



Alliance for IoT
and Edge Computing
Innovation

Webinar • 18 July 2023

Presentation of the White Paper IoT and Crisis Preparedness

AI@TI

Opening and Welcome

Damir Filipovic, AIOTI Secretary General

Agenda

Agenda

- 15.00** **Opening and Welcome (10 min)**
Damir Filipovic, AIOTI Secretary General
- 15.05** **Presentation of the paper and recommendations**
Rita Santiago (Ubiwhere)
- 15.20** **Presentation of the examples (40 min)**
Mario Drobics (AIT)
Monica Florea (SIMAVI)
- 16.00** **Questions from the audience (15 min)**
Moderated by Ana Pereira (Ubiwhere)
- 16.15** **Wrap up and end of the Webinar (5 min)**
Damir Filipovic, AIOTI Secretary General

About TF Communities

Highlights – Task Force Communities

Relevant facts

70 member organisations

87 participants

Main achievements

Deliverables

- Paper IoT Improving Healthy Urban Living
- Paper IoT and Crisis Preparedness
- Facilitating the creation of consortia for collaborative research projects

Collaborations

Events

- SCEWC session
- AIOTI Signature Event 2022

Presentation of the Paper and Recommendations

Rita Santiago (Ubiwhere)

Introduction

From natural to non-natural causes, disasters harm public safety and must be addressed as an integrated and complete scenario.

The Paper is divided into:

- An Era of Pandemics
- Natural Disasters
- Cybersecurity take on Crisis Management
- Attacks on Public Spaces
- Recommendations

An Era of Pandemics – Scenarios and Best Cases

1. TRIALOG

- Use Case: Personalised Health Knowledge Graph
- Use Case: IAMHappy

2. Bi-Rex

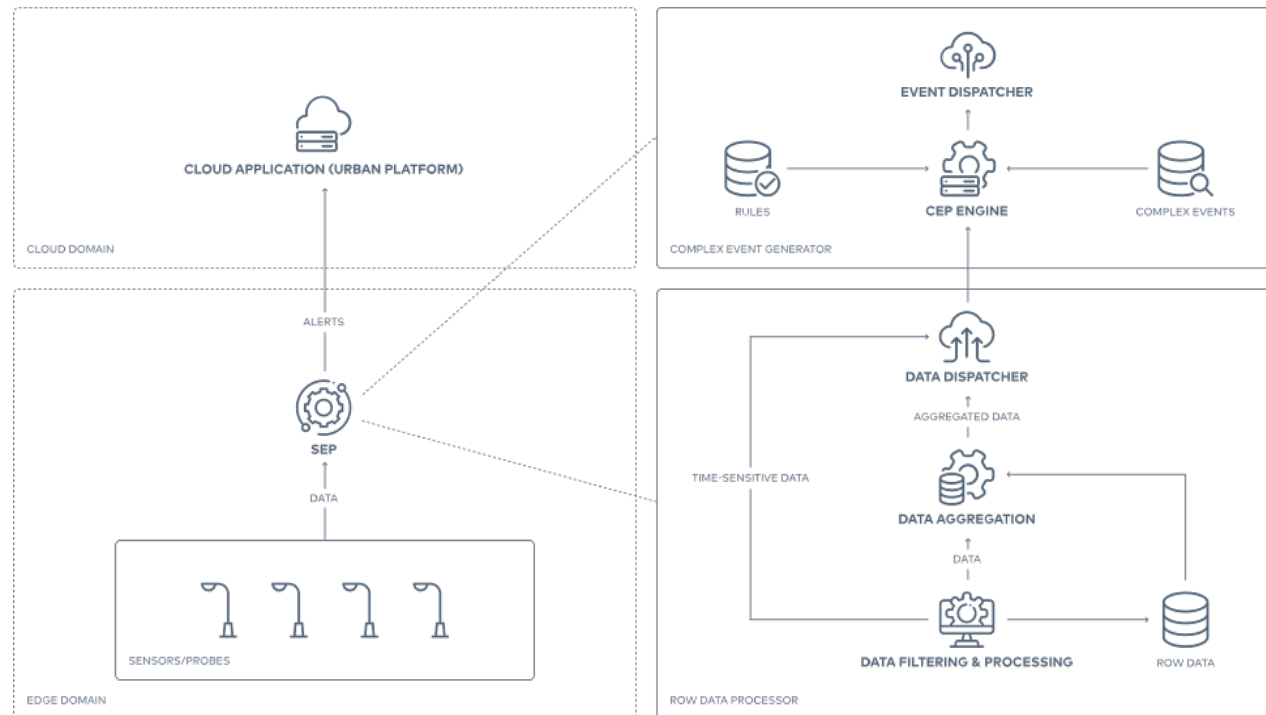
- Big Data Innovation & Research Excellence
- HomeEmo - Home dialysis

