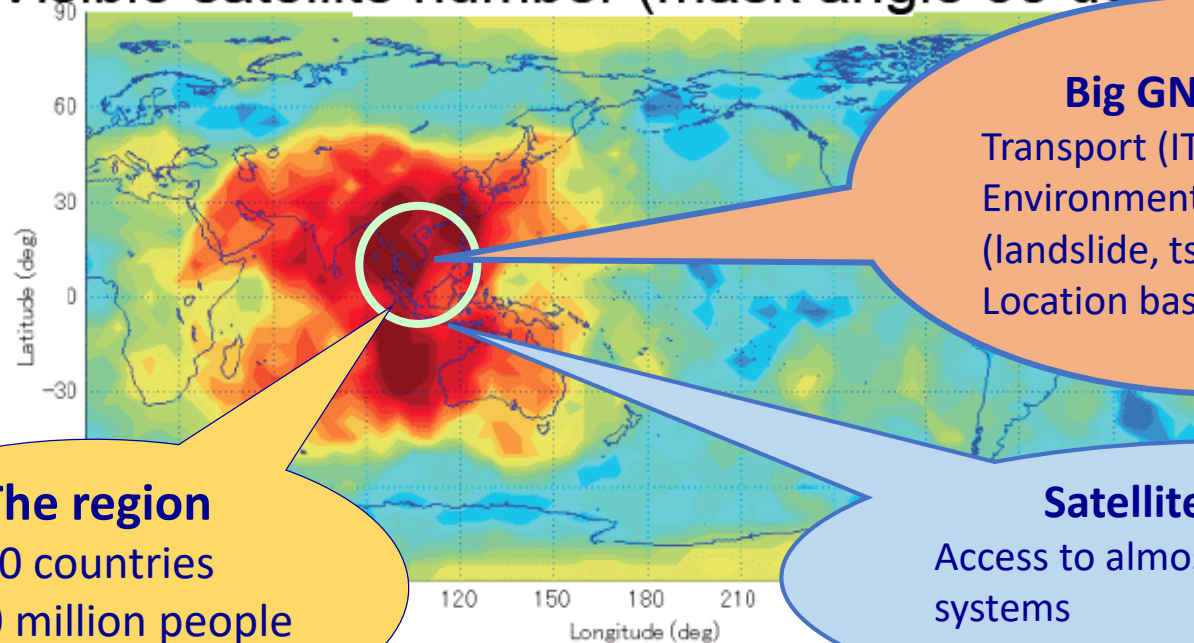
- 2012 – 2015: FP7 Growing NAVIS Project
- 2015 – 2018: H2020 BELS Project
- 2018 – 2020: H2020 BELS plus Project



Why South East Asia?

Social, technical, and economical reasons

Visible satellite number (mask angle 30 degrees)



Big GNSS market:

Transport (ITS, traffic safety)
Environment monitoring
(landslide, tsunami...)
Location based services

The region

10 countries
≈ 650 million people
Fast GDP growth

Satellite Navigation

Access to almost all GNSS/RNSS
systems
Do not own any GNSS/RNSS

GPS(27)+GLONASS(24)+Galileo(30)+COMPASS(35)+IRNSS(7)+QZSS(3)+SBAS(7)



Receiver	Position	Status
PolarX5-3012312 (SEPT)	Lat: N17°57'17.6729" 1.116m	Tracked Sats: 48
IP Address (Eth):	Lon: E102°36'51.9695" 0.928m	Clock: Internal
Uptime: 0d 00:50:01	Hgt: 201.580m 2.149m	Temp: 48 °C — V: 12.15 volts

 SBAS	 Status
 Overall Quality	 Int. Logging
 Corrections	 Ext. Logging
 Wifi	

Overview	GNSS	Station	Communication	Corrections	NMEA/SBF Out	Logging	Admin
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GNSS > Satellites and Signals

