Citizens and cities facing new hazards and threats

30th November to 4th December 2020

Session 8: Smart resilient cities

Joe Gorman

IMPETUS:
A research and innovation project addressing urban safety

Intelligent Management of Processes,
Ethics and Technology for Urban Safety

A Horizon 2020
Research and Innovation Project

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 883286.

WHAT is IMPETUS: Key facts

- A research and innovation project in "Horizon 2020" programme of the European Union

- Carried out by a multi-national consortium across Europe and beyond

- Overall goal: *Improve the security of public spaces in smart cities*

- Total budget 9.3 M€, EC funding 7.9M€

- Led by SINTEF, independent research institute, Norway

- Duration 24 months

For an international audience: What is H2020?

- H2020 = "Horizon 2020" – the biggest EU research and innovation programme ever
- Almost €77 billion of funding over seven years (2014 to 2020)
- Promotes excellent science, industrial leadership and addresses societal challenges
- Most projects involve collaborative research in multi-disciplinary consortia
- Highly competitive grant application process

Presentation Overview
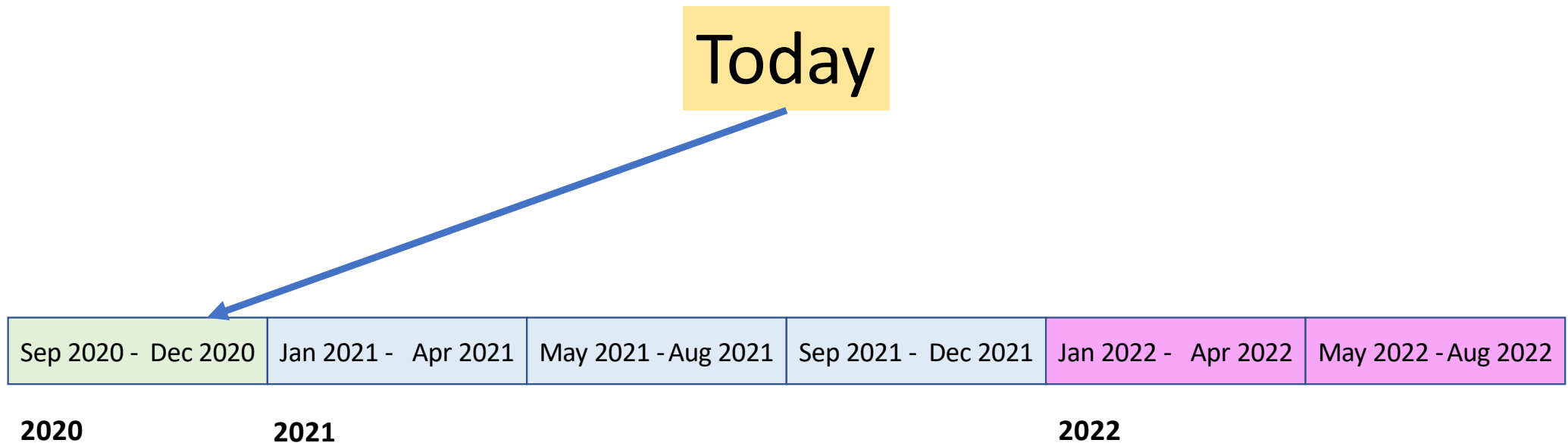
What?

When?

Who?

Why?

How?

Where?

What next?

What?

When?

Who?

Why?

How?

Where?

What next?

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WHEN will IMPETUS happen?

Challenging: 24-months duration

Today

Sep 2020 - Dec 2020	Jan 2021 - Apr 2021	May 2021 - Aug 2021	Sep 2021 - Dec 2021	Jan 2022 - Apr 2022	May 2022 - Aug 2022

2020   **2021**   **2022**

What?
When?
Who?
Why?
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Where?
What next?

WHO is involved in IMPETUS?

