UAV data in a training centre for rescue and emergency forces: The EU's TT-GSAT project

Irmgard Runkel,
GEOSYSTEMS GmbH

HEXAGON GEOSPATIAL
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TT-GSat

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ESA INVESTOR FORUM AMBASSADORS HOW TO APPLY NEWS PORTFOLIO CONTACT Search

TT-GSAT - Test- and Training-Centre for Geoinformation- and Satellite based Rescue & Emergency Services (TT-GSAT)

Home » Portfolio » TT-GSAT

TT GSat

ACTIVITY	Demonstration Project (from FS)
STATUS	Ongoing
THEMATIC AREA	Aviation, Safety & Security, Education & Training

- support an end-user-oriented development making good use of **new security technologies products and services**;
- **speed up** the time-to-operation, reduce risk of implementation and enable capacity building
- foster the utilization of **innovative technologies**, products and services in this particular market segment.

proTime Navigation & Kommunikation

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IABG

Fraunhofer IML

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ARTES 20: Integrated Applications Promotion (IAP) Programme ● Feasibility Studies / Demonstration Projects ● AO/1-6124/09/NL/US (Issue 5.3), ESA/IPC(2009)11, 09.153.75

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TT GSat

ACTIVITY	Demonstration Project (from FS)
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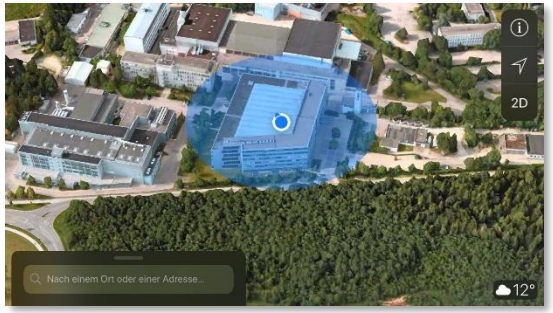
THEMATIC AREA	Aviation, Safety & Security, Education & Training

Multimedia Emergency Services Communication

Ad-hoc Image processing



Secure localization & navigation

Situation display and mission control

proTime Navigation & Kommunikation

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Project partners

IABG

„digital.sicher.vernetzt.“

https://www.iabg.de/

- Independent technical consulting
- **Terrestrial radio systems (including TETRA, ad-hoc networks)**
- **Control centers**
- **Operation of test facilities**
- Global Navigation Satellite Systems GNSS (especially Galileo Public Regulated Service PRS)
- Satellite communications
- Geographic Information Systems GIS
- Earth Observation
- Safety & Security

proTime Navigation & Kommunikation

„Wir realisieren Innovationen für mobile Menschen und Güter“

http://www.protime.de/

- Mobile data communication
- Satellite navigation and positioning
- Mobile networked electronic devices
- Telematics services
- System analysis and development
- Mobility and logistics
- Protection and security
- Tourism and seniors
- Security applications
- TT-GSAT Feasibility study member

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„Die Experten für raumbezogene Daten“

https://www.geosystems.de/

- **Automated processing chains**
- Remote sensing
- Photogrammetry
- **Software and service provider** for analysis, processing, distribution and management of high-resolution satellite, aerial and drone imagery
- Geographic Information Systems GIS
- **Spatial data management**
- Hexagon Geospatial Partner
- long-standing partner of IABG