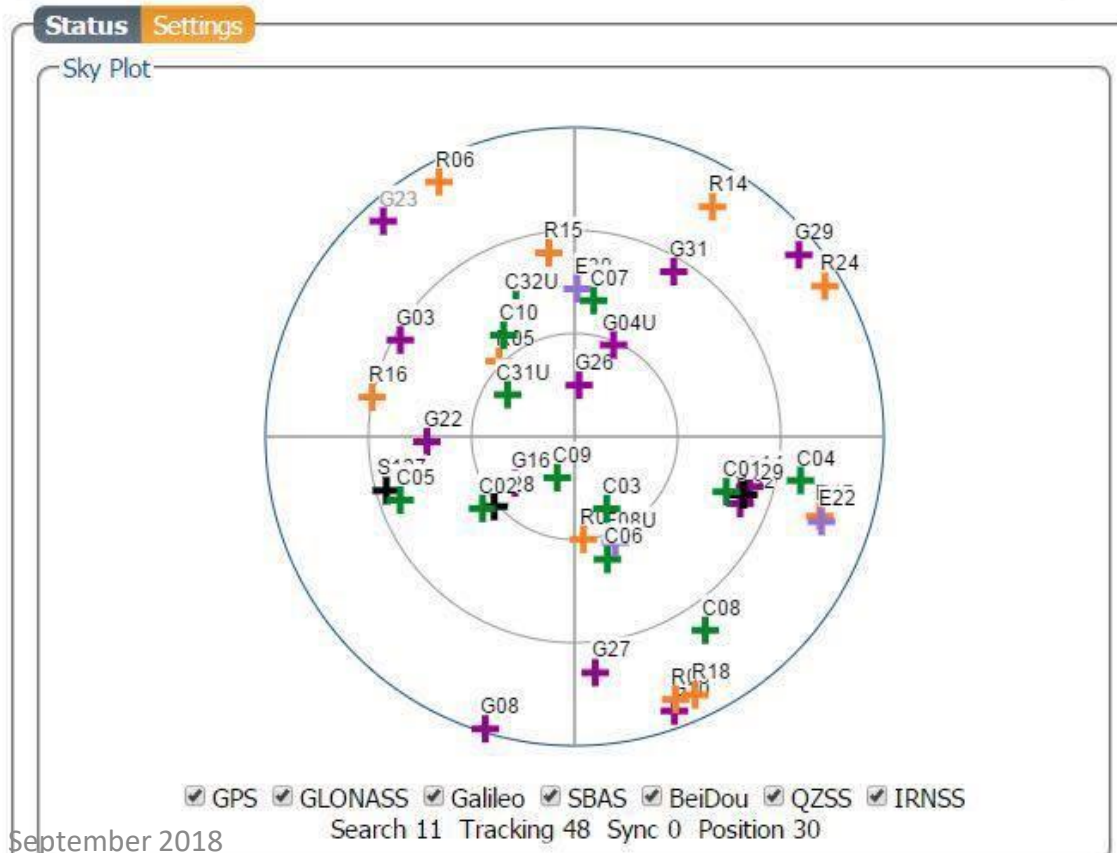
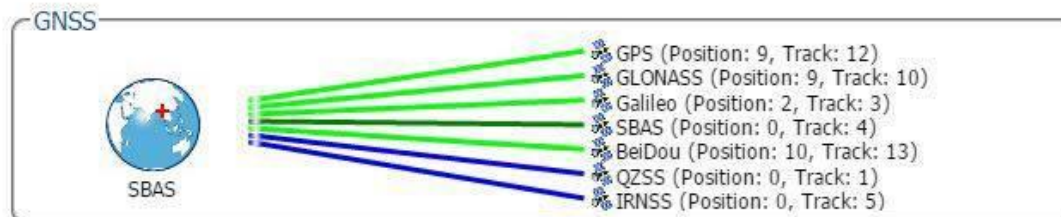
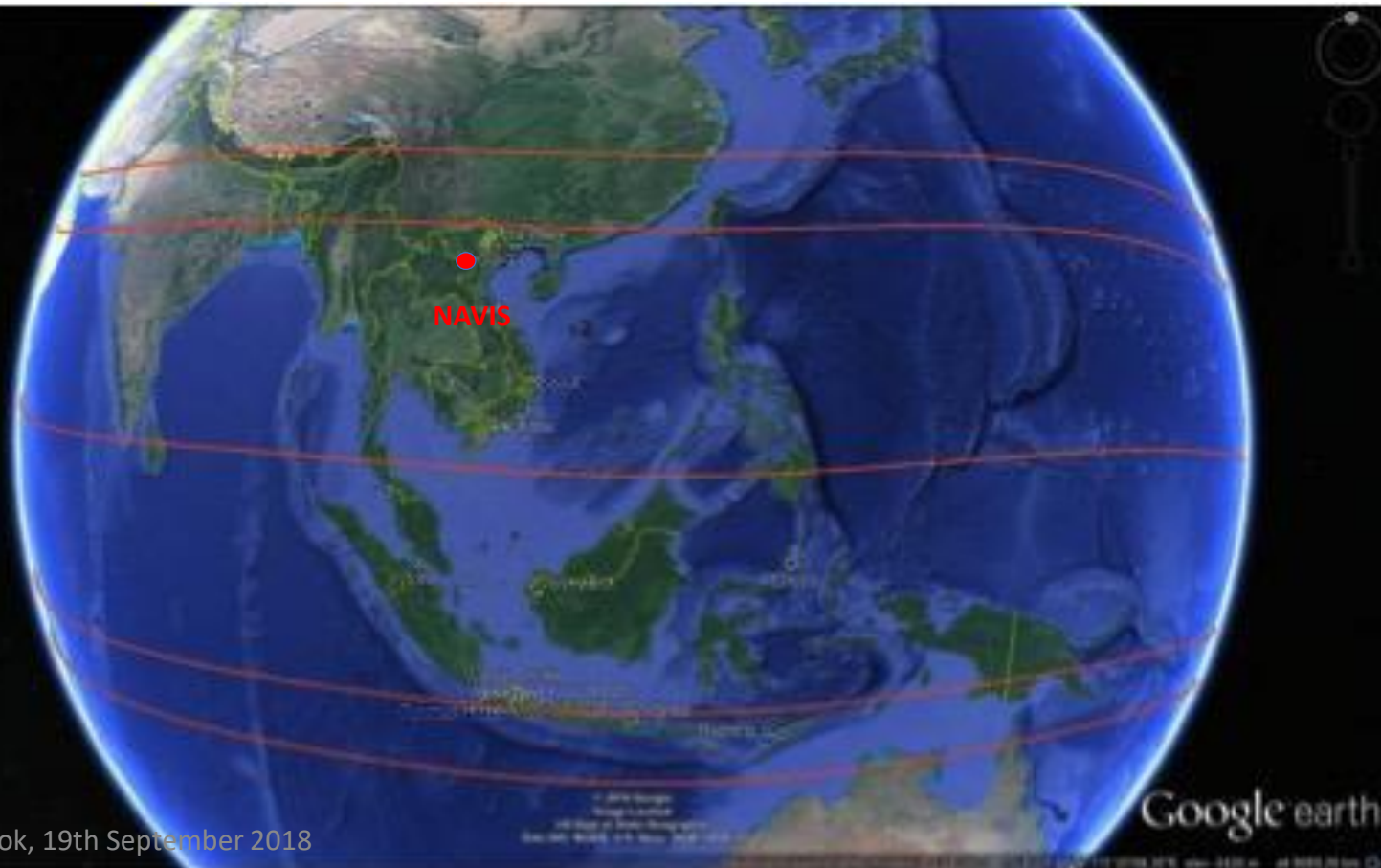


Image courtesy
of Alain Suskind
(Septentrio)

Convenient location of the NAVIS

The geographic location of the NAVIS Centre, not far from the magnetic equator, is strategic for studying the ionosphere and its anomalies.





