



TIRAMISU

Toolbox Implementation for Removal
of Anti-personnel Mines, Submunitions and Uxo

Location, Communication and Data Services for Sensors and Robots in the Field

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www.fp7-tiramisu.eu




Agenda


1. **Scenario:** TIRAMISU project
2. **Field Data Management:** system overview
 - a) **LOCALISATION:** positioning box
 - b) **COMMUNICATION:** field-mesh-net
 - c) **STORAGE:** repository service
 - d) **VISUALISATION:** spatial mgm. cockpit
3. Status & next steps ...


Scenario – TIRAMISU project





What's in the toolbox


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1) Advanced Global Survey
tools to help setting priorities among the affected areas, using remote sensing, contextual data, expert knowledge and GIS analysis.
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2) Non-Technical Survey
tools to support Suspected Hazardous Area (SHA) assessment and delimitation using remote sensing, contextual data, expert knowledge and GIS analysis.
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3) Technical Survey
tools to detect indicators of probable presence of landmines/UXOs.
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4) Stand-off Detection
tools to detect mines, submunitions or explosives at close range with remotely controlled Micro (Unmanned) Aerial Vehicles (MAV/UAV), remote controlled ground platforms (UGV) or flying biosensors (honeybees).
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5) Ground-based Close-in Detection
tools, such as advanced metal detectors, ground penetrating radars and novel chemical sensors.
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6) Disposal of ERW (Explosive Remnants of War)
tools to protect deminers or vehicles against explosions.
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7) Mine Risk Education
tools to assist in Mine Risk Education activities.
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8) Training
tools aiming at developing capacity building and enabling the user uptake of the tools developed.
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9) Mine Action mission management
tools to improve planning and execution of Mine Action missions.
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10) Standards
this module includes the current and in-progress or proposed CEN Workshop Agreements (CWA).

- **4 years**
- **26 partners**
- **19 M€**
- **-> 12/2015**



DATA MANAGEMENT IN FIELD MISSIONS



information challenges:

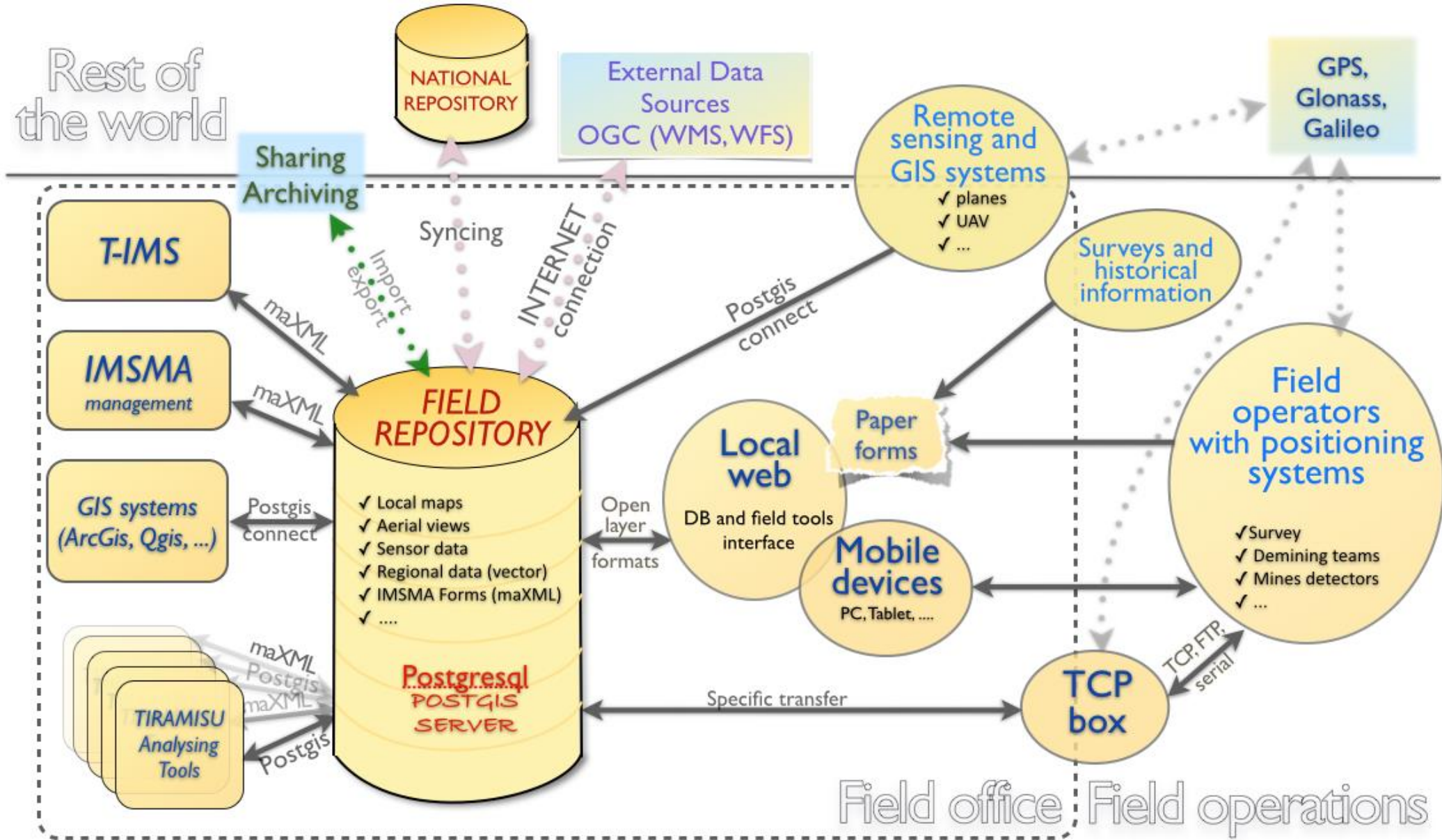
- boundaries, landmarks and fences
- What was found, How, Where, When, by Whom?
- Which operations have been done, Where, When and by Whom?
- Spatial Analysis of contamination characteristics and distribution