3. INFN Laboratory for Technology Transfer

- A secure cloud-edges computing architecture for metagenomics analysis
- Smart city Active ageing
- Healthcare: Smart and remote control

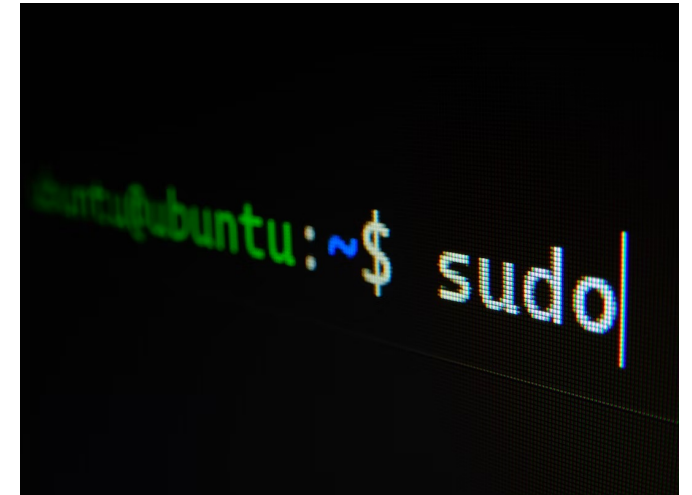
Natural Disasters – Scenarios and Best Cases

- Cross-domain Emergency Managing and Planning about Hazard Crisis data integration using ontologies
- SPADE: multi-purpose Physical-cyber Agri-forest Drones Ecosystem for governance and environmental observation
- SEP: Smart Event Processor



Cybersecurity take on Crisis Management

- Cyber Crisis Management: A Decision-Support Framework for Disclosing Security Incident Information
- Crisis Management in a Federation – Cybernetic Lessons from a Pandemic
- Cyber Crisis Management Roles – A Municipality Responsibility Case Study



Attacks on Public Spaces – Cloud Computing advantages & limitations

Advantages of cloud computing	Limitations of cloud computing
Scalability	Network latency causing delays
Flexibility	Data security breaches
Elasticity	Lack of reliable and secure network connectivity on public spaces
Multitenancy	Lack of skills and expert staff
Storage capacity	Computational time for data processing
Resource pooling	
Cost-effectiveness	

Recommendations

- Research Recommendations
- Standardisation and Interoperability Recommendations
- Business-driven Recommendations
- Policy-driven Recommendations

Presentation of the examples

Mario Drobics (AIT)
Monica Florea (SIMAVI)

Center for Digital Safety & Security

Digital technologies for highly reliable systems and a secure society

Responsible Digitalisation – Privacy – Safety – Security by Design

Industry/Companies



Industry 4.0



Digital Transport



Automotive



Connected Cars



Smart Grid



Critical Infrastructures



Crisis & Disaster Management (CDM)



Smart City



Internet Social Media



Digital Identities

- AIT is the largest applied research institute in Austria (>1400 employees)
- Strategic partnerships with Gov. Organisations
- Strong footprint in international innovation programs
- Strong international footprint of employees



