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Smart Spaces Safety and Security for All Cities

CERIS Event – "Innovating Smart Cities Resilience through Research and Best Practices“

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Pilot demonstration in the City of Trikala (GR)

11/4/2024

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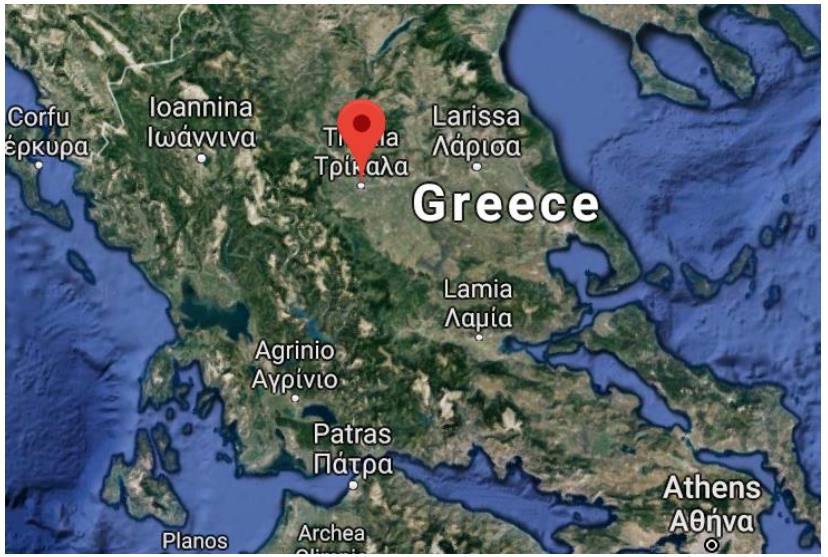
Results from Trikala pilot

- Trikala is a small provincial city in Greece that hosts a population of approx. 81,000 inhabitants (130,000 including the region)
- The city hosts around 85,000 citizens commuting per day and accommodates up to 1.000.000 seasonal visitors/tourists in the winter
- It is a European city in transformation in the process of automation and digitalization
- Trikala is testing the usability of secure and safe physical and digital ecosystem for the well-being of its citizens and produce evidence-based policy making tools and strategies for a systemic transition path towards innovation, carbon neutrality and secure areas.
- Multiple challenges exist in the cities' infrastructure and ICT systems as well as in new technologies that the city demonstrates under realistic conditions, such as drones, automated vehicles etc.
- The city of Trikala is one of the 100 EU cities and one of the 6 Greek municipalities chosen by the EU to be part of the 'Climate Neutral and Smart Cities' mission.



-Large scale event:Matsopoulos Park in Trikala: Mill of Elves
-Need to use new technologies for early-warning tools that ensure security
-Small EU city with critical risks in infrastructure