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51. The Ministers welcomed the setting-up of a co-operation framework in the field of civilian use of satellite navigation systems, and expressed their willingness to promote the involvement of their relevant institutions and organisations. They encouraged in particular the establishment of a permanent EU-ASEAN collaboration centre on civilian use of satellite navigation systems.

**18th ASEAN-EU Ministerial Meeting Co-Chair's Statement
Madrid, 26 May 2010**

The 18th ASEAN-EU Ministerial Meeting, under the theme of “Partners in Regional Integration”, was held in Madrid, Spain on 26 May 2010 and co-chaired by their



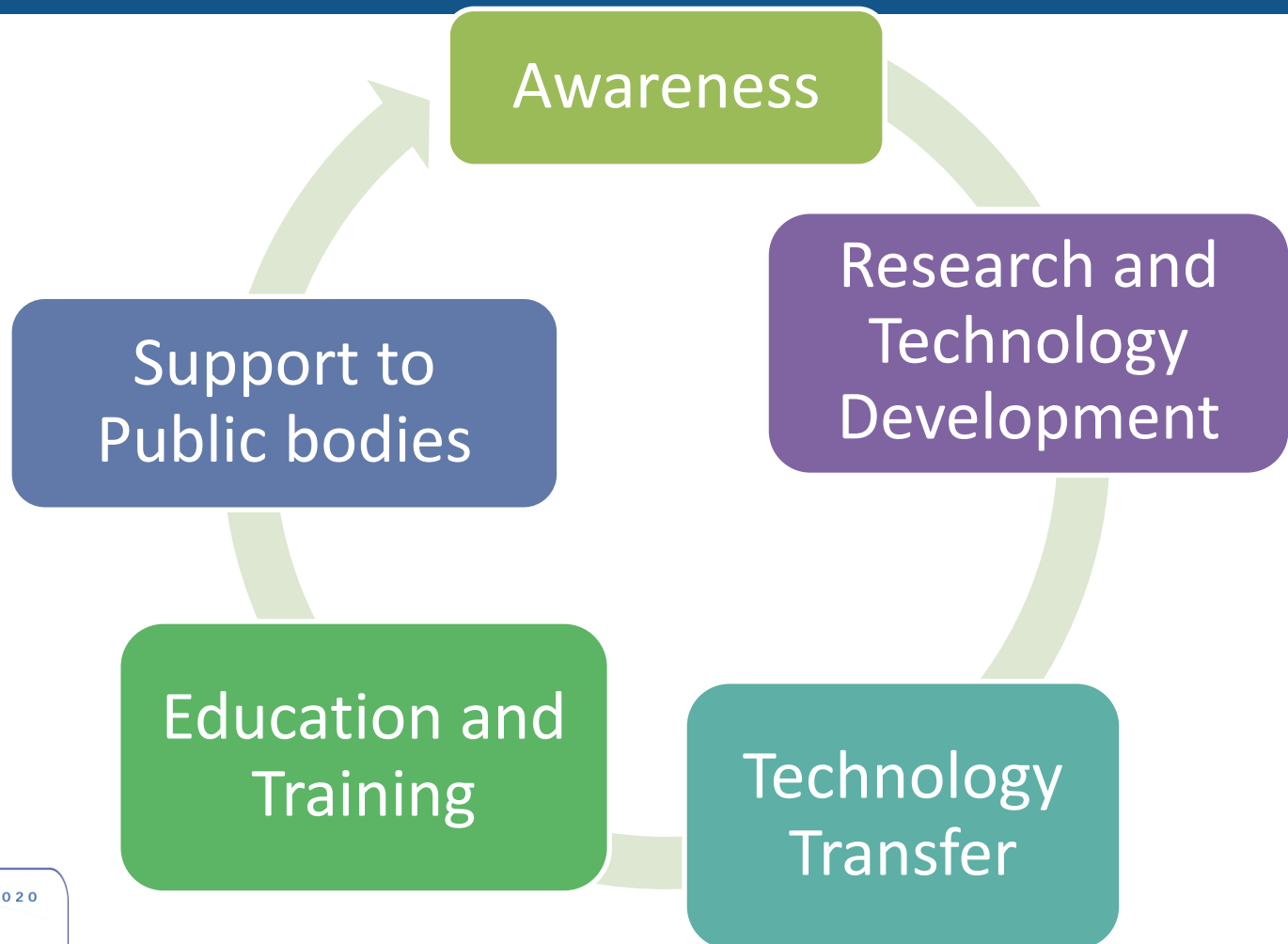
9th ICG Meeting
Prague, 13 November 2014

Working Group: Information Dissemination and Capacity Building

Recommendation of Committee Action:

ICG Working Group C recommends that the Office for Outer Space Affairs in cooperation with the ICG membership, and the educational centres and organizations, such as the NAVIS Centre and GEospatial and Space Technology consortium for Innovative Social Services (GESTISS), and international initiatives, such as MGA and its members, organize workshops and technical seminars in the field of GNSS and its applications in South East Asia region. The participation of BeiDou/GNSS Application Demonstration and Experience Campaign (BADEC) is also encouraged.

NAVIS Services



Research Topics



1. Multi-GNSS signal processing and receiver design
2. Precise positioning technologies (DGNSS/RTK/PPP)

3. Resilient GNSS:

- Ionospheric scintillation & monitoring
- Interference mitigation
- GPS anti-spoofing and anti-jamming

