

UCP 2020 MINUTES OF MEETING OF THE GEOMATICS AND URBAN PLANNING SESSION

Meeting Date	01.12.2020	Time	14:00-19:00
Meeting Called By	GSA	Location	Online
Minutes Taken By	Asparuh Kamburov, Evenflow	Next Meeting Date	UCP 2022
Attendees	<p>Eduard Escalona (GSA) Panel Moderator Michal Babáček (GSA) Supporting moderation Asparuh Kamburov (Evenflow) Panel Coordinator</p> <p>User Community Representative Pablo Olmos (Leica-Geosystems) - Panel users' chair</p> <p>Attendees: See Annex 1</p>		
Distribution (in addition to attendees)	UCP Plenary, GSA, Public		

Organisation	Name	Signature
European GNSS Agency	Eduard Escalona	
Evenflow	Asparuh Kamburov	

Agenda Items	Presenter
1. Welcome and introduction	E. Escalona
2. Review of Market Report 6 and Market Trends	A. Kamburov
3. Open discussion on user requirements and Galileo services	M. Babáček
4. Interactive augmentation providers map	E. Megias
5. EGNOS visibility maps	M. Ruiz
6. Geomatics on the Move contest	E. Escalona
7. Associations: Council of European Geodetic Surveyors	V. Krupa
8. Associations: EUPOS	B. Droscak
9. GISCAD-OV	R. Capua
10. EGNOS success stories in Geomatics	M. Ruiz
11. Upgrade to Galileo in RTK networks	P. Wiklund
12. Machine control in Construction	G. López
13. Copernicus programme	M. Massart
14. Land monitoring service for Geomatics and Urban Planning	M. Zotti
15. Final Q&A	E. Escalona



Summary

The 3rd User Consultation Platform (Geomatics and Urban Planning panel) took place on the afternoon of 1st December as an online event. It gathered more than 83 participants from various European public (government, NGO, academic) and private organizations of different sizes and research/business areas.

The discussions of the experts were mainly focused on the current and future possibilities which the use of EGNSS should yield for geomatics and urban planning, including:

- Parameters, benefits and roll-out schedule of the free Galileo **High-accuracy service**
- New market trends in Geomatics in the face of the **4th Industrial revolution**
- **Transformation** in the construction market thanks to autonomous GNSS machine control and its increased interest for **authentication** and **anti-jamming/spoofing requirements**
- Assessment of **synergetic** professional applications with data from Copernicus Land Management Service.

The panel was divided in three sections:

- 1) **User Needs and Requirements Documents** - this section provided insights into the state of Galileo authentication, integrity and anti-jamming parameters. Authentication and integrity were identified as important for several applications, especially autonomous machine control in construction and mining (mainly for safety reasons), and would need proper user requirements in near future.

The users were acquainted with the testing campaigns of the Galileo OS-NMA function and invited to its Public Testing stage during 2021. Interest was expressed in spoofing detection for geomatics apps like autonomous construction and marine surveying. In general, anti-jamming solutions are of interest for most of the user community, as spoofing/jamming incidents are detected more often.

The participants were familiarized with the HAS main characteristics: signal structure, accuracy levels, availability and technical support. Phases 0, 1 and 2 of the roll-out, the main project milestones and a dedicated [survey](#) were also presented. Apparently, there is an increasing interest in the HAS for professional applications, so the Geomatics community is eager to be able to benefit from free high accuracy, as soon as possible. The main target of HAS are emerging applications such as autonomous vehicles, drones and robotics, plus all other applications where 20 cm positional accuracy is sufficient.

- 2) **User community**

The RTK service providers **SKPOS** and **SWEPOS** presented very good results on Galileo performance within their service coverage areas. There was also a high interest in the **interactive map** of Galileo ready augmentation providers, as well as the **Geomatics on the Move contest** and various **CLGE** events, presented within this panel.

- 3) **Use cases**

It was agreed that autonomous construction and its related ecosystem of sensor fusion, SLAM, robotics, VR and AR, cloud computing, 3D modelling, etc. is a sector that would benefit from dedicated user requirements. Several GNSS requirements were identified as important: **Accuracy** (cm level, especially for height determination); **Orientation** - GNSS/IMU fusion for vehicle orientation and levelling; **Availability**, especially in complex environment (e.g.



mountains, reflective surfaces) and **Reliability** - for optimized work and vibration robustness.