- Decentralisation of critical infrastructure
- Systems and services as a plan b

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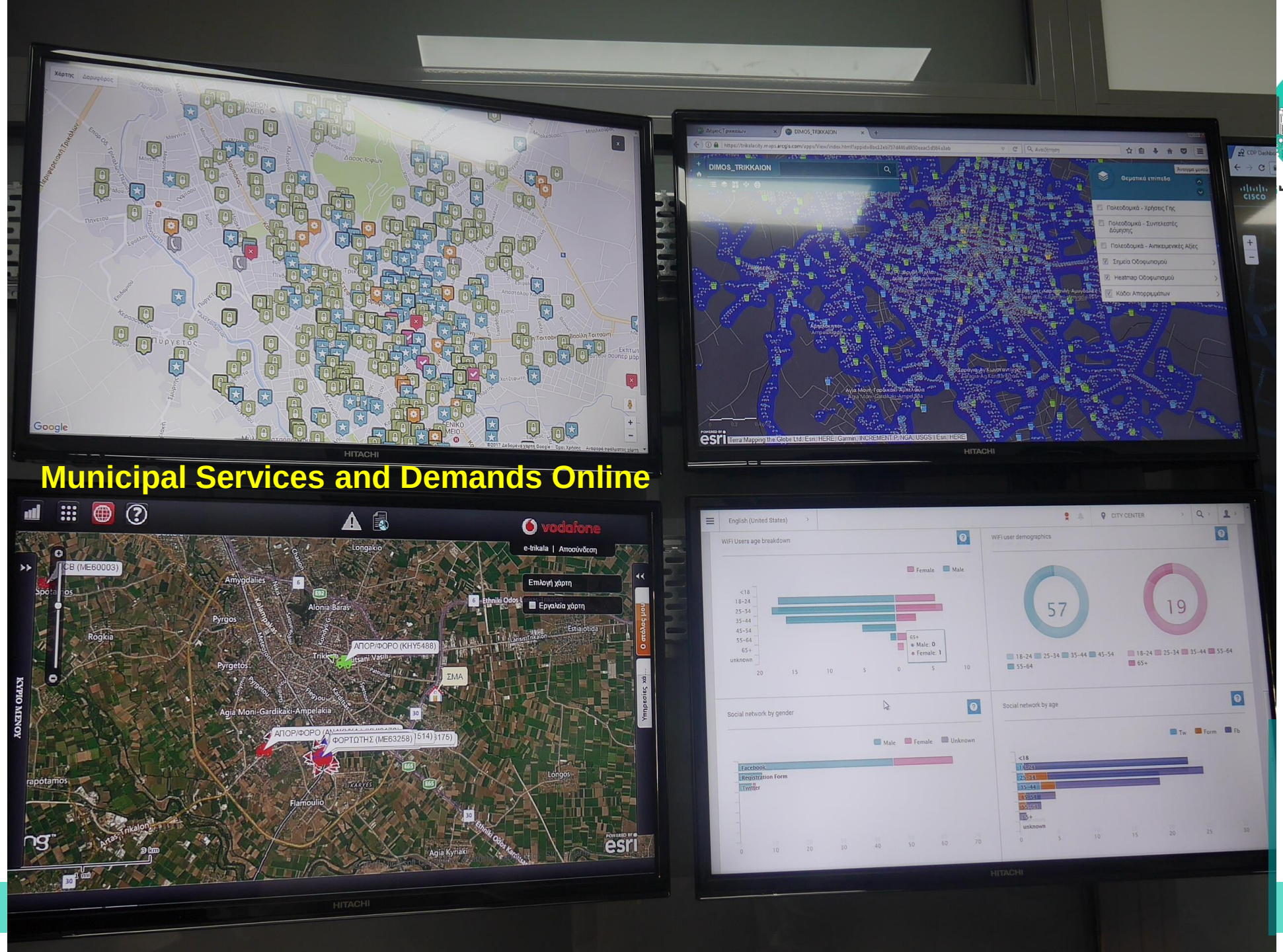
Results from Trikala pilot

Trikala's Smart City Control Centre:

- The Cisco Smart+Connected Digital Platform designed to display the data it collects on one admin screen
- GIS displays spatial-urban planning data and points of interest in the Municipality of Trikala
- Traffic light operation monitoring system. It offers online monitoring of malfunctions and blown light bulbs in the city's intersections that are regulated by traffic lights
- Municipal vehicle traffic recording system
- Terminal for monitoring the operation of wireless network hubs for free Wi-Fi access
- Recording and monitoring the progress of residents' petitions
- Posting Municipality of Trikala open data
- Smart Lighting System, which has achieved energy savings of over 60% compared to conventional lighting systems.
- Environmental Conditions Monitoring System: Using special equipment for environmental readings (such as measuring the concentrations of air pollutants and particulate matter, and noise levels), the quality of the atmosphere can be evaluated and any potential impact on public health can be assessed.


