



SMARTCITY
EXPO WORLD CONGRESS

4 - 6 NOVEMBER 2025
BARCELONA

EXTRACT

CREXDATA

protecció civil
■ ■ ■ ■

From Crisis to Action

How AI and Data Technologies are Closing the Reaction Gap at “Moment Zero”

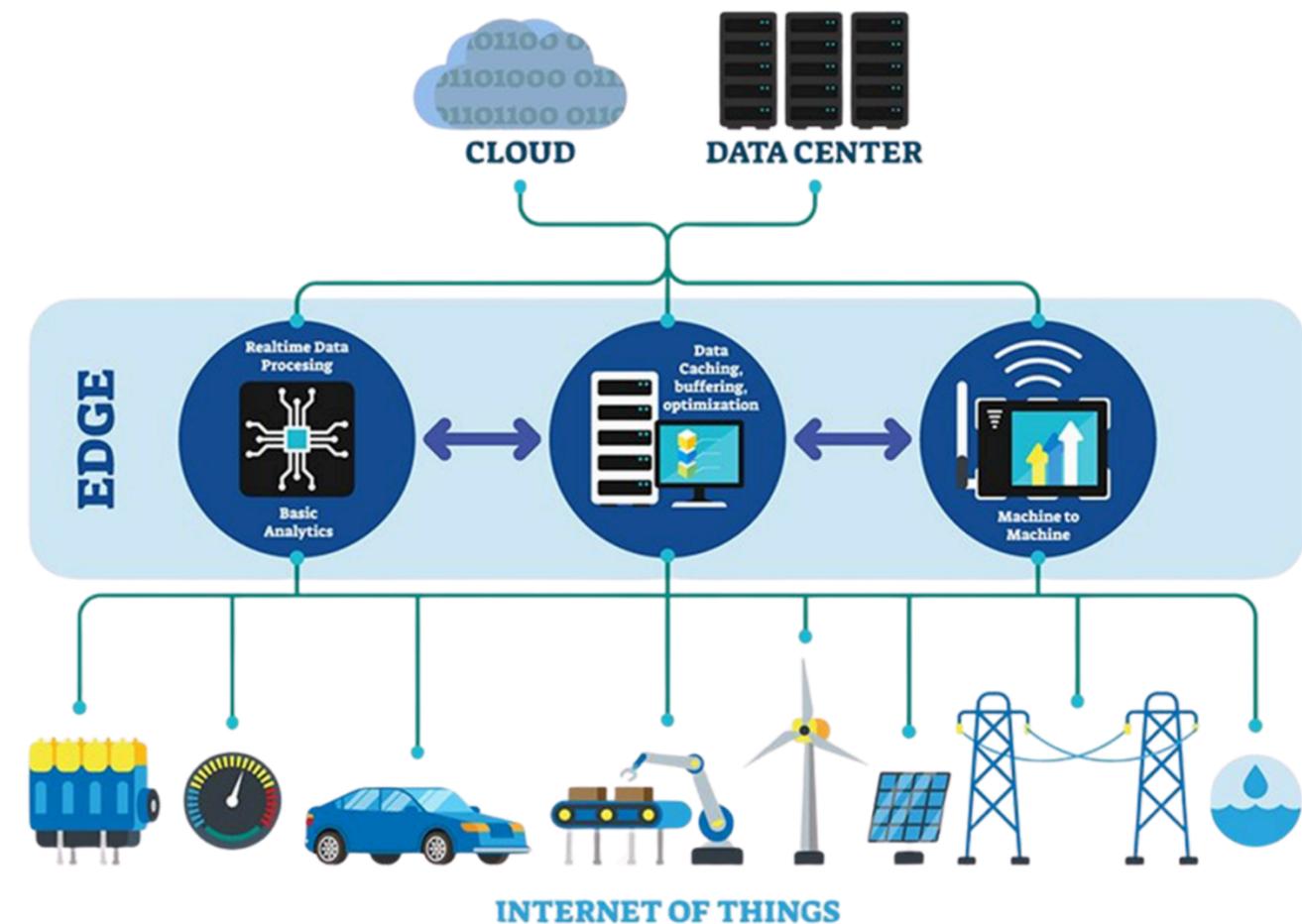
6 NOVEMBER 2025

9:30 - 10:15, TECH X CITIES



RESEARCH ON COMPLEX ANALYTICS PROCESSES TO EXTRACT VALUABLE KNOWLEDGE

- **IoT Devices** to collect data
- **Edge Computing** at the source in cities for fast, private, economical processing
