H2020 Project IMPETUS: Key Results

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Intelligent **M**anagement of **P**rocesses,
Ethics and **T**echnology for **U**rban **S**afety

Motivation / Objectives

IMPETUS: Main objectives and driving questions

The IMPETUS intersection: integrating interdependent solutions and concerns
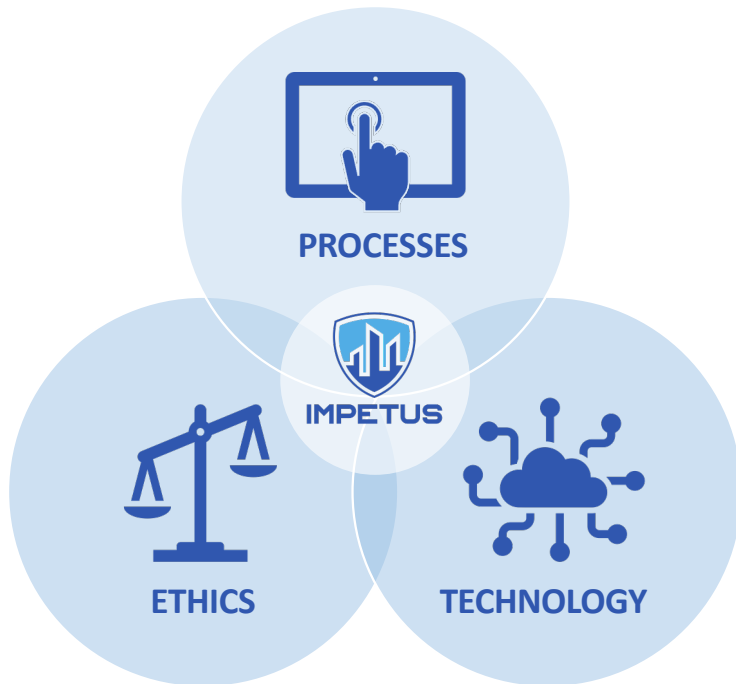
Improve the security of public spaces in smart cities

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

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

- How can **ethical** and legal issues be safeguarded and handled?

- Do they create new **cyber security** risks and reliance on infrastructure?

Results overview

Results overview - 1

- **Public safety tools** providing specific capabilities around:
  - Detection
  - Simulation & analysis
  - Intervention
- **Platform**: Integrates tools; common interface/dashboard
- **Frameworks** (aka "Practitioners Guides") to support deployment:
  - Managing operational change
  - Accounting for ethical and legal concerns
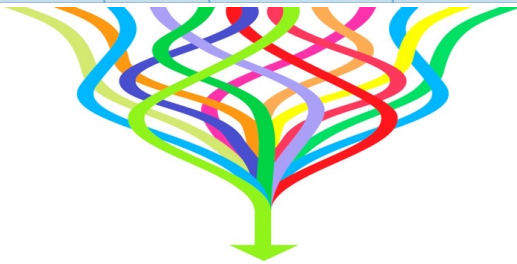 - Managing cybersecurity

PROCESSES

OPERATIONAL FRAMEWORK

ETHICS

2

4

1

TECHNOLOGY

3

ETHICAL FRAMEWORK

CYBERSECURITY FRAMEWORK
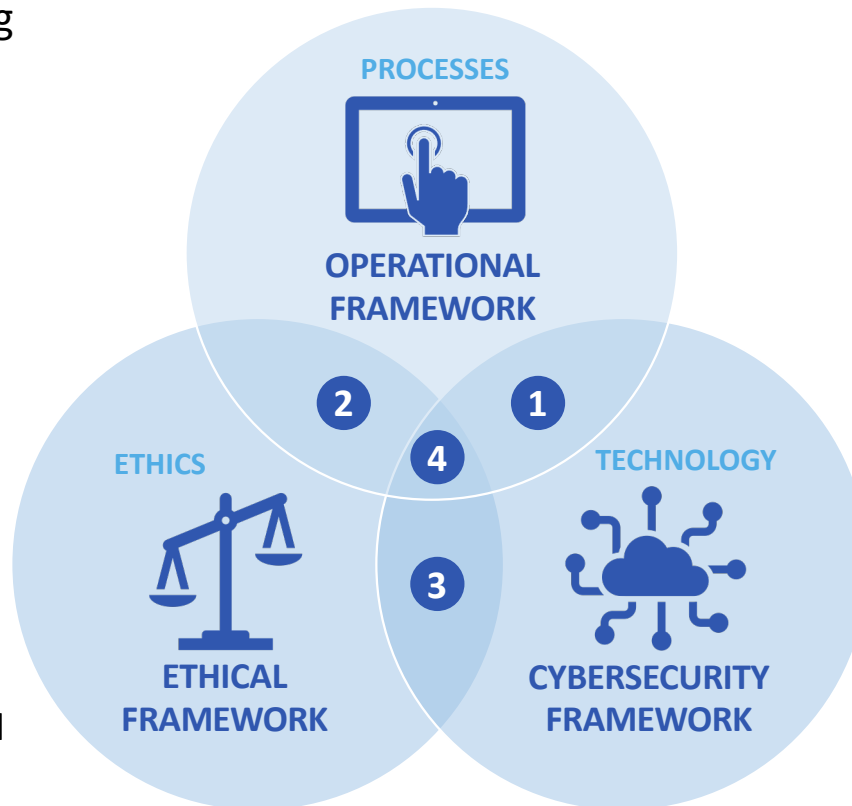
1 AI-based threat detection, analysis and intervention