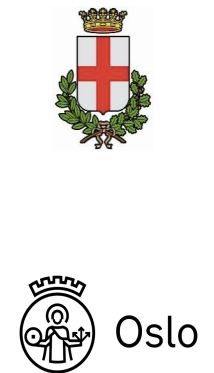• Multi-national consortium with complementary skills/roles
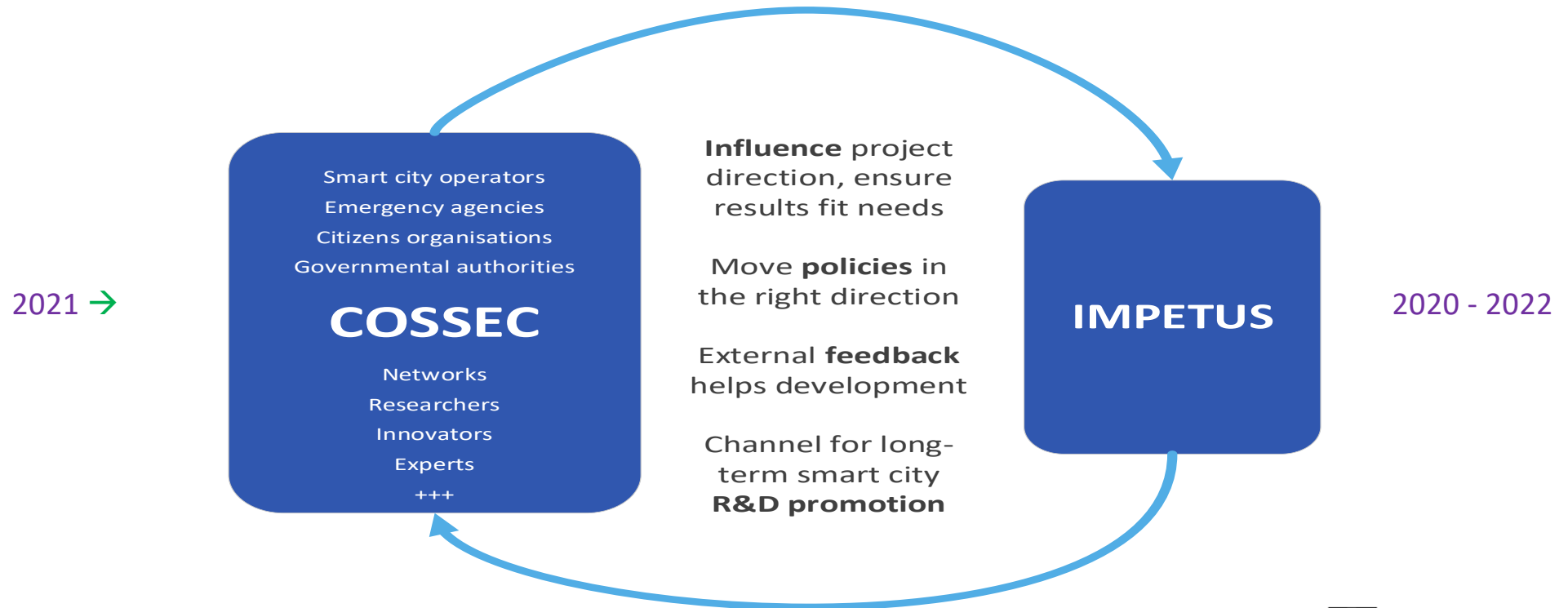