4. Intelligent Transport System (ITS) and Location-Based Services (LBS)



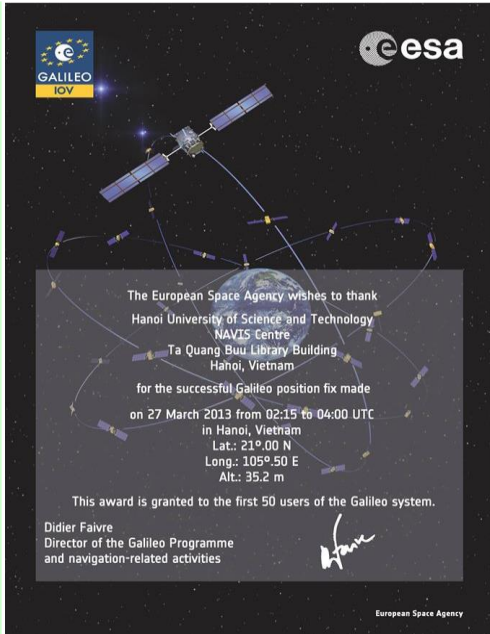
International Cooperation in RTD

- With European institutions:
 - Universities: Polito, UPC, UFC, ENAC...
 - Organization/Institution: JRC, ESA, ISMB, INGV, BavAIRia ...
- With Japanese institutions:
 - JAXA, universities...
- With Australian institutions:
 - University of New South Wales (UNSW)...
- Cooperation with ASEAN Member States:
 - via bi-lateral, multi-lateral projects, and regional organizations such as SCOSA, MGA...
- Member of Multi-GNSS Asia (MGA)

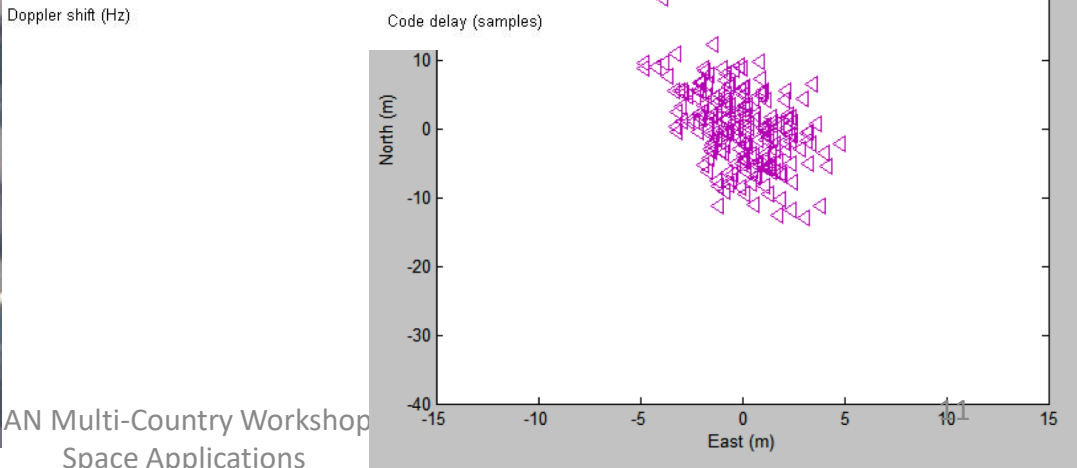
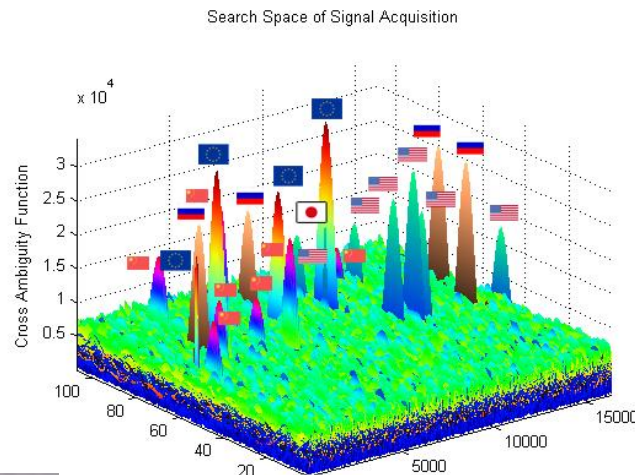
Some R&D Results

Multi-GNSS software receiver and signal processing

Among 50 first users of the Galileo system



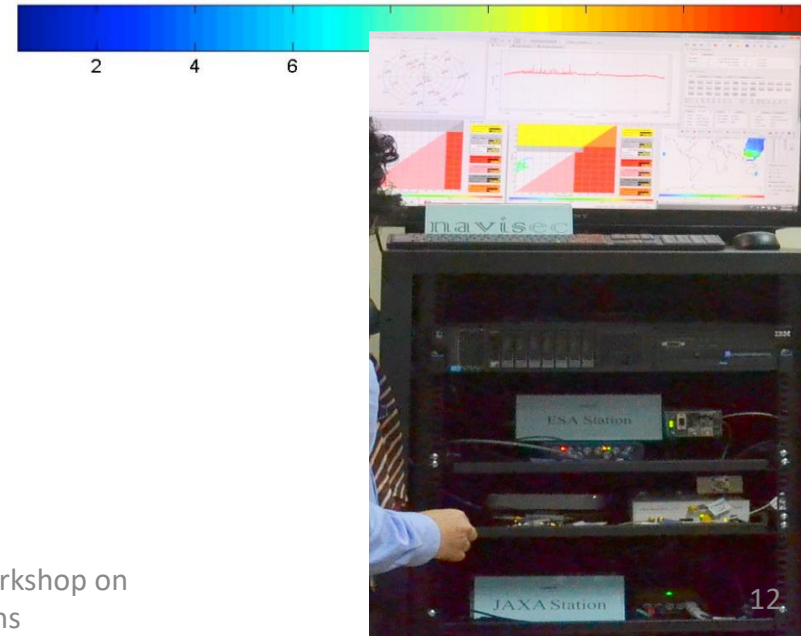
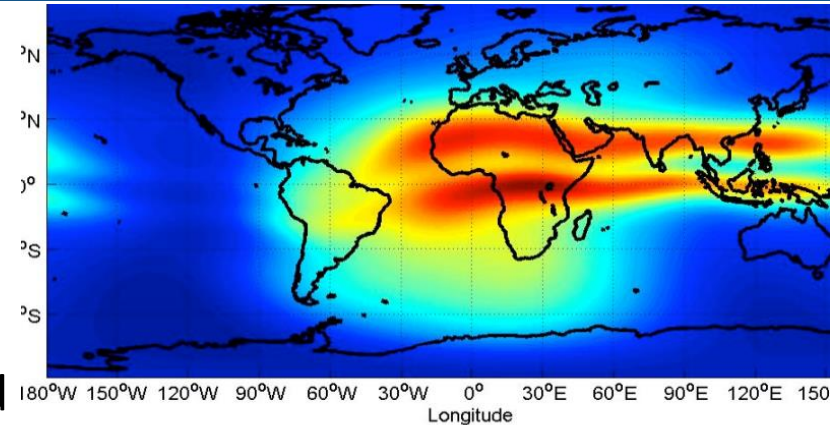
GPS/GLONASS/Galileo/Beidou/QZSS multi-system solutions