+

2 Privacy-preserving technical and legal framework

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3 Ethical & explainable AI including security awareness

=

4 Decision-making support tools combining AI + human-in-the-loop

Specific technological capabilities

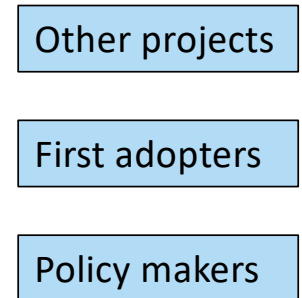| Type of support	Be prepared	Detection	Situational awareness	Response optimization	Learning
Tools	Breach and attack simulation	Social media detection	Cyber threat intelligence	Human Computer Interaction	Cyber Threat Mapping
		Weapon detection	Phyiscal threat intelligence	Physical threat response optimization	
		Biological risk detection			

Integrating Platform
- Tools usable in single interface
- Tools can connect and share data

Practitioners Guides

PRACTITIONER'S GUIDE

OPERATIONS

WORK PROCESSES FOR OPERATIONAL PERSONNEL DEALING WITH EMERGENCIES

by IMPETUS

PRACTITIONER'S GUIDE

CYBER SECURITY

HOW TO GUARD AGAINST, DETECT AND DEAL WITH CYBER SECURITY THREATS

by IMPETUS

PRACTITIONER'S GUIDE

ETHICS & DATA PRIVACY

INTEGRATING ETHICAL PRINCIPLES AND RELEVANT LEGISLATION TO RESPECT DATA PRIVACY INTO OPERATIONS

by IMPETUS

Practitioner's Guidelines
- Advice
- DOs and DON'Ts
- Reference information
- Training materials

LESSONS LEARNED

Other projects

First adopters

Policy makers

Technical results

IMPETUS Tools

| Be prepared	Detection	Situational awareness	Response optimization	Learning
Breach and attack simulation	Social media detection *	Cyber threat intelligence	Human Computer Interaction	Cyber Threat Mapping *
	Weapon detection *	Phyiscal threat intelligence *	Physical threat response optimization *	
	Biological risk detection			

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

SNA

INSIKT INTELLIGENCE

Natural Learning Processing

Machine Learning

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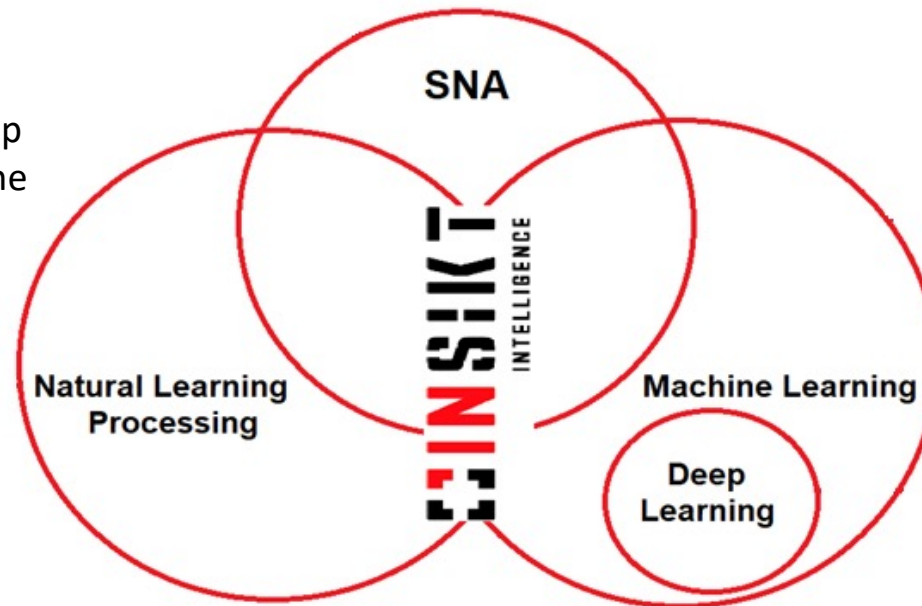
- **NLP**
  - Methods to discover insights into the content of the messages

