



BRIMATECH

The Austrian Project HA-GAL  
Praque, 15/11/2016

# Contents

- I. Brimatech Services
- II. HA-GAL Project

BRIMATECH identifies

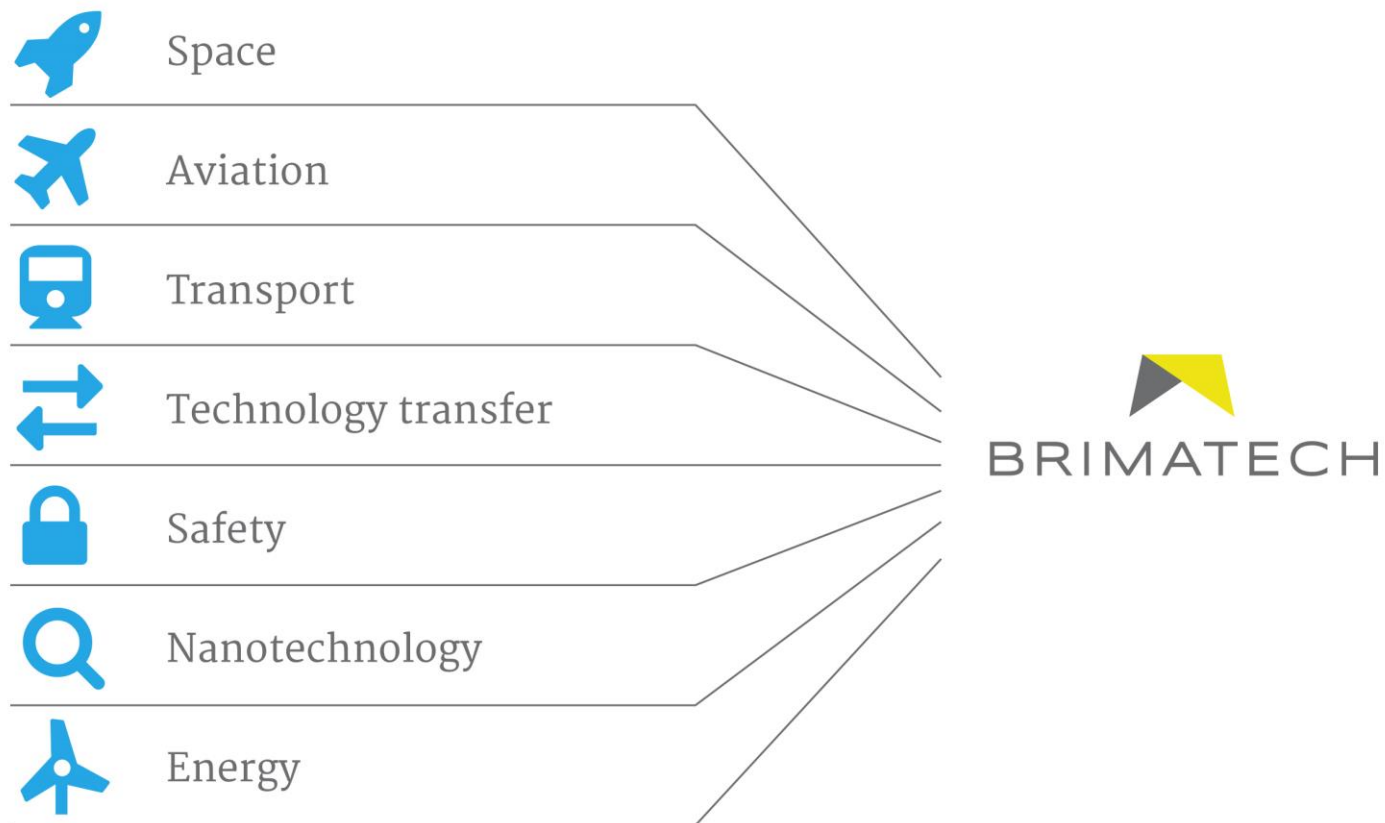
# Markets for innovations and technologies

Brimatech is a market research and consulting company specialising in technology markets.

We talk to experts and we observe users. We investigate trends and factors impacting market success. We develop business models and strategic concepts. We transfer technologies to new markets. We connect players in a given industry and we make them more visible internationally.