Some R&D Results

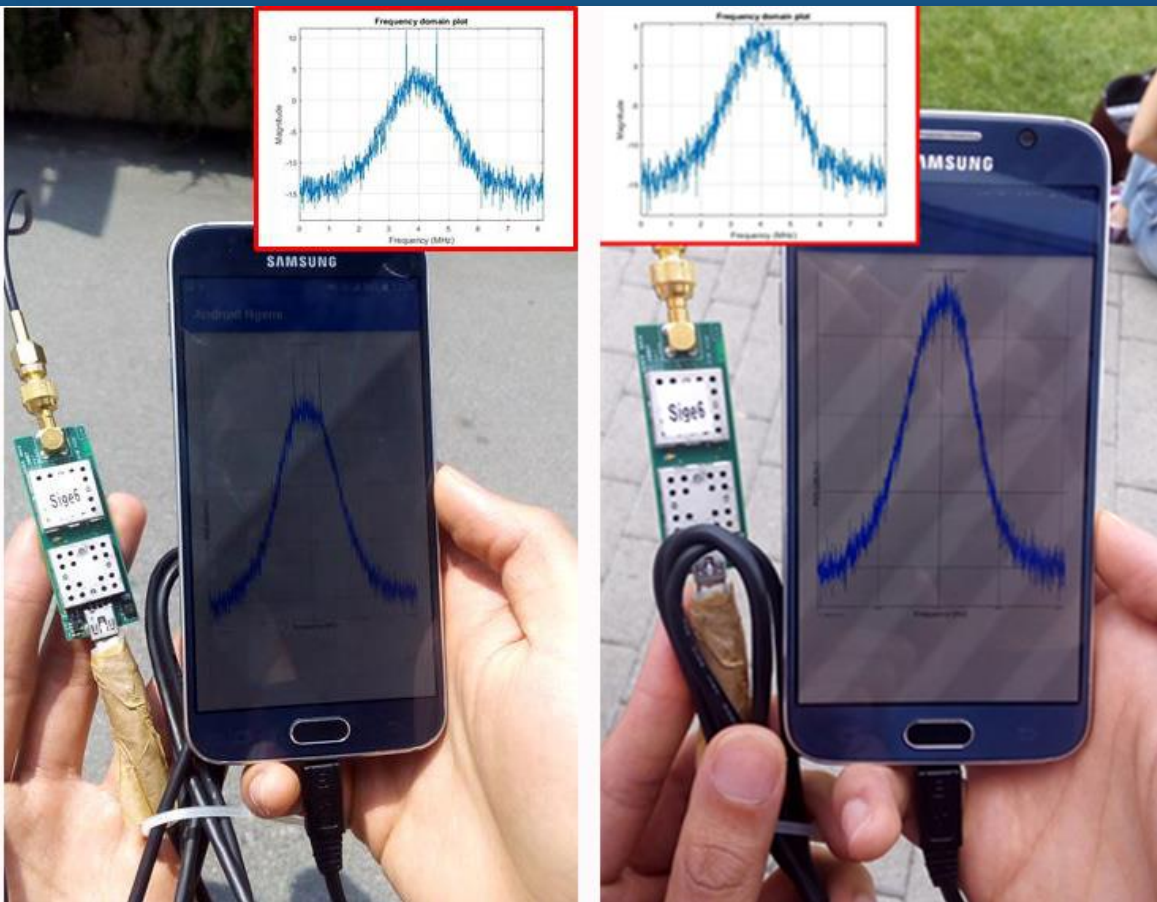
Signal and Ionospheric Monitoring

- **JAXA** (Japan Aerospace Exploration Agency) signal monitoring station since 2012
- **ESA** (European Space Agency) station since 2013
- **JRC-IPSC** (The Institute for the Protection and Security of the Citizen of the European Commission Joint Research Centre) for monitoring ionosphere scintillation events.
- **INGV (Istituto Nazionale di Geofisica e Vulcanologia)** and **ISMB** and **Polito** on GINESTRA / ERICA projects funded by ESA