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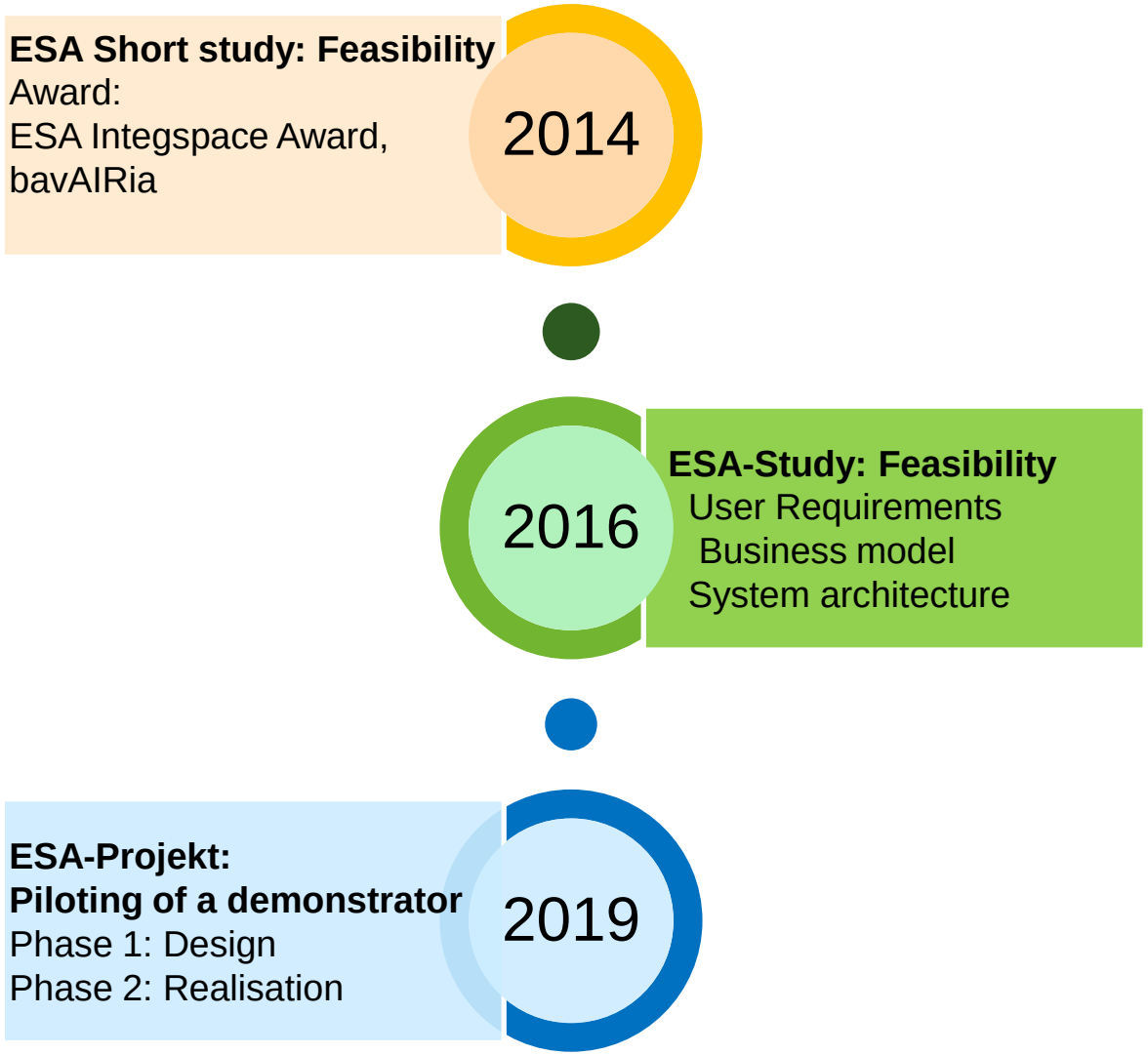
From the idea to the demonstrator and further ….



Involved BOS users (selected):

- Bavarian Police (PP, BLKA, Training Institute)
- Munich Fire Department
- State Fire Brigade School Geretsried
- Technical Relief Organization (THW, Munich)
- Federal Criminal Police Office (BKA)

Involved industry partners (selected):

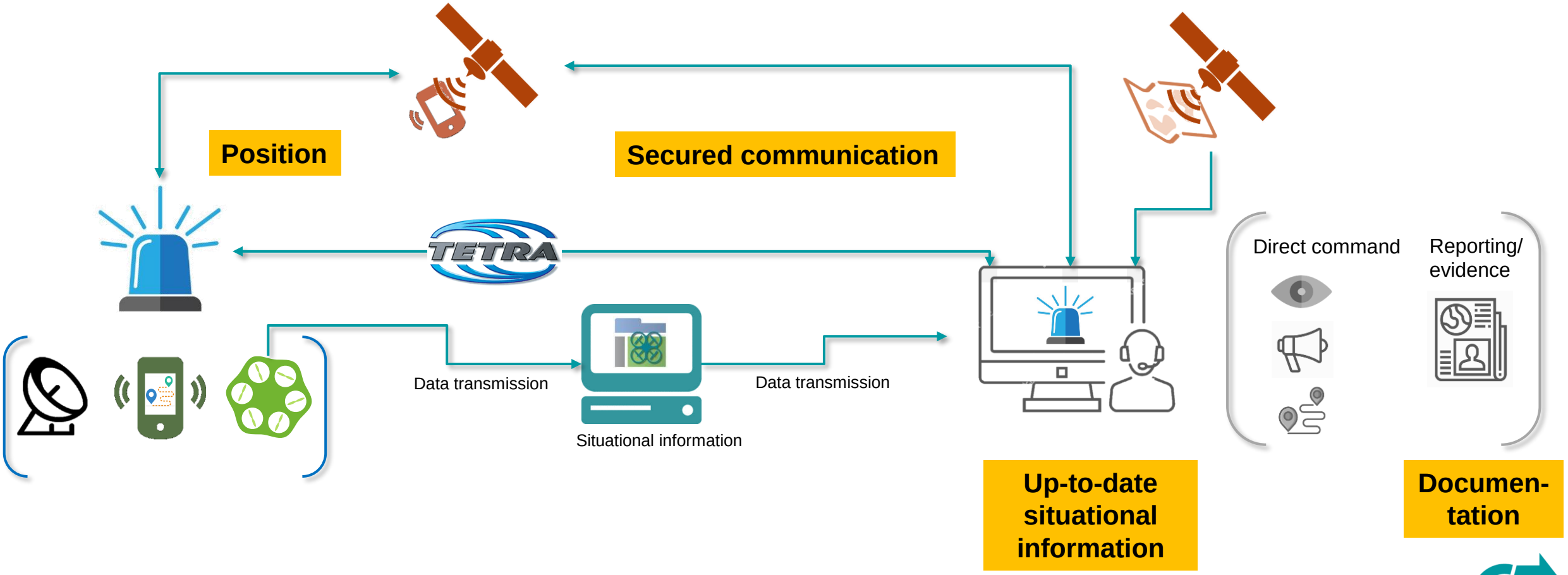
- Avaya
- Hexagon
- Microdrones
- Eurofunk Kappacher

Results

- Over 200 user requirements -> approx. 30 prioritized requirements
- Provision of proof of feasibility, profitability analysis
- Draft services, subject areas, possible system architecture, organizational approach

Overall capability of necessary operational components

- Seamless information transfer counts ….