DATA MANAGEMENT IN FIELD MISSIONS

- different data formats
- status monitoring over longer periods of time
- location, type, depth and condition of the mines detected
- visualisation of exploratory lanes, reference points, natural and man-made features
- etc.

Sensors can produce amounts of (sometimes useful) data !

Scenario – TIRAMISU project

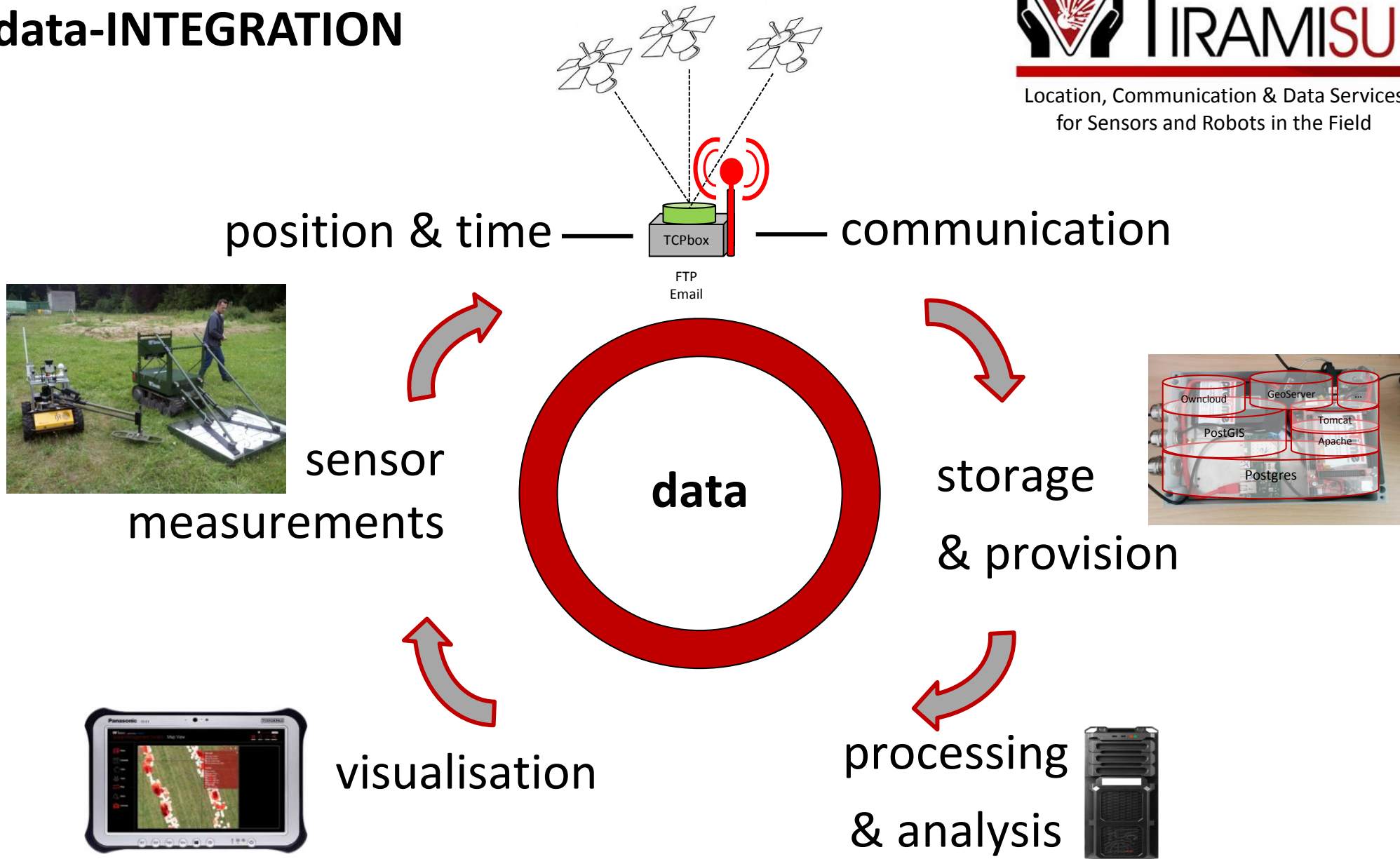


Field Data Management: system overview



Field Data Management: system overview





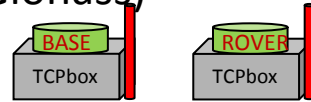
LOCALISATION: positioning box



- **same hardware** but different configurations:

- **GNSS** receiver (GPS, Glonass)

- BASE or ROVER



- with correction data from BASE **or** internet services **or** without corrections
- internet is required for only ONE single box, which communicates with all others
- expensive geodetic receiver
- less expensive raw-data receiver

- **location** provider (for robot platforms):

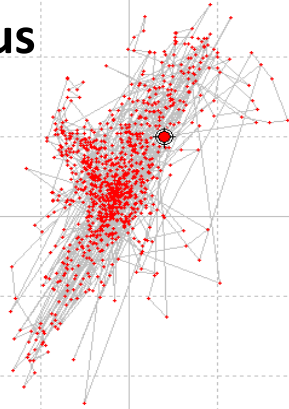
- TCP-box streams position data to the sensor
- the sensor stores georeferenced measurement data files into TCPbox
- sending GNSS track or **gyro, acceleration and compass** data

- **communication** provider: mesh-net node (e.g. 'modem' for the field-repository); coverage extension just by adding more rovers

single receiver/RTCM3

standard single receiver

within 5m radius



5 m

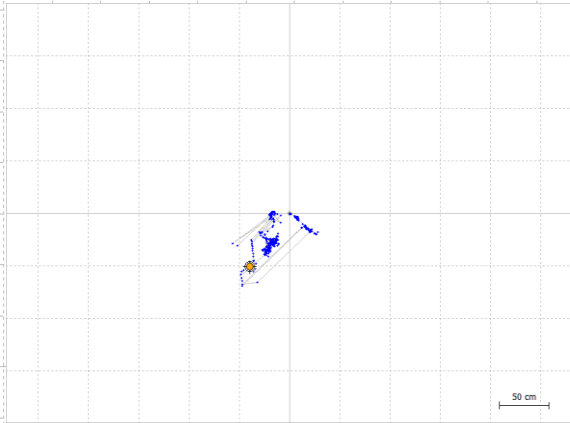
**standard single receiver with internet
based RTCM3 correction data**



