

UAV BASED SMART DETECTION & LOCALIZATION OF RADIOACTIVE AREAS

Real-time Situation Awareness
for First Responders

Michael Hofstätter

Sensing and Vision Solutions

Center for Digital Safety & Security

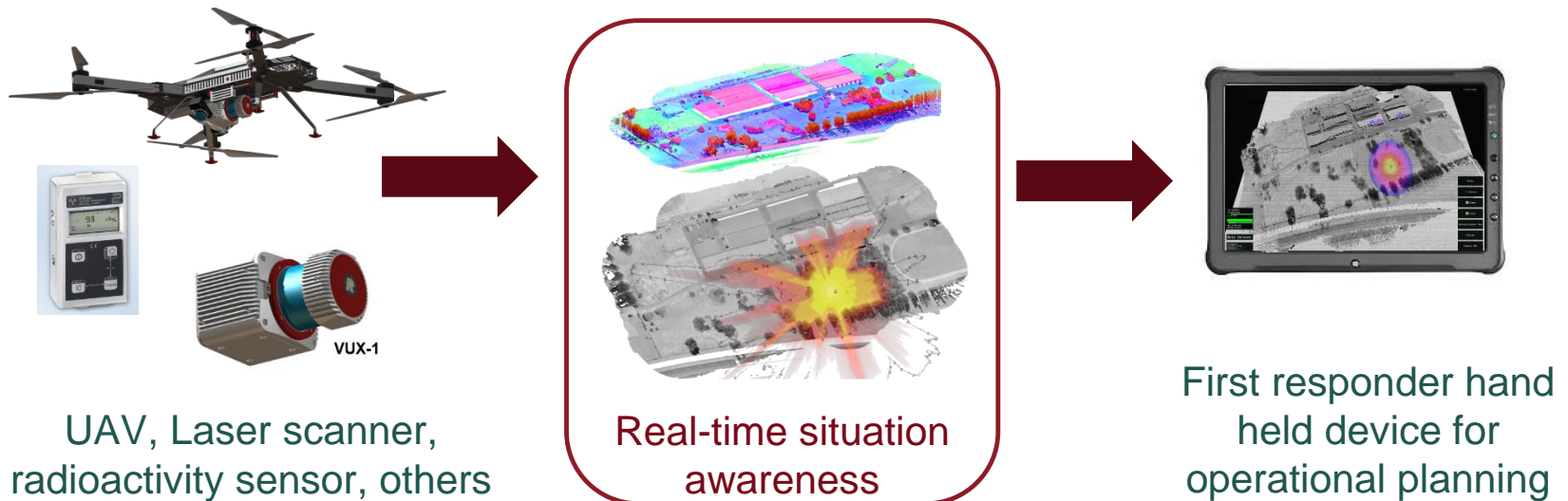
AIT Austrian Institute of Technology



OBJECTIVES AND VISION

Improving **decision support** for operational planning by providing **real-time situation awareness**

- **accurate 3D terrain** maps of the current situation
- **automatic detection and localization of radioactive sources**
- **radiation maps** to show potential hazardous zones
- **immediate visualization** of results on a hand held device
 → **increased personal safety**

