

bavAIRia – Bavarian Cluster Aerospace & Advanced GNSS Service Testing in Bavaria

Baerbel Deisting

AOR Workshop, December 7th, 2015

Bavaria

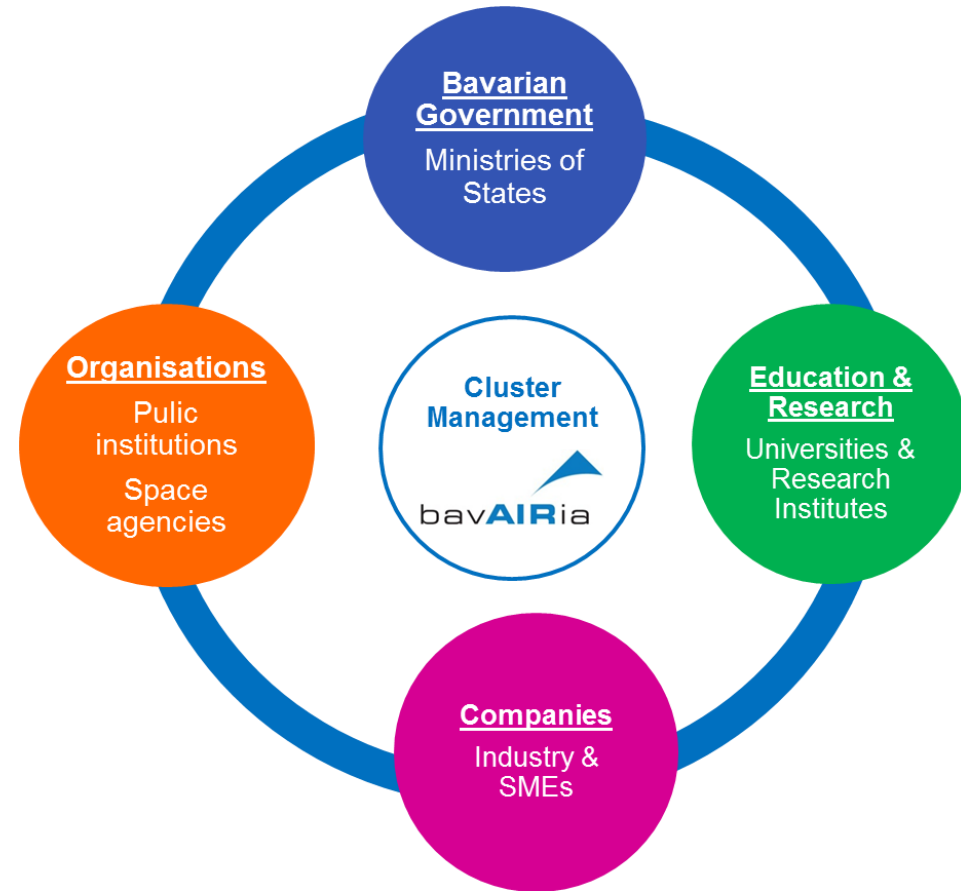
Economic Dynamics and Quality of life

- Area : Germany's largest Federal State (70,550 km²)
- GDP (2012) € 466 billion:
No. 8 in EU
- Population (2012): 12.5 Mio.
Inhabitants: No. 9 in EU
- World class industry headquarters

Innovation and Tradition

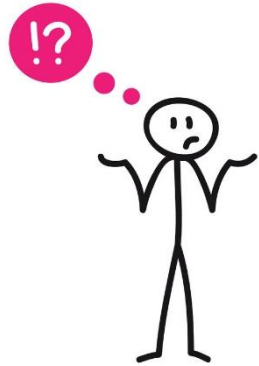
- Key players in European and global space and space applications scene
- Bavaria is home to
 - internationally operating companies
 - innovative small and medium sized companies
 - numerous startups
- Technological expertise in such fields as satellite navigation, earth observation, satellite communication, robotics, and space propulsion systems