There was a very lively discussion on how there is a clear trend to miniaturize surveying equipment, which eventually might result in many high-accuracy field operations being done via smartphones if GNSS technology (mainly on the antenna side) allows it. In turn, this means that requirements such as authentication and integrity of positioning technologies, including GNSS, will also become more important to ensure **safe** operations.

4) Copernicus

The main outcome of the dedicated Copernicus slot was that the combined use of Copernicus and EGNSS can significantly contribute to Geomatics, where the two different data dimensions offered by both space components provide a much better understanding of the environment in activities where this information is essential, such as **mining, mapping, asset inventory** and many others, unlocking also the creation of new applications and businesses.

The SLIDO platform attracted more than 50 active users, who accounted for a total of 383 poll votes (See detailed report in Attachment 1).

Minutes of Meeting

Election of the users' chairperson:

Pablo Olmos (Leica Geosystems) was elected as chairperson.

General discussion notes

User Needs and Requirements Documents

E. Escalona opened the forum, welcomed the attendees and invited them to participate actively. A dedicated SLI.DO platform was opened for real-time Q&A session as well as for a simultaneous live quiz/competition containing 20 questions. A welcome video presentation from Fiammetta Diani was broadcasted.

A. Kamburov presented selected market trends and other features from the GNSS Market Report 2019. Some of the main conclusions from that presentation are that:

- Digitalization, service-based approach and automation are among the major flagman among the market trends
- Shipments continue to grow: sales forecasts from Market Report 2012 (about 0.5 mln. surveying sold devices until 2020) are five times over fulfilled (2.5 mln. devices estimate in the 2019 edition)
- Cadastral Surveying, Mapping, person-based construction and machine control account for vast majority of revenues
- AEC projects are driving the geomatics market forward

Kamburov also presented the main players in the Geomatics value chain, and concluded with the planned Market trends for the 2021 edition (MR7), which will be the first one to incorporate Copernicus.

Michal Babáček presented the need for clarifications in the User Requirements Document due to new regulations, technologies, demand, etc. and underlined that it is updated in a continuous process.



The following questions were asked after this presentation:

1. Are you aware of any spoofing/jamming incidents in your country?

Yes - 44%, No - 56%

2. For which applications authentication is important?

- a) Not needed for any geomatics app - 4%
- b) Machine control – construction - 76%
- c) Autonomous machines in construction - 92%
- d) Mining – machine control - 52%
- e) Autonomous machines in mining - 64%
- f) Hydrographic Survey - 32%
- g) Offshore exploration - 40%
- h) Other - 16%

3. Are there any missing geomatics applications that could benefit from an authentication service?

Drones was the answer with most votes.

4. Are anti-jamming solutions something you seek or rely on?

Yes - 78%, No - 22%

E. Escalona then presented the Galileo HAS and explained the main technical characteristics, the roll-out schedule, project milestones and the main target areas.

The following questions were answered after this presentation in SLIDO:

1. Could you confirm that the High Accuracy Service is relevant for the following list of geomatics applications?

- a) GIS/Mapping - 81%
- b) Cadastre in rural areas (land consolidation) - 81%
- c) Hydrographic survey - 29%
- d) Offshore exploration - 24%

2. Please define if HAS will rather be utilized by:

- a) Intermediate actors (integrators/service providers) - 20%
- b) Directly by the end users - 87%

Regarding integrity, it was outlined as critically important feature for marine surveying by Frederic AUGER from the oil company TOTAL, who reported signal integrity/availability problems in off-shore Lebanon. It was agreed that for large and expensive projects lack of integrity costs money (due to downtime).

The SLIDO discussion provided the following insights:

1. Could you please confirm that integrity is relevant for the following applications?

- a) Mining - Machine Control - 38%
- b) Mining - Autonomous Machine Control - 62%
- c) Construction Survey - Machine based (Set out, trajectory, machine control) - 71%
- d) Construction Survey – Autonomous Machine Control - 86%
- e) Other - 33%

Asset management was identified as also important application in terms of integrity.

Interactive sessions (user community)

The first presentation - **Interactive Augmentation Providers Map** by E. Megias provided insights in some new features at the **GSC** website in the first quarter of next year, including a web-based world map with visual information about augmentation service providers that support Galileo. Each country that is "Galileo-enabled" is highlighted by a colour and clicking over it the names of the providers and some basic characteristics is provided. The service sparked discussion about possible



target audiences that would be interested in accessing this kind of information, as well as if this information helps to make decision which service provider to contact. The service was deemed valuable and to be used as soon as possible.