RESEARCH

INDUSTRY & SMEs

NGOs

CITIES

COSSEC – Community of Safe and Secure Cities

- Extends involvement and influence beyond IMPETUS consortium to wider stakeholders involved in topics of the project
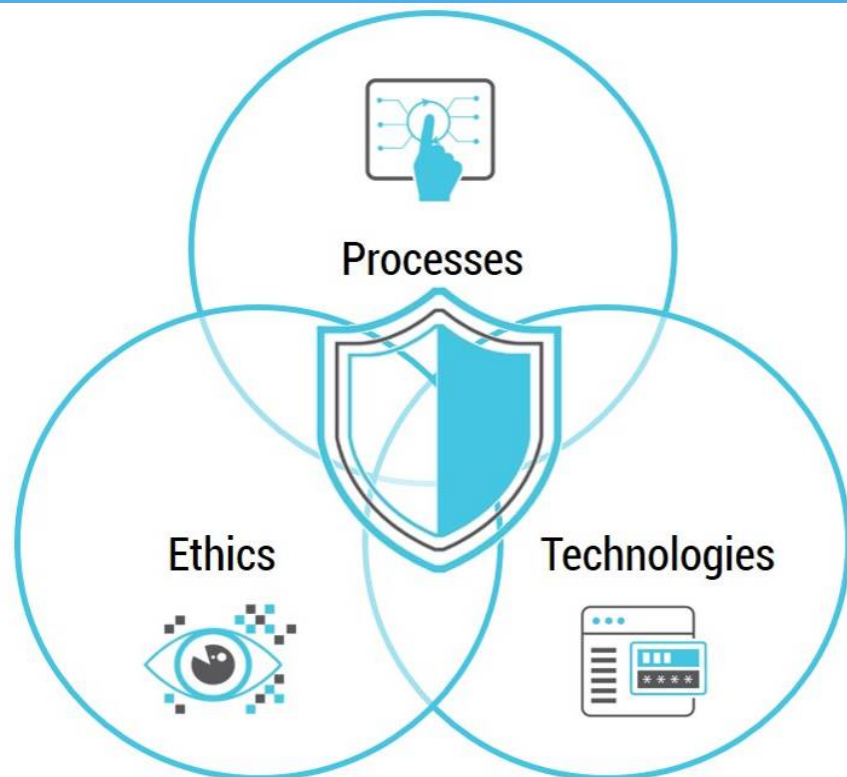
2021 →

COSSEC

Smart city operators
Emergency agencies
Citizens organisations
Governmental authorities

Networks
Researchers
Innovators
Experts
+++

Influence project direction, ensure results fit needs

Move **policies** in the right direction

External **feedback** helps development

Channel for long-term smart city **R&D promotion**

IMPETUS

2020 - 2022

What?
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WHY IMPETUS: Main objective

Processes

Ethics

Technologies

The IMPETUS intersection:
integrating interdependent solutions and concerns

Improve the security of public spaces in smart cities

- Can advanced **technologies** improve the detection and management of security events?

- How will this affect **processes** used in day-to-day operations?

- Are there **ethical** and legal issues?

WHY do Smart Cities need IMPETUS?

Smart Cities

- High-tech grid of sensors (cameras, environmental sensors, traffic sensors, ...)
- IoT ("Internet of Things") – internet is everywhere – not least in everyone's pockets
- IT systems controlling critical infrastructure
- Advanced algorithms and AI (Artificial Intelligence) to help people make decisions

Efficient city administration

Enhanced situational awareness, especially in emergencies

Help authorities make sound decisions, fast

←Enhance   Combat→

IMPETUS

Increased "attack surface"- more vulnerabilities e.g. cyber attacks

Increased risk of unethical use of personal data

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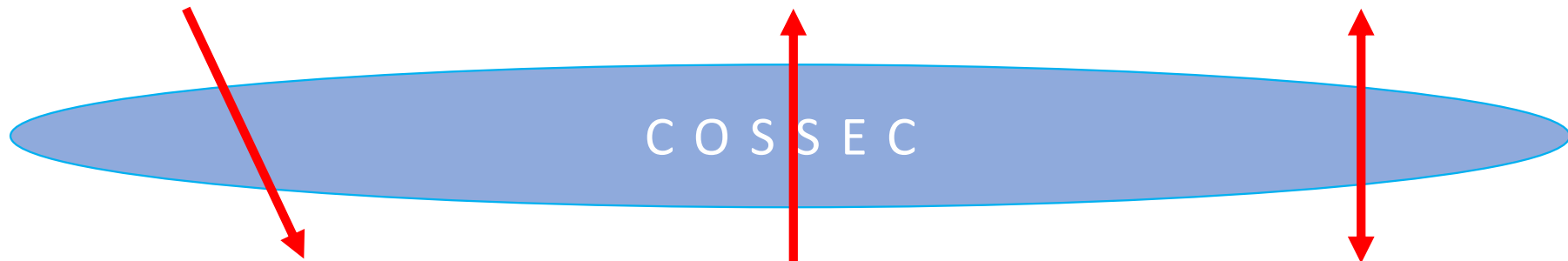# HOW will IMPETUS achieve its vision?