Collect



Exchange



Understand



Share



Data acquisition & edge computing

Federated data distribution & workflows

Data analytics & prediction

Knowledge sharing

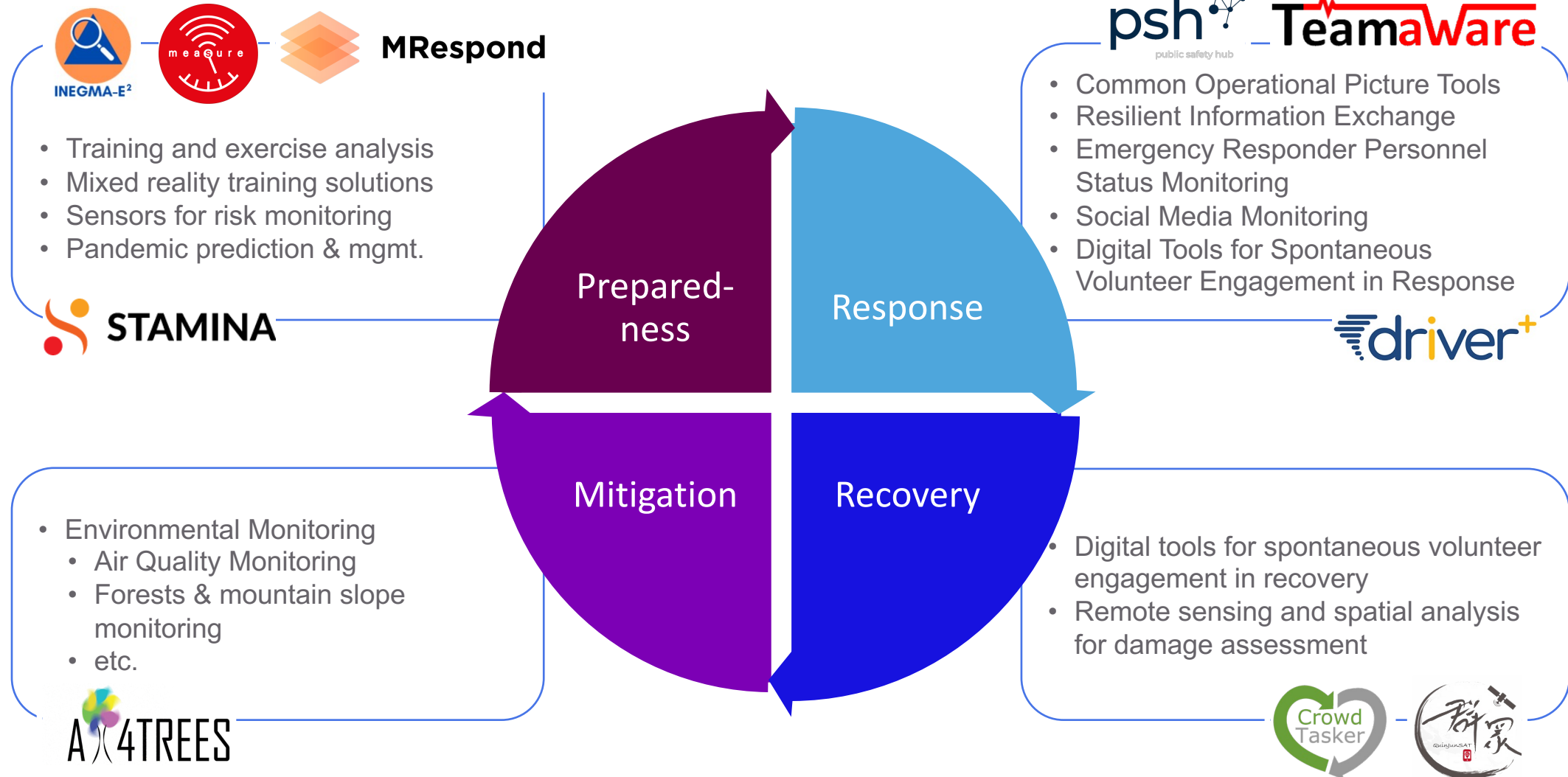


ACT



Cooperative Digital Technologies

Solutions for Crisis & Disaster Mgmt.



MRespond



STAMINA



4TREES



Situational awareness in the field

Flexible communication networks & common operational picture

Integrated In-Team Situational Awareness

- Integrating indoor/outdoor localisation, body posture capture and health monitoring to provide a complementary solution for situational awareness within team-members

Integration of various types of sensors

- Detect, identify and monitor threats for responders to be well prepared against unexpected emergencies

Enhanced User Interfaces (UIs)

- Usage of Augmented Reality (AR) and Artificial Intelligence (AI) to present refined information to the responders

Resilient ICT infrastructure

- Message dispatching interoperability enabling seamless cross-organisation communication

Sensor Systems



Head mounted CAM



Wearable Nomadic Beacons & GNSS



Drone mounted (HD Cam/ IR Sensor)



