

SHADE

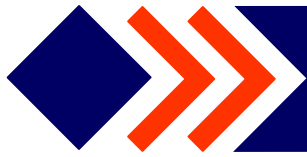
ESA Contract No.:
17545/03/NL/GS

Definition and Demonstration of Special Handheld based Applications in Difficult Environment



*The First International Symposium on
Geo-information for Disaster Management
Delft, The Netherlands, March 21-23, 2005*



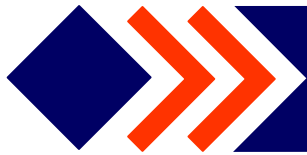


The Problem



Satellite navigation becomes difficult or impossible in obstructed areas...





SHADE Objectives



SHADE Challenges – Overcome Line-of-Sight Limitations in Difficult Environments:

- Urban & Natural Canyons,
- Narrow Streets & Tunnels,
- Inside Buildings & Parking Garages.

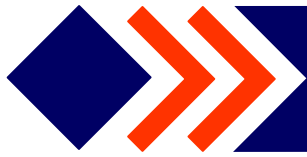
SHADE Targeted Applications – Provide Reliable Positioning Information for Safety Critical Personal Mobility Applications:

- Civil Protection, Police & Security,
- Fire Fighting inside Buildings & Mountainous Forests,
- Rescue Operations inside Buildings & Mountainous Forests,
- Dangerous/Valuable Goods & VIP Tracking and Monitoring.

SHADE Key Features:

- Provide/Enhance System Integrity by using EGNOS Signals and EGNOS based Algorithms in the Mobile Units (MU),
- Improve System Availability by
 - Assisted GPS/EGNOS (MU 1)
 - External Sensors as Augmentation to GPS/EGNOS (MU 2)
 - Terrestrial System (Loran-C) as Augmentation to GPS/EGNOS (MU 3)





SHADE Partners / Observers



Prime Contractor
• TeleConsult Austria

Subcontractors
• DigiUtopika



• TeleSpazio



Local Partners (Italy)

- Tele+ Italia
- Teledata GeoConsulting
- BIC Südtirol
- Hotel Schloß Korb
- National Mountain and Cave Rescue of Northern Italy
- Ingenieurbüro Psenner

Local Partners (Portugal)

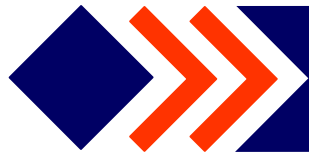
- Lisbon Municipality
- National Fire-Fighters and Civil Protection of Lisbon



Local Partners (Austria)

- Alpine Safety & Information Center





SHADE System Concept



SHADE supports location sensitive information exchange

SHADE integrates four basic elements:

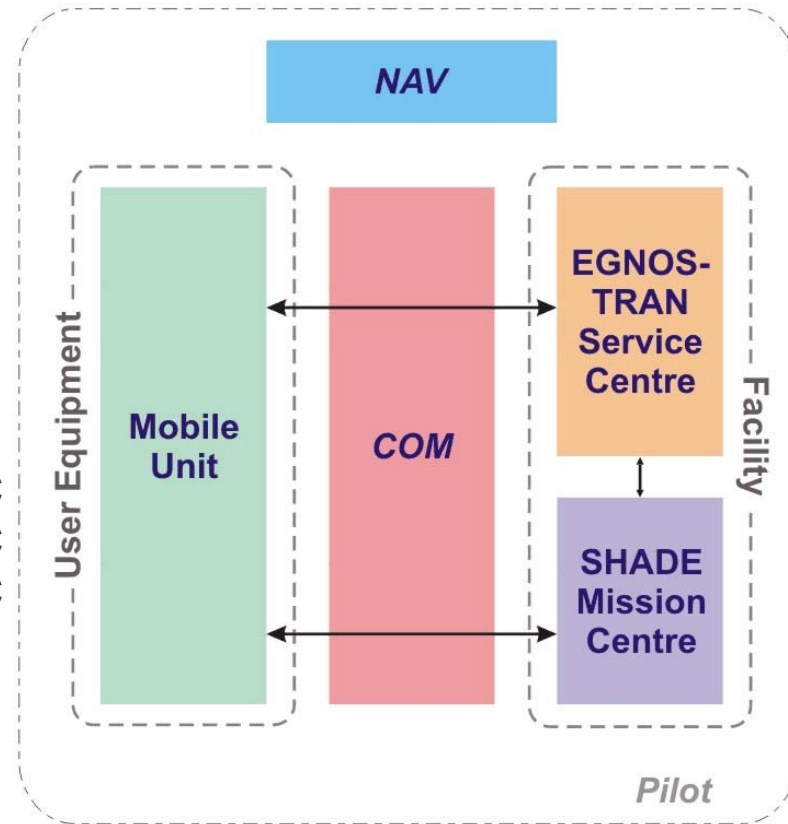
- **Navigation, Communication, Geo-Information, and Multimedia**

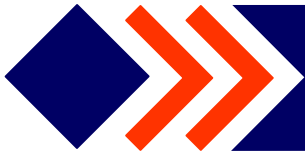
SHADE demonstration tests incorporate three different navigation technologies:

- **Pilot 1: Mobile Unit 1 connected to ESC and SMC**
- **Pilot 2: Mobile Unit 2 connected to ESC and SMC**
- **Pilot 3: Mobile Unit 3 connected to ESC and SMC**