- **Cloud Computing** for housing a lot of information
- **High Performance Computing** for large workloads and training of complex AI models
- **5G/6G Communication** for reliable and fast interconnection



USE-CASE: UNDERSTANDING THE CRISIS RESPONSE GAP



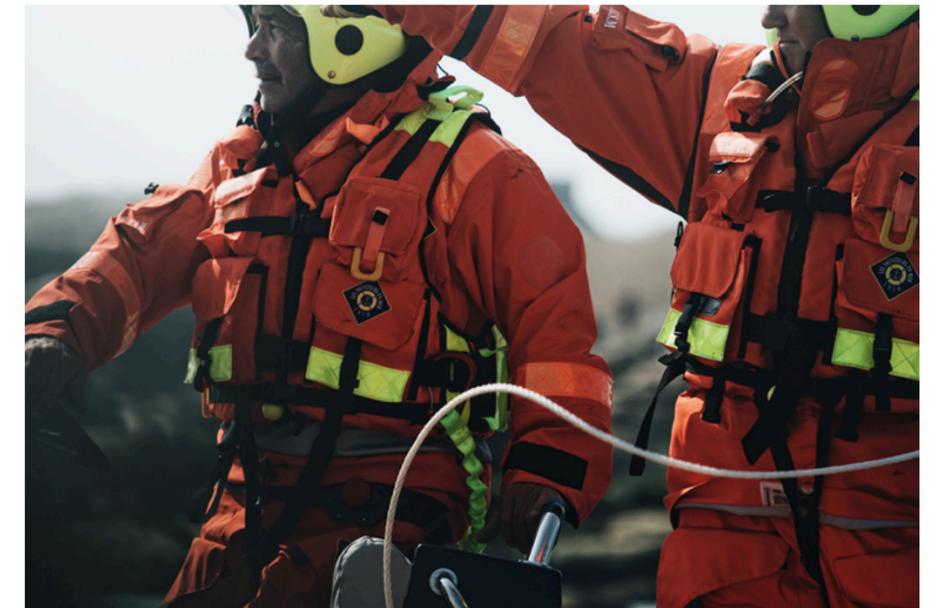
Municipality of Venice



DISASTER

CONFUSION

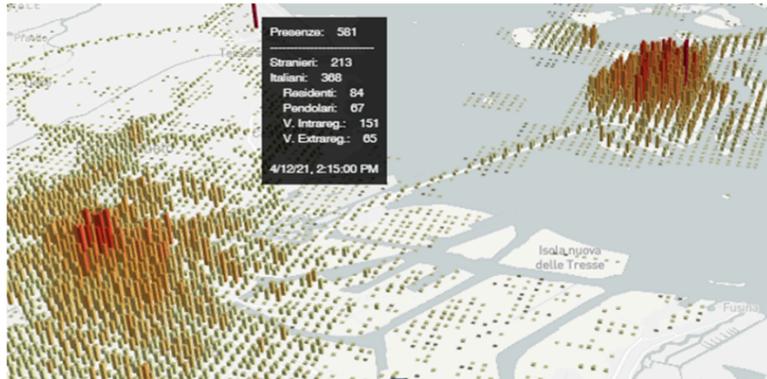
RESPONSE



Guide citizens in a complex urban mesh (Venice) through a safe route
Personalized Evacuation Route (PER) System