Wearable Health Sensor



Wearable IMU Sensor



Wearable CBRN Sensors



Citizen Involvement Data



Drone mounted Wearable Acoustic Sensor



Social Media Data



City IoT Data

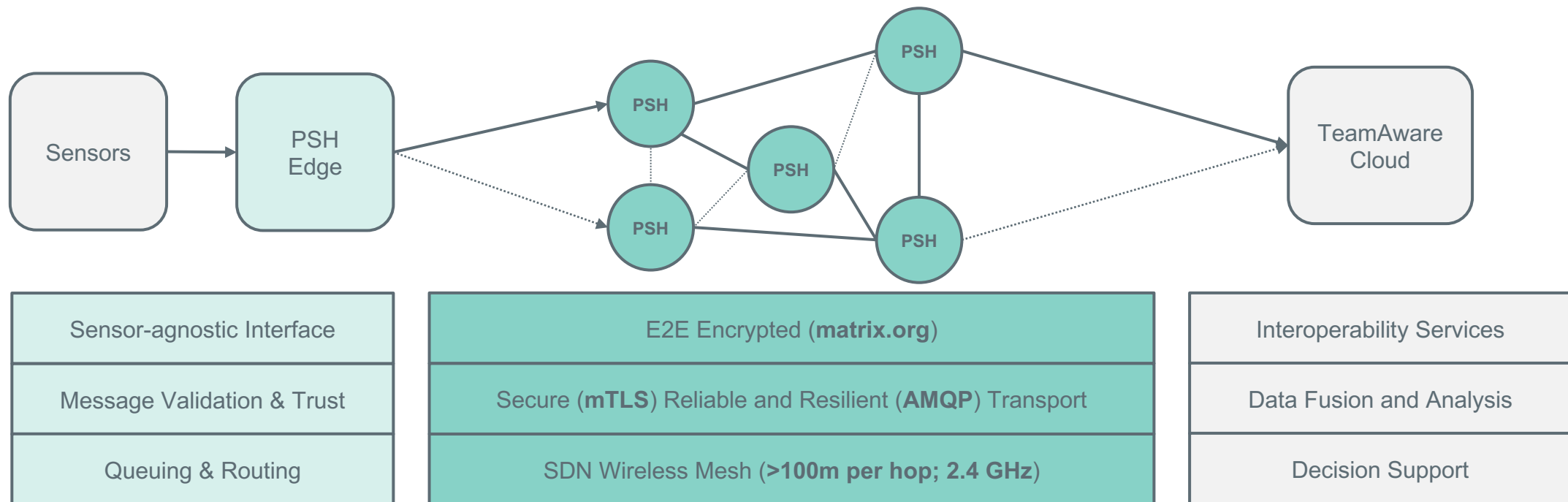
PSH – Public Safety Hub



Deployable and Resilient

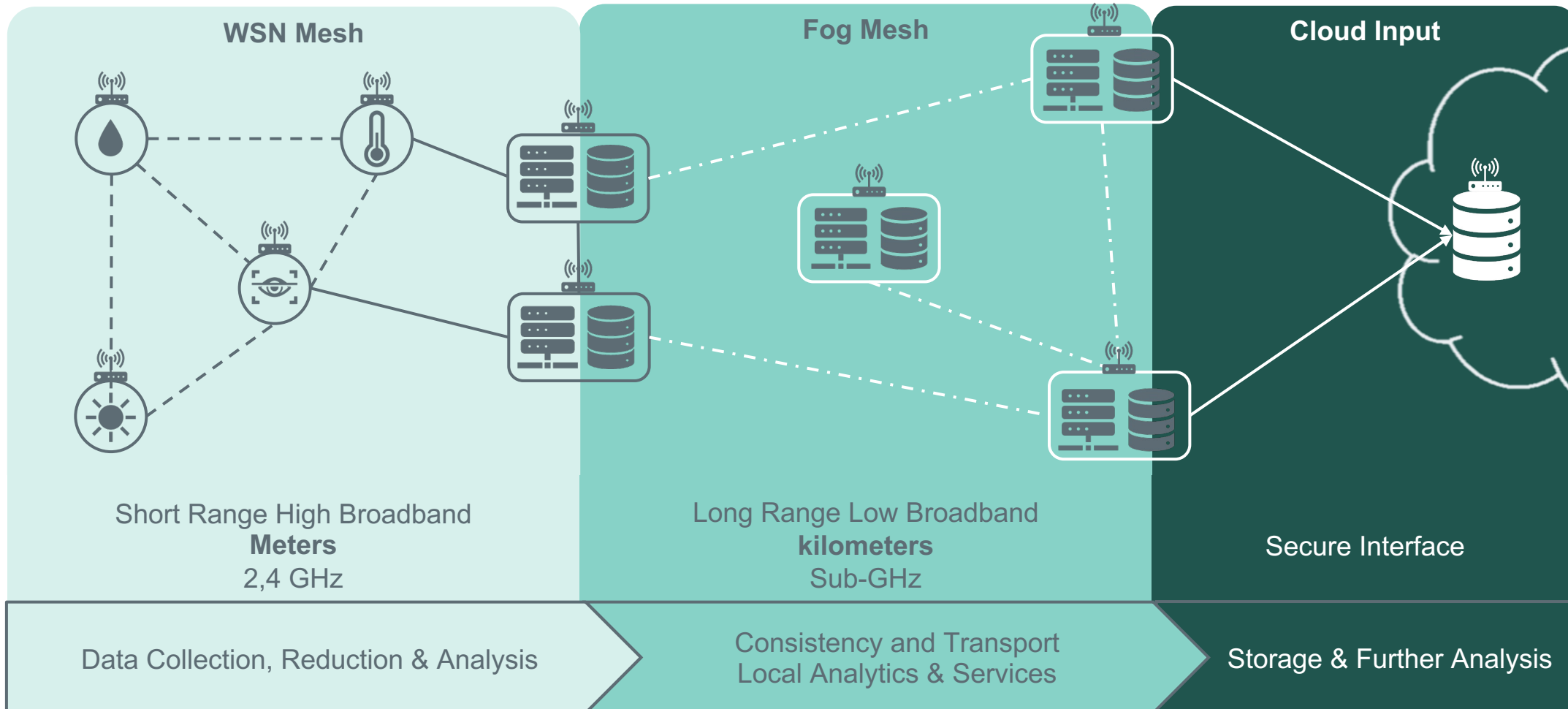
TeamAware brings situational awareness in **communication blackout** scenarios through AIT's Public Safety Hub (**PSH**)