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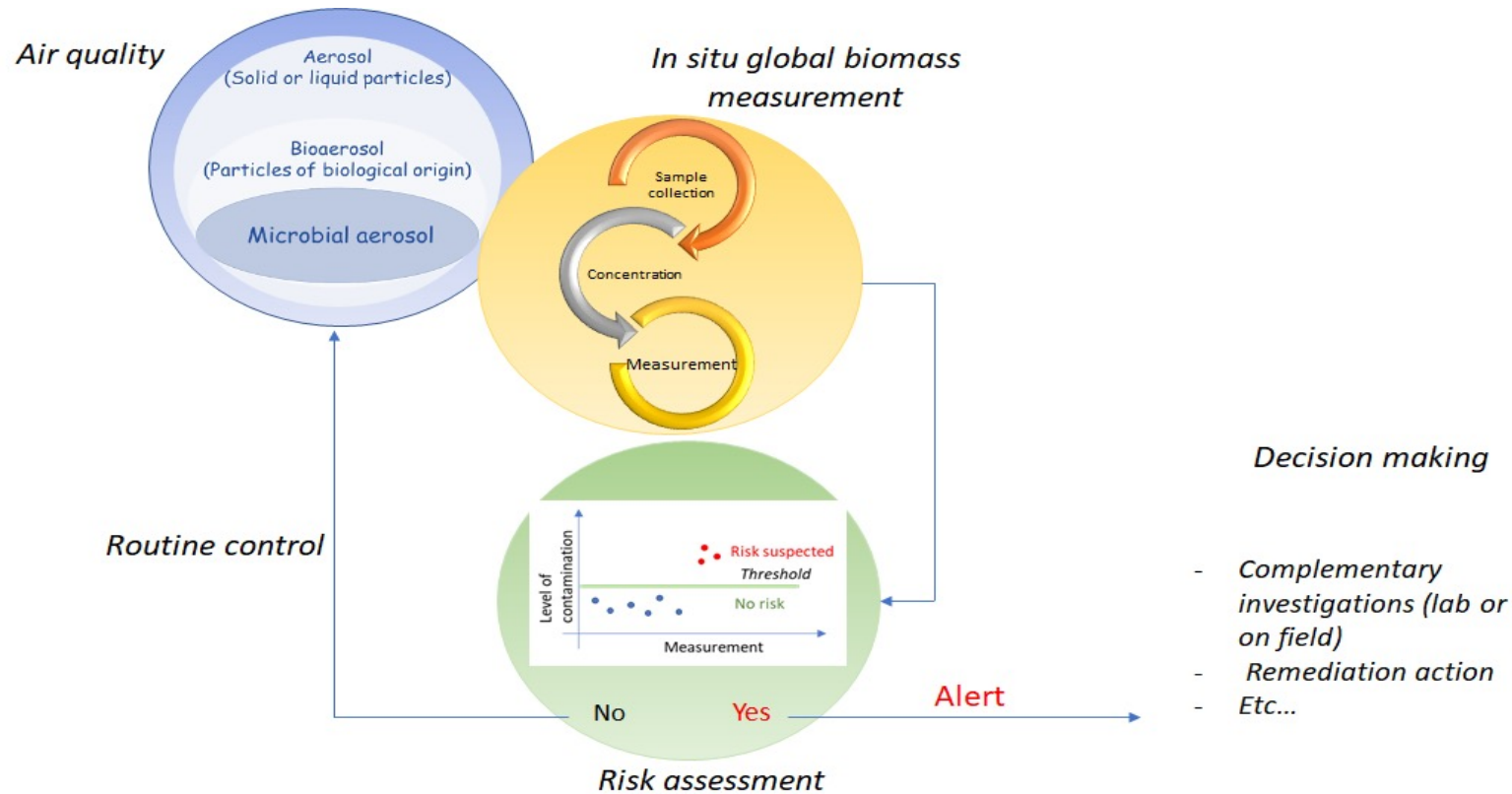 - Methods to discover relationships between users