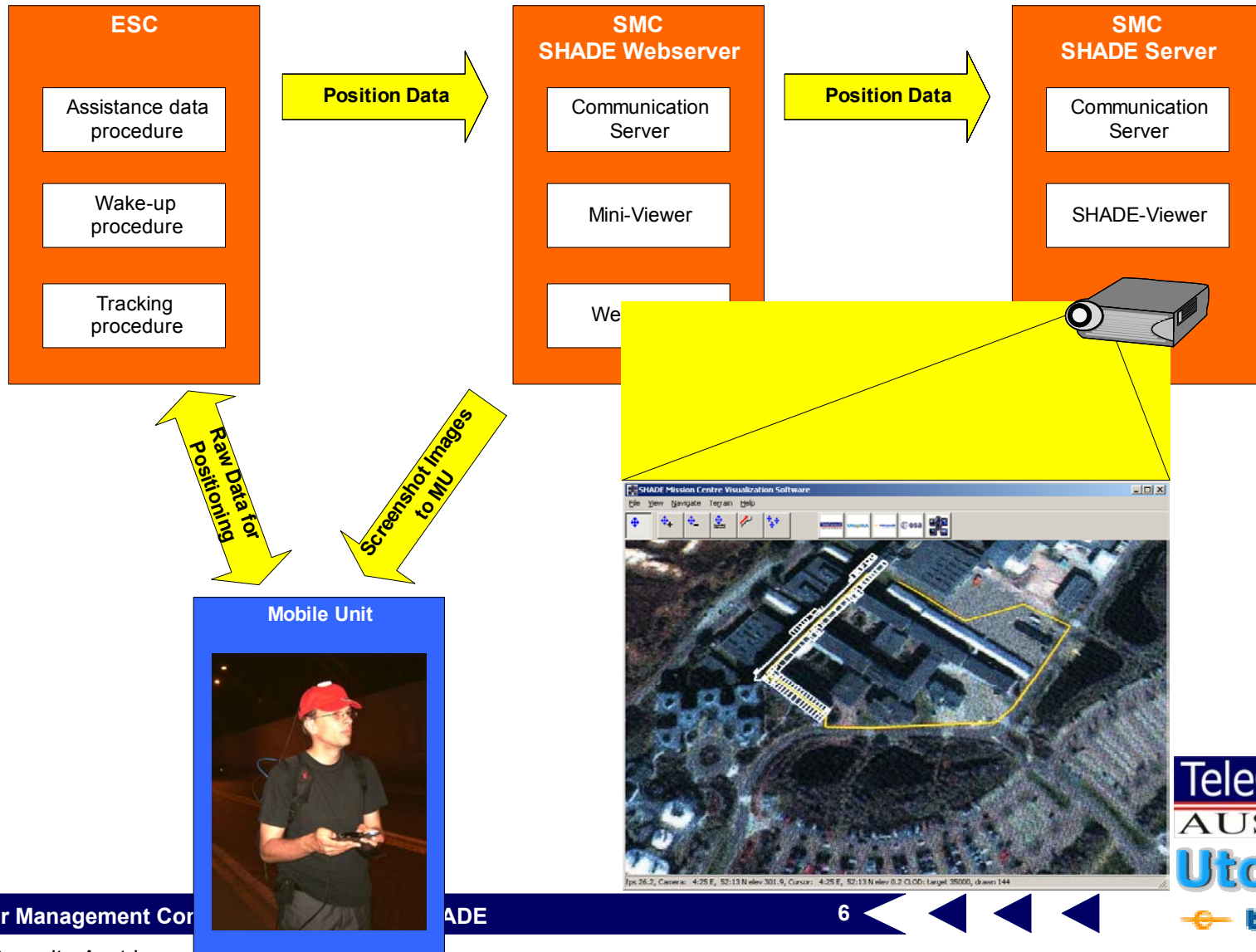
Characteristics of the Mobile Units (MUs):

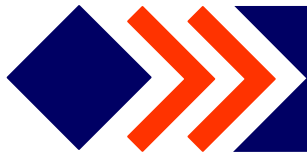
- **MU 1: Assisted GPS/EGNOS based on the EGNOS TRAN concept**
- **MU 2: Sensor augmented GPS/EGNOS based on a „multi-sensor box“ (including accelerometers, gyros, barometric sensor, magnetometer, temperature, etc.)**
- **MU 3: Integrated GPS/EGNOS and Loran-C to a single solution**





SHADE Mission Centre



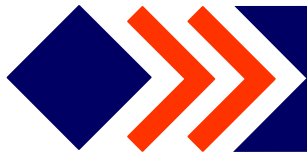


Integrity Determination



- Integrity determination using EGNOS
- Based on DO-229, protection level concept
- Adaptation to the pedestrian case
- Determination of probability multipliers (κ -values) according to SHADE application requirements
- Extension for sensor augmentation (Pilot 2), time-dependent variances
- Extension for Loran-C (Pilot 3), empirical determination of Loran-C TOA and GPS stand-alone variances
- **Open issue: variances of local pseudorange errors (multipath, troposphere, interference)**





SHADE Lisbon Campaign 1



Target Application:

- >>> VIP and Dangerous Goods Tracking
- >>> Sub-urban to Dense Urban
- >>> Primary Pilot No. 1