PSH enables **secure & resilient** information exchange and gathering via inexpensive wireless mesh ad hoc networks



Wireless Sensor Mesh Networks

Deployable Fault-Tolerant Communication Infrastructure



MEASURE

Sensor-Based Monitoring of Emergency Responder Performance in Exercises



Challenge

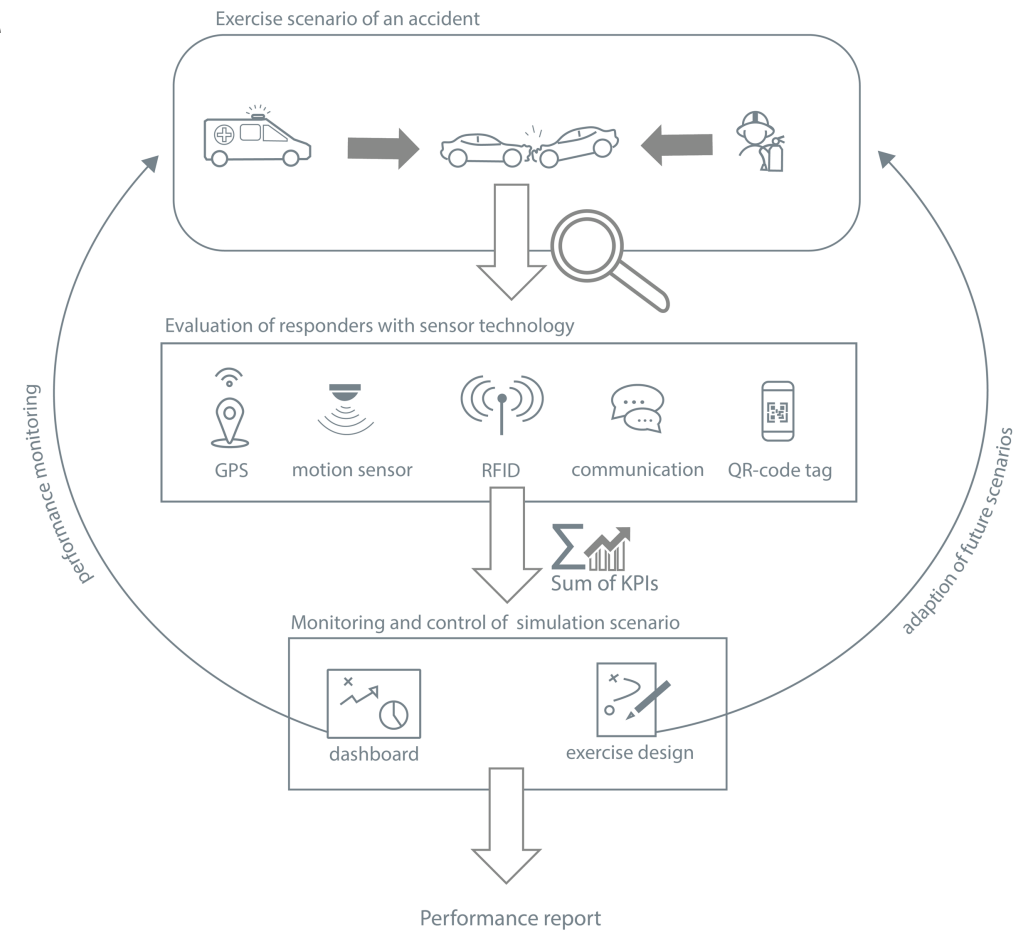
- **Unclear performance parameters** in emergency response
- Evaluation and analysis of exercises results demands **strong efforts** (time, budget and staff)

Approach

- Define goals of exercise
- Identify KPI's to objectively measure if goal has been achieved
- Provide IoT and analytical tools to collect data and indicators for each KPI

Outcomes

- Technical Implementation of Sensor-Based Monitoring System
- Catalogue of Verified KPI for Fire Service and Emergency Medical Service
- Understanding of Socio-Ethical Circumstances, when using Sensors for Performance Monitoring