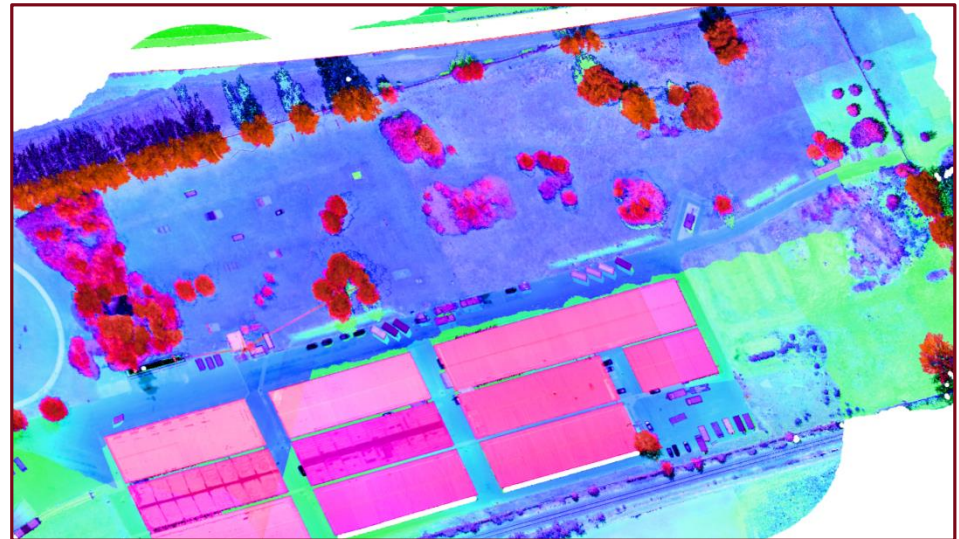


EXPLORATION OF UNCHARTED ENVIRONMENTS

- **Accurate 3D Terrain maps**
 - **live data streaming** to ground station while UAV flies across area
 - 3D Terrain map is **updated in real-time** based on laser measurements

- **Dynamically improving ground model**
 - New laser points always contribute to 3D terrain model

- **See through vegetation**
 - revealing hidden pathways
 - impassable streets
 - terrain irregularities