CLOSING RESPONSE GAP

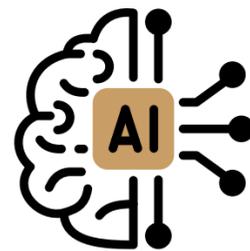
Real-time data gathering



Urban Digital Twin

Models the city-gathered data

Specific actions



Artificial Intelligence

1. Learns to generate routes based on simulated emergency scenarios
2. Generates routes to citizens when emergency occurs

Reality

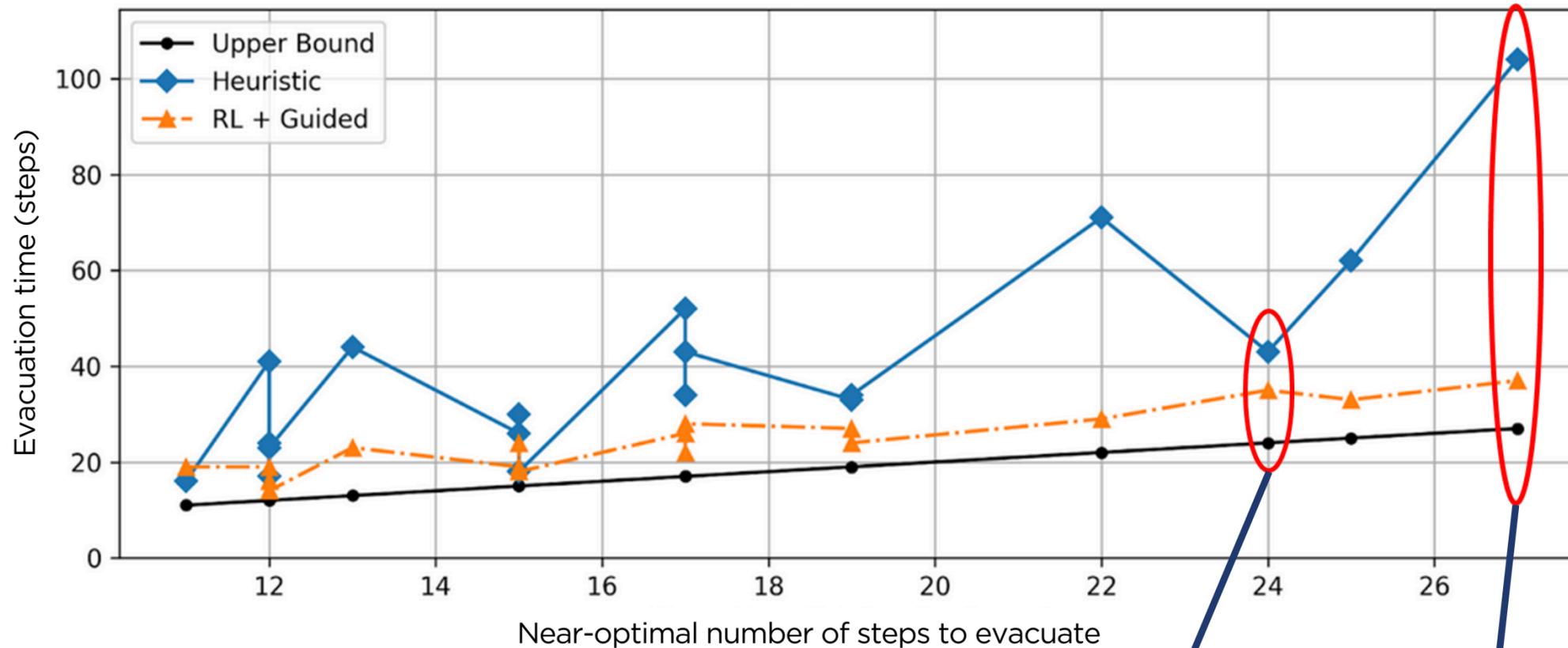


Simulated scenarios



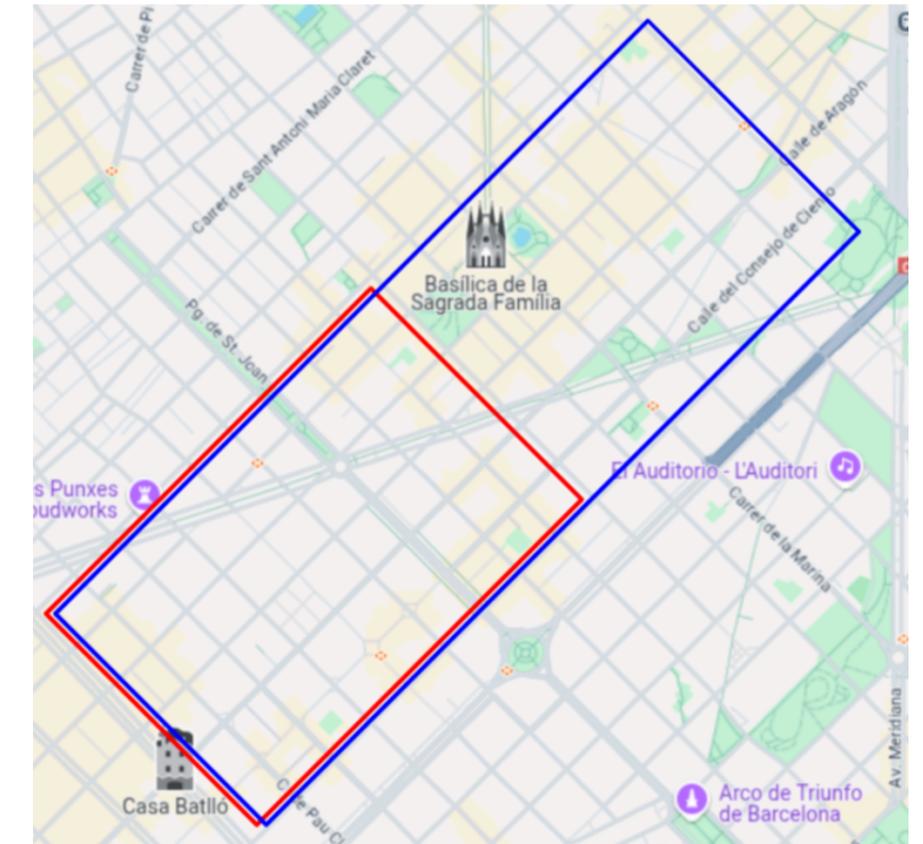
THE IMPORTANCE OF INTELLIGENT DECISIONS

20 random maps with 50 and 80 nodes and 100 people



Near-optimal: 24 steps
RL + Guided: 35 steps
Heuristic: 43 steps

Near-optimal: 27 steps
RL + Guided: 37 steps
Heuristic: 104 steps



An area of BCN
with **50** and **80** nodes

TURNING INSIGHTS INTO DECISIONS: HOW TO EMPOWER FIRST RESPONDERS

CREXDATA and in particular the “**Emergency use case**” aims to improve the **situational awareness** so that **informed decisions** are taken by civil protection considering ranked future worlds with explicit uncertainties avoiding disaster impacts.