What do we need?
- Identify *risks* and *opportunities* in smart cities
- Formalize *requirements*

What tools can help us?
- *Refine* technologies from partners
- Refine and integrate to provide an *integrated platform*

Does it work?
- Validation in *large scale trials*
- Involve *stakeholders* from inside and *outside consortium*

C O S S E C

Are ethical, privacy and legal issues understood and respected at all levels?

Key result: integrated platform

But what is a "platform" anyway?"

Something to wait while expecting progress?

… or platform 9 ¾, the start of an adventure?

Platform: Provides the *support* you need

Integrated: for use separately or together, as part of an overall solution

In different phases	For different kinds of threats

Before

Simulation

Chemical/biological attack

Specific

Imminent

Detection

Cyber attack

Physical attack (gun, vehicle, bomb, ..)

During

Classify – monitor - analyze

Optimize response

Evolving

Forewarning of unusual activity

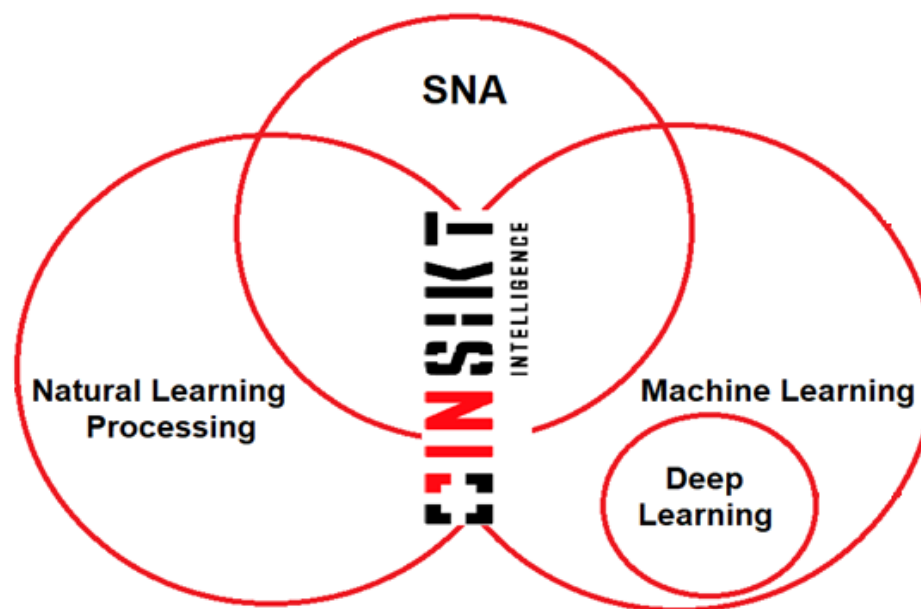# Tools primarily aimed at threat detection and analysis

Social media detection tool

Forewarning of unusual activity – based on internet activity observations

Methods & Tools to automatically monitor public online content

- **Automatic text classifiers**
  - Machine Learning and Deep Learning models to classify the messages in domains