Brimatech was founded in 2008 in Vienna.

# BRIMATECH brings together markets and Technologies



# BRIMATECH

## Services

### Market and industry studies

- Market environment, trends
- Competition
- Competence maps



### Technology transfer

- Trendsetting technologies
- Market needs
- Networking



### Stakeholder analyses and user integration

- Surveying of market participants
- User needs
- User acceptance



### Consulting and Coaching

- Strategy coaching
- Start-up consulting
- Financing models
- Design of web tools



### Business models & business development

- Market release strategies
- Value chains
- Cost/benefit analyses



### Training and education

- High-tech marketing
- Business to business marketing
- Market research



# Experiences with Positioning/Galileo

Numerous national, FP6, FP7, H2020 and ESA projects related to

- Surveying
- Reference Station Providers
- Road, Dangerous Goods Transport, ITS, Maritime, Rail
- LBS
- Aviation
- Catastrophe Management
- PRS

# The Project

**HA-GAL** – The 'High Accuracy GALileo-Commercial Service':  
Opportunities and risks for GNSS-reference station operators

Project duration: 01.01.2015-30.09.2016

Partners:



Austrian Space Applications Programme (ASAP):



# Situation

## Galileo Commercial Service (CS)

- A service with costs
- Expected from 2017/2018 (?)
- Two core areas:
  - High-Accuracy Service (HA)
  - Authentication Service (AU)

### High-Accuracy Service

- Promises a positioning accuracy at the 1dm level or better
- Based on global satellite orbit and clock corrections and utilizing the Precise Point Positioning (PPP) concept

→ Competing regional reference station operators



# Objectives

## Technical objectives

- Analysis of technical requirements, barriers and options of Galileo-CS HA-Services
- Verification of how GNSS-reference network services can make use of internally available dense GNSS observations data to allow its customers a more efficient, more accurate and more rapid positioning (as compare to the CS-Service)


## Market study

- Definition of new services for GNSS reference network operators to **cooperate with** or to **distinguish from** the Galileo CS HA-Services
- Analysis of **promising strategies**

# Questions

- What are the chances and risks Reference Network Providers will face in the light of the Galileo Commercial Service?
- Which strategies are they developing? In which timelines?
- How will they position themselves?
- Which surrounding conditions are they expecting?
- What are their wishes towards the Galileo Commercial Service, what are they expecting?
- Which support/input do they wish?
- Do they wish for more cooperation/networking, maybe even joint projects?

# Overview DGPS – PPP Services

Generic term	GBAS	SBAS	
Colloquial term	Network RTK / DGPS	„PPP“ Services	„SBAS“ Services
Example for provider / brand name	<ul style="list-style-type: none"> <li>- AXIO-NET / FarmRTK</li> <li>- 06-GPS / MoveRTK</li> <li>- Trimble VRSnow</li> <li>- Topcon TopNet</li> <li>- SAPOS</li> <li>- ...</li> </ul>	<ul style="list-style-type: none"> <li>- John Deere StarFire</li> <li>- Trimble Omnistar / CenterPoint RTX</li> <li>- Veripos / TerraStar</li> <li>- Fugro / SeaStar</li> <li>- Hemisphere / Atlas</li> </ul>	<ul style="list-style-type: none"> <li>- EGNOS (EU)</li> <li>- WAAS (US)</li> <li>- ...</li> </ul> 
Set-up, Infrastructure, characteristics	<ul style="list-style-type: none"> <li>- Local area</li> <li>- Reference stations 50km distance</li> <li>- Bi-directional Coms needed</li> <li>- Mobile phone or local radio broadcast</li> <li>- ...</li> </ul>	<ul style="list-style-type: none"> <li>- Global</li> <li>- ~100 Reference Station worldwide</li> <li>- Uni-directional Coms</li> <li>- Satellite Link</li> <li>- ...</li> </ul>	<ul style="list-style-type: none"> <li>- Regional</li> <li>- ~50 Reference stations</li> <li>- Uni-directional Coms</li> <li>- Satellite Link</li> <li>- ...</li> </ul>
Performance characteristic	<ul style="list-style-type: none"> <li>- 2 centimeter</li> <li>- within seconds</li> </ul>	<ul style="list-style-type: none"> <li>- 5-30 centimeter</li> <li>- Within 5 – 30 minutes</li> </ul>	<ul style="list-style-type: none"> <li>- 1-2 meters</li> <li>- within seconds</li> </ul>