Municipal Services and Demands Online
DIMOS_TRIKKAION
vodafone
e-trikala | Αποσύνδεση
Επιλογή χάρτη
Εργαλεία χάρτη
ΑΠΟΡ/ΦΟΡΟ (ΚΗΥ5488)
ΣΜΑ
ΦΟΡΤΩΤΗΣ (ΜΕ63258)
WiFi Users age breakdown
WiFi user demographics
Social network by gender
Social network by age
Facebook
Registration Form
Twitter
HITACHI
esri

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Results from Trikala pilot

General Objectives:

- **Development of system** dedicated to **securing citizens in public spaces, natural and digital infrastructure/assets** of the **smart city of Trikala in Greece** at large against **physical and cyber threats**

- Promotion of **affordable detection, localization and alert solutions as modular systems**

- These detections are real-time data and provide **early warning and improved awareness** to the Municipality and city operators and first responders: National Hellenic Police, Fire Brigade, Municipal Police, Hellenic Aviation Authority etc

- The systems support **evidence-based decision making** in the policy-making landscape of the Municipality of Trikala

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Results from Trikala pilot

- **High complexity/multistakeholder city-led approach- The main actors involved in this pilot are:**
- Municipality of Trikala (owner and operator of the autonomous bus infrastructure and surveillance infrastructure)
- E-Trikala (responsible for the smart city infrastructure, control centre, communications and IT network, GIS system, etc.)
- Hellenic Police
- Fire Brigade
- Municipality Police
- Volunteers (municipality employees and citizens)
- 5G network provider (Vodafone)
- Ministry of Digital Governance
- Association of Greek Cities
- Private sector: Technical Partners

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Results from Trikala pilot

The pilot focused on the following soft targets in 3 different locations:

- Two city bridges (one in the city center, the other more remote). The environmental and structural monitoring of the city center bridge is crucial, given its location and use. The second bridge will be monitored for road traffic.
- The Christmas Festival: Mill of Elves is an outdoor park near Trikala downtown (around 3km) which hosts the Christmas festival attracting around 1.000.000 visitors from November to January every year.
- The E-Trikala offices including the Smart City Control Centre that manages all smart city infrastructures.

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Results from Trikala pilot

Portfolio of capabilities and differentiated significance/usability

Sensing systems:

- ✓ Optical fiber sensors (monitoring traffic, structural health of infrastructure, water levels, temperature, etc.)
- ✓ Physical access system (physical unclonable function)
- ✓ Chemical sensing (detection of precursors)
- ✓ Video analytics (e.g. detecting suspicious objects or behaviours)
- ✓ Fire and smoke smart sensors (automatic 112 call capability)
- ✓ Cyber attack detection module
- ✓ System for monitoring of people's urban mobility

A simulation package:

- ✓ Crowd and evacuation modelling;
- ✓ Terrorist attack hazard analysis tool (IED and mass-shooting);
- ✓ Fire and smoke simulation;

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Communication tools:

- ✓ A mini-UAV sub-system that allows for rapid, semi-automatic deployment of UAVs to remote areas based on specific mission requirements
- ✓ A gesture-based communication system
- ✓ Mission- Critical Push-to-Talk devicesmobile app
- ✓ A Community Policing mobile application

An **Early Warning and Alert Raising Engine (EWARE)** fusing detected events with contextual knowledge and relevant real-time data into meaningful alerts

A **Common Operational Picture (COP)**, the sole user interface that displays alerts as well other relevant data from other system components (including legacy systems);

A **Risk and Resilience assessment tool (R2)** that allows city operators to assess the risks of their smart city or particular locations.