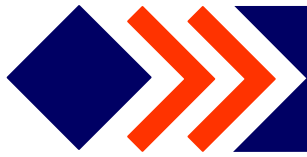


Parque das Nações Building as seen from the SMC



Parque das Nações Building Image



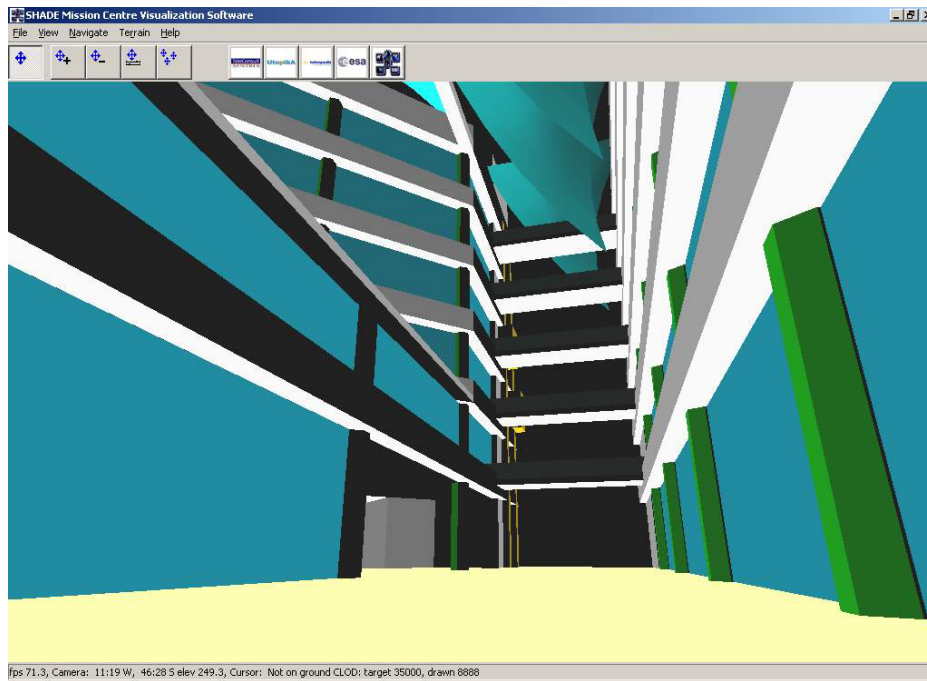


SHADE Lisbon Campaign 2



Target Application:

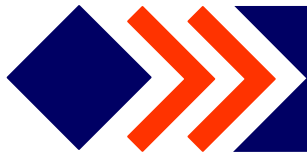
- >>> Emergency Assistance and Rescue
- >>> Dense Urban to Deep Indoor
- >>> Primary Pilot No. 2



Parque das Nações Building Interior as seen from the SMC



Parque das Nações Building Surroundings



SHADE Bolzano Campaign



Target Application:

- >>> VIP and Dangerous Goods Tracking
- >>> Rural to Dense Urban and Indoor
- >>> Primary Pilot No. 1



3D Visualization Bolzano Rural Area

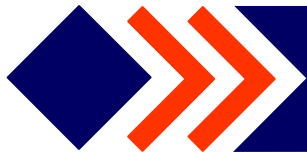


Hotel Schloss Korb (VIP pick-up location)



BIC Bolzano Interior



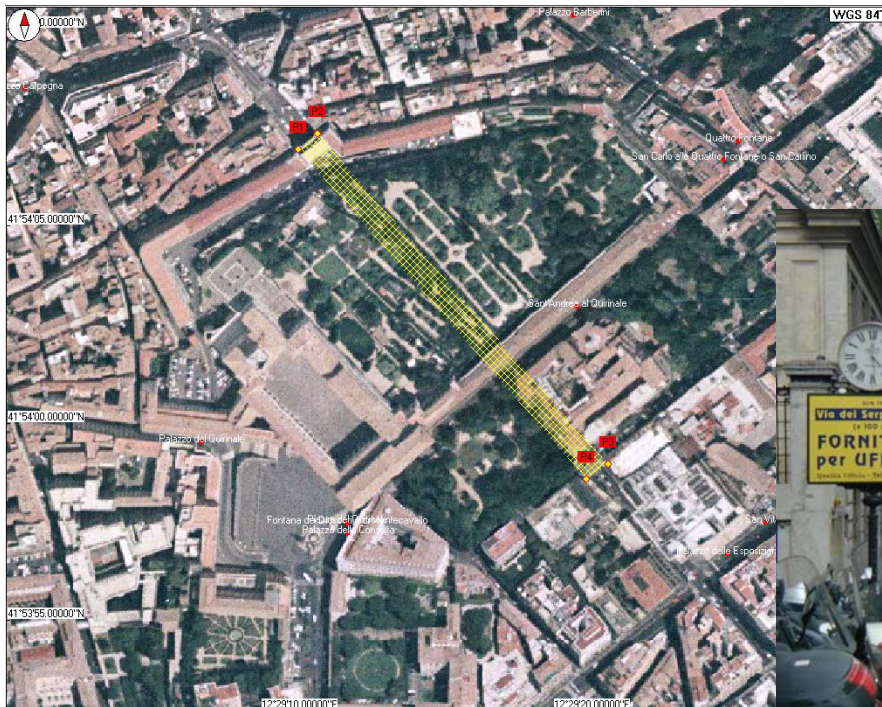


SHADE Rome Campaign 1



Target Application:

- >>> Rescue Services (Tunnel Rescue)
- >>> Dense Urban to Deep Indoor
- >>> Primary Pilot No. 2



Rome Centre – Tunnel Scenario

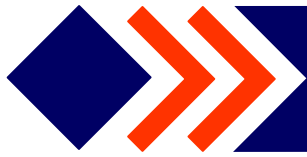


Tunnel Entrance (north-west)

