AMBOS

Abwehr von unbemannten Flugobjekten für Behörden
und Organisationen mit Sicherheitsaufgaben

CEPT Workshop on Spectrum for Drones / UAS

Detection of Drones
- Research Project AMBOS -

Copenhagen, 29 June 2018

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The AMBOS Project

Abwehr von unbemannten Flugobjekten für Behörden und Organisationen mit Sicherheitsaufgaben

Defence of Unmanned Aerial Vehicles for Safety and Security Authorities

Sponsored within the frame work of the

Ziviles Sicherheitsforschungsprogramm in Germany and the KIRAS program in Austria

AMBOS is a bi-national project

Sponsored by:

Bundesministerium für Bildung und Forschung

Sponsored by:

bmvit Bundesministerium für Verkehr, Innovation und Technologie

KIRAS Sicherheitsforschung

AMBOS

Motivation and Basic Concept

Detection

- Recognize drones flying towards or into a safe zone

Verification

- Evaluate the detection results and decide, whether – and if yes then which – interventions shall be applied

Intervention

- Perform the selected interventions against inbound flying drones to prevent it from penetrating the safe zone

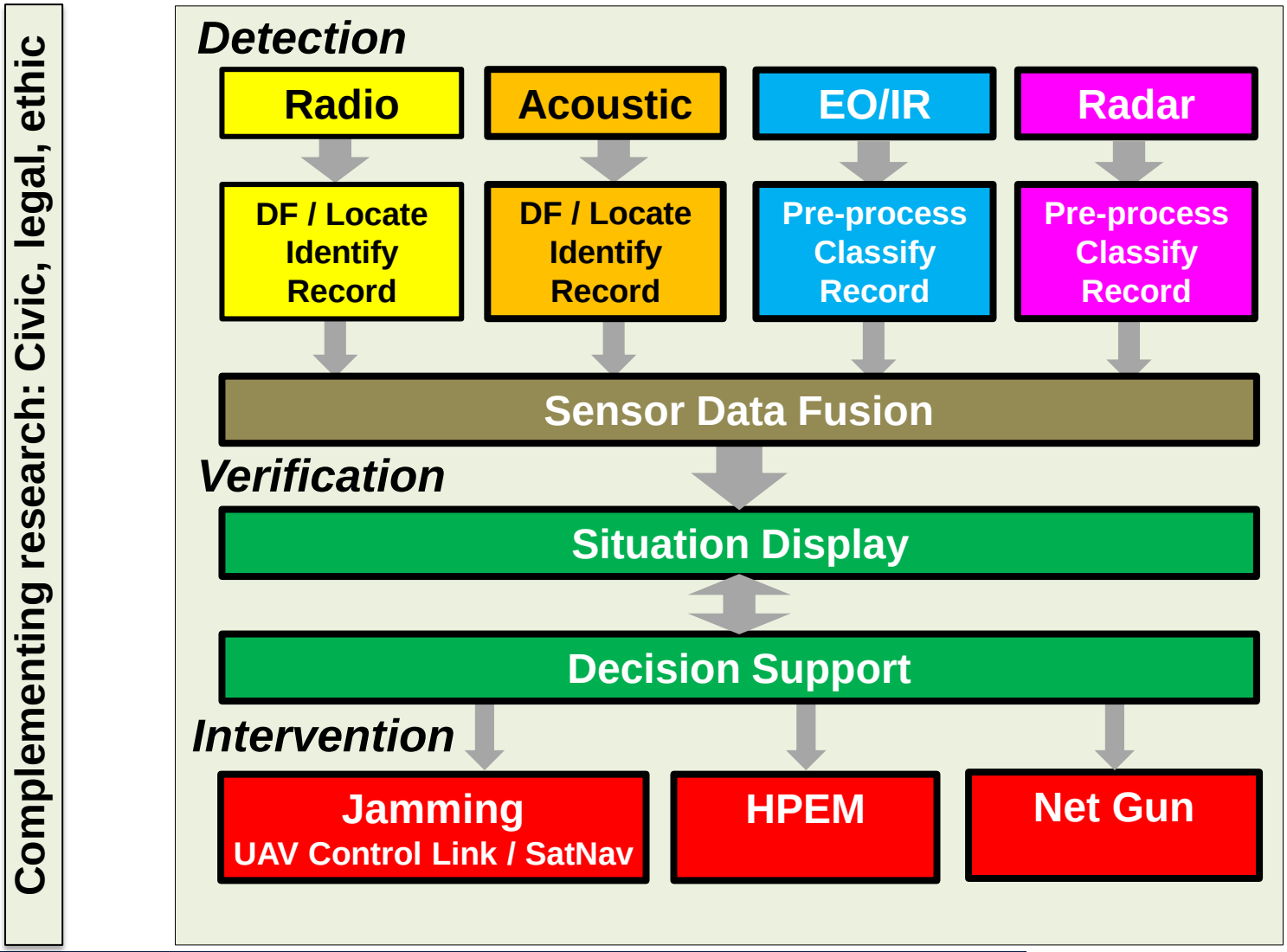
Goals

Implementation of Demonstrator Systems – one each in Austria und Germany

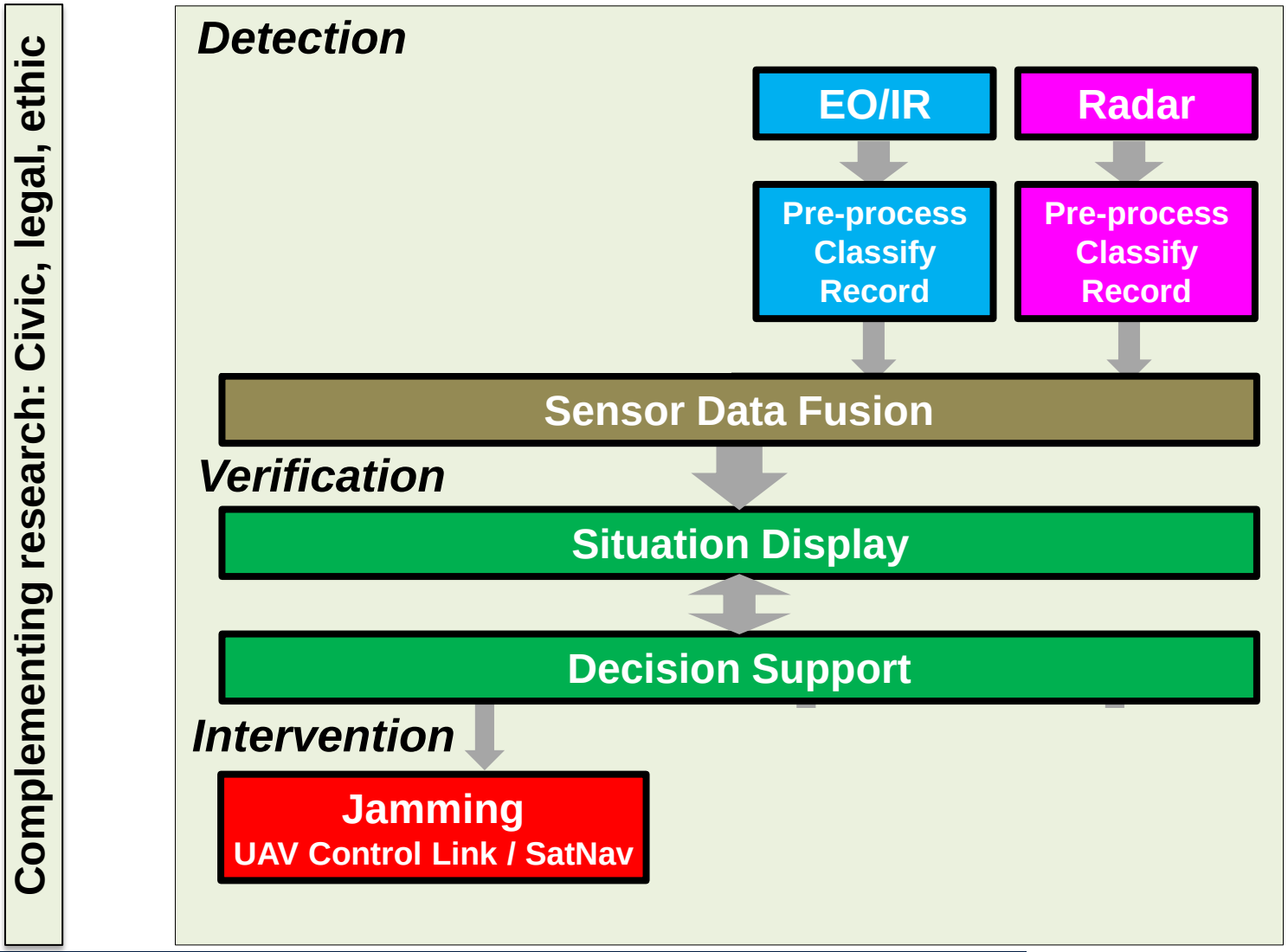
- Systematical investigations of the included components with respect to the performance regarding defence against Unmanned Aerial Vehicles
  - Basis: Scenarios described by users of such systems
  - Demonstrate possible features
  - Identify limits
  - Define / describe a product
  - Identify necessary additional research