Forewarning of unusual activity – based on sensor data

Anomalies of different time series detected (in green)
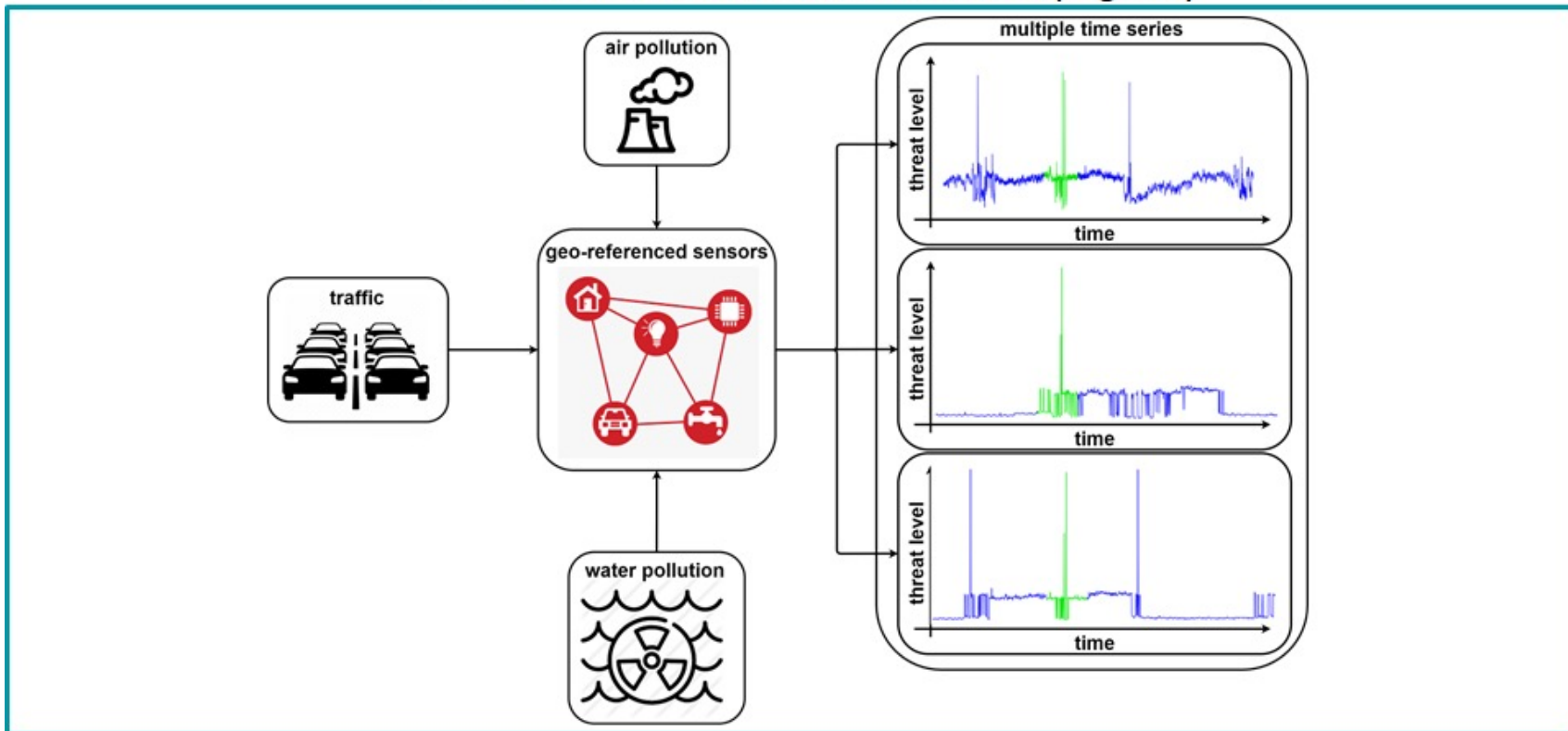
Biological risk detection tool