The next presentation - **EGNOS Visibility Maps** by M. Ruiz demonstrated another web-based map that shows shadowed areas (areas without any EGNOS coverage) across Europe, using the EU-DEM product from the Copernicus Programme. It is also available in urban areas using OpenStreetMap 3D building data. Real-world examples for Switzerland and Brussels were provided.

The following questions were raised and answered:

1. **Were you aware of the EGNOS visibility maps tool?**
 - a) *Yes - 19%*
 - b) *No - 81%*
2. **Do you find the EGNOS visibility maps tool easy to use?**
 - c) *Yes – 20%*
 - d) *No – 0%*
 - e) *Never used it – 80%*

After that, E. Escalona presented the aims, evaluation criteria and schedule of the **Geomatics on the Move Contest**.

The fourth presentation from this section was **Working for a Profession**, presented by the CLGE president V. Krupa. He outlined the structure, executive board and the strategic goal of CLGE to be a leading representational body for the Surveying Profession in Europe. Several annual events held by CLGE were discussed, namely the **European Surveyor of the year** and the **CLGE Students' Contest**. In time **Code of Professional Qualifications for Property Surveyors** had become a de facto standard in Europe. A social project in favour of disabled people and based on GNSS survey - www.BlueParking.eu, was presented as well. It is a web-based mapping platform which will make it possible to find the position of parking spaces for disabled persons in Europe. More importantly, CLGE is also very happy to be one of the leading consortium partners of **GISCAD-OV**, a Horizon 2020 project that brings Galileo to the Geodetic and Property Surveyors. Finally, CLGE outlined their will for stronger cooperation with GSA for **Professional practice for Geodetic Surveying** and **Geomatics on the Move Contest**, as well as with other institutions, such as EUPOS and EUREF.

The fifth presentation – **EUPOS - status, activities, experience with Galileo** was given by Branislav Droščák (EUPOS chairman). The history, goals, documents and current structure of EUPOS were drawn in the light of its 2020 status. The activity of two working groups - **EUPOS Combination Center (ECC)** and **Service Quality Monitoring (SGM)** was discussed. EUPOS provided information about several GNSS that their members work on, namely:

- GNSS metrology – possibilities of GNSS rovers calibration/verification
- GNSS signal jamming and interference
- Galileo – experience with network RTK extended by Galileo
- InSAR and GNSS techniques co-location

B. Droščák also presented some results from a test campaign named **Experience with RTK using GAL + BDS** in Slovakia using the RTK network SKPOS. The overall structure of SKPOS was outlined, plus some promising results when incorporating the Galileo within the RTK service. The Galileo solution provides very stable results (over 24-hour period) in terms of standard deviation for horizontal and vertical position. He showed that while in 2019 only 20% of the users were utilizing a GAL+BDS solution (via RTCM 3.2 MSM5 protocol), in 2020 they had increased to 43%.



1.1.1 Interactive sessions (use cases)

After a short break R. Capua presented the project **GISCAD-OV: Galileo High Accuracy for Cadastral Surveying** – a Horizon2020 co-funded endeavour, aimed at design, development and validation of a complete Service Chain for reduced cost High Accuracy Services for Cadastral Surveying and Infrastructural Monitoring applications through Galileo HAS services, PPP and PPP-RTK integration. The project incorporates leading European organizations, aimed at:

- Definition of Cadastral Surveying Requirements for High Accuracy GNSS
- Design and Development of an Augmentation System
- Standardisation, including contribution to RTCM (SC-104, SC-134) and ISO 19152 LADM (Land Administration Domain Model) WGs for Augmentation, Mapping standard messages and procedures development

The project currently is a field cadastral surveying verification stage across European countries.

The following presentation by M. Ruiz discussed several **EGNOS Success stories in Geomatics**, namely:

- LUCAS project – an EGNOS/Copernicus integration for Land use and land cover survey;
- Maritime surveys using EGNOS in the Hydrographic Office of the Polish Navy
- Eustream – a gas pipeline project with EGNOS positioning in areas without RTK coverage
- Hydrographic projects of the Maritime Administration of Latvia
- Environmental projects in Pirineu Natural Park using EGNOS supported mapping/GIS

The next presentation in this session was **Upgrade to Galileo in RTK networks** by P. Wiklund. He showed the current status of SWEPOS – the Swedish RTK network, and some user statistics. Accordingly, the main users are from:

- Construction 35%
- Surveying 17%
- Agriculture 16%
- Municipalities 13%

Since February 2018 support for Galileo had been added in SWEPOS network RTK service, which had provided:

- Improved availability
- More fixed solutions and shorter time to initialisation, especially at 25–35 degree elevation cut-off angle

Reportedly, this improved availability had provided work in dense vegetation on a project in a remote border area between Sweden and Norway. Another project – Norrbotniabanan (rail infrastructure) is also undergoing, for which **Galileo had been made mandatory for all contractors**.