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Overall capability of necessary operational components

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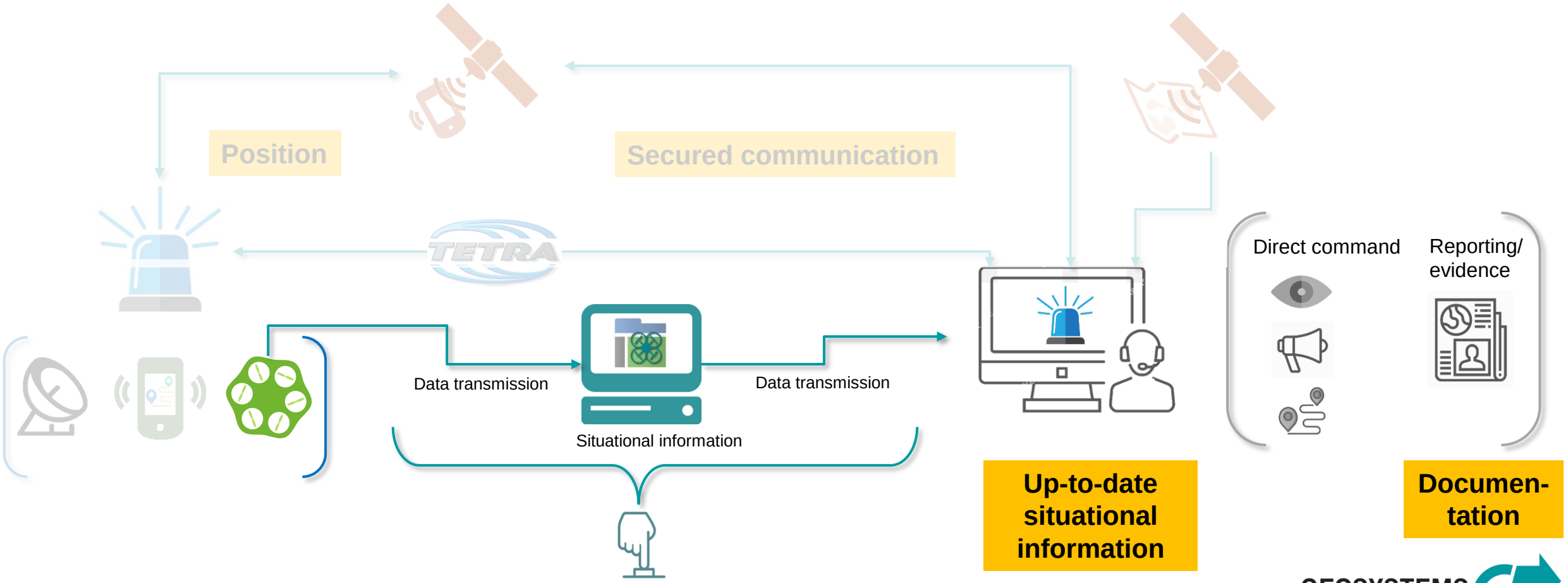

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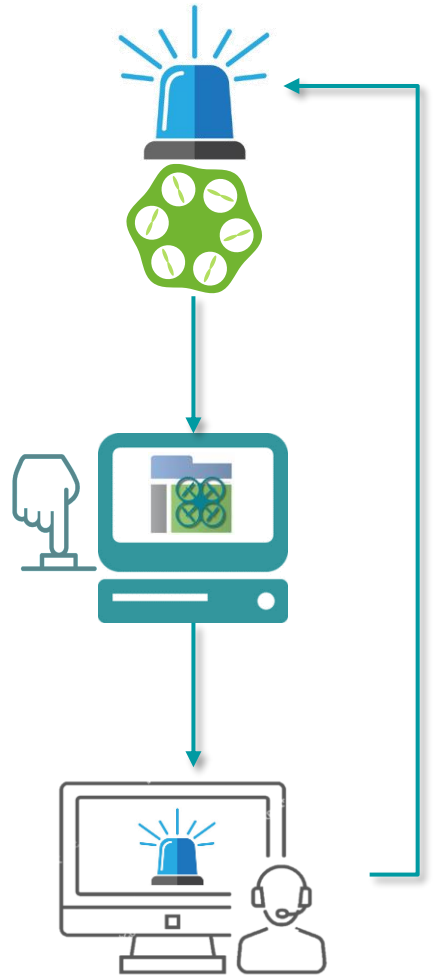
The drone - a link in the chain of operations