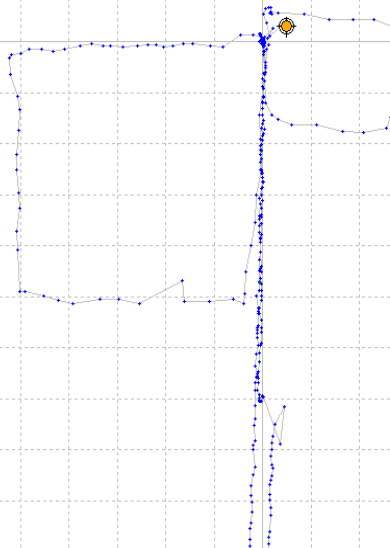
2 m

two standard receivers as base/rover system within 40 cm radius

Static position:

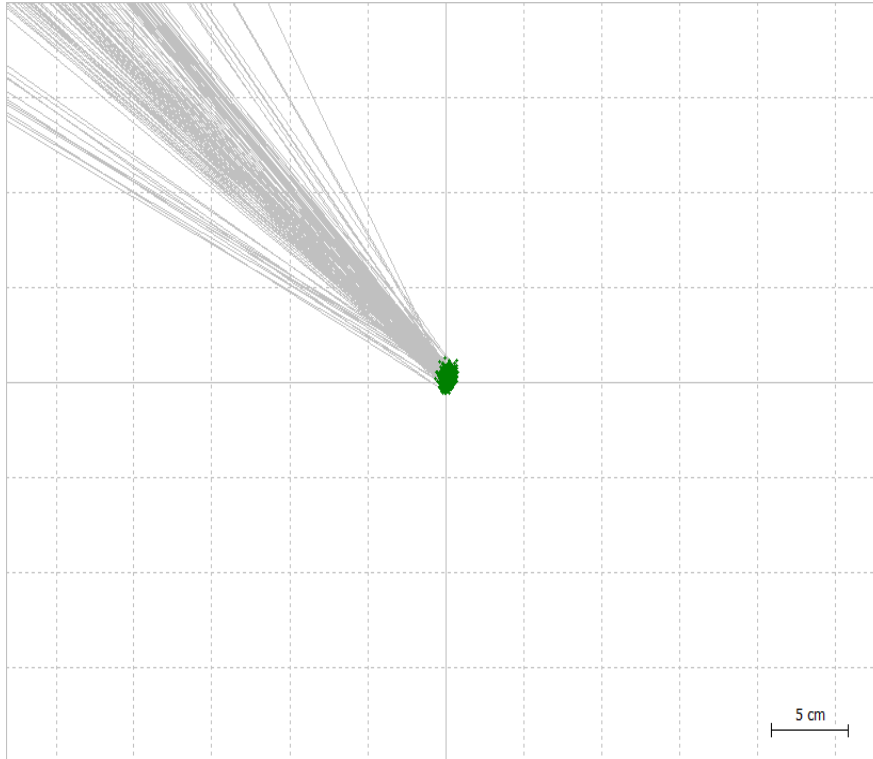


Moving:



geodetic base/rover

Static position:



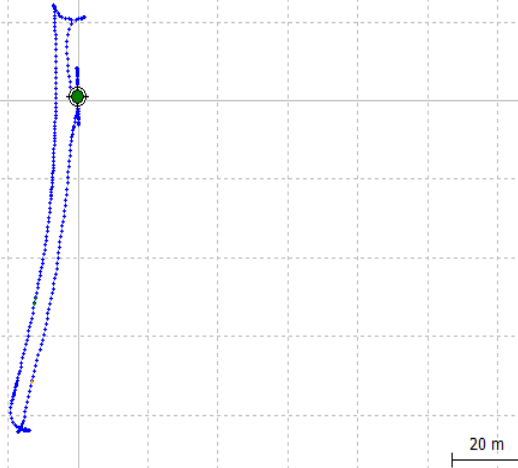
two expensive geodetic receivers
base/rover system within 25cm radius
after position fix