- **Data collection technologies**
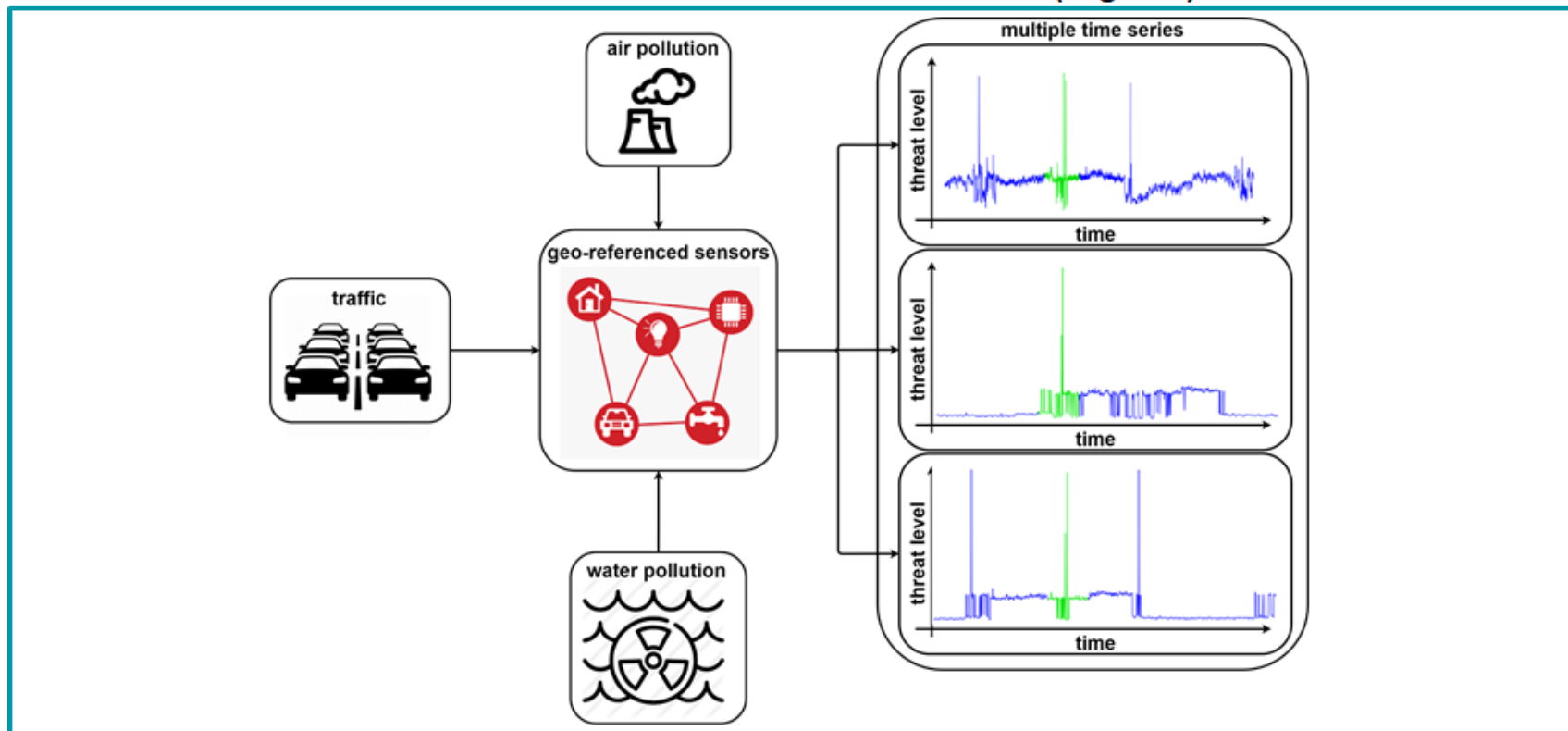 - Methods to extract information from web and social networks