- Latest situation report
  - Search for missing persons and persons
  - Situation reconnaissance for mission optimization
  - Accident documentation
  - Surveillance at large events
- Interaction with mission communication
  - Data/position from and to the actor
    (cell phone, GPS, dashboard, etc.)
- Data transmission directly to the operations control center



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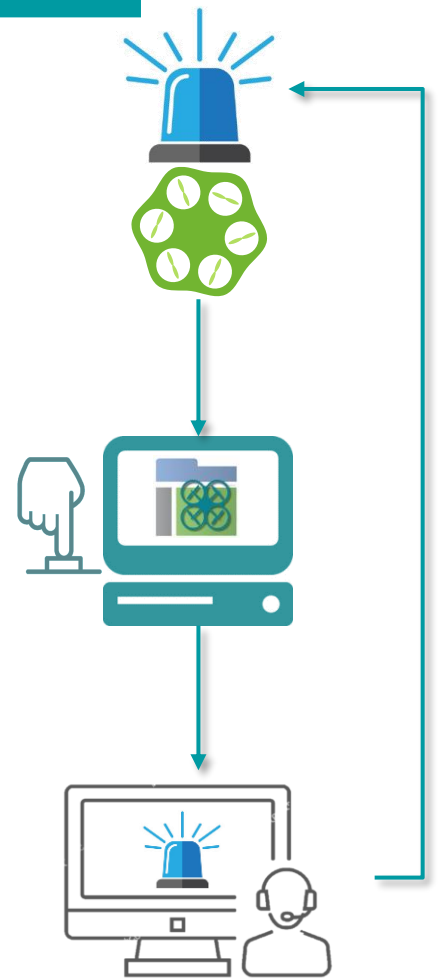
Requirements for drones in the BOS environment

Fire brigade	Police	THW	Mountain rescue	Disaster

- Special cameras ➔ Thermal imaging camera, multispectral cameras
- Easy transport and setup
- Easy operation (must be secondary)
- More payload (f. special equipment)
- Automatic data preparation (depending on requirements)
- Automatic data availability at the decision maker (incident commander, operations control center)
- Administrative exempt operation (LuftVO §21a (2)) ➔ direct operation Liability insurance
- Ongoing training on state-of-the-art technology and operation



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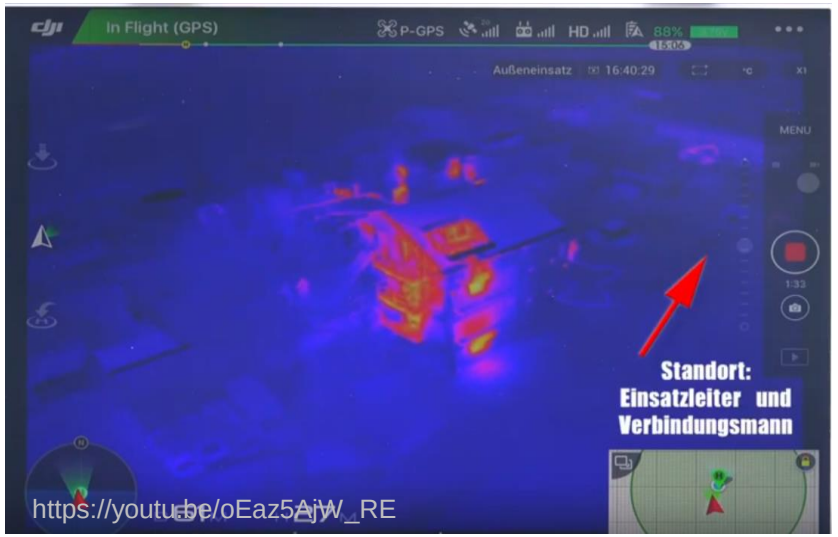
Fire department and drone

- Where are pockets of fire or embers?
- Where do potential dangers lurk?
- How can firefighters be guided safely to and from the fire or fire scene?



„ In the future, drones will be an indispensable tool for fire departments, in their daily operations as well as in disaster management."

Hartmut Ziebs, President of the DFV.

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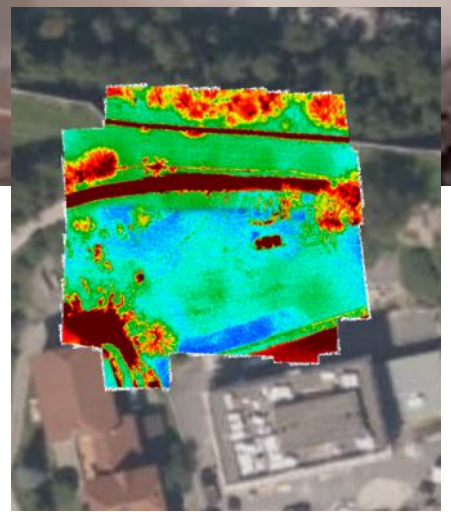
Pockets identification



Thermal information with aerial information

- Direct situational information
  - Visual identification
  - Automatically reported listing
  - Mobile app for localization (Smart-Phone)
- Faster and more reliabile