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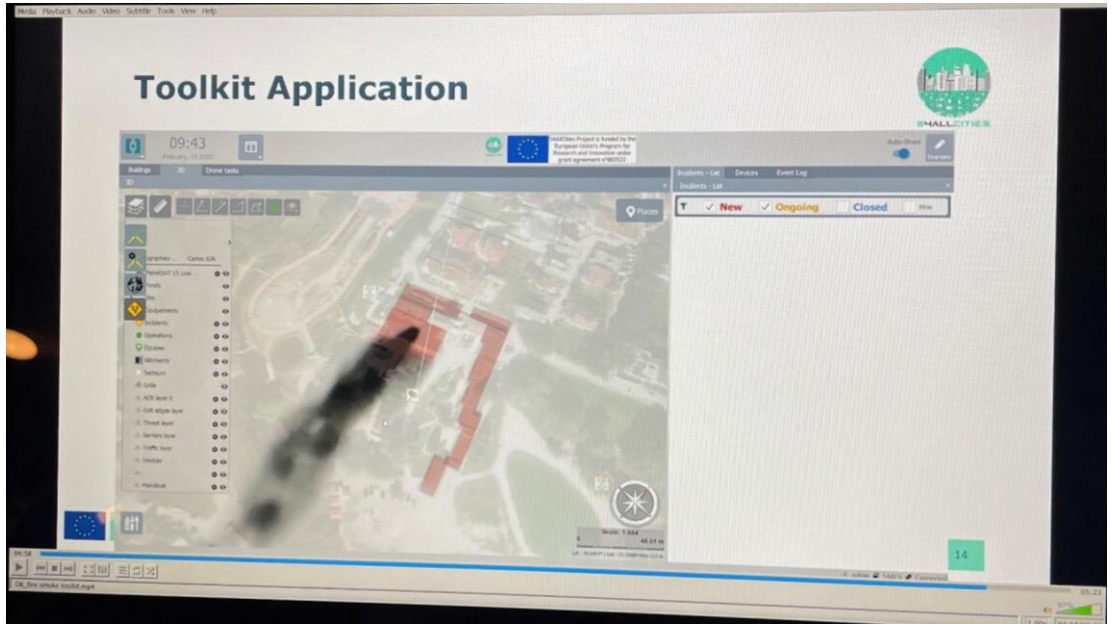