Project time: 2 years

Structure of the System

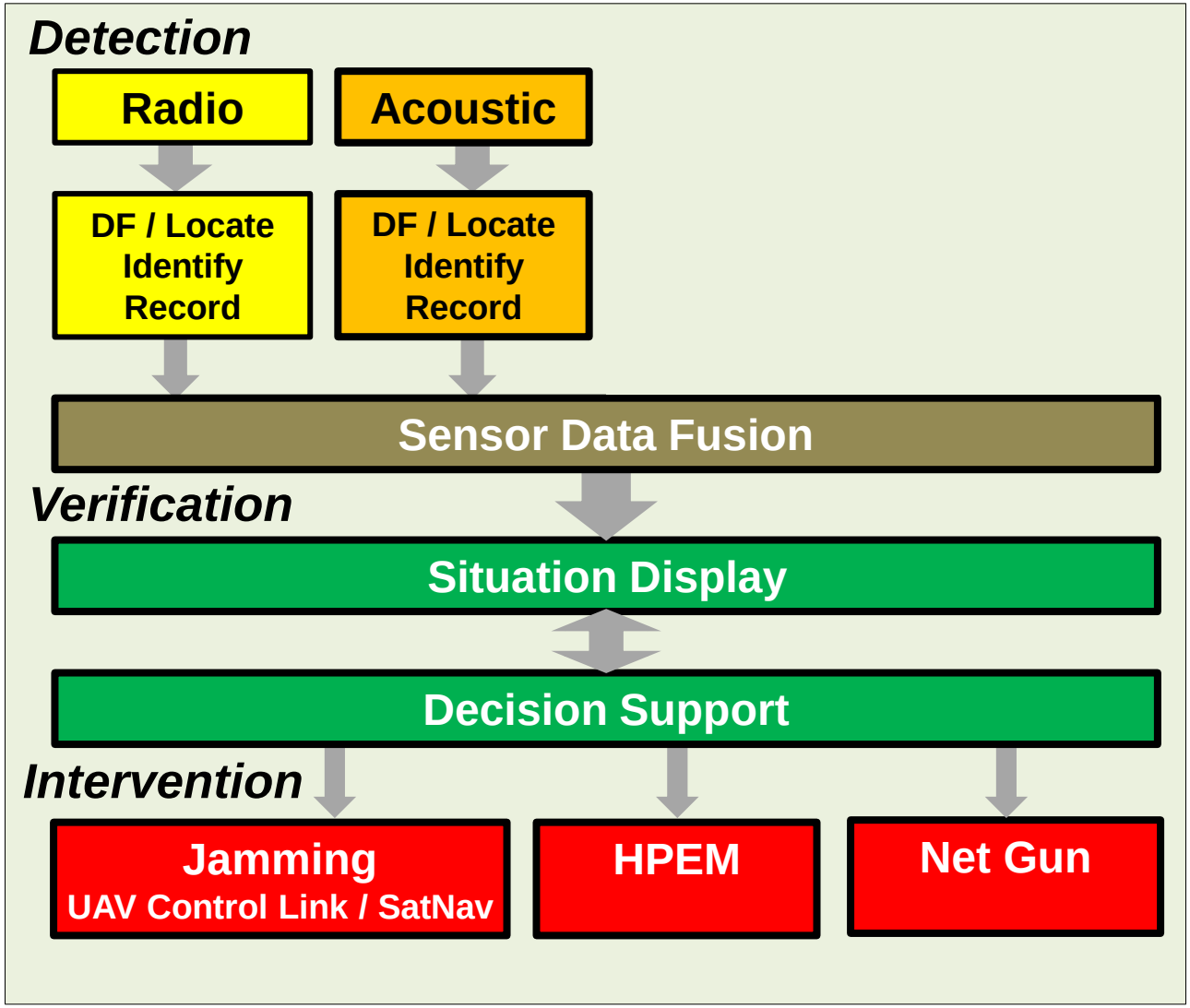


Focal points of the Austrian approach



Focal points of the German approach

Complementing research: Civic, legal, ethic



Austrian Partners

Lead: AIT Austrian Institute of Technology
Coordinator: Christoph Sulzbachner

RESEARCH

INDUSTRY

USER

German Partners

Lead: Fraunhofer-Institute FKIE
Coordinator: Hans Peter Stuch

RESEARCH

Fraunhofer FKIE

Fraunhofer IDMT

Hochschule für Wirtschaft und Recht Berlin
Berlin School of Economics and Law

INDUSTRY

DIEHL BGT Defence

ELT Technologie für Innovation

HP Marketing & Consulting

USER

Bundeskriminalamt

Bayerisches Landeskriminalamt

BUNDESPOLIZEI

POLIZEI BADEN-WÜRTTEMBERG POLIZEIPRÄSIDIUM EINSATZ

Deutsche Hochschule der Polizei

POLIZEI Nordrhein-Westfalen Landesamt für Zentrale Polizeiliche Dienste

Scientific and technical approaches for the UAV-detection

Acoustical Detection

Testing of complementing approaches

Hardware

- Diehl: Local centric microphone array
- IDMT: Distributed sensors

Algorithms

- FKIE: Deterministic approach
- IDMT: Statistical approach

Optical Detection

Machine Learning used for classification of UAV

Radio Reconnaissance

Use of Software Defined Radios and COTS-Products

=> Cost-effective approach

Application of State-of-the-Art signal processing algorithms

basis for further optimization

Scientific and technical approaches for the UAV-detection

Sensor Data Fusion

Application of a Fusion Engine

Based on scientific methods not just the combination of sensor data – but the fusion of the information

Situation Display and Decision Support

In close contact with the users decision strategies are designed and developed for the operation in real time software environments

Human-in-the-Loop Approach

Challenges

Acoustical Detection

Achiving robustness for the detection – incl. direction finding and classification of UAV in operational scenarios with real ambient noises

Optical Detection

Find an optimal configuration regarding resolution, number of cameras, computing power etc.

Radio Reconnaissance

Detection of a multitude of RF-signal characteristics – incl.

- the pairing phase UAV ⇔ remote control
- Manufacture specific communication in up- & downlink

Direction finding of the the UAV and the remote control

Limited reaction time due to rapid attack scenarios

- Detection + signal analysis + direction finding

Operation in urban environment (vs. line-of-sight scenarios)

Challenges

Sensor Data Fusion

Achiving robustness of the detection results in a sense of True/Positive, True/Negative, False/Positive and False/Negative

Situation Display and Decision Support

Displaying the complex operation environments and the dynamic time critical police specific decision finding

Intervention: Jamming, HPEM und Net Gun

Achiving maximum range – causing minimal collateral damage

Entire AMBOS System

Design technical solutions, which provide maximum performance within the legal, societal and ethical context

Contacts

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