- **NLP**
  - Methods to discover insights into the content of the messages

- **Social Network Analysis**
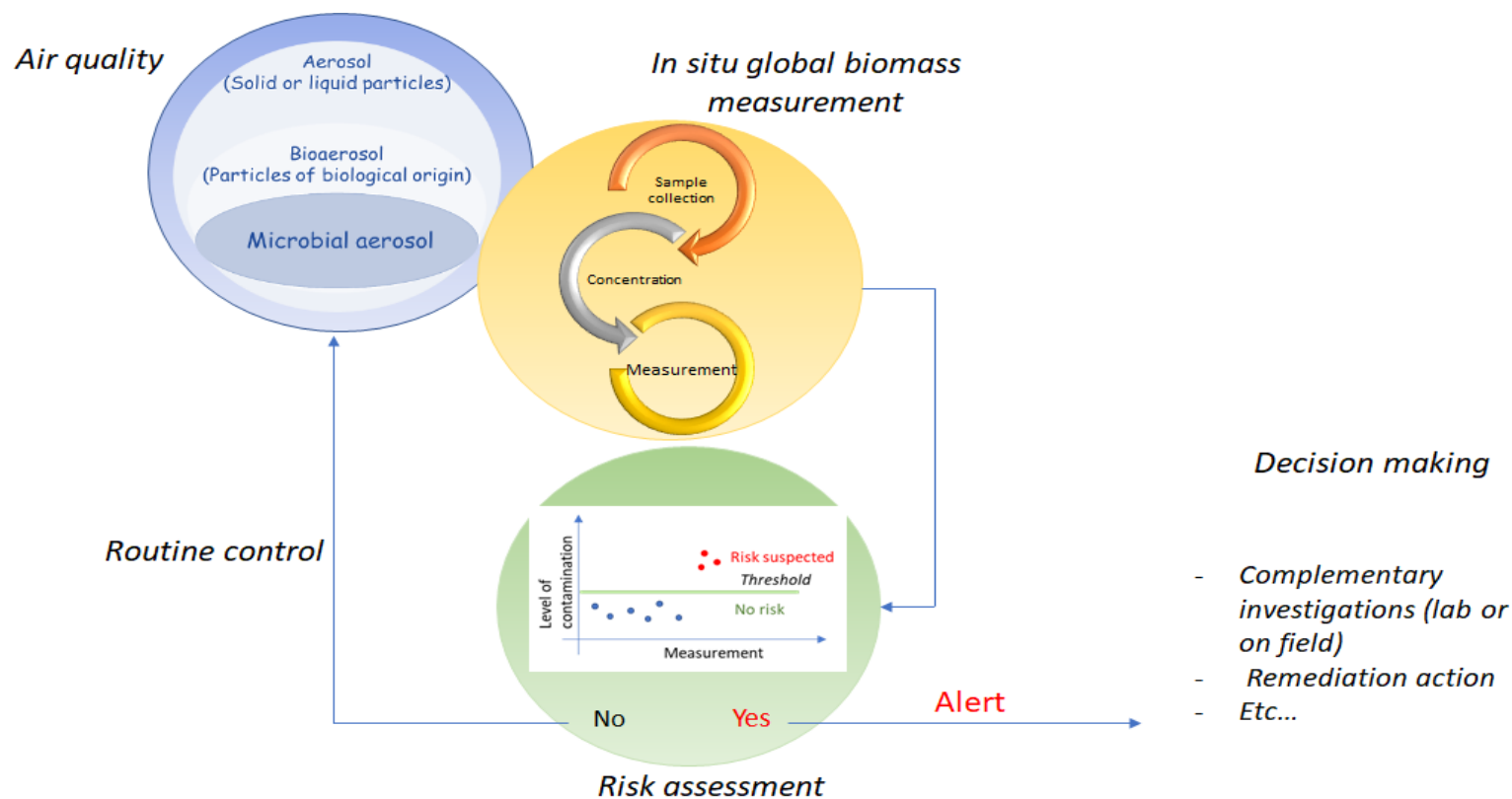 - Methods to discover relationships between users

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Physical threat intelligence tool

Forewarning of unusual activity – based on sensor data

Anomalies of different time series detected (in green)

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Biochemical risk detection tool