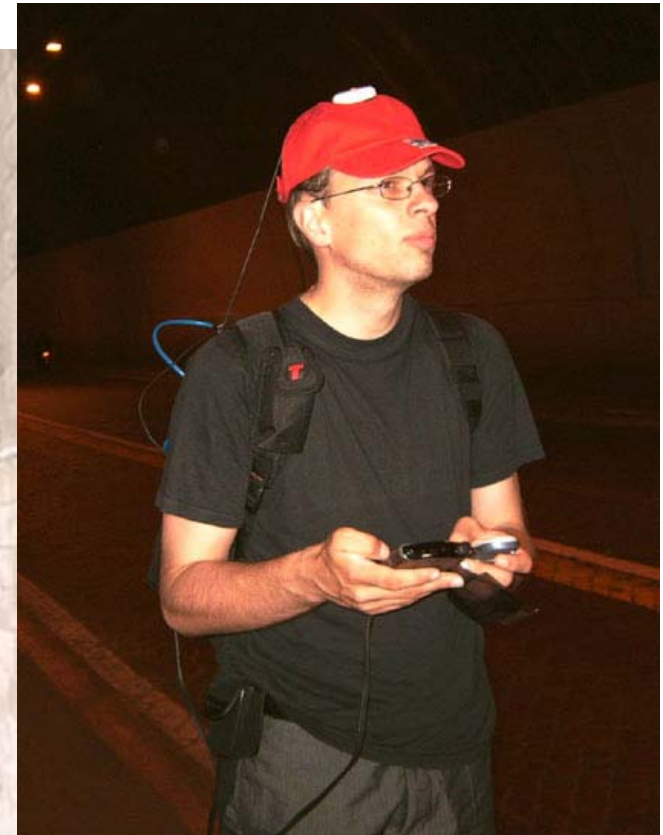


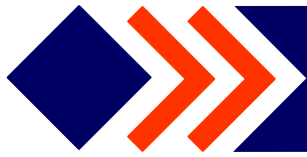
Tunnel Entrance (south-east)





SHADE Rome Campaign 2





SHADE ESTEC Campaign

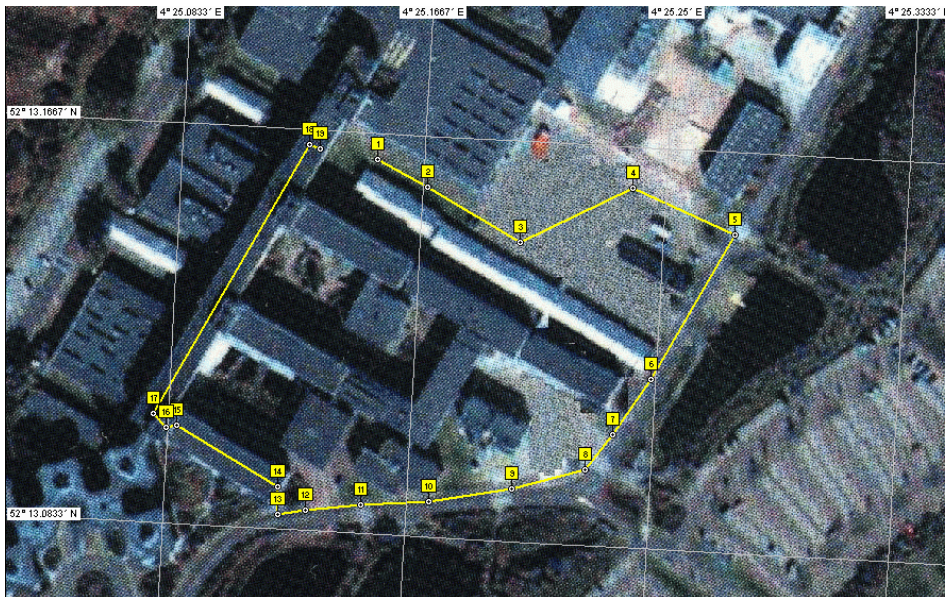


Target Application:

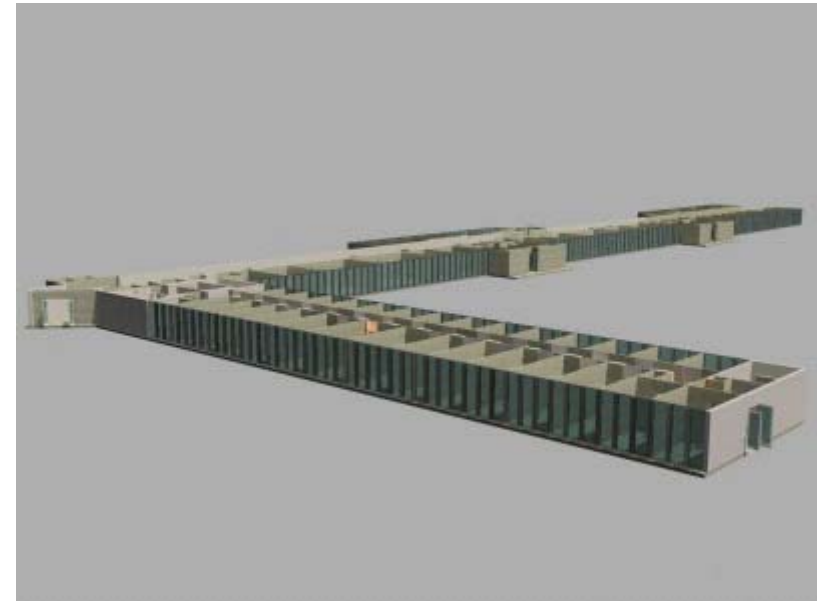
>>> Rescue Services

>>> Rural to Dense Urban and Indoor

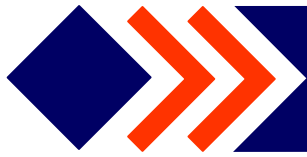
>>> Primary Pilot No. 3



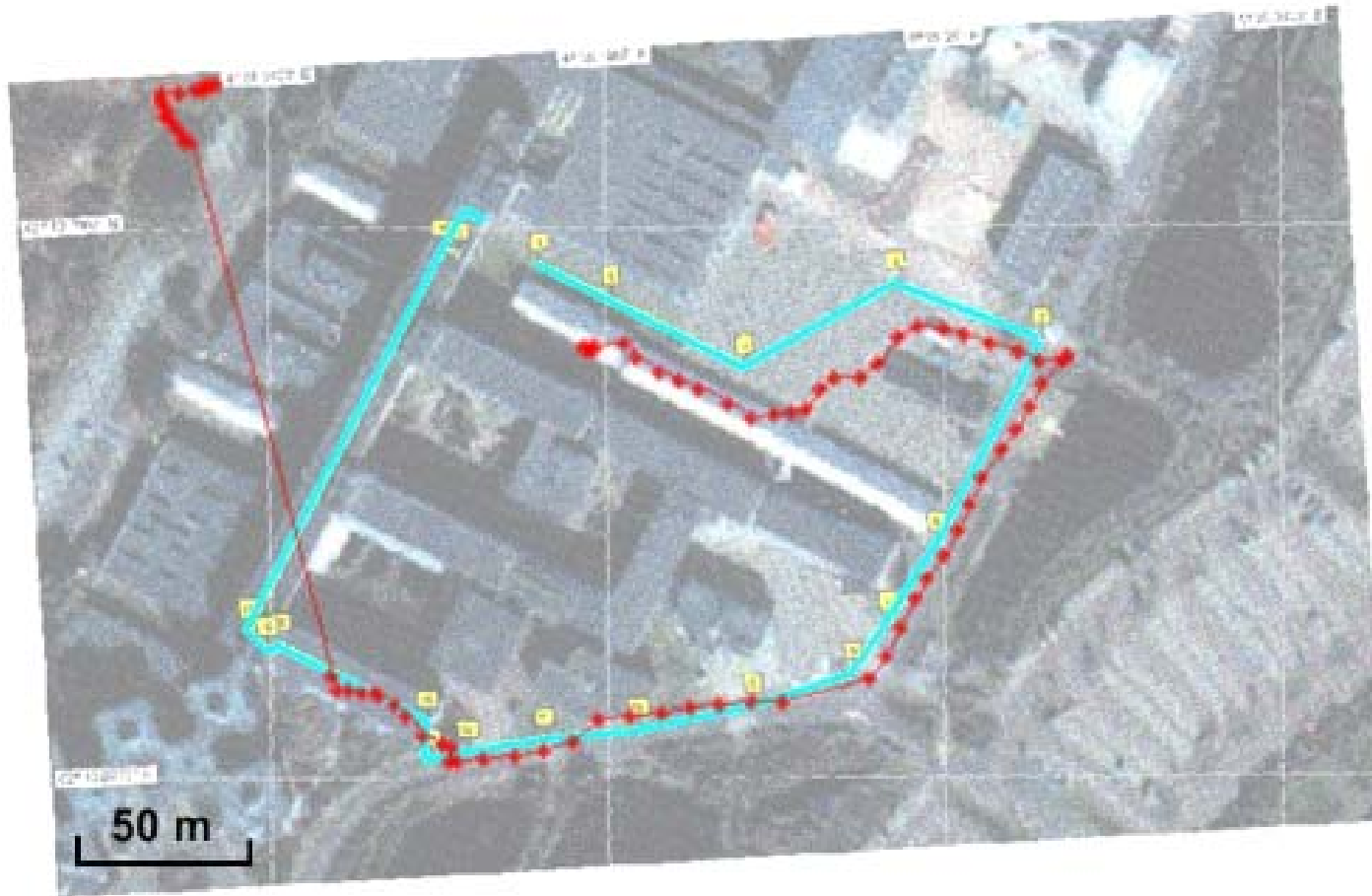
ESTEC Satellite Image with demonstration route