Mixed Reality Training System

for First Responders

- **MR training framework** to train first responders for situations that are too expensive or dangerous to train in real life
- Trainees are tracked in **large inside and outside areas**
- **Different scenarios** can be simulated
→ virtual elements projected into the real environment
- Events in the real environment influence the virtual scenario (e.g., virtual smoke leaving rooms through open windows)
- First responders can **train with their equipment** as used to (e.g., radio, helmet, fire hose)
- **Virtual injuries are projected** onto real emergency puppets
- **Virtual fires can be extinguished** with a real fire hose



<https://mrespond.at/>

AI for Active Forest Management

AI for Climate Sensitive Tree Growth Modelling and Maximum Carbon Segregation

Challenge

Forest Growth



Tree Growth Yield Tables

How quickly does a tree grow?

Species	Age	Height	Diameter	Volume	Weight
Oak	10	15	10	100	1000
Oak	20	25	15	1000	10000
Oak	30	35	20	10000	100000
Oak	40	45	25	100000	1000000
Oak	50	55	30	1000000	10000000

Forest Health



Climate Change

Climate change and the crisis of biodiversity are the two largest challenges of the 21. century

Climatic Extremes

Droughts Wild Fires Heat Waves

Disturbances Unpredictable Impactful

Carbon Segregation


Phenological Patterns Change

Vegetation season length


Forest Economy

Method & Goals

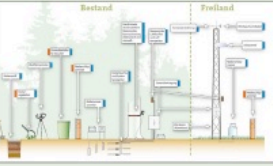
Laser scanning



Dendrometers



Bio & Climatic



Satellites




Image Courtesy: ESA

+

Machine Learning

Artificial Intelligence Explainability Bayesian approaches

Growth Model

Core components of Decision Support Systems for forest management on a local, national and regional level, empowering response to minimize potentially harmful consequences for modern societies in line with the UN Sustainable Development Goals.

<https://ai4trees-project.at/>

SIMAVI Overview

Software SME focusing on:

- **Domains:** Security & Cybersecurity, eLearning & eTraining, eHealth, eCustoms, eGovernment, eAgriculture
- **Technologies:** AI, Big Data & Analytics, Data&IoT platforms, DSS, GIS, Mobile apps, User interfaces, UX design, Cybersecurity frameworks, XR
- **Integration, validation and pilot deployment**
- **R&D projects:**
 - ✓ *45 H2020 projects (5 as Coordinator)*
 - ✓ *17 Horizon Europe projects (2 as Coordinator)*
 - ✓ *Partner in ERASMUS+, ISF and EDF projects under contracting*

Actively supporting community disaster

Innovative customized tools and technologies aimed at facilitating operations

Better response coordination and deployment of resources and FRs in the field

Interoperable and secure incident management and better integration of IoT

Enhanced preparedness, awareness, and reaction capability

Improved resilience of critical infrastructures

Societal trust and feeling of security

New knowledge about field validation of different tools, technologies and approaches in real-life scenarios

DRS and Crisis Management - Solutions &



[Coordinator SIMAVI]

Integration, validation and real-life demonstration for the **TeamAware** system that includes physically deployed sensor platforms, network infrastructure and communication protocols connecting the AI platform, AR/Mobile UI and HMI components.



S&R Training System framework and aftermath knowledge capitalization mechanisms for the early location of entrapped victims under collapsed structures, risk assessment and FRs safety



AR/VR content curation for training firefighters and forest fire ignition models - **SILVANUS**



Cybersecurity framework for urban safety for the **IMPETUS** platform that combines IoT and Cloud computing approaches with local partners smart cities' solutions.



Interactive, Collaborative Digital Gamification Approach to Effective Experiential Training and Prediction of Criminal Actions' with integrated physics engine - **LAW-GAME**



TREEADS Integrated Fire Management Systems (IFMS) and enhanced reality, UX design, training, including virtual reality simulators for air fleet and ground resources



Holistic passenger ship evacuation and rescue ecosystem using **PALAEMON** Academy and AR Glasses for Ship Crew



ISOLA

Crowdsourcing and mobile apps monitoring, 3D-visualization of early warnings modules and AR Glasses Interactive Simulators for **ISOLA** - 'Innovative & Integrated Security System on Board Covering the Life Cycle of a Passenger Ships Voyage'



PANTHEON - Community-Based Smart City Digital Twin Platform for Optimised DRM operations and Enhanced Community Disaster Resilience



www.search-and-rescue.eu

Emerging technologies for the Early location of Entrapped victims under Collapsed Structures and Advanced Wearables for risk assessment and First Responders Safety in SAR operations

The S&R framework objectives will enable supportive approach using a wider range of decisional support features and monitoring systems and will also give to first responders an effective and unified vision of:

