



GISCAD-OV

Galileo High Accuracy for Cadastral Surveying

“This project has received funding from the European GNSS Agency under the European Union’s Horizon 2020 research and innovation programme under grant agreement No 870231”

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User Consultation Platform 2020

1 December 2020

Project objectives

- **Objective:** 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
- Main activities:
 - **Cadastral Surveying Requirements for High Accuracy GNSS:** all Value Chain actors involved (Augmentation SP, Software Companies, NMCAs, Professionals)
 - **Design and Development of an Augmentation System** for affordable and reduced service price High Accuracy Services for Cadastral Operations, with Integrity Monitoring
 - **Cadastral Surveying Pilot Projects in seven EU Countries** Validation of Galileo Commercial Services and PPP through Cadastral Surveying and comparison with existing High accuracy techniques
 - **Scientific and Cadastral Validation:** GNSS performances and NMCAs quality check
 - **Business Analysis** Involvement of the whole Value Chain for defining an affordable and cost effective Services for Surveyors
 - **Standardisation:** contribution to RTCM (SC-104, SC-134) and ISO 19152 LADM (Land Administration Domain Model) WGs for Augmentation, Mapping standard messages and procedures development

Project Organisation

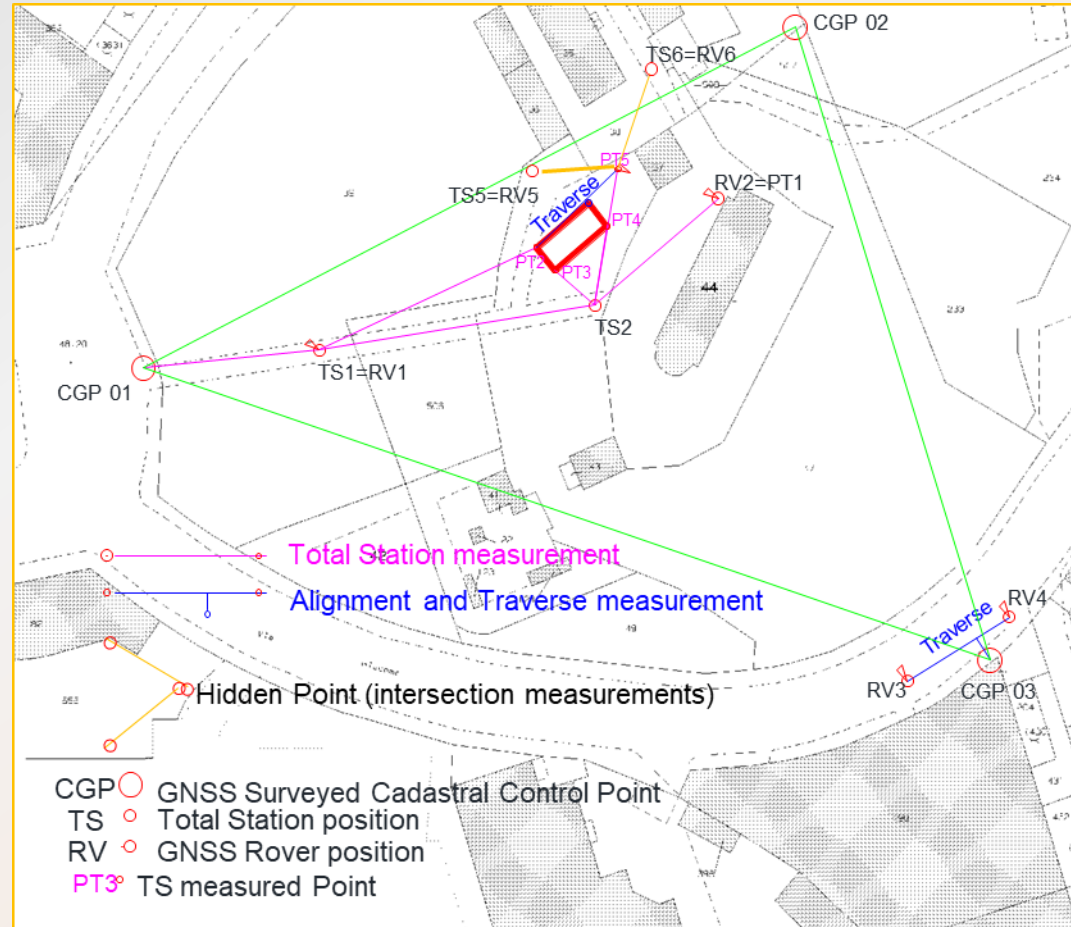
- Horizon 2020 Project
- Started on December 2019
- Project Duration: 36 months