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

Weapon detection tool*

- Based on AI-based analysis of CCTV images
- Detecting a Weapon With Security Cameras Is **Hard**, Because The Camera Angle And The Environment Is **Never The Same**.
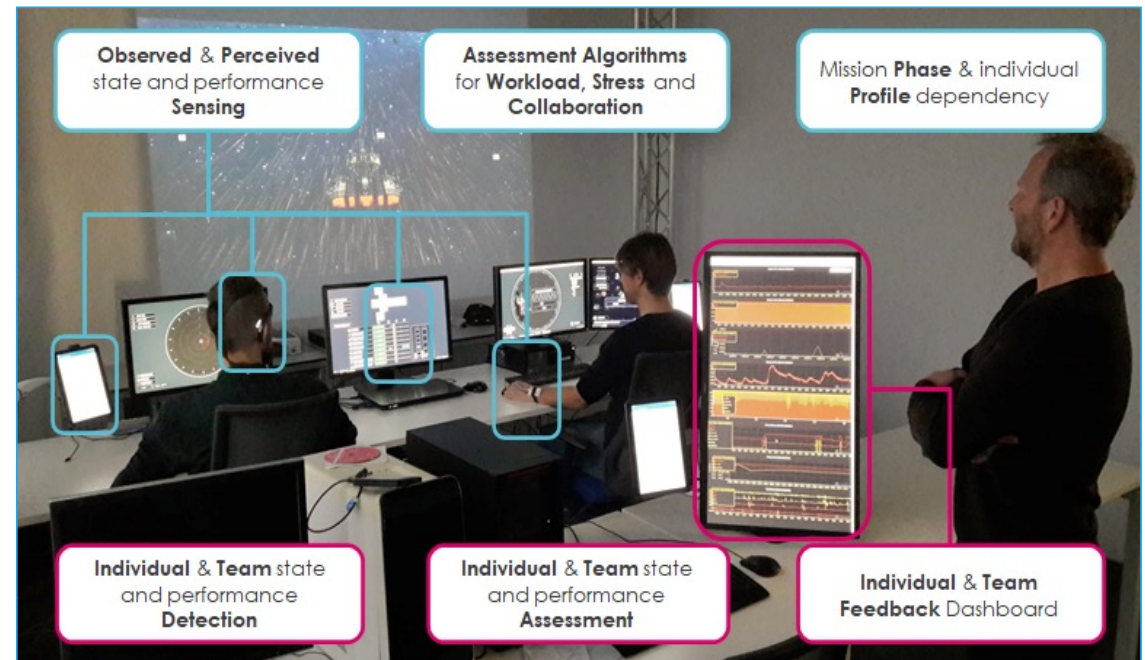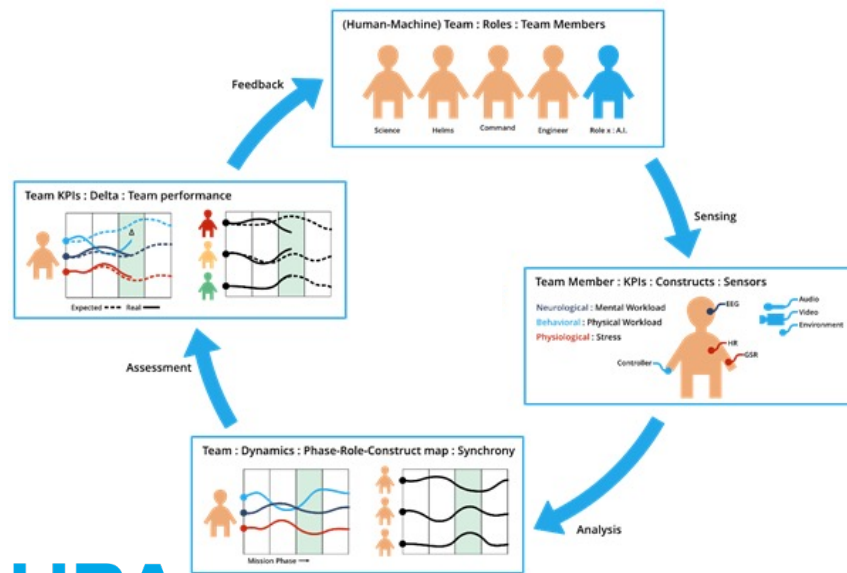