- *the dynamic changes going on during event's lifetime and*
- *the capabilities and resources currently deployed in the field.*

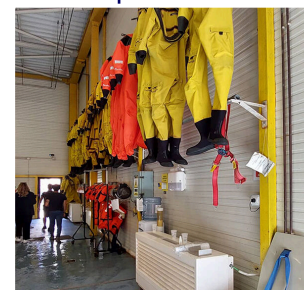
- S&R Training System, services interoperability framework and aggregation of components and available interfaces
- Design of an aftermath knowledge capitalisation mechanism
- Authoring tool for trainers with integrated player with live audio communication and role-based access to specific content
- XR application that allows the FRs to better communicate and coordinate while having access to real time information from various sensors during the exercise:

Virtual replica of Tuzla Airport(Romania) has been developed to allow simulation using real life conditions: the XR headset operator will have a satellite view over the airport and it will be able to easily coordinate the FRs using the assistive technologies.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 882897

4. Attacks on Public Spaces.



The use case took place at the Regional Air Services (International Airport Tuzla), located near the Black Sea at about 300 km from Bucharest, early September 2022



<https://treeads-project.eu/>

A Holistic Fire Management Ecosystem for Prevention, Detection and Restoration of Environmental Disasters

The project mission is to reduce the amount of damage caused by wildfires while maximising the benefits of restoration, managing the impact of Wildfires on Communities. Under a changing socio-ecological context, we are establishing a unified Technological Ecosystem for integrated fire management and adaptive forest restoration.



TREEADS has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101036926

1. TREEADS Integrated fire Management systems, practices and Services
 - TREEADS integrated fire management systems (IFMS) will use best practices and current services, incorporate the social input and work on complex forest fires that include factors like structural causes rooted in land and urban planning, climate and weather condition, human activities in the vicinity of forests and cultural traditions that are not considered by current systems.
2. TREEADS Enhanced Reality, UX Design, Training, including virtual reality simulators for air fleet and ground resources
 - Serious games and simulations which will enable single- and team-based training of fire related stakeholders
 - The TREEADS Enhance reality including Next Generation Emergency Communications, so that to increase information and awareness of First Responders.
 - Integrate the developed Artificial intelligence (AI)-assisted Decision Support platform that will be a valuable tool to the ones that are in command under the pressure of the events and of the time.
 - Augmented Reality (AR) glasses will be used for live monitoring of victims and information from the scene

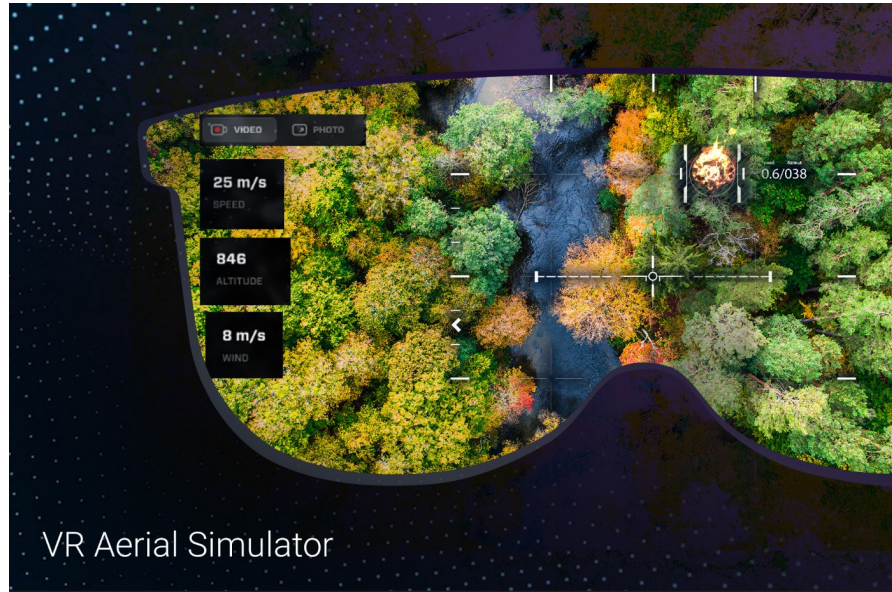


USE CASE: XR training for fire hazard situation

2. Natural Disasters



Software Imagination & Vision



VR Aerial Simulator



VR GROUND UNIT Simulator





LAW-GAME

<https://lawgame-project.eu/>

An Interactive, Collaborative Digital Gamification Approach to Effective Experiential Training and Prediction of Criminal Actions