- Project Members:
 - International Organisation of Surveyors
 - Local and PPP Service Providers
 - Service Providers
 - PPP and NRTK Software Company
 - NMCAs
 - Surveyors Service Providers
 - Receiver Manufacturers
 - Universities
 - RTCM and ISO Standardisation Chairmen
 - Advisory Board, including NMCAs

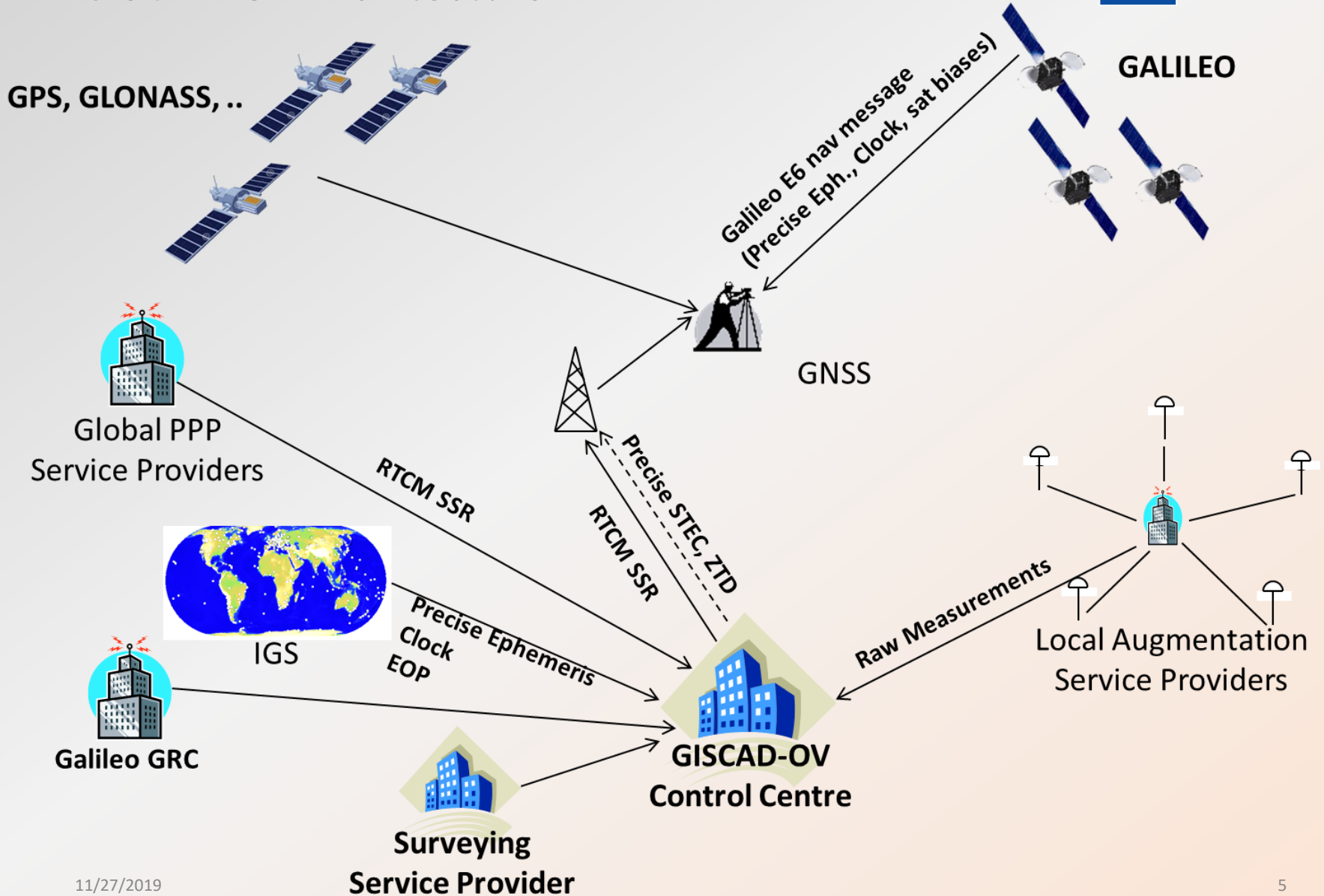
Organization	Type
GEOWEB SpA	Industry
EXAGONE	Industry
IGN-CNIG	Public Body
SOGEI SpA	Industry
UNIPD	University
GEO++ MbH	Industry
NOVATEL Inc	Industry
YORK University	University
GEOFLEX	Industry
TU Delft	University
TELESPAZIO	Industry
VUGTK	Public Body
CLGE	Public Body
UNIROMATRE	University