Instant   Weapon Detection   Via AI   Through CCTV   With Real-Time Alerts

Tools primarily aimed at optimizing threat response
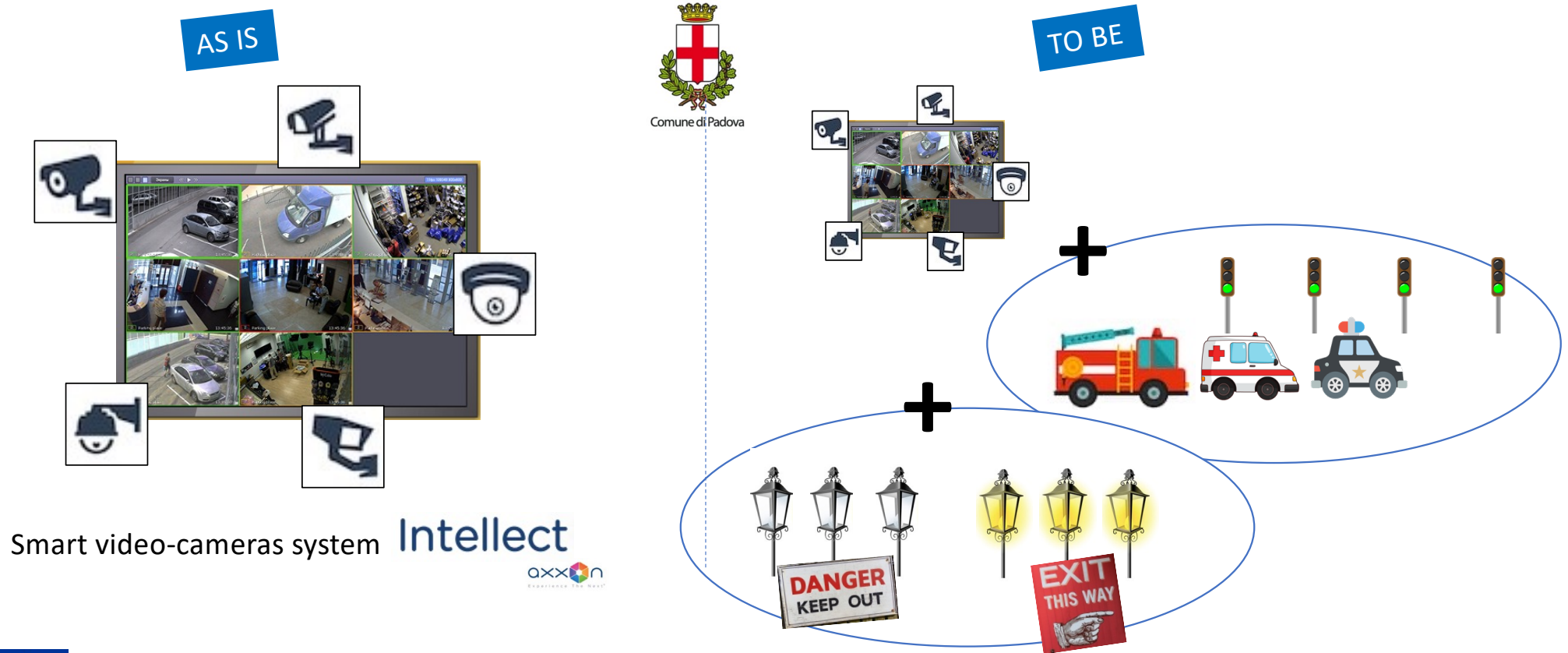
Human computer interaction tool

Optimize response – helping operational teams manage stressful situations

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

Physical Threat Response Optimization*

Optimize response – direct & prioritize traffic

AS IS

TO BE

Comune di Padova

Smart video-cameras system

Intellect
axxon
Experience The Next*

DANGER KEEP OUT

EXIT THIS WAY

The integrating platform

Platform*: integration to support public safety operations

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

In different phases

Before　Simulation

Imminent　Detection

During　Classify – monitor - analyze　Optimize response

For different kinds of threats

Specific
- Chemical/biological attack
- Cyber attack
- Physical attack (gun, vehicle, bomb, ..)

Evolving　Forewarning of unusual activity

Platform*: based on Snap4City

Non-technical results

Practitioners Guides

- Practitioner's Guides* are "must reads" for users of IMPETUS solutions
- Each provides:
  - **Guidelines**: "how to…", "DOs and DONTs", role definitions, …
  - **Training materials / services**
  - **Reference information** (tool documentation, relevant regulations, …)

* Called "Frameworks" in early documentation

Thank you!