The SaPPART COST Action
Main outcomes and deliverables

High Quality Positioning: a Key to Success for Autonomous Driving

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Content

- COST: European Cooperation in Science & Technology
- Context of SaPPART
- The SaPPART COST Action
- Scientific Missions - STSM
- Deliverables
- Perspectives
EU COST Action

- European Cooperation in Science and Technology (COST) framework for cooperation in science and technology
  - Enhance research progress through creation of new international networks
  - Allow scientists to grow their ideas by sharing them with their peers
- Funding period of 4 years
- The funding covers
  - Networking activities such as meetings, conferences, workshops, short-term scientific exchanges, training schools, publications and dissemination activities
  - COST does not fund research itself
SaPPART “Big Picture”

- Increasing capacity, improving safety and reducing congestion
- ITS represent 50% of the GNSS market
Context of SaPPART Action

Towards safety/liability-critical ITS applications
Context of SaPPART Action

Overcharging
User A is located within the charging area

Impact of positioning

Undercharging
User B is located outside of the charging area

COST – SaPPART -2015
Context of SaPPART

R&D projects
- RCI
- GSC
- EOTR
- GIROADS
- GINA
- SIGNATURE
- TACOT
- GNSSmeter

Standardisation support projects
- SUGAST
- SAGITER
- QualiSaR

SaPPART
Research-oriented network

Standardisation groups
- TC SES/SCN
- CB5 – SGT APP 001
- TC5/WG1

COST Action TU1302 – Satellite Positioning Performance Assessment for Road Transport (SaPPART)
EU COST SaPPART

- SaPPART 2013-2017
- Members from 23 countries
- SaPPART’s goals
  - Bring together leading experts in GNSS, ITS and mobility
  - Provide reference documents and guidelines for implementing specific GNSS based ITS application
  - Framework for the definition of the performance of the GNSS-based positioning terminals in ITS
  - Procedures to assess these performances
  - Disseminate for better understanding of the potential and limitations of GNSS
SaPPART’s tools

- Working groups
- Short Term Scientific Missions (STSMs)
- Workshops
- Documents
  - White paper
  - Handbook: link the GNSS-based positioning terminal service levels to the application Key Performance Indicators (KPIs)
  - Guidelines: for performance assessment tests of GNSS-based positioning terminals (GBPT)

- Data-set
- www.sappart.net (all documents)
Scientific Mission - STSM

- To support missions (exchange visits) with the aim at strengthening the existing networks
- To allow scientists to go to an institution in another COST Country
- To foster collaboration, to learn a new technique
- Mission form 1 week up to 3 months
<table>
<thead>
<tr>
<th>Name of applicant / Organization / Country</th>
<th>Host / Organization / Country</th>
<th>Period</th>
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<tbody>
<tr>
<td>Dr Franc Dimc / University of Ljubljana / (SI)</td>
<td>David Betaille / IFSTTAR / Nantes (FR)</td>
<td>2017-17-04 to 2017-04-20</td>
</tr>
<tr>
<td>Dr Valerie Renaudin / IFSTTAR / Bouguenais CS4 (FR)</td>
<td>Laura Ruotsalainen / FGI / 02430 Masal (FI)</td>
<td>2017-02-26 to 2017-03-10</td>
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<tr>
<td>Mr Calogero Cristodaro / Politecnico di Torino / Turin (ITALY)</td>
<td>Laura Ruotsalainen / Finnish Geospatial Research Institute (FGI) / Masal (FI)</td>
<td>2016-11-07 to 2016-11-18</td>
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<td>Mr Andrej Štern / University of Ljubljana / Ljubljana (Slovenia)</td>
<td>Valérie Renaudin, IFSTTAR, Nantes (FR)</td>
<td>2016-09-11 to 2016-10-01</td>
</tr>
<tr>
<td>Dr Matti Raitoharju / Tampere University of Technology / Tampere (FI)</td>
<td>Lennart Svensson / Chalmers University of Technology / Gothenburg (SE)</td>
<td>2016-04-01 to 2016-04-30</td>
</tr>
<tr>
<td>Dr David Betaille / Ifsttar / Marne-la-Vallée (FR)</td>
<td>Paul Groves / University College London / London (UK)</td>
<td>2016-06-19 to 2016-07-02</td>
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## STSM