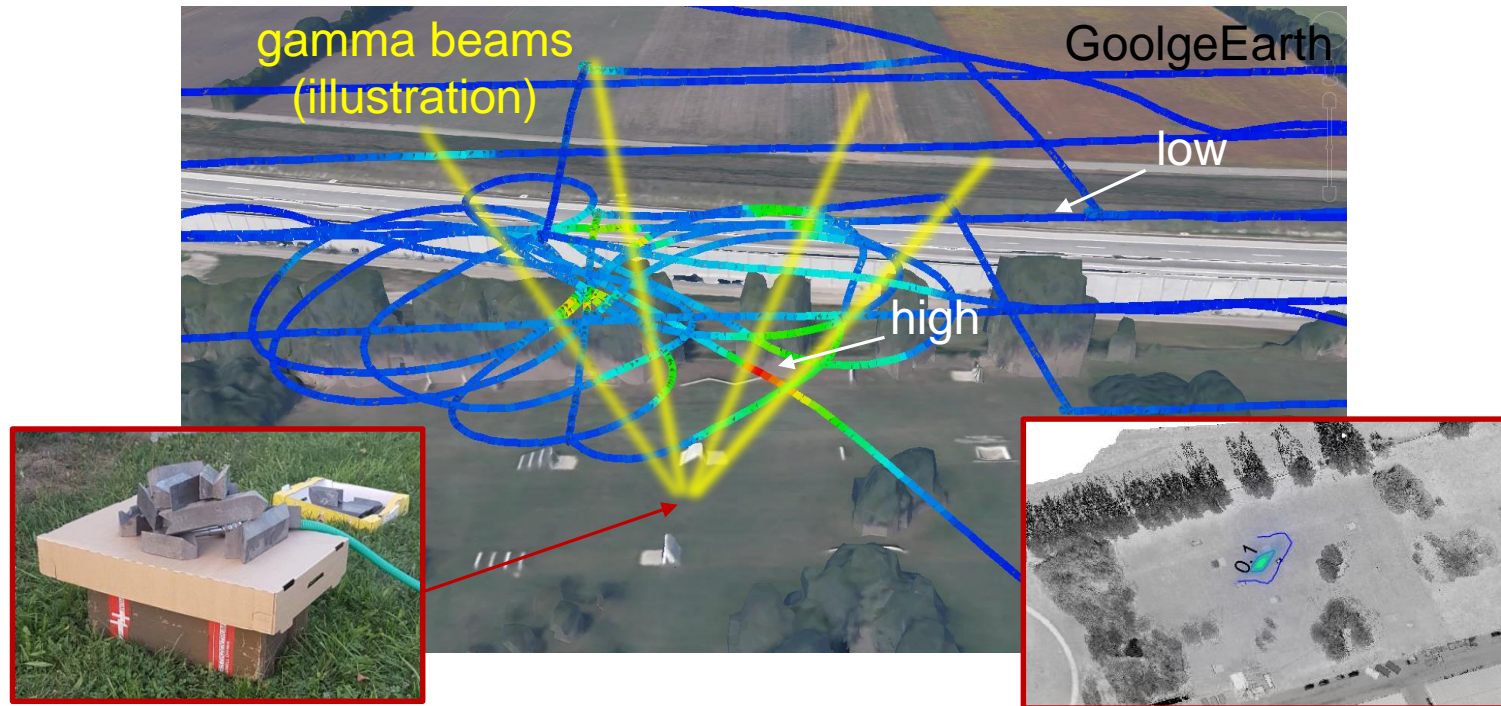


3D Terrain map including vegetation

SMART DETECTION OF RADIOACTIVE SOURCE

Generate a consistent view of 3D LiDAR and CBRNE sensors by

- **fusion** of all available measurements (LiDAR, radioactivity) into a
- **comprehensive information** set aiming to reveal position and parameters of radioactive sources

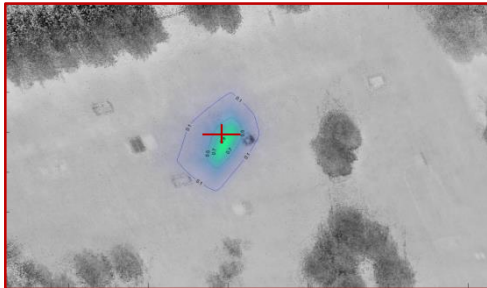


radioactive source partially obstructed

localized source

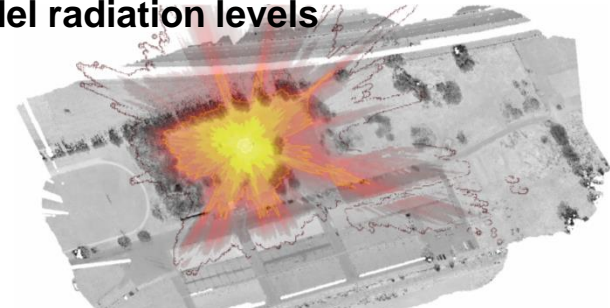
BENEFITS OF REAL-TIME SITUATION AWARENESS

Localization of a single radioactive source within a minute



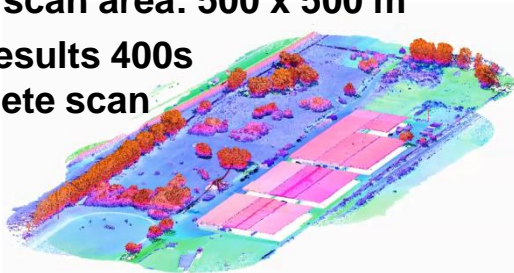
Radioactive source detection

Radioactivity measurements are combined with 3D terrain maps to model radiation levels



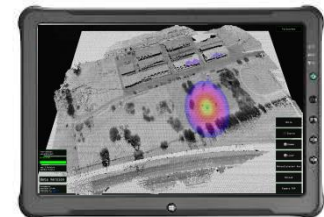
Radiation above ground

- High quality
20k laser pts/s → 30 pts/m²
- Large scan area: 500 x 500 m
- Fast results 400s complete scan



Reliable ground models

- Complex situations (fragmentation)
- Accuracy of localization ~ 1m
- Real-time situation awareness



Smart detection & Visualization

PARTNER OVERVIEW – IPR MAP



- Copter + Laser scanner
- Gamma detector
- System Engineering, data analytics, data fusion, data processing, radiation source localization
- Mobile visualization
- Usability analysis
- Wireless communication optimization



CBRN Protection



CONTACT

MICHAEL HOFSTÄTTER

Senior Engineer
Competence Unit Sensing and Vision Solutions
Center for Digital Safety & Security

AIT Austrian Institute of Technology GmbH

Giefinggasse 4 | 1210 Vienna | Austria

michael.hofstaetter@ait.ac.at | www.ait.ac.at