The final presentation for use cases showed **Machine control in Construction**. G. Lopez underlined that **automation is now a reality in construction**. He discussed the 5 main trends in construction that his company (Septentrio) focuses on, namely Autonomous, Connectivity, Accurate Localization, 3D, and Wearables. With proper field project examples, he showed that for difficult environments (e.g. in forests or steep terrain) GNSS/INS is a powerful integration for device orientation, empowered by the multiple GNSS constellations and Galileo multi-signal value. A dedicated anti-jamming/spoofing technology (AIM+) was presented as well, which adds value to signal protection. The extra Galileo signals also help to have further signal diversity and thus also help in improving Septentrio's AIM+ anti-jamming and anti-spoofing technology. G. Lopez showed statistics, according to which **Poland** is the country with the largest amount of construction projects since 2016, with



Germany and Norway leading overall in Machine control system integration. A High-Speed Railway project in Norway was showcased, in which machine integration had provided the following benefits:

- Cost savings due to lack of downtime (up to 1000 euro)
- Availability under difficult mountain conditions
- Resilience to jamming events
- Robustness for the difficult conditions and environments (mountain, metal)

The major outcomes from this presentation are that:

- EU has important challenges with the evolving macro-economics in Construction
- Construction automation and optimizations are needed
- GNSS offers a key element towards the transformation in construction market
- European GNSS developments will provide the advantages for this transformation

Many experts with experience in construction projects joined the conversation and discussed the benefits of Galileo for this sector.

Copernicus session

Two presentations were showcased in this session. The first focused on **Copernicus contribution to Geomatics & Urban Planning**. M. Massart presented several services and their applications:

- CORINE Land Cover service and its latest 2018 edition.
- Land Monitoring Service with High Resolution Layers
- Urban Atlas and 3D visualisations with examples for Prague and Genève
- Monitoring of Housing and Infrastructure in an application for Berlin
- Urban Green Landscape app for cleaner city environment

Of special interest for Geomatics was the **European Ground Motion Service** and its applications for:

- Natural and man-induced geohazard risk assessment
- Geodesy
- Land management, urban and rural planning
- Infrastructure development and monitoring
- Mining and other natural resources extraction
- Structural, rail, road and civil engineering

The benefits of a web-app project (CAMS) for road traffic calculation were demonstrated.

The last presentation showed various scenarios for usage of **Copernicus Land monitoring service for Geomatics and Urban Planning**. M. Zotti showed several synergetic projects, related to urban planning were presented, based on the Land Monitoring Service, including soil assessment, monitoring of coastal zone changes, infrastructure monitoring, plus applications of Land Surface Temperature on city planning and development. A dedicated GIS Map app for Corine Land Cover for the European Environment Agency was demonstrated as well.

The Copernicus session showcased that the combined use of Copernicus and EGNSS can significantly contribute to Geomatics, where the two different data dimensions provide a much better understanding of the environment in activities where this information is essential, such as for natural resources management including mining, mapping, asset inventory and many others, unlocking also the creation of new applications and businesses.

Results from the quiz



After final questions the results from the live quiz were made public. The winner was Bertram Arbesser-Rastburg (OVN) with 19 correct answers, followed by Pablo Olmos (Leica Geosystems) with 18. The full questions may be found in Attachment 1.

GSA invited UCP participants to provide any additional comments by email.

Conclusions

The 3rd UCP attracted more than double participants than the event two years ago, maybe due to the online way it was organized. The proper selection of panellists and several parallel interactive platforms triggered lively discussion. In general, the Galileo HAS service is needed and expected as soon as possible, but integrity and anti-jamming features of Galileo were identified as paramount for automation in construction. Evidently, the contribution with Copernicus opens new volume in the book of Geomatics and Urban Planning.

Other Notes & Information

With the contribution of:



Annexes & Attachments

Attachment 1: Polls-overall-UCP_2020_Geomatics_and_Urban_Planning.xlsx

Attachment 2: Archive with all presentations from the event

Attachment 3: Panel Discussions Results - summary presentation

Annex 1 – List of participants