bavAIRia - the Cluster AeroSpace

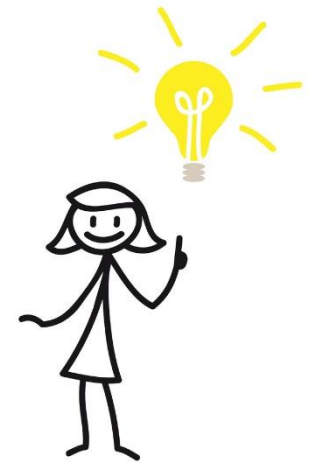


bavAIRia is engaged in Aviation, Space and Space Applications.

bavAIRia's Tasks



- Support the development of innovative space-based applications and services in various fields



- Foster cooperation between industry, SMEs, universities, research institutes as well as politics
- Support international cooperation
- Enable international business and cluster cooperation



bavAIRia Members in Space & Space Applications

Industry – Education & Training - Science & Research – Services – Administration & Associations



Advanced GNSS Service Testing in Bavaria



**GATE Operator:
IFEN GmbH**



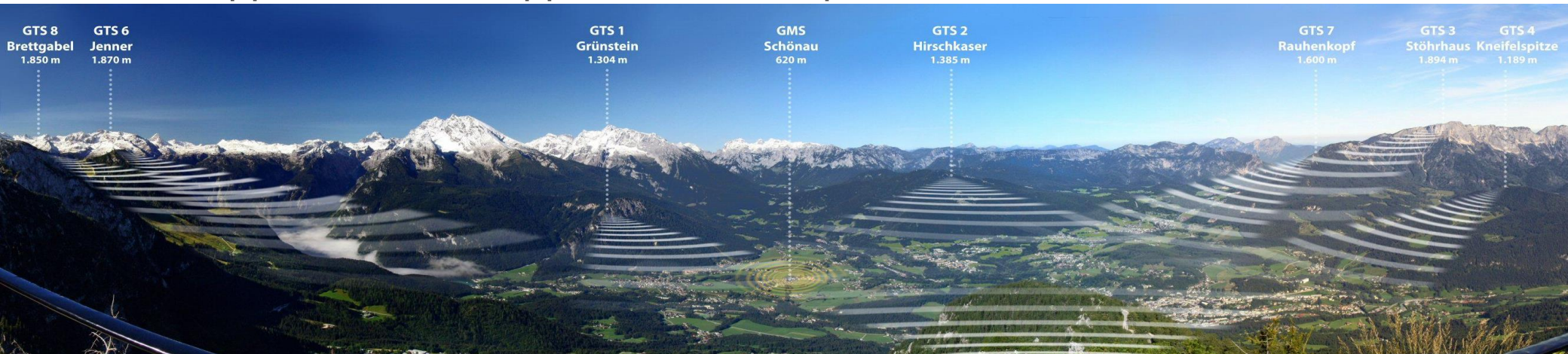
Overview

- Unique outdoor **test range** for Galileo positioning, using eight terrestrial **transmit stations** located on **top of mountains**
- GATE is operated by **IFEN GmbH** on behalf of the **German Aerospace Centre DLR**
- GATE is **open** to users from all over the world
- ESA uses GATE for its **European GNSS Evolution Programme**



GATE main objectives:

- Support of Galileo receiver developments and testing
- Support of GNSS application developments



GNSS Service Testing Opportunities

Galileo conformity testing:

- Full **Galileo Service Tests** with SIS on **all frequencies** (E1, E5a/b, E6) through the GATE transmit stations.
- **Integration** with already available **Galileo IOV & FOC** satellites for a combined positioning