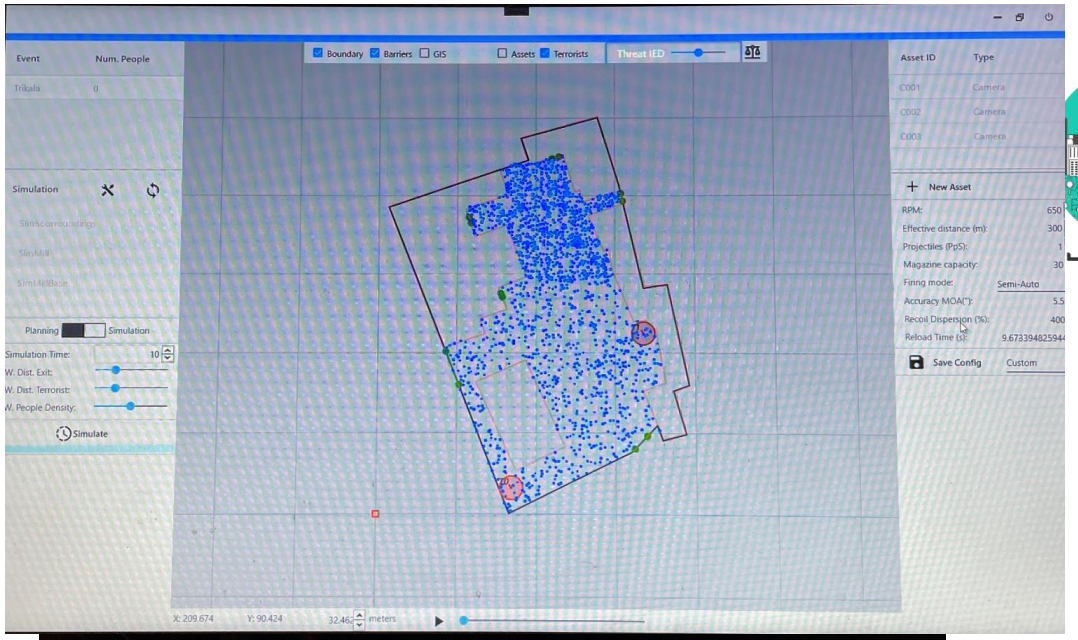
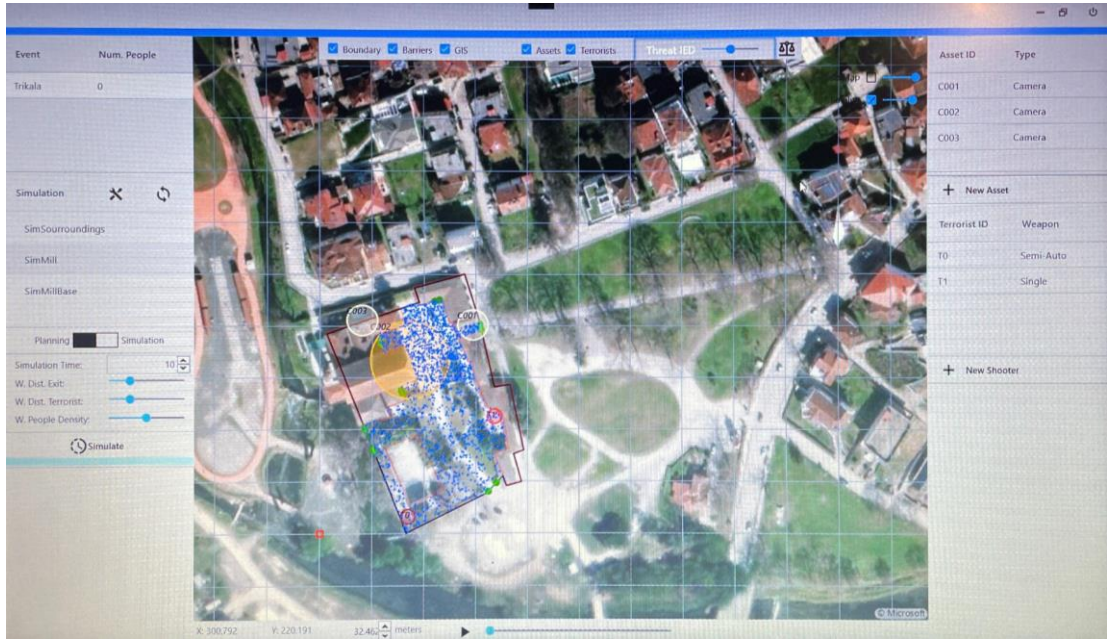
Demonstration cases (scenarios)