Some R&D Results

Portable Interference Detector



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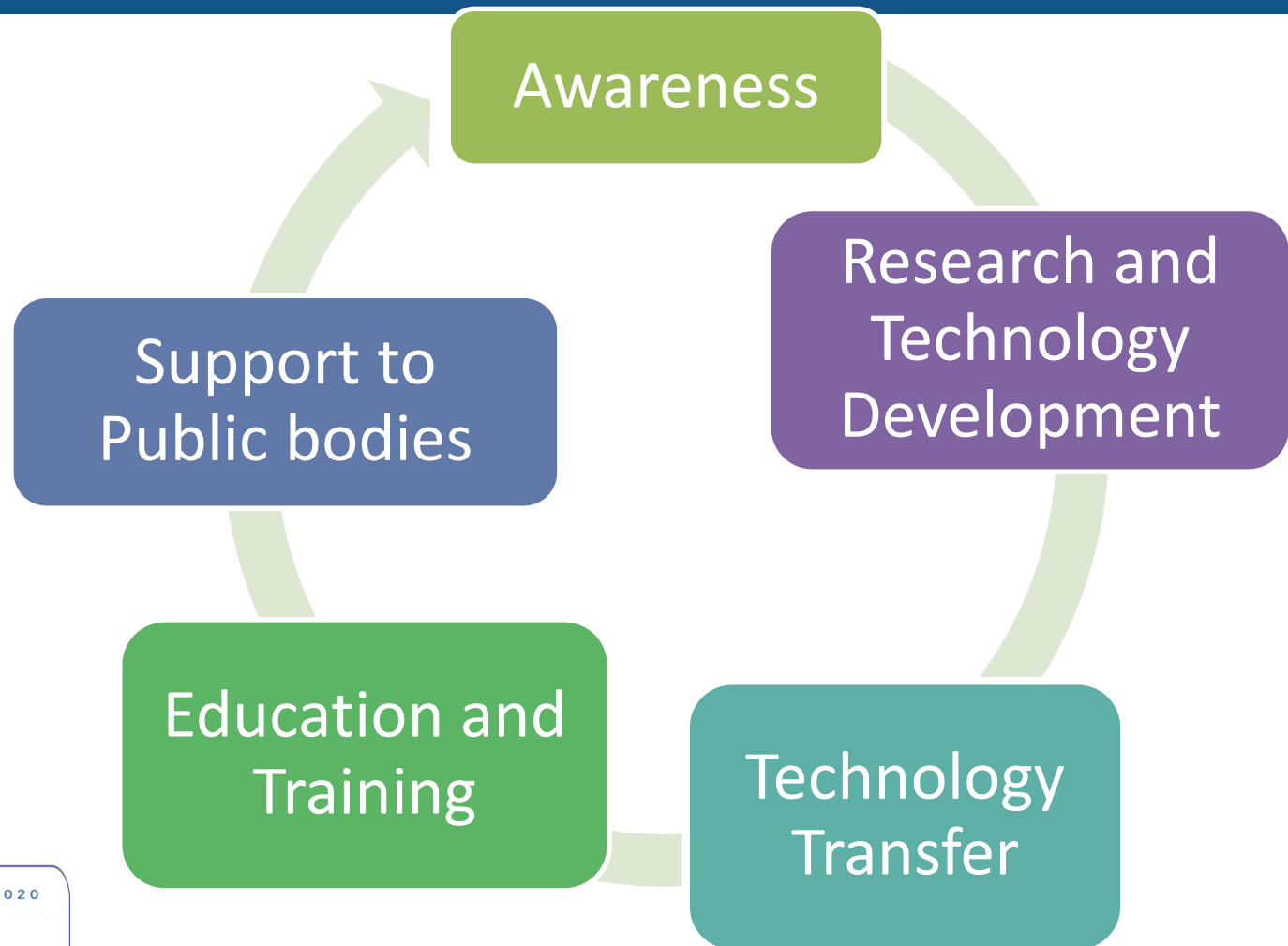
navis

**NGeneApp of
NAVSAS on Mobile
Phone**

Open sky conditions:
interference caught

Western portion of the sky
obscured by a nearby
building: **no interference**

NAVIS Services

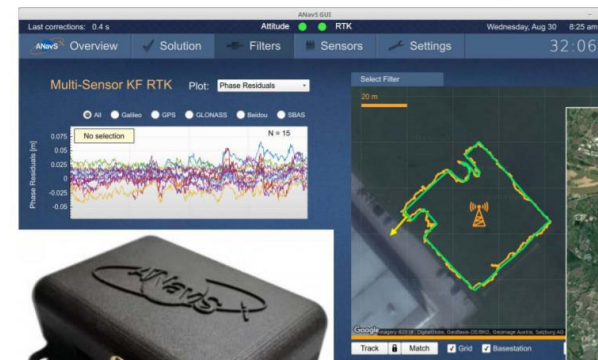


The NAVIS as test-bed

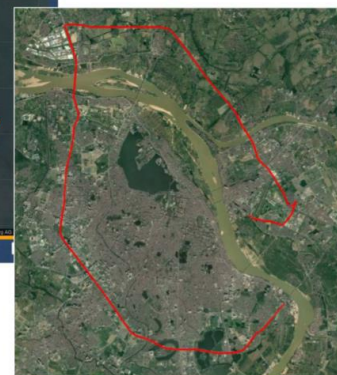
- Companies and institutions willing to test their equipment and GNSS based solutions in the challenging multi-GNSS environment available in Hanoi can use the NAVIS Centre as a test-bed.
- NAVIS staff can provide valuable technical support for such RTD initiatives.
- Within the BELS project several EU based companies have already exploited this opportunity.