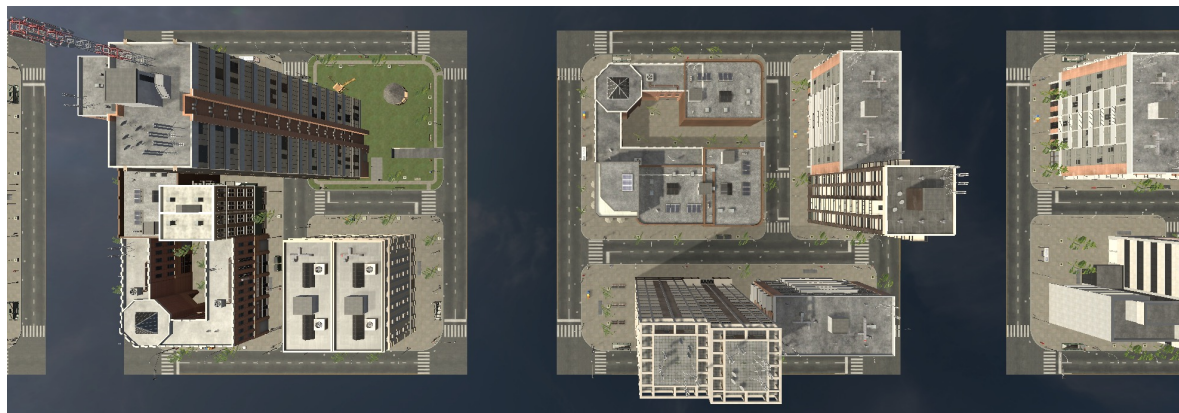
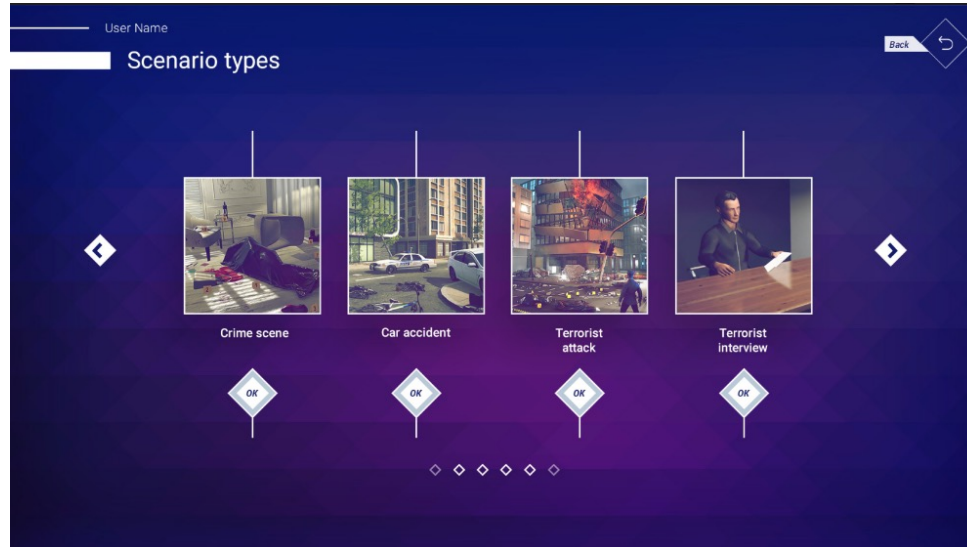
LAW-GAME objective is to train police officers on the procedure, enhancing the transition between the theory and real-life practice through gamification technologies in a safe and controlled virtual environment.

To achieve this, the project introduces an attractive approach for assisting the development of core competencies required to perform intelligence analysis through a series of AI-assisted procedures for crime analysis and the

Prediction of Illegal acts
LAW-GAME has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101021714.



- **Real-time 3D Rendering of Dynamic Virtual Environments**
 - offer realistic simulations of real-world situations and environments, which can help users prepare for real-life scenarios. Officers can experience the scenarios and practice different skills, which can help them be better prepared for real-world situations.
- **LAW-GAME Physics Engine**
 - Configuration of the Graphics engine with special laws regarding the crime scene simulator. The graphics engine includes simple 2d physics like gravity, velocity impact, motion in general and also advanced vehicle physics to simulate suspension and tire forces.
 - Increased interaction with the environment and objects that will also enable the ability to catalogue the evidence found
 - The physics engine plays an essential part in virtual reality by ensuring that in-app actions have natural-feeling consequences. The immersive nature of virtual reality (VR) would be diminished without a physics engine that allows virtual objects to interact with one another in a realistic manner.



Questions from the Audience

Moderated by:
Ana Pereira (Ubiwhere)

Wrap up and end of the Webinar

Damir Filipovic, AIOTI Secretary General



Thank you for listening

Any questions?

You can find us at [@AIOTI_EU](https://twitter.com/AIOTI_EU) or email sg@aioti.eu