

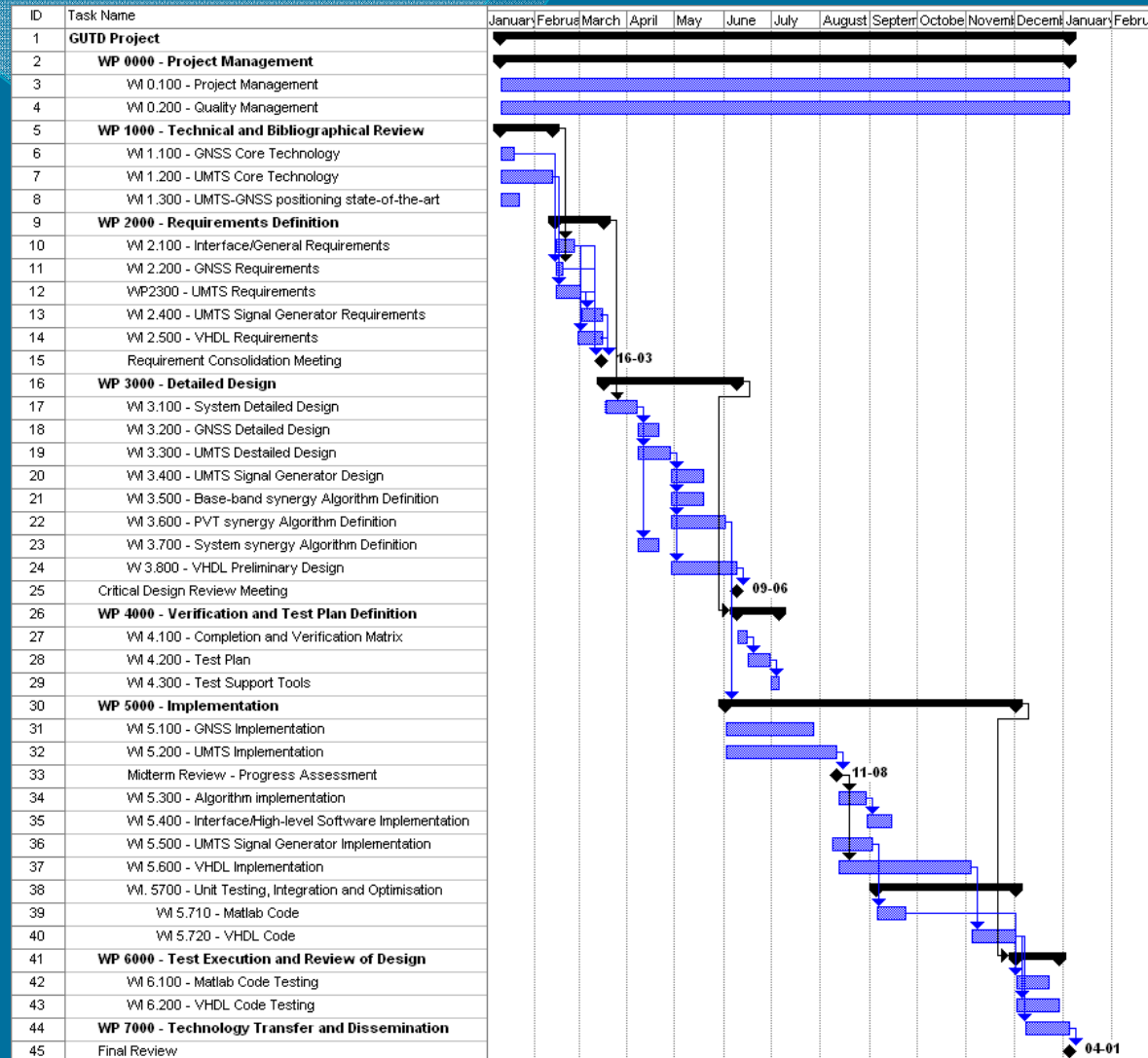
GNSS and UMTS Technology Demonstrator

GJU Workshop
Brussels
5 and 6th of April 2006

Company	Country	Role in Project
Skysoft Portugal 	Portugal	Prime contractor Skysoft will develop a simulator to validate the GUTD concept
M3 Systems 	France	Partner Prototype development, testing and validation in VHDL to support the proof of concept
Universitat Politècnica de Catalunya 	Spain	Partner Investigation of the synergy algorithms between GNSS and UMTS
IMST GMBH 	Germany	Partner Support to the requirement elaboration and test plan definition

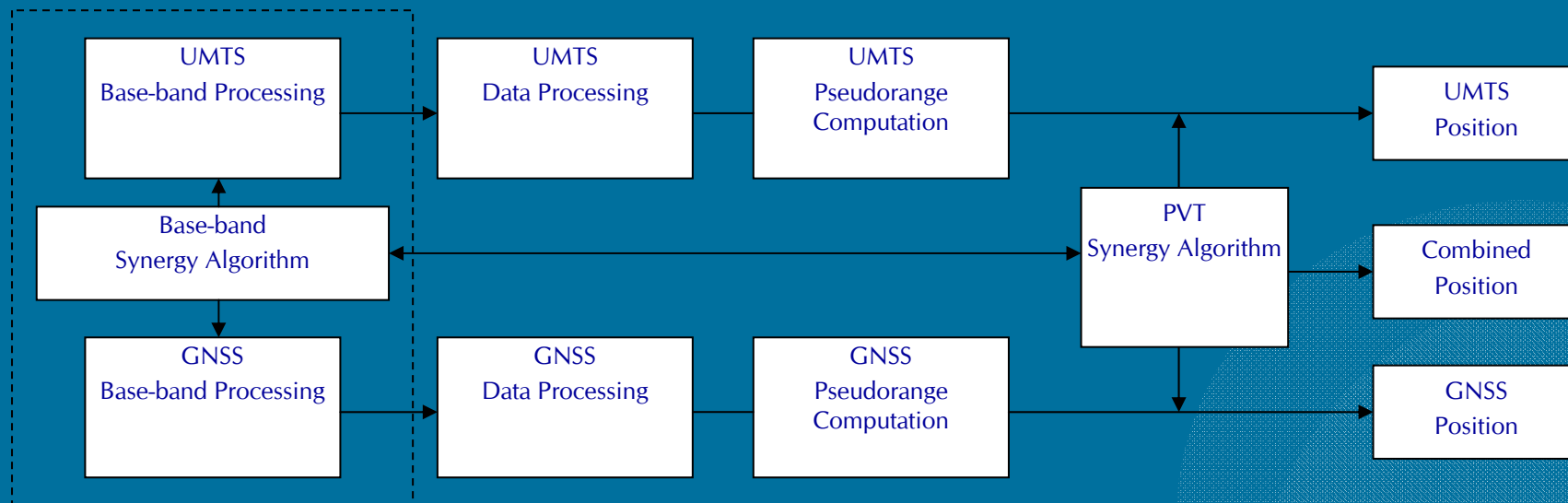
- | | UMTS | GNSS |
|------------|--|--|
| Advantages | <ul style="list-style-type: none"> • Higher availability in urban environments • In doors positioning • Better resistance to multipath due to stronger signal | <ul style="list-style-type: none"> • World coverage • Higher position accuracy (~10-50 times better) |
| Challenges | <ul style="list-style-type: none"> • Worse position accuracy • Worse performance in rural environments | <ul style="list-style-type: none"> • Highly dependent on sky visibility • Low signal power |

- To assess the degree of synergy between UMTS and Galileo in order to benefit from the two technologies to achieve greater position availability
- To study the current state of the art of the synergy algorithms and to analyze the inherent trade offs
- To develop a Simulator Framework that allows the Design, Validation and Testing of such device
- To implement a prototype model in a hardware description language that allows future integration into a single chip following the SoC (System-On-Chip) philosophy, paving the way to the integration of such capability into mobile devices
- To develop a Technology Transfer plan and disseminate the project results, e.g. Through a web site



- The project is about to kick off
- The project duration is 12 months

- GNSS and UMTS synergy at the receiver is studied at three levels
 - Baseband processing
 - Navigation solution
 - Assisted Positioning and end terminal



- Scientific Investigation Challenges
 - Multipath mitigation techniques (note that although the signal is stronger in UMTS, then the multipath may affect more, and position error may increase if only the received power is contemplated)
 - Analysis of Automatic detection of signals under the Non-Line-Of-Sight condition
- Analysis of the similarities between UMTS and GNSS receiver architectures, focusing on the signal processing part
- Assisted GNSS to increase position availability
- Efficient and closed-form hybrid solutions, still capable of performing a weighted data fusion according with the quality of the received measurements
- Joint estimation of position and integrity, exploiting available measurement redundancy thanks to the synergy

- Development of a Simulator Framework to allow the Design and Validation of Synergy Algorithms between GNSS and UMTS

The project aims at developing a Matlab® simulator where a system integrator, or manufacturer could design, implement and validate algorithms intended to merge the GNSS and UMTS systems.

- Prototype Model of a Combined GNSS and UMTS Terminal

On the basis of the signal processing algorithms specification and their validation in the Matlab environment, the prototype model will be migrated into hardware description language (VHDL) and the algorithms and synergy algorithms (baseband level) validated. The assessment of hardware implementation feasibility and efficiency will allow to prepare future design of portable devices with merged technology capabilities.

- Results Analysis

The test results of both the demonstrator and the model will be analyzed in order to assess the applicability and viability of the concept. This results in a list of recommendations and conclusions.

- Technology Transfer and Dissemination

The technology transfer to the GNSS market main segment will be analyzed resulting in a technology transfer plan. Dissemination will be covered by numerous activities, including the development and implementation of the project website, as well as its respective dissemination to interested parties

- To use the demonstrator in order to
 - Upgrade any upcoming UMTS position, or hybridisation, technique
 - Provide a toolset for internal investigation purposes, and design of receivers, taking advantage of the software flexibility and modularity to analyze the trade offs between different architectures
 - Taylor and use as validation tool set for testing a real receiver
 - the investigation of new synergy algorithms and assess their performance and impact on the overall system
- To use the prototype model as a first step to the integration in a single chip.
- Set-up a complete Hardware/Software environment modeling the whole GNSS/UMTS signal processing chains and allowing testing and validation of synergy algorithms at different levels of the architecture

Company	Country	Contact Information
Skysoft Portugal 	Portugal	Luís Nunes luís.nunes@skysoft.pt
M3 Systems 	France	Willy Vigneau vigneau@m3systems.net
Universitat Politècnica de Catalunya 	Spain	Jaume Riba jriba@gps.tsc.upc.edu
IMST GMBH 	Germany	Ingo Willimowski willimowski@imst.de