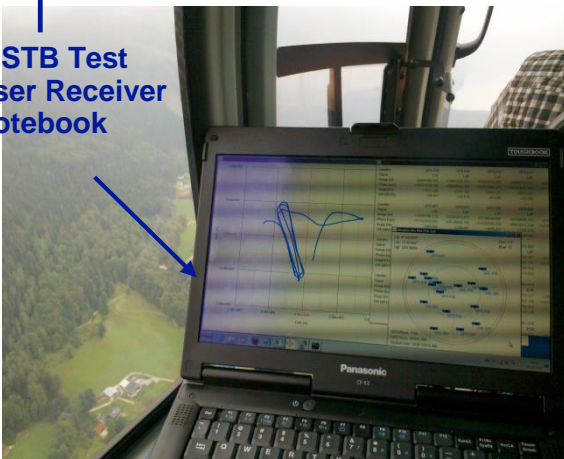
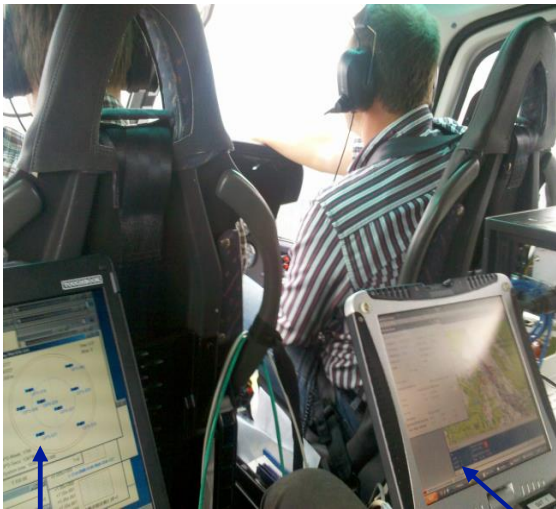


Receiver robustness testing:

- Simulation of arbitrary **Feared Events** on satellite clocks (per frequency & PRN) for integrity testing of receiver RAIM algorithms
- Simulation of different **Evil Waveform** signal deformations (ICAO Threat Model)
- Possibility to generate **in-band jamming** and **CW interference** signals

Use of **Galileo COTS receivers without any modification**

High Integrity Service Test Bed – EGNOS Evolution Tests



HISTB Test User Receiver Notebook

GATE Monitoring Notebook



DLR-IKN – Interference -Tests

Interference tests of DLR-IKN with the GALANT receiver. The measurements are supported by the BMWi project KOMPASSION.

New developed compact multi array antenna



Horn antennas for transmitting interference signals in addition to the eight regular GATE transmitter signals

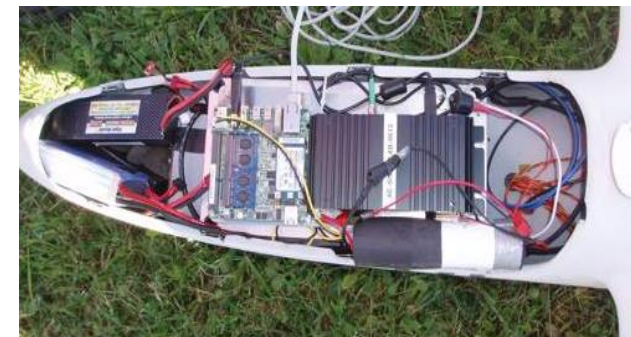
PITVANT (Portuguese Air Force Academy)



GATE: 3D-Positioning with Galileo signals



PITVANT Project:
The University of Porto and the Portuguese Air Force Academy research and develop technologies for controlling Unmanned Aviation Systems (UAS)



EU-Asia Collaboration Interests of IFEN

Special customisation of IFEN's GNSS Test Solutions according to the specific needs of the collaboration partner.

Special customisation of IFEN's GNSS receiver platforms according to the specific needs of the collaboration partner.

Collaborate with IFEN to meet mutual interests in R&D of

- GNSS Positioning & Navigation Technologies
- GNSS Applications & Test Solutions,
- GNSS Awareness & Capacity Building.

Thank you for your attention!



bavAIRia

Europe's heart of aerospace
and navigation

Baerbel Deisting
Director of Space & Space Applications
deisting@bavAIRia.net