Situation

- **Visual**
- **Pocket coordinates**
- **Waypoints**

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THW and drone

- Operation in the explosive ordnance contaminated area of Lübtheen (THW Freising with thermal imaging cameras)
- Operationally in action: Unit UL - unmanned aerial reconnaissance
  - different drones,
  - Base vehicle f. mission tactical evaluation,
  - 18 drone pilots

Information from satellite image data - here Sentinel S2

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Police and drone

- Resources
- Closes capability gap
- Reconnaissance and documentation
- Cost effective
- Permanent evolution

- Permanent need for :
  - Exercise
  - Know-how
  - Knowledge

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Mountain rescue and drone

- Closes the gap between walking and helicopter
- Situation:
  - test phases,
  - partial operational deployment,
  - decentralized considerations and acquisitions
  - individual equipment
  - training usually by manufacturer => functional training

Unmanned helicopter – about 1 Mio EURO

Seminar „Drohneneinsatz und IT- Sicherheit“ an der SFSG

Drone with FLIR – Bavarian Mountain Rescue

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For a meaningful situational awareness

- Sensor-independent processes
- Fully automated process chain in the background
- Data processing where it makes sense (desktop / cloud)
- Direct data integration into the operations control center
- Reportable data
- Universal workflow, easy to adapt to special requirements
- Quality assured algorithms
- No special knowledge required for operation
- (interchangeable procedures)

- Creation of a 2D position image (position: x,y)
- Creation of a 3D position image (position and height: x,y,z)

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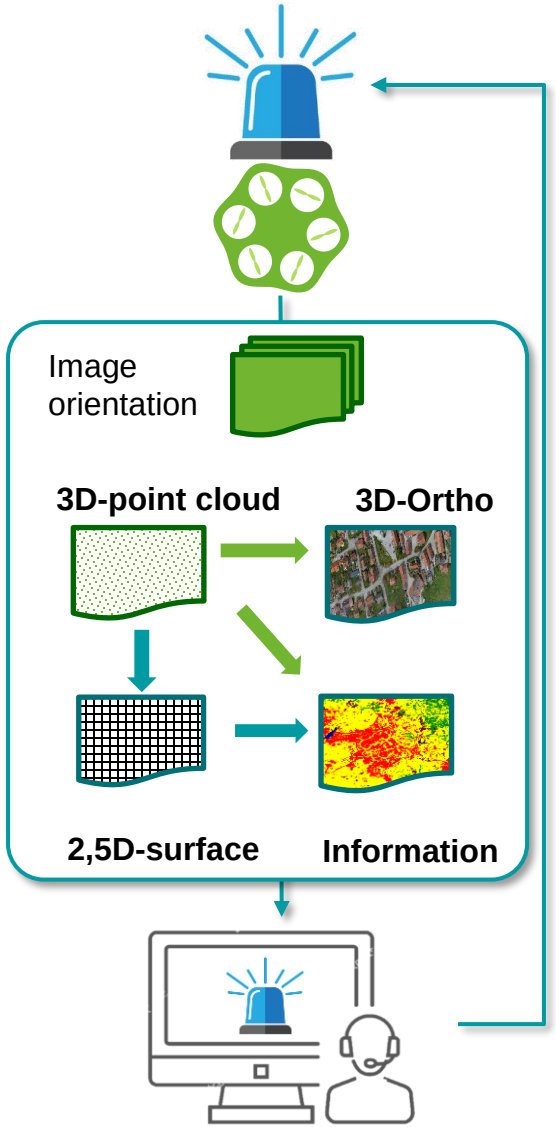
For a meaningful situational awareness



- Photogrammetry
  => precise position information x,y,z
- image data processing
  => basic data
- algorithms for special topics
  => e.g. identify embers
- Data service for operations control center
  => mission-compliant data formats