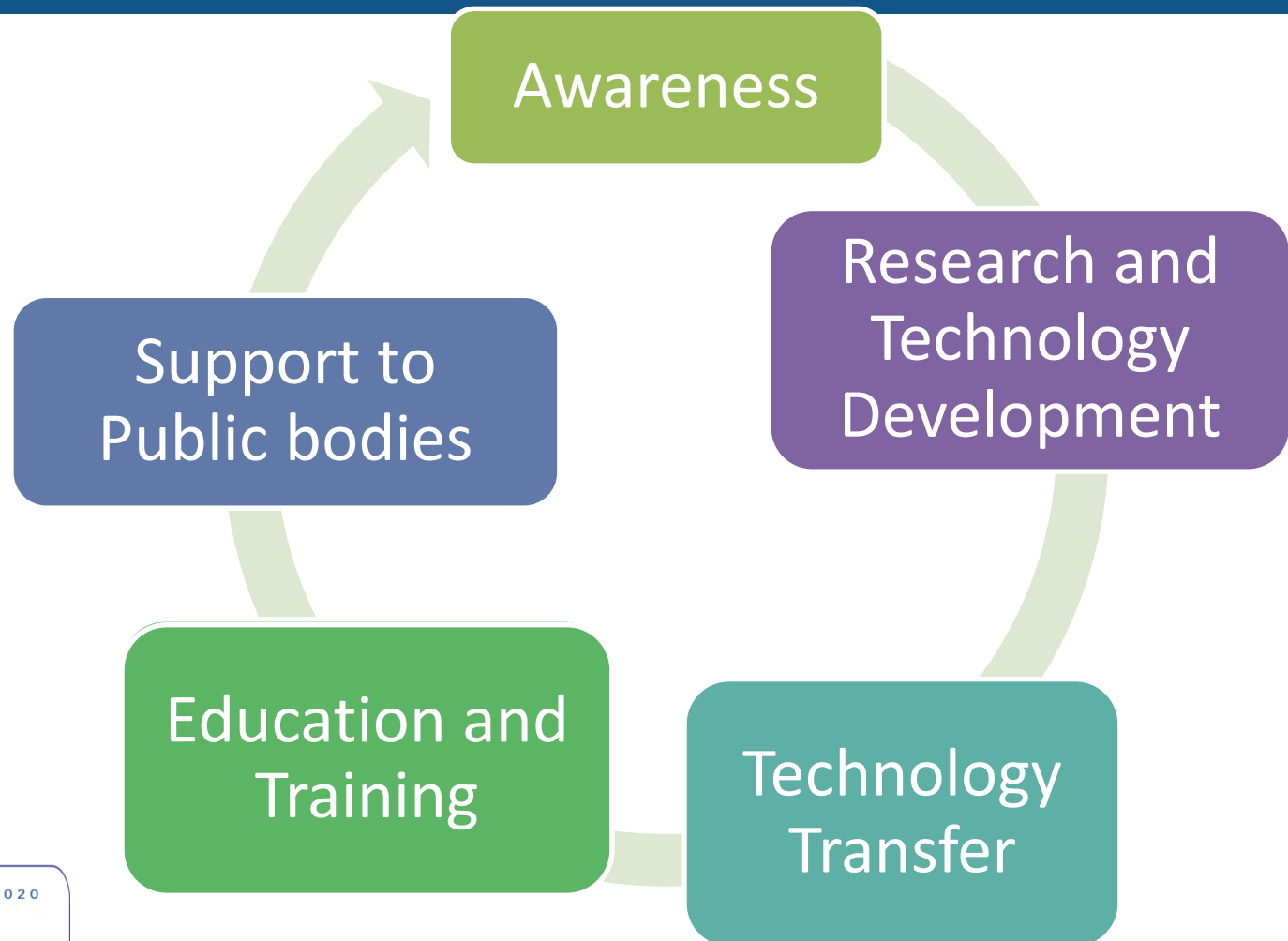
Multi-GNSS, Multi-Sensor RTK Positioning



Validated also in
challenging conditions
in Hanoi, Vietnam



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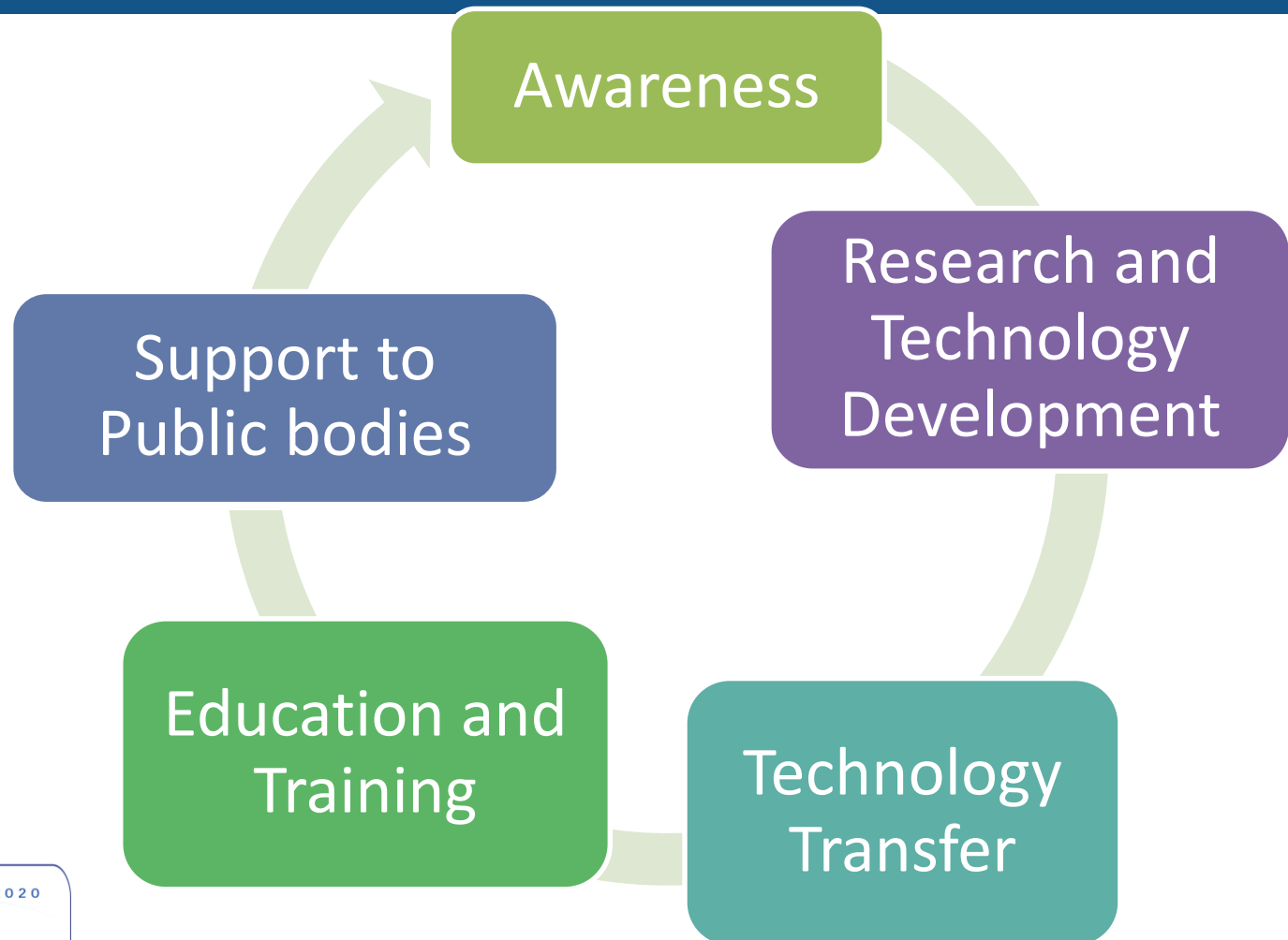
Education and training @ NAVIS

- Organisation of international training courses, summer schools, and workshops for students and technicians from public and private sector in Vietnam and in the Asia-Pacific.