Cadastral Surveying procedures

- Distances and Angles measurements
- GNSS, Total Stations, EDM hybridisation
- Hidden Points
- NMCAs Validation
- Average Surveying duration more than 2 hours
- Surveys/year in single EU Countries: 10000-1300000
- National Reference Framework and INSPIRE



GISCAD-OV Architecture

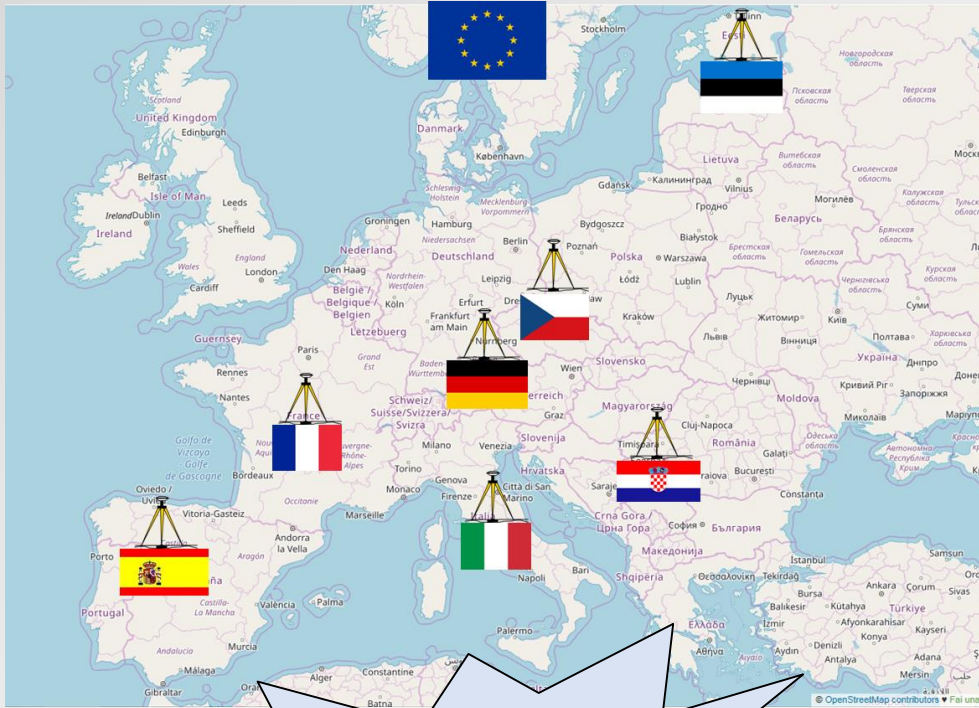


GISCAD-OV Service Levels

Cadastral Operation	Accuracy Requirement (1 σ)	Integrity	Availability	Time for Convergence/TTFA
SL1 Suburban or rural areas, cadastral map updates	30 cm	$2 \cdot 10^{-3}$ /hour (1)	High (97%)	Less than 10 min
SL2 Detailed Cadastral Points, Buildings insertion, boundary determination	<5 cm	$2 \cdot 10^{-3}$ /hour	High (93%)	5-10 min
SL3 Detailed Cadastral Points, Buildings insertion, boundary determination	<5 cm	$2 \cdot 10^{-3}$ /hour	High (93%)	1-5 min