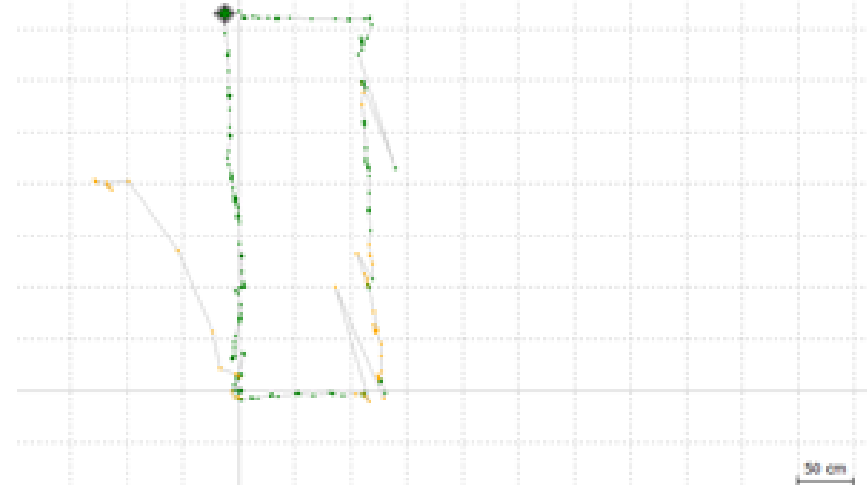
! neither GPS nor Glonass guarantee a precision !