The scenarios can be broken down into the following cases:

Case #	Main functionalities demonstrated
Case 1	Citizens' report of suspicious activity Detection of chemical precursors
Case 2	Detection of cyber attack Detection of suspicious behaviour
Case 3	Detection of suspicious object Simulation of IED attack and mass-shooting
Case 4	Detection of adversarial attack Detection of illicit attempts to access critical building (and number of people involved)
Case 5	Evacuation modelling Guidance to evacuation routes Crowd monitoring
Case 6	Communication in the event of congested 4G/5G network
Case 7	Detection of fire Request for assistance through gesture-based communication Simulation of fire and smoke Generation of access routes for first responders
Case 8	Detection of suspicious activity Detection of network anomaly and recovery of video coverage Deployment of UAV
Case 9	Detection of person Updating UAV mission to follow a person


Toolkit Application
09:43
New
Ongoing
Closed


Event
Num. People
Boundary
Barriers
GIS
Assets
Terrorists
Threat IED
Asset ID
Type
Simulation
Planning
Simulation
Simulate
New Asset
Save Config


Event
Num. People
Trikala
Boundary
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Assets
Terrorists
Threat IED
Asset ID
Type
C001
Camera
C002
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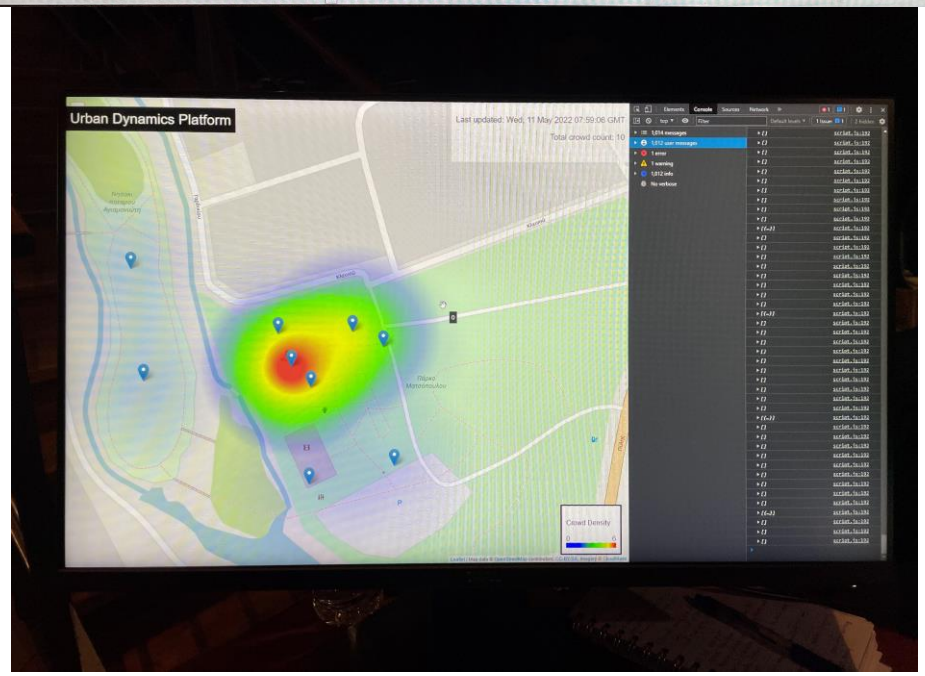
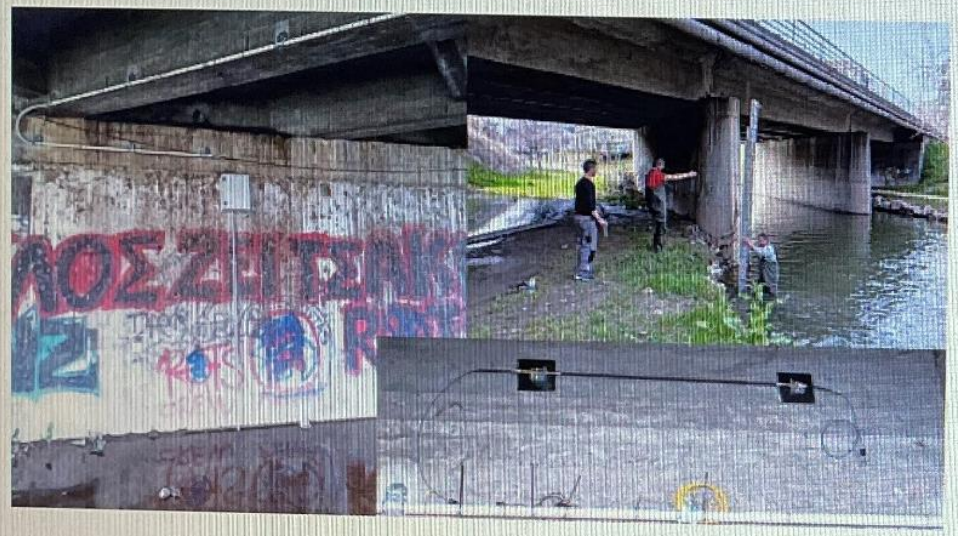
C003
Camera
Simulation
SimSourroundings
SimMill
SimMillBase
Planning
Simulation
Simulate
New Asset
Terrorist ID
Weapon
T0
Semi-Auto
T1
Single
New Shooter