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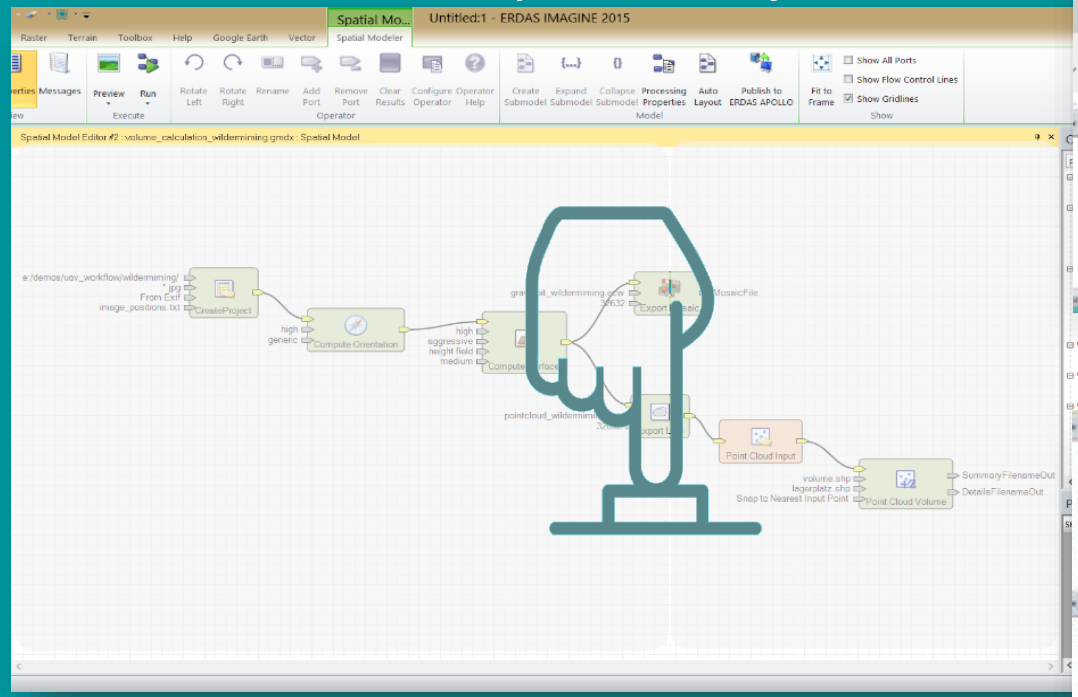
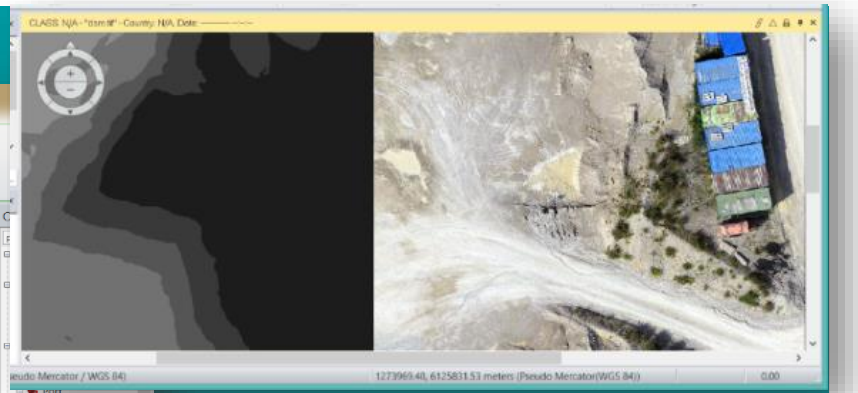
For a meaningful situational awareness

Ortho mosaic + special analysis

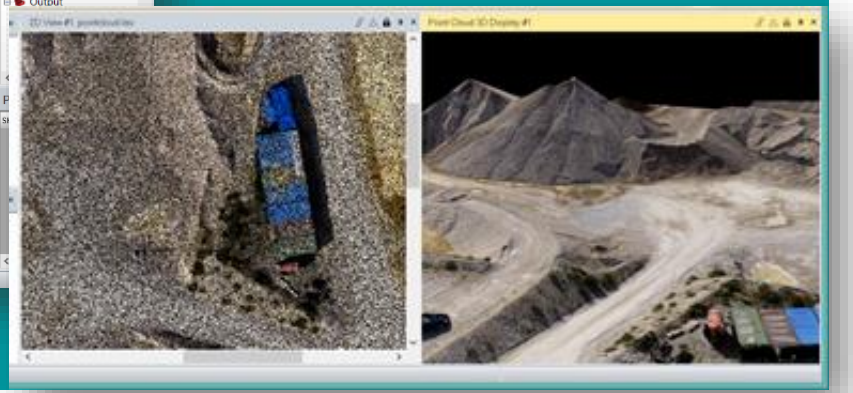


Agisoft Metashape + IMAGINE UAV

Situation in 2D (Orthomosaik, WMS)



Situation in 3D (point cloud)



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Example: Vorarlberg State Warning Center

- Fire department + drone + evaluation in the emergency vehicle + data upload to the operations control center
- Delay-free, fully automatic creation of current situation image data