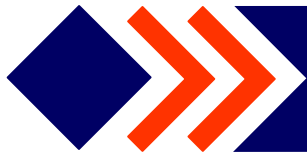


ESTEC ground floor 3D building model

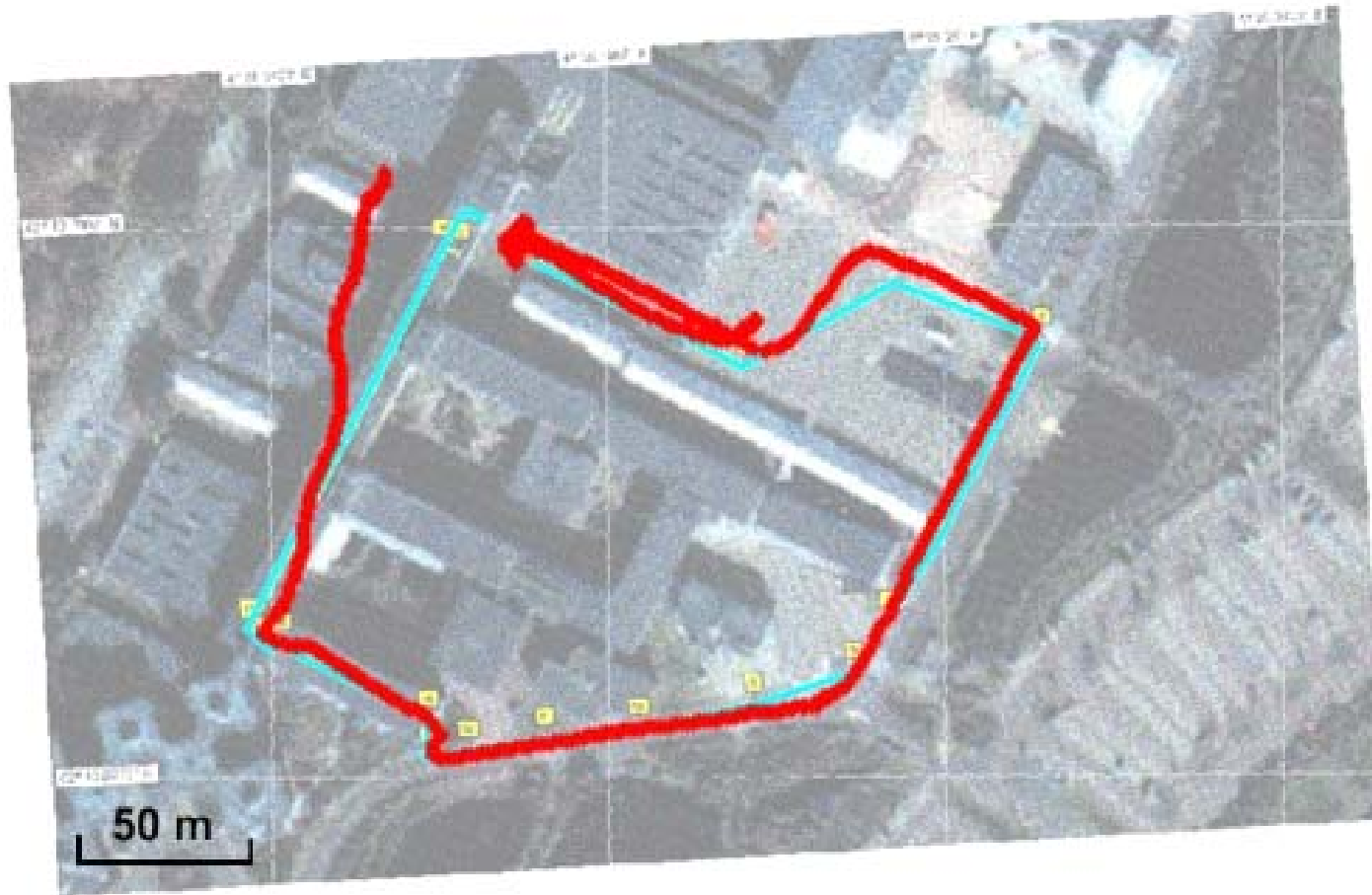


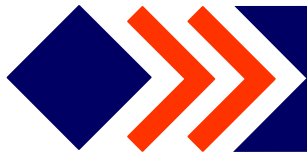
Demo Result – Pilot 1



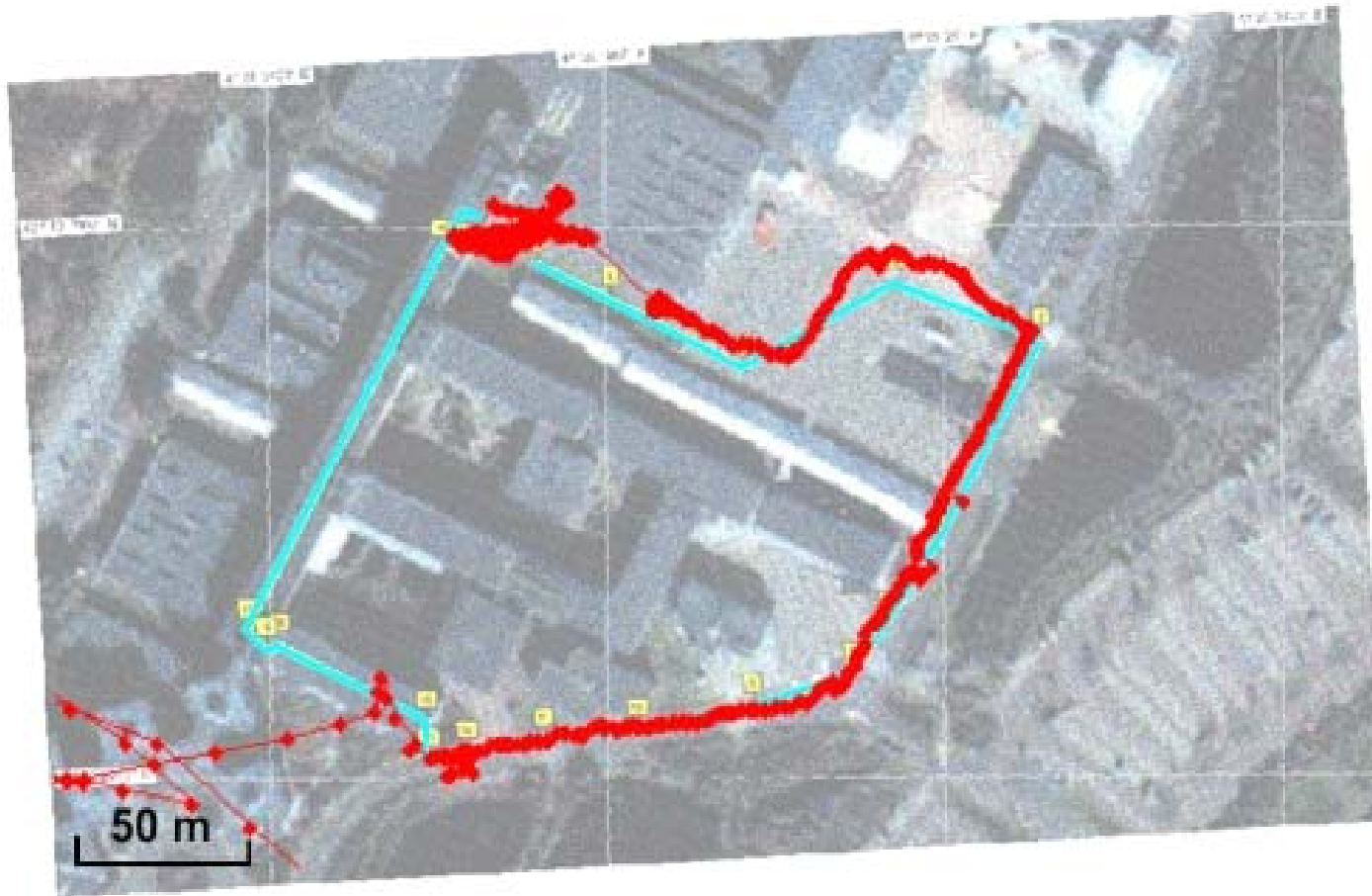