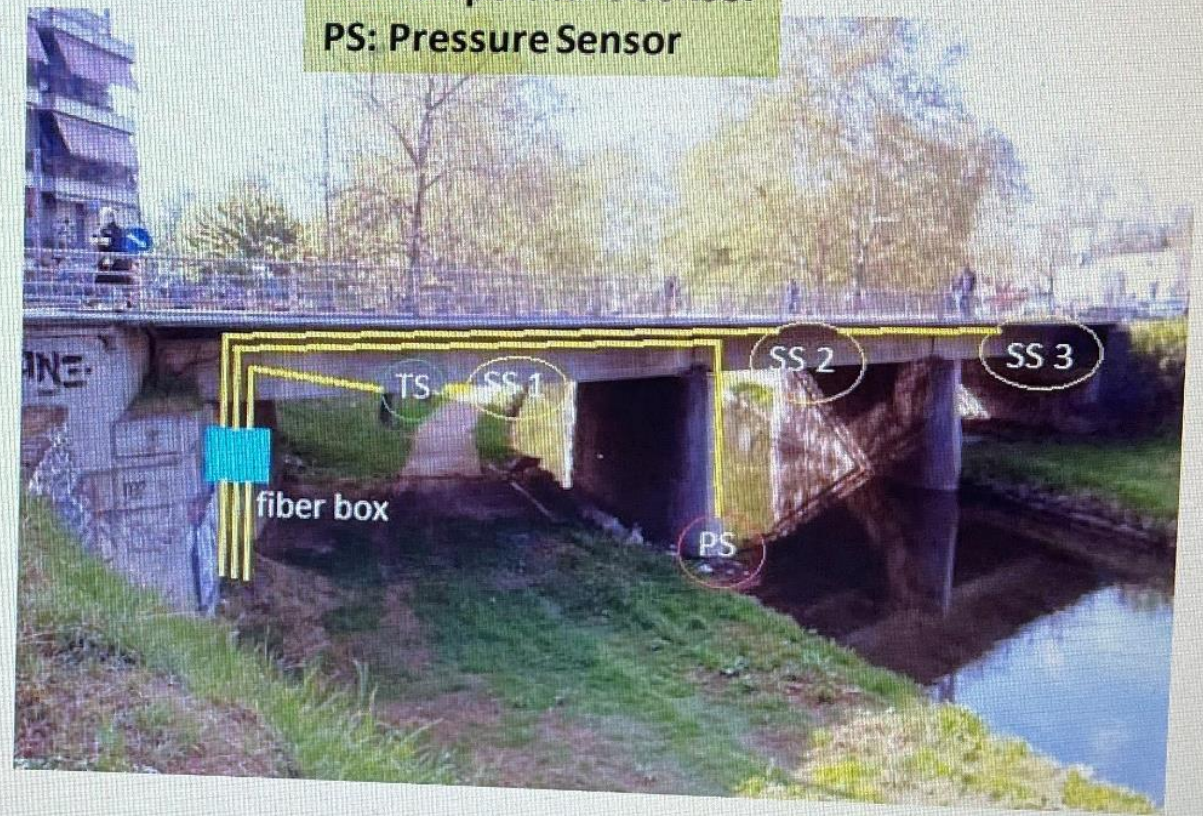

Urban Dynamics Platform

Venizelou Bridge, Trikala, Thessaly



Sensor SN	Sensor Type	Operating Wavelengths	Positioning on the bridge (Figure 15)	FBG Channel
21090010313	Temperature	1511nm	TS	3
21090010314	Pressure	1512nm & 1515nm	PS	2
21090010317	Strain	1579nm & 1588nm	SS 1	3
21090010316	Strain	1539nm & 1568nm	SS 2	4
21090010315	Strain	1529nm & 1537nm	SS 3	4

SS: Strain Sensor
TS: Temperature Sensor
PS: Pressure Sensor



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Challenges:

- Need to train end user's personnel on technological, legal,ethical aspects for identifing needs, capability gaps
- Need to acquiring additional equipment for uptaking the results or intervene to historical buildings, centers, critical infrastructure
- Need to find new forms of financial resources for acquiring novel tools, lack of a solid ppp business plans
- Need to update the procurement processes
- Need to improve legislative landscape: privacy concerns and acceleration of legal permits
- Lack of public acceptance, citizens engagement
- Need to break silos between interdepartmental organization or different stakeholders

Lessons learnt:

- High importance to use the novel AI automated tools in alert and detection, localization for the smart city of Trikala: high-speed alert, real time, structured data collection, improved awareness and intervention
- City-led scenarios for capabilities needed, the practitioner needs are defining the results of R&I
- Tools are adjusted, modular for the particularities of the city (historical center and buildings, old infrastructure, legacy systems)
- the uptake of the outcomes is targeted through national funding and future EU R&I projects
- Municipality as a facilitator for citizens engagement: more participatory approaches lead to better embracement of deployment and outcomes
- Digital infrastructure and real-time large volumes of data need to provide evidence-based policy-making

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Market uptake in the city of Trikala

-Greece launched, and on 13 July 2021 the Council of the European Union approved, the National Recovery and Resilience Plan, “Greece 2.0” (the NRRP)

-The implementation is under the Recovery and Resilience Facility Agency (RRF)

-6,93M has been allocated for the development of smart city services in various fields:

Urban mobility

Security

Health

energy

civil protection

water resources

waste management

economic development

inclusivity

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THANK YOU FOR YOUR ATTENTION

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