Chemical/biological attack – collect data, smart assessment of risk level

Weapon and face detection tool

Physical attack (gun, vehicle, bomb, ..) - based on AI-based analysis of CCTV images
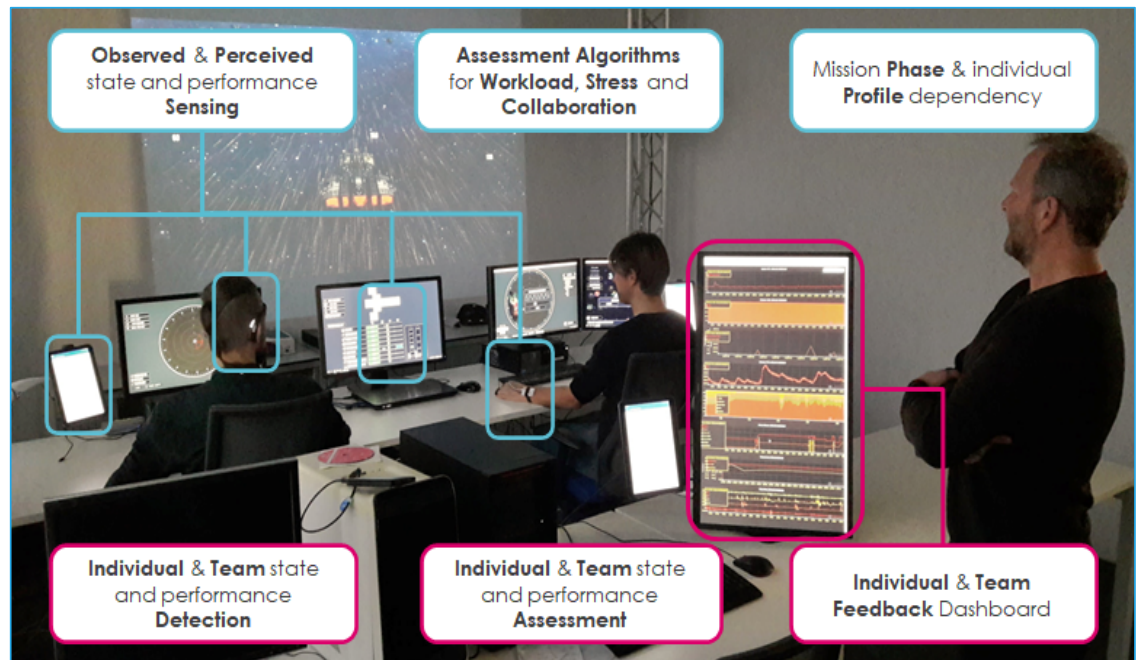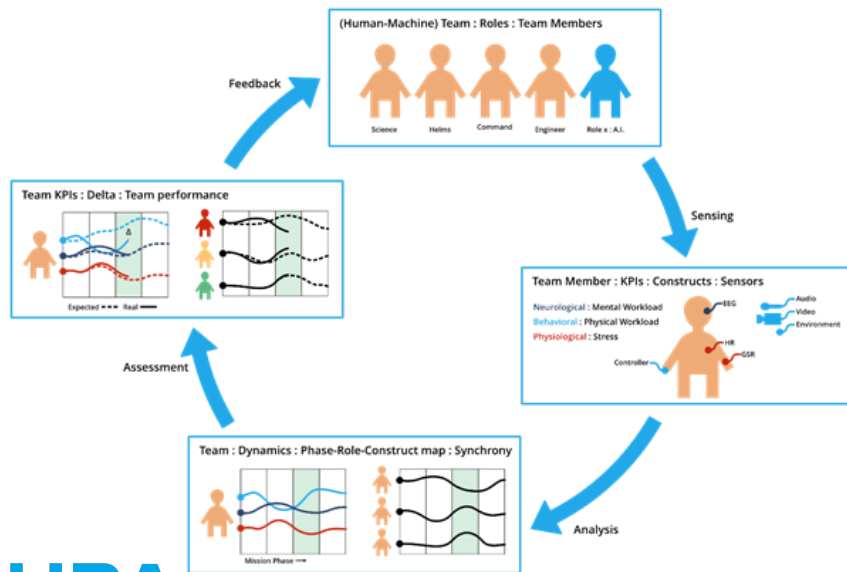
Instant