(1) Derived from the maximum acceptable number of lost surveys/year

Pilot Projects



Real On-Field Cadastral Surveying

- Czech Republic
- Estonia
- Croatia
- France
- Germany
- Italy
- Spain

5 surveys/Country (NMCAs rules applied)

Galileo Based Infrastructural Monitoring on a bridge

Expected Project Impacts

Service Providers:

- Reduced infrastructure and maintenance costs (<150 km sparse RS)
- Communication burdens reduction through HAS
- Service Levels Differentiation

Cadastral Professional users:

- Improved availability in urban areas
- One-time terminal configuration
- Reduced Service costs

Receivers manufacturers:

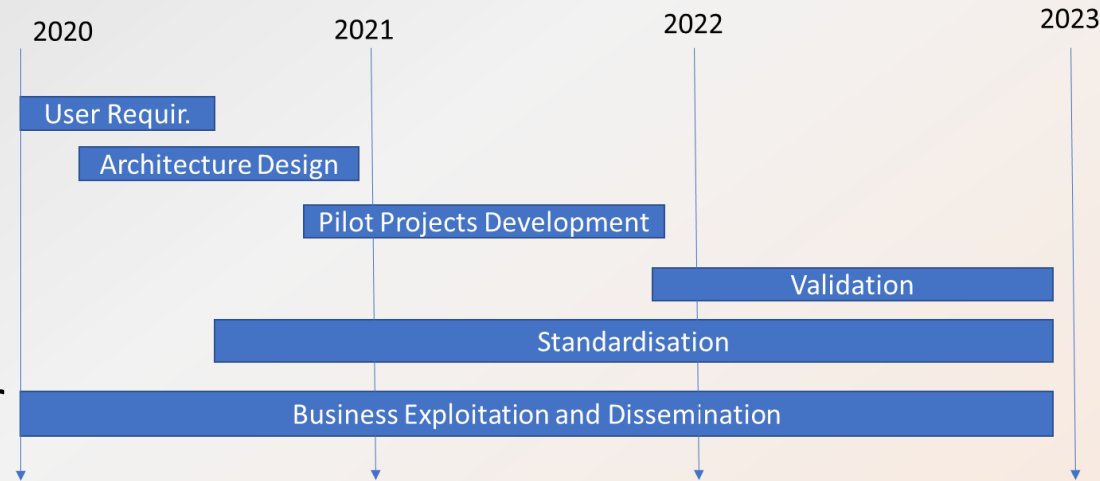
- Market uptake due to lower barrier to entry for High Accuracy Users
- Cost production reduction due to economy of scale

NMCAAs:

- Harmonized GNSS service levels on a wide area
- Reduced time for cadastral acts approval
- Increase in the number of processed acts per year

Timeschedule and Next Steps

- Current Status (2020):
 - User Requirements
 - Architecture Design
- Next steps (2021-2022):
- Pilot Projects development
- Standardisation activities for GISCAD-OV within:
 - RTCM SC-104 and SC-134
 - ISO 19152 LADM
- Scientific and Cadastral Validation
- Business Analysis



Open discussion topics

- **Low cost multiple frequency and multiconstellation GNSS receivers for Land Surveying:** current status, main limitations and advantages
- **Smartphone surveying:** dream or reality? Current status of Multiple Constellation, Dual frequency code/phase equipped smartphone, crowdsourcing and the possible use in Land Surveying applications
- **The future of Surveyors Professions:** how SLAM, crowdsourcing, high accuracy positioning democratization, low cost mapping and on-board data acquisition will change the profession of surveyors?



Thanks for your attention

<https://giscad-ov.eu/>