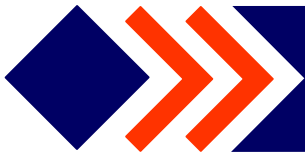
Demo Result – Pilot 2





Demo Result – Pilot 3

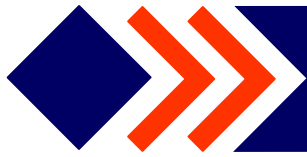




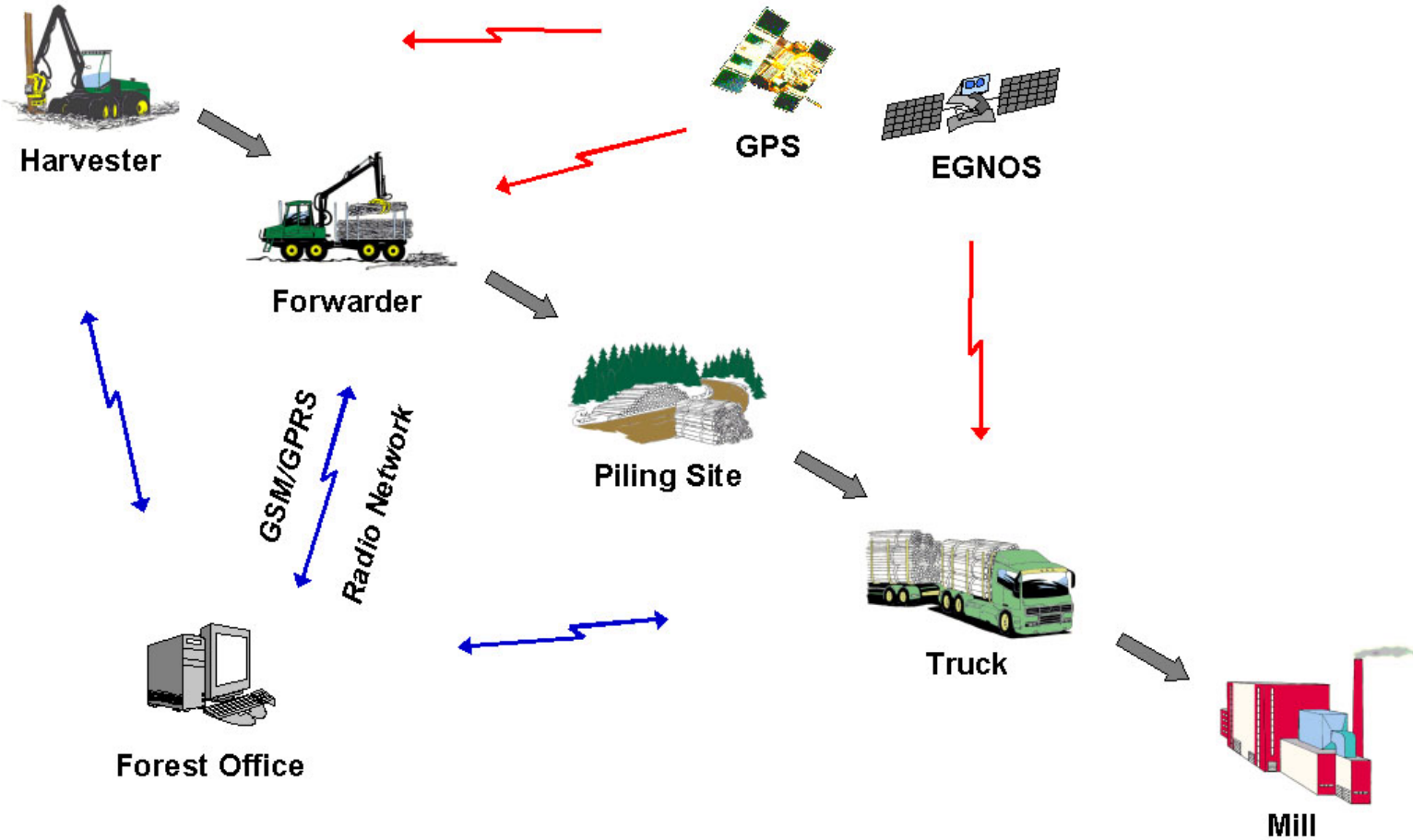
Ongoing activities based on the SHADE results