- Institutional teaching of HUST where NAVIS staff lecture, final projects for graduate and undergraduate HIST students.
- PhD students

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Support to public bodies

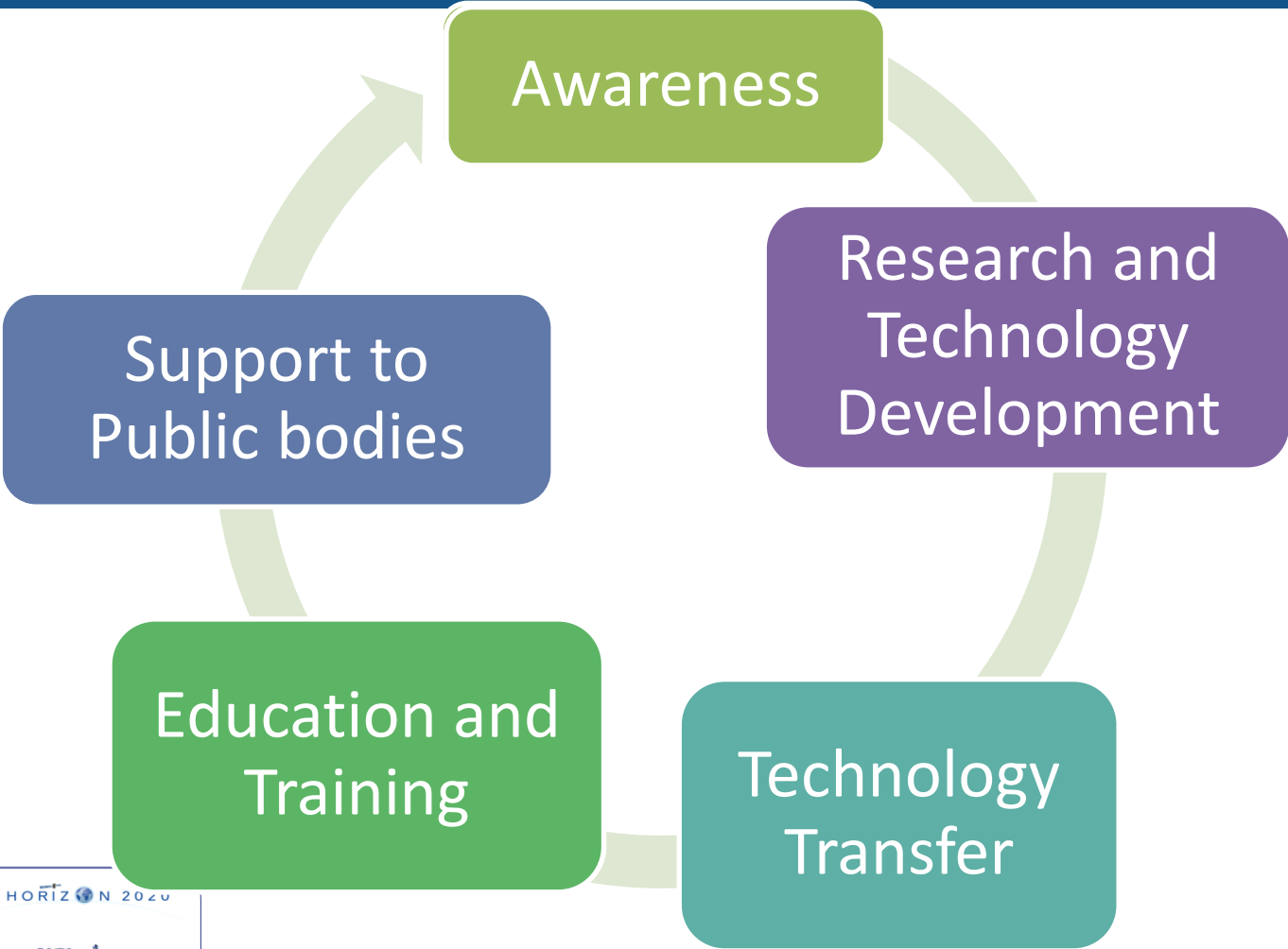
The NAVIS Centre is offering its expertise and knowledge to public bodies and authorities.

Several cooperation activities have been undertaken in particular with:

- Directorate of Road Administration.
- Department of Survey, Mapping, and Geoinformation
- Space Committee of Vietnam
- Institute of Metrology



NAVIS Services



Awareness Raising

The NAVIS Centre has conducted several awareness-raising actions, both at home and abroad, participating to conferences, seminars, workshops, aiming at:

- Increasing awareness about the Multi-GNSS environment and the opportunities it can provide.
- Informing stakeholders and users about latest technological developments and available solutions.
- Warning authorities and stakeholders about threats and problems that can affect GNSS applications.



ASEAN Multi-Country Workshop on
Space Applications

Conclusions

- The NAVIS Centre, at HUST, has **strong expertise**, excellent national/international relationships, and good reputation in the field of GNSS.
- NAVIS is aiming at being a **hub for GNSS R&D and training in SEA**. It has **good familiarity** with European research and working environment thus it can help SEA stakeholders to get out the most of European GNSS solutions.
- South-East Asia is covered by the largest number of GNSS and a challenging ionospheric environment is available at NAVIS that **offers a good environment for testing** the performance of satnav products and applications.

*We're open for any idea and cooperation in the field of
GNSS*

Thanks!



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