geodetic base/rover

Walking a rectangle with 3.5 m x 1 m

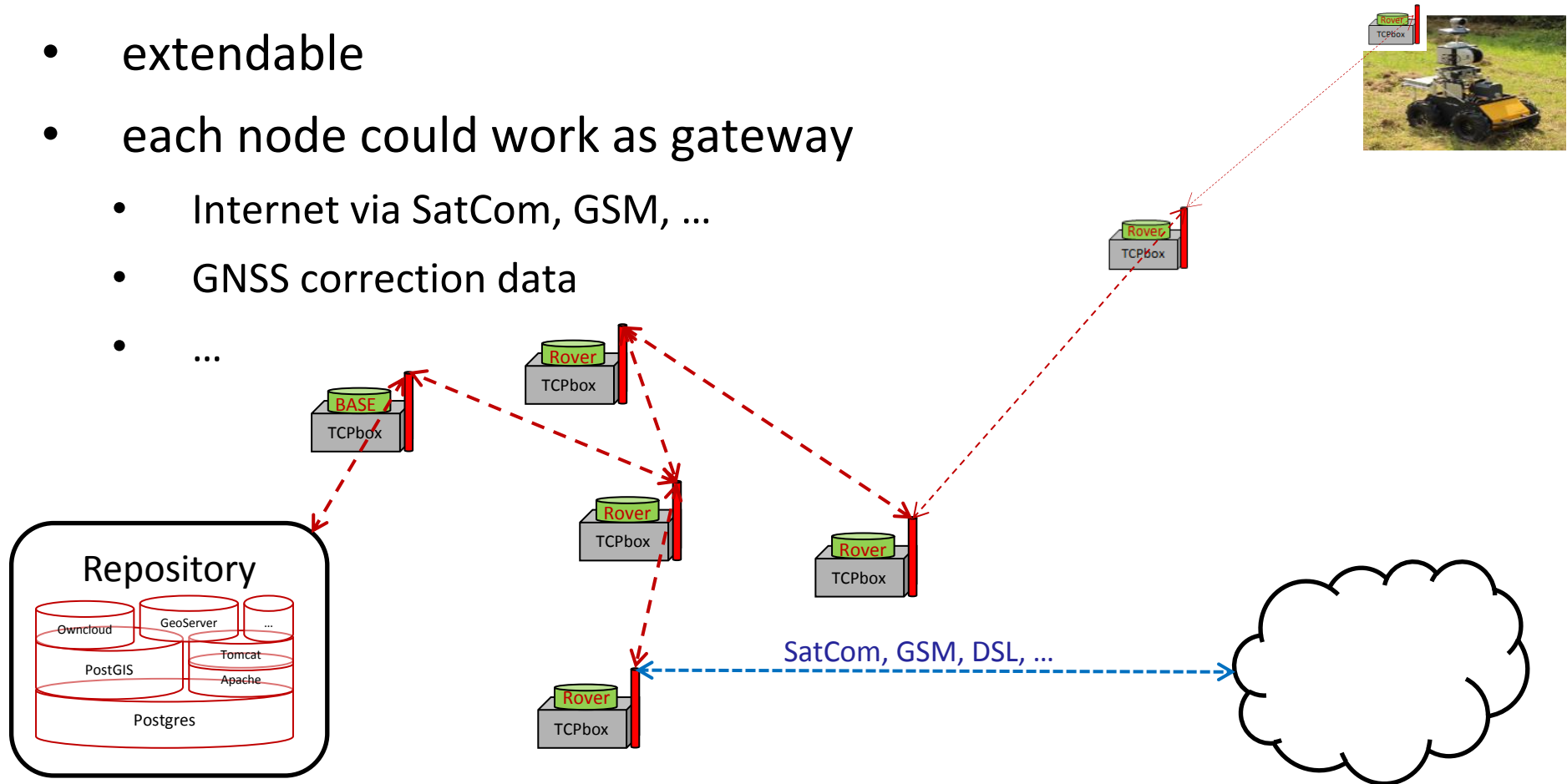


Driving 100 Meter on a road, turn
and way back



COMMUNICATION: field-mesh-net

- self organizing wifi nodes
- extendable
- each node could work as gateway
 - Internet via SatCom, GSM, ...
 - GNSS correction data
 - ...