gun

Weapon Detection

ai

Via AI

Through CCTV

With Real-Time Alerts

Tools primarily aimed at optimizing threat response

Human computer interaction tool

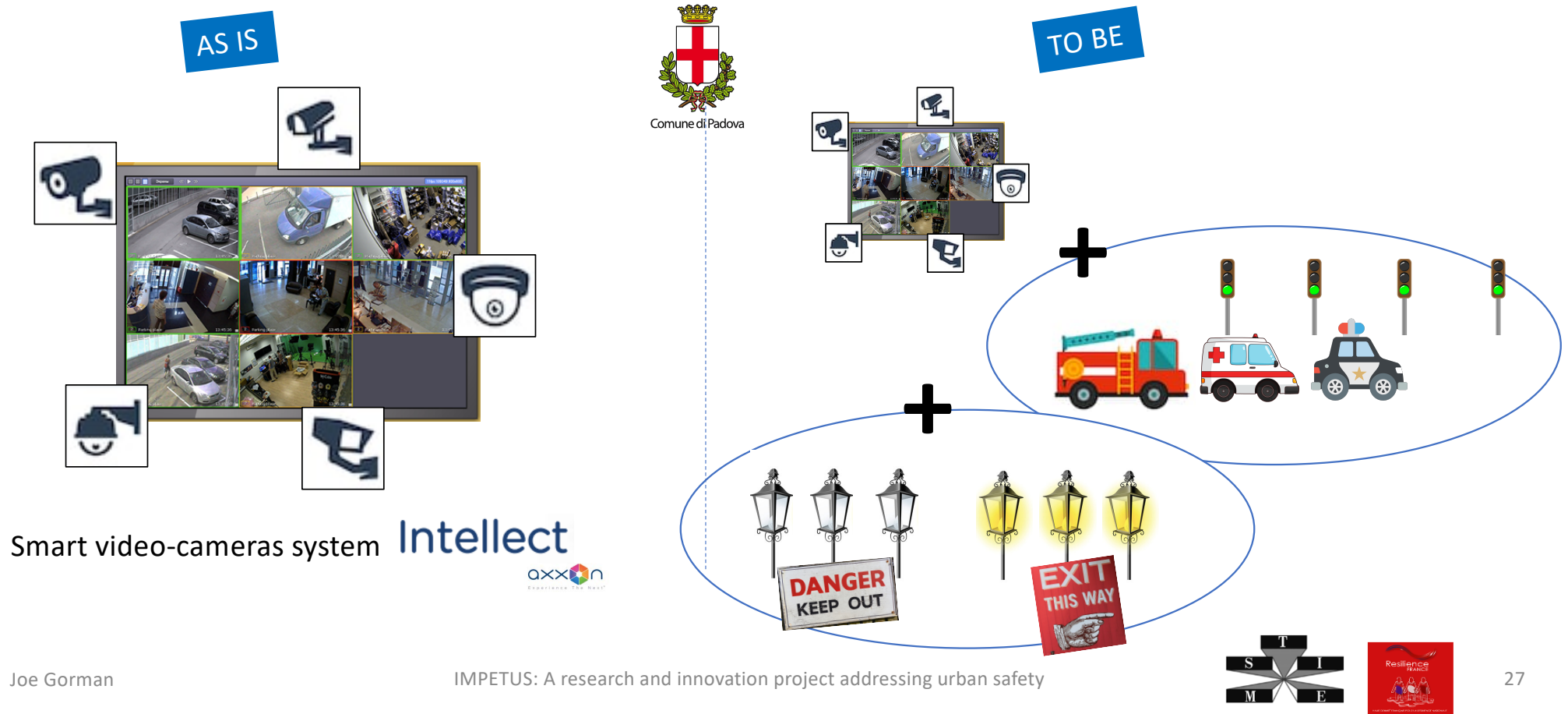## Optimize response – helping IT system users work well under stress

Using (neuro)physiological sensors, machine learning for real-time workload assessment and user feedback

Physical Threat Response (Padova)

Optimize response –direct & prioritize traffic

AS IS

Comune di Padova

TO BE

Smart video-cameras system   Intellect
axxon

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WHERE and how will IMPETUS be validated?

Validation pilots in two cities

- **Phase 1: Technical and acceptance testing on non-live systems**
- **Phase 2: Data collection from live systems, for analysis but no intervention**
- **Phase 3: Live test with simulated physical and cyber attack**

Oslo, Norway

Padova, Italy

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What next? – Next steps, short-term

- **Detailed consortium dialogue: cities, technology partners, ethics & privacy partners - to specify requirements**
- **Focus groups/questionnaire –to get immediate outside view**
- **Initiate COSSEC for long-term collaboration**
- **Arrange face-to-face meetings**

What next? – Long-term, post-project

- **Promote uptake of results in smart cities throughout Europe and elsewhere**
- **Influence policy making to facilitate uptake consistent with ethical and legal principles**
- **Establish COSSEC as a permanent community of users**

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RESEARCH	INDUSTRY & SMEs	NGOs	CITIES