Bild: Landeswarnzentrale Vorarlberg

Event: Landslide Doren

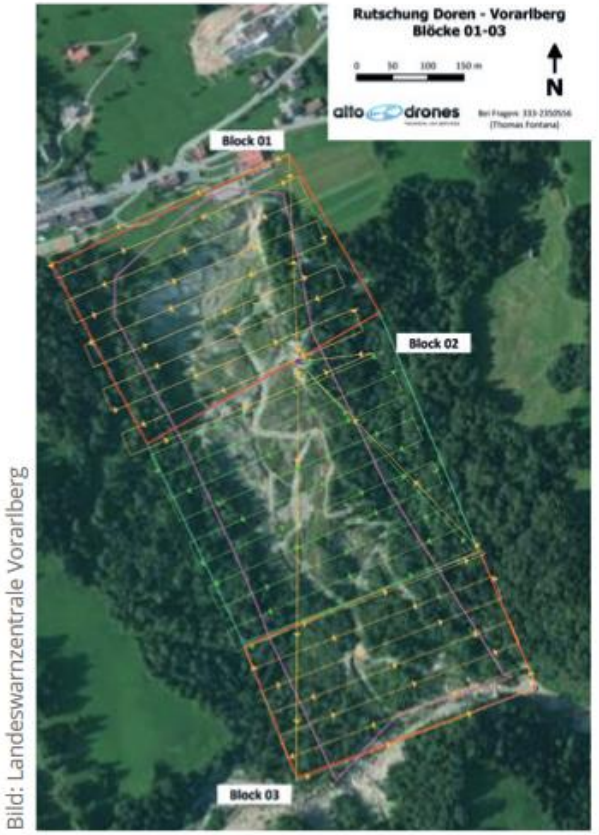

Bild: Landeswarnzentrale Vorarlberg

Flightplan drone

Up-to-date ortho mosaic

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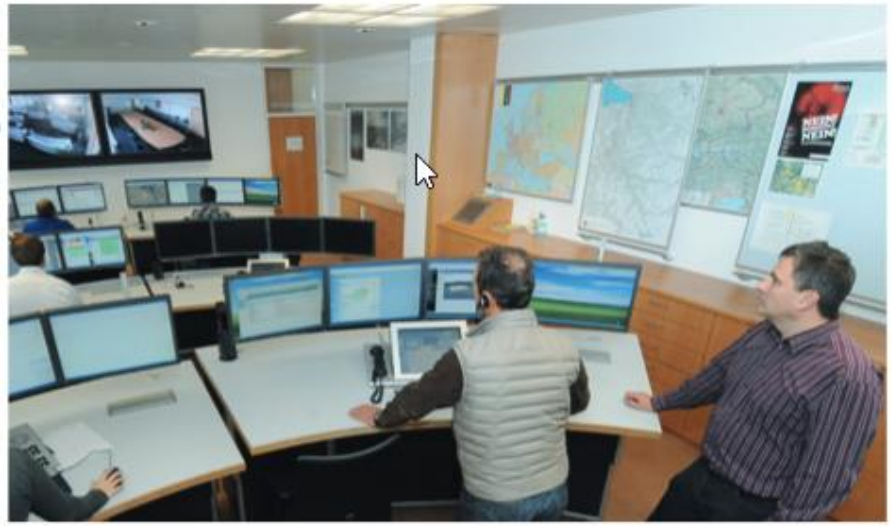

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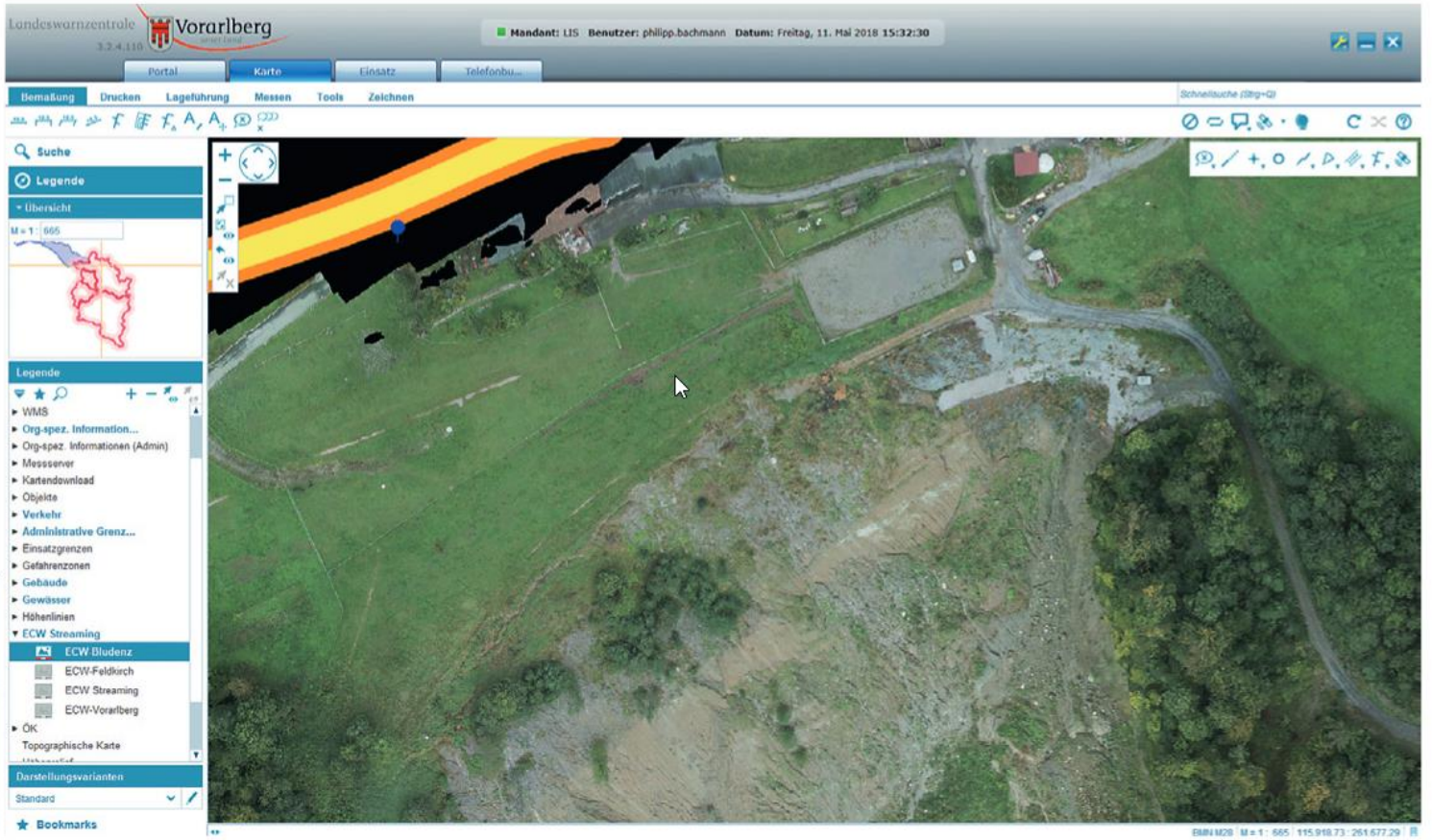