29 September 2015



1

GBAS= Ground Based Augmentation System  
 SBAS = Satellite Based Augmentation System  
 PPP = Precise Point Positioning  
 RTK = Real Time Kinematik



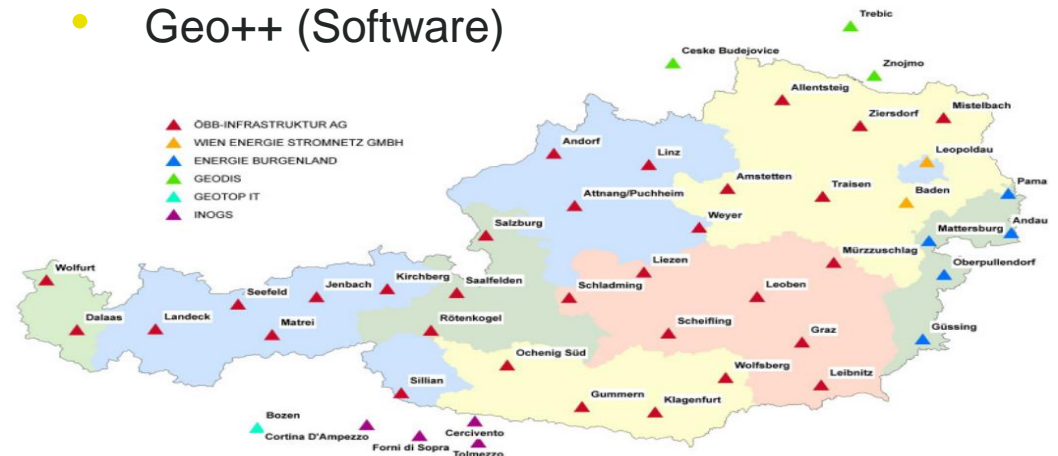
# Stakeholders in the project

## Workshop

- Austrian Federal Railways
- Linz AG
- Energie AG
- EPOSA
- EVN
- TU Vienna
- Federal Office of Metrology and Surveying
- Ministry bmvit
- CZEPOS
- European GNSS Authority
- GUGiK
- ROMPOS

## Interviews

- ÖBB (Austrian Federal Railways)
- EPOSA (Reference network, AT)
- LGLN (SAPOS - Reference network, DE)
- Axio-Net (Reference network, DE)
- 06GPS (Reference network, NL)
- Leica Geosystems (PPP, Hardware)
- Trimble (PPP, Hardware)
- Topcon (PPP, Hardware)
- Geo++ (Software)



## Current User Groups for Reference Networks

- Surveying
- Agriculture
- GIS
- Construction
- Machine control
- Energy (onshore)
- More: Scientific, Police, Archaeology
- Upcoming:
  - Automotive
  - Drone control
-

# Conclusions I

- cm accuracy is required for most applications
- Latency period of PPP at the moment too long for the majority of the existing users, but will come down to 1-2 min.
- CS is unclear with respect to: Target groups, Cooperation with local reference stations providers, Specifications, Business Model, Cost/Price, EGNOS, Equipment needed
- Reference stations are (being) upgraded for Galileo, different experiences for receivers

## Conclusions II

- Receivers to use the best service option available at time
- Galileo CS and RTK could complement each other (local market access, rural areas without communication connection)
- User support is a big issue
- Different approaches for public or private RTK network providers
- More information and awareness is needed
- Timing is important now
- **Reference network providers to join forces**



BRIMATECH

Dr. Susanne Katzler-Fuchs  
+43 664 9689421  
[skf@brimatech.at](mailto:skf@brimatech.at)

Mag. Johanna Egger-Berndorfer  
+43 664 9689424  
[jeb@brimatech.at](mailto:jeb@brimatech.at)

Brimatech Services GmbH  
Lothringerstraße 14/3  
1030 Vienna, Austria

+43 (0)1 715 32 00  
[office@brimatech.at](mailto:office@brimatech.at)  
[www.brimatech.at](http://www.brimatech.at)