- **Poland**
- **Denmark**
- **Croatia**
- **Norway**

<table>
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<tr>
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<th>Poland</th>
<th>Denmark</th>
<th>Croatia</th>
<th>Norway</th>
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</thead>
<tbody>
<tr>
<td>Dr Martti Kirkko-Jaakkola / FGI (Finland)</td>
<td>Centre for Transport Studies / Imperial College London / London(UK)</td>
<td>2015-10-19 to 2015-10-30</td>
<td></td>
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</tr>
<tr>
<td>Dr Marko Sevrovic / University of Zagreb, Faculty of Transport and Traffic Sciences / Zagreb(HR), <a href="mailto:marko.sevrovic@fpz.hr">marko.sevrovic@fpz.hr</a></td>
<td>Washington Yotto Ochieng / Imperial College London / London(UK)</td>
<td>2015-09-07 to 2015-09-18</td>
<td></td>
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<tr>
<td>Prof. L-F Pau / CBS / Denmark</td>
<td>Faculty of Forestry / University of Agriculture, Krakow / Poland</td>
<td>08 July-15 July, 2015</td>
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<tr>
<td>Mr. Svend-Peder Oseth Q-Free / Norway</td>
<td>FRANçois PEYRET / The French institute of science and technology for transport, development and networks (IFSTTAR), Nantes / France</td>
<td>27 July – 7 August, 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr Mohammad Zahidul Hasan Bhuiyan / Finnish Geodetic Institute, Kirkkonummi / Finland</td>
<td>FRANçois PEYRET / The French institute of science and technology for transport, development and networks (IFSTTAR), Nantes / France</td>
<td>2014-10-06 to 2014-10-17</td>
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<tr>
<td>Mr Harris Perakis / National Technical University of Athens / Greece</td>
<td>Mr Pierre-Yves Gilliéron / EPFL Lausanne, TOPO lab. / Switzerland</td>
<td>29th Sept. to 10th October 2014</td>
<td></td>
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<tr>
<td>Mr Carlos Moriana-Varo / GMV AEROSPACE AND DEFENCE S.A.U. / Tres Cantos (ES)</td>
<td>FRANçois PEYRET / The French institute of science and technology for transport, development and networks (IFSTTAR), Nantes / France</td>
<td>2014-10-26 to 2014-11-07</td>
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COST is supported by the EU Framework Programme Horizon 2020
STSM

- **Valuable outcomes** for the Action
- **Active contributions from researchers** to the objectives of working groups
  - **Test measurements** under real conditions
  - **Record of trajectories** with several positioning sensors
  - **Assessment of the positioning quality**
    - Comparison to ground truth trajectory
  - **Characterization** of GNSS receivers
    - Classes of performance
White Paper

- Published by Ifsttar under creative commons license in 2015
- Available on www.sappart.net
White Paper

- Highlights
ITS World Congress 2015 in Bordeaux (~9’000 participants)

- **Space technology** and **GNSS** have been presented as a main topic of interest
- Dissemination of SaPPART: booth, Special sessions, White Paper
Handbook

- «Assessment of positioning performance in ITS applications»
- Published by Ifsttar under creative commons license in 2017
- Available on www.sappart.net
Handbook

- Highlights
Guidelines

- **Goal**: to provide guidelines for generic test procedures for the evaluation of GNSS-based Positioning terminals (GBPT) performance, either by field tests, simulations or their combination.

- **Status**
  - Under preparation
  - To be published in December 2017
Conclusion

- Contribution of SaPPART to the working groups of standardization (CEN, ISO)
- SaPPART has demonstrated the absolute necessity of the positioning assessment for very demanding applications
- SaPPART has contributed to the improvement of the synergy between groups of stakeholders
  - When GNSS people meet ITS world
THANK YOU FOR YOUR ATTENTION!

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White Paper

- **Goal**: to inform the key actors of the terrestrial transport sector on the issues and the impacts of positioning quality in applications, more specifically in Intelligent Transport Systems

- **Role of positioning systems** in transportation and the necessity to correctly assess their performance

- **Fundamentals of positioning systems** with a particular focus on GNSSs

- **Positioning terminal architecture** and the parameters used for the characterization of performance such as availability, accuracy and integrity
Handbook

- Focus on \textbf{positioning performance issues} according to the requirements of ITS applications
- \textbf{Role of positioning information} in some emblematic applications
- Introduction to a \textit{simulation method for sensitivity analysis}
- Discussion of the \textbf{error sources} at the terminal level and introduction to a model of the horizontal position error
- Application of the error model and the sensitivity analysis to two examples of ITS systems (Road User Charging and eCall)