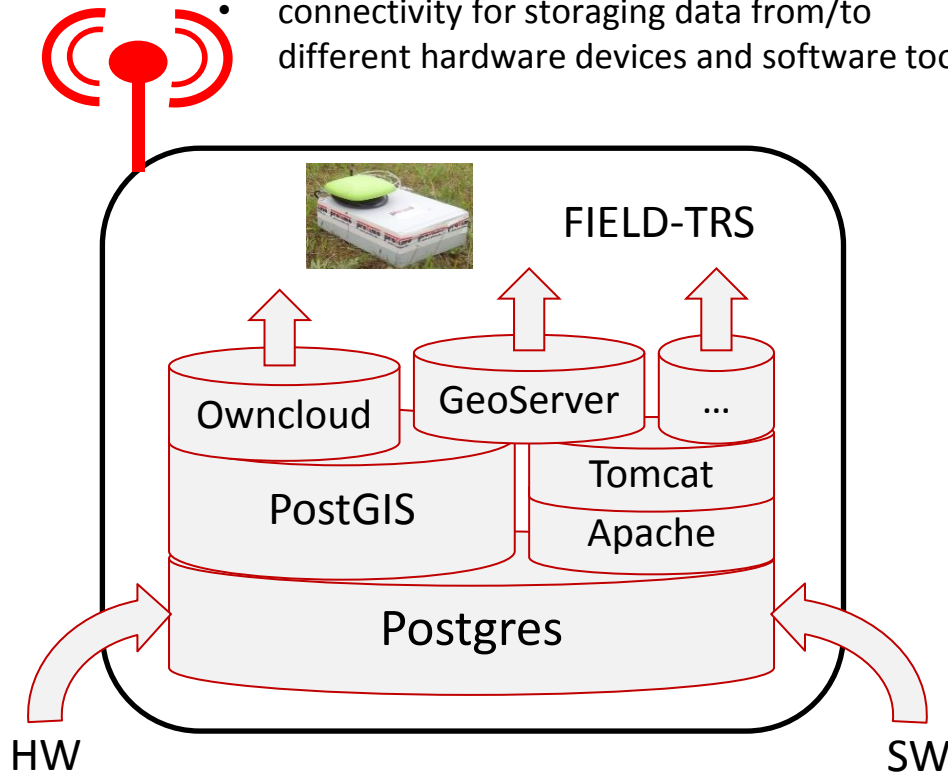


STORAGE: repository service

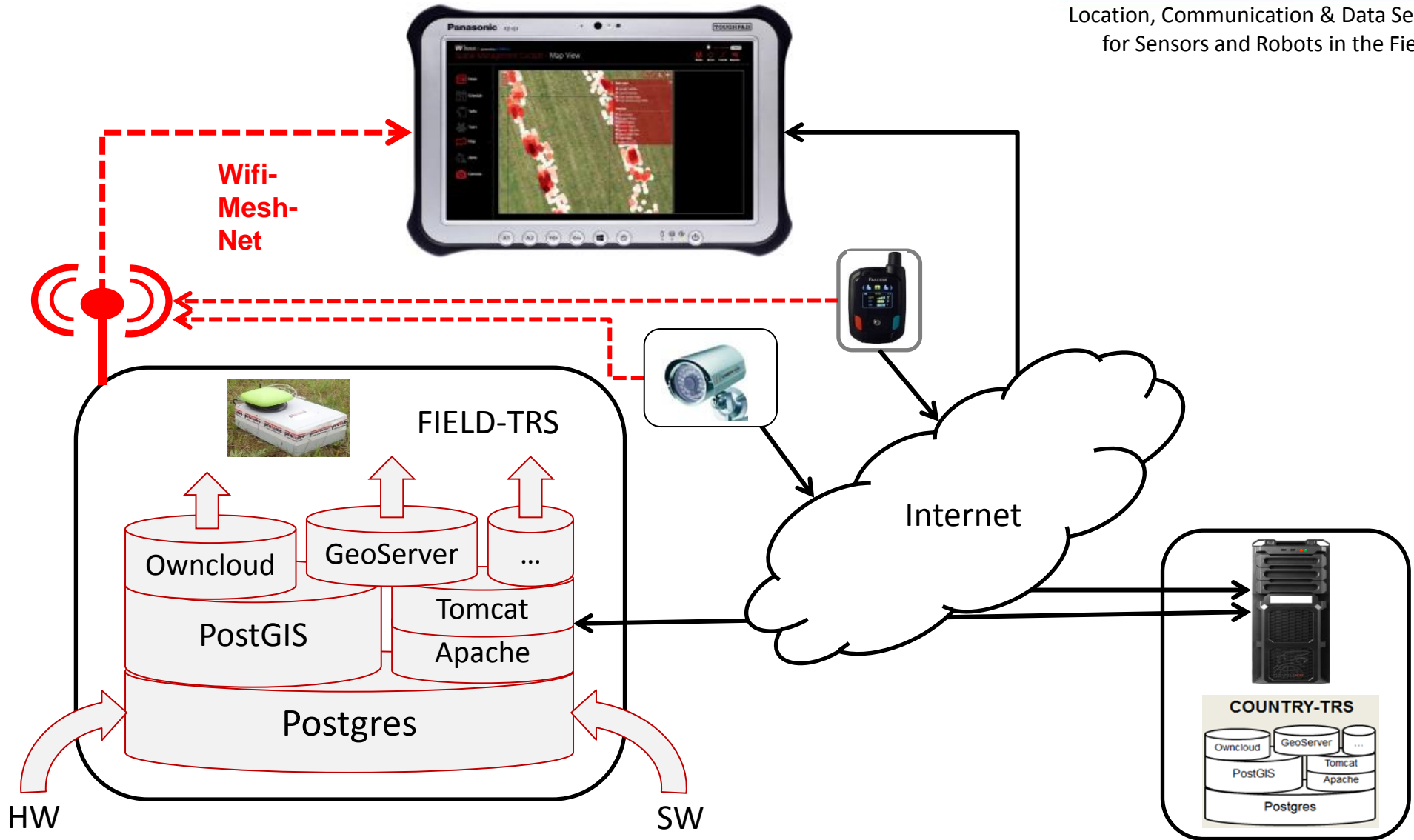
- two implementations:
 - 'field TRS': rugged, power self-sufficient system; can be connected at the field level to the MESH-network
 - 'country TRS': hosted on the internet with same functionality as 'field'

- internal functionality:

- connectivity for storing data from/to different hardware devices and software tools



VISUALISATION: 'spatial mgm. cockpit'