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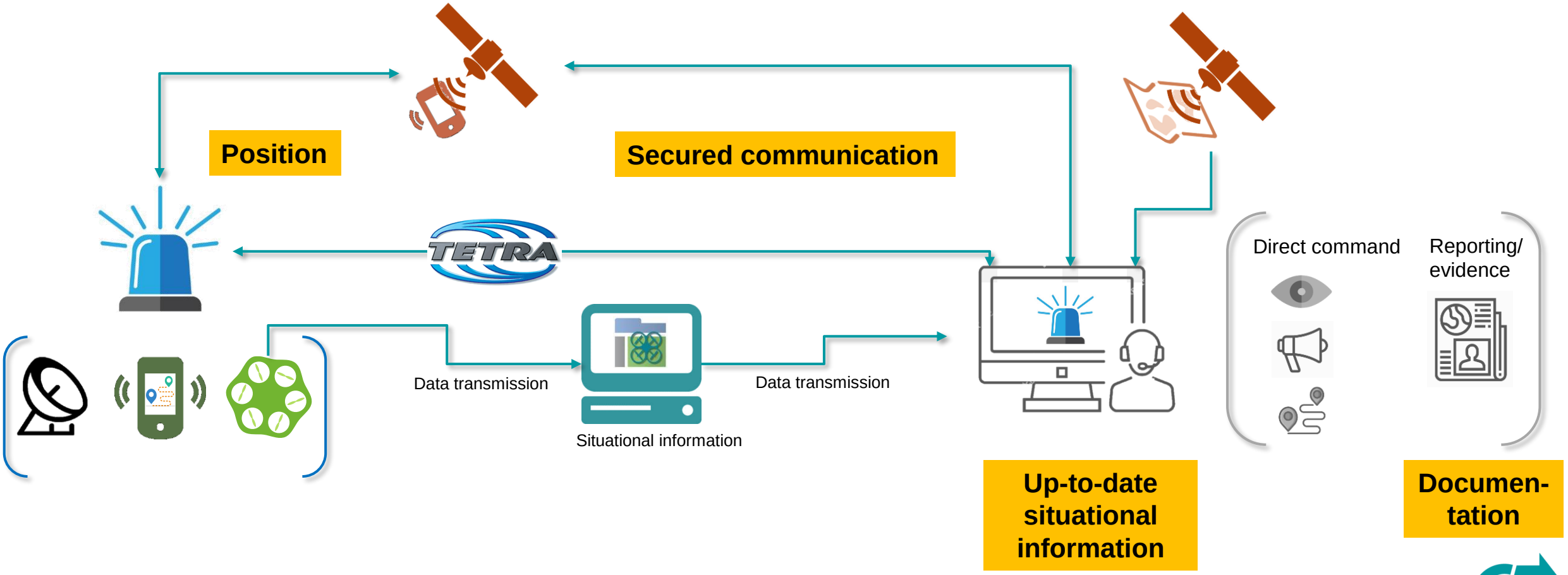

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Test and training center for geo-information and satellite-based rescue & emergency services

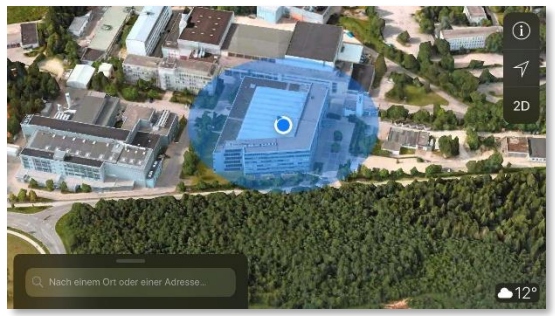
Secured communication

Multimedia Emergency Services Communication

Up-to-date situation

Ad-hoc
Image processing

position



Secure localization & navigation

Decision, documentation

Situation display and mission control

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Thank you!

Irmgard Runkel

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https://youtu.be/K_5qHTPVm-Y

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