HEINZ NIXDORF INSTITUT
UNIVERSITÄT PADERBORN



Ministry of the Interior
Finland

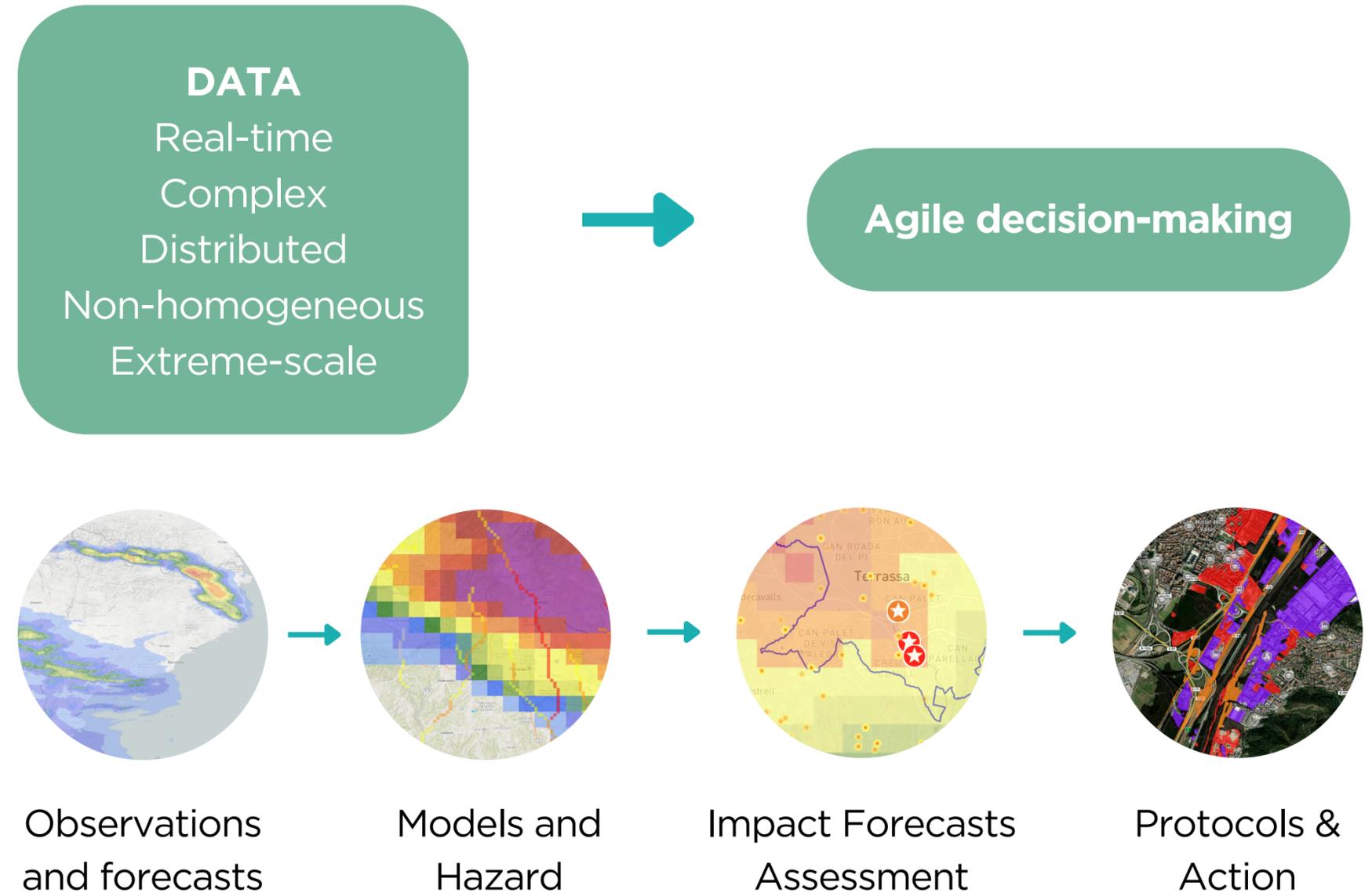
City of Dortmund
Fire Department



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE



hydus
hydrometeorological
innovative solutions





**CENTRIC
DATA NODE**

CENTRALISE AND HOMOGENISE REAL-TIME DATA



**MODELS
INTEGRATION**

INTEGRATE IMPACT BASED MODELS TO ASSESS POTENTIAL FUTURE SCENARIOS



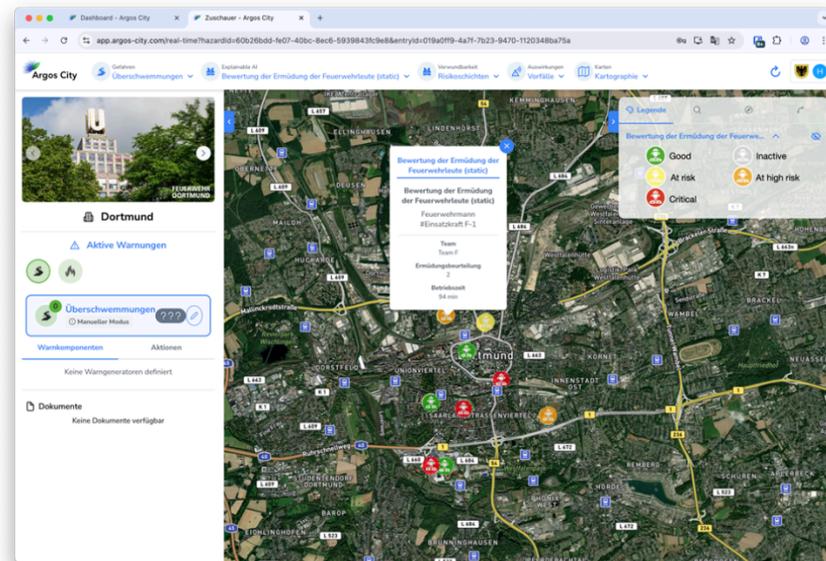
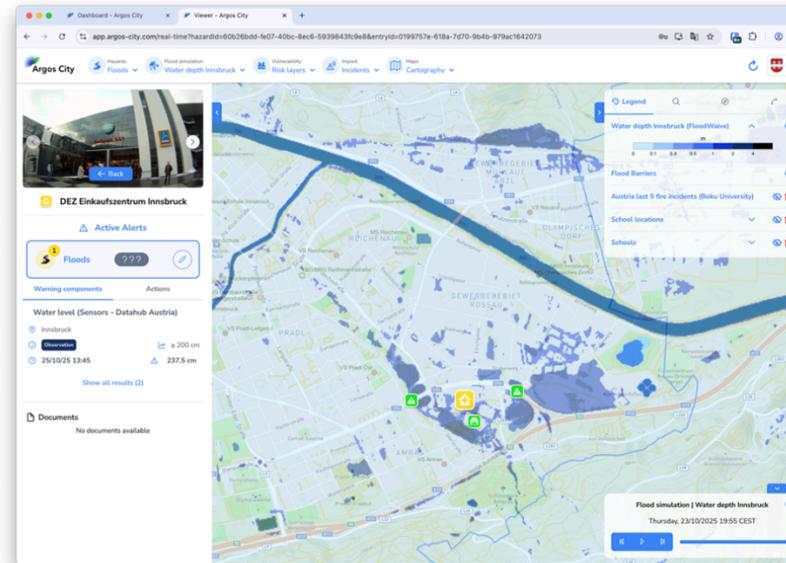
**COMBINE &
VISUALIZE**

COMBINED VISUALISATION OF DATA AND SIMULATIONS



**IMPACT
ORIENTED**

**PROVIDE REAL-TIME HYPERLOCAL IMPACT ASSESSMENT TO STREAMLINE
DECISION-MAKING**



CIVIL PROTECTION STRUCTURE

Three levels according to the different administrations:

- **State:** Lead by the **Minister of Interior of the Spanish Government**
- **Regional:** Lead by the **Minister of Interior of the Catalan Government**
- **Local:** Lead by the **Mayor** in their municipalities

Four levels of coordination:

- **CENEM:** National emergency coordination center
- **CECAT:** Catalonia coordination center (regional coordination)
- **CECOPAL:** Local coordination center (municipalities)
- **ICP:** Incident Command Post. On-site coordination