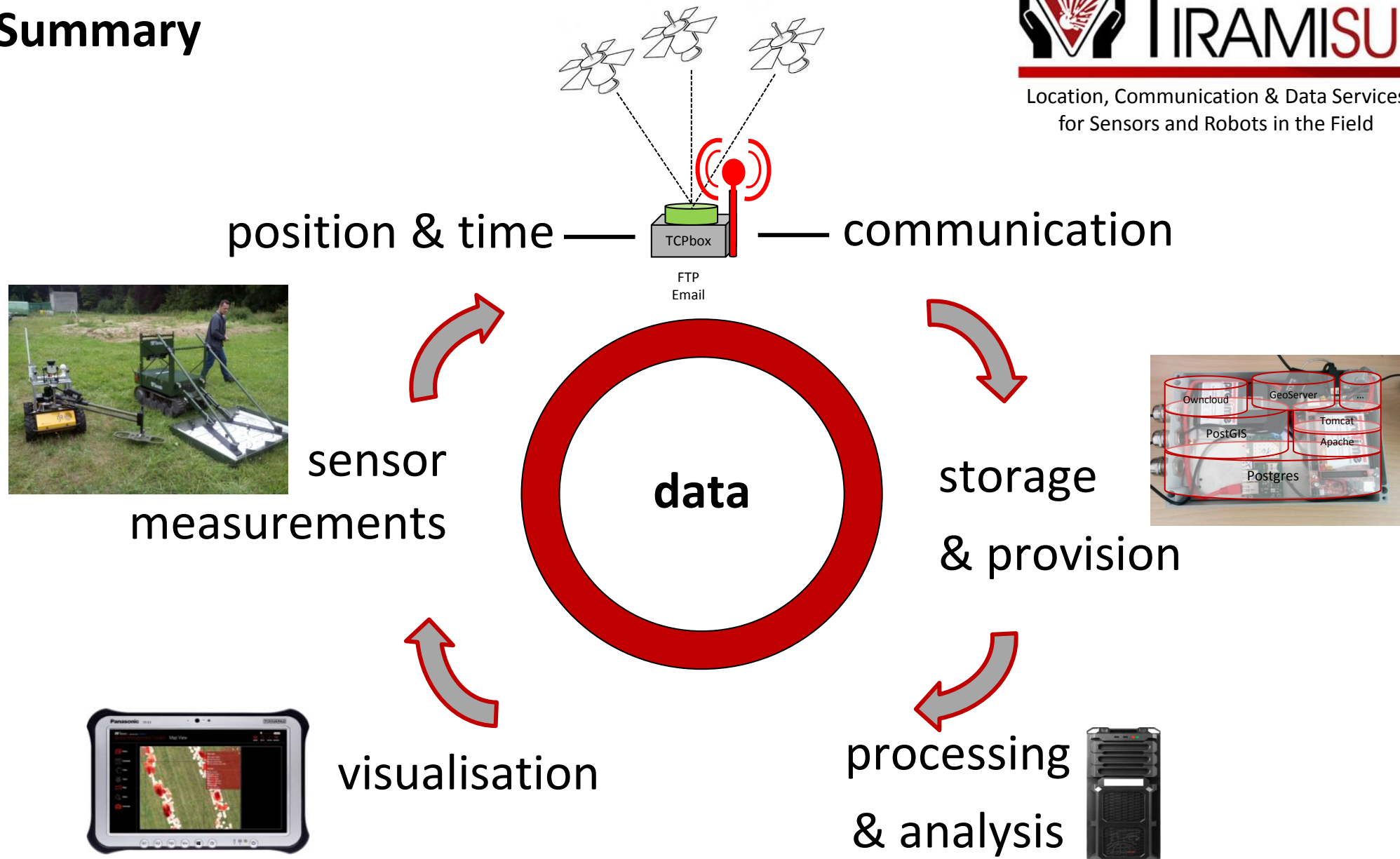
VISUALISATION: 'spatial mgm. cockpit'



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Summary



- Implementation (done)
 - Field tests (→ June)
 - Demonstration & Validation (August/September)
 - Documentation
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- **2016 ...: Open for integration of further robotic platforms and sensors!**



THANK YOU
ANY QUESTIONS?

Dirk Schmidt
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