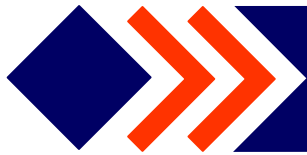
- Concentrate on most promising unit for pedestrian navigation: Multi-Sensor Box (MU2): smaller, lighter & more reliable
- Add Multiple options for wireless data links (SatCom, WiFi, UMTS, etc.)
- Mobile Mission Centre
- Keep the device handling and user interface simple and intuitive



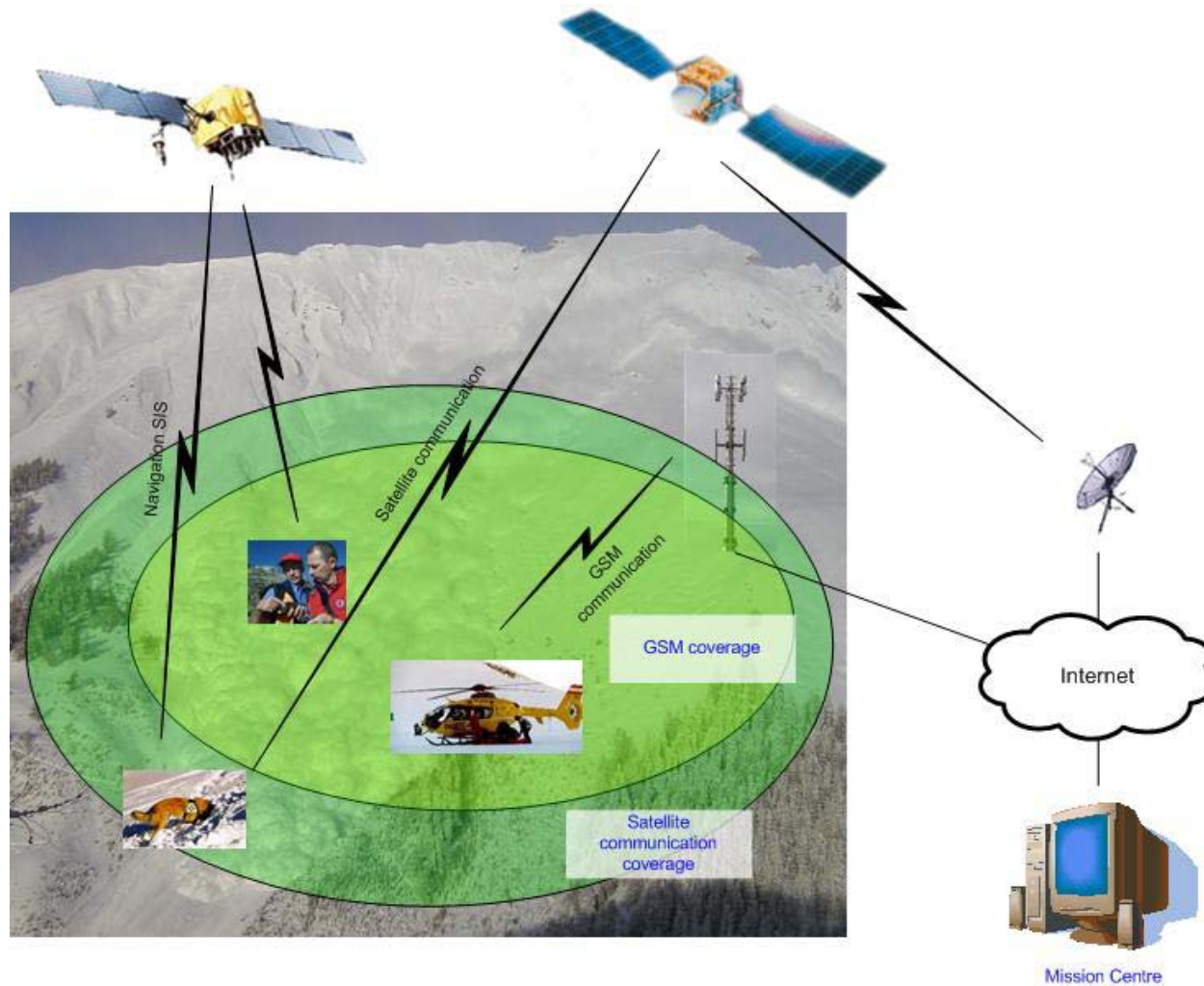


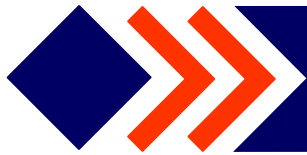
Follow-Up Project: EGNOS NT





Follow-Up Project: SARFOS





Follow-Up Project: PANORAMA



Definition and realisation of a functional demonstrator:

COTS + DEDICATED AUGMENTATIONS

GPS/EGNOS

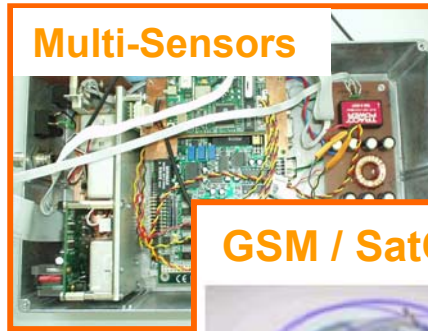


PDA

GSM

Pos / Nav

Multi-Sensors



GSM / SatCom



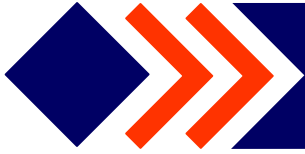
Communication

GIS



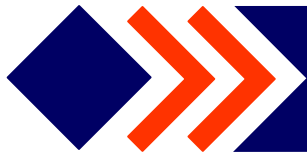
Online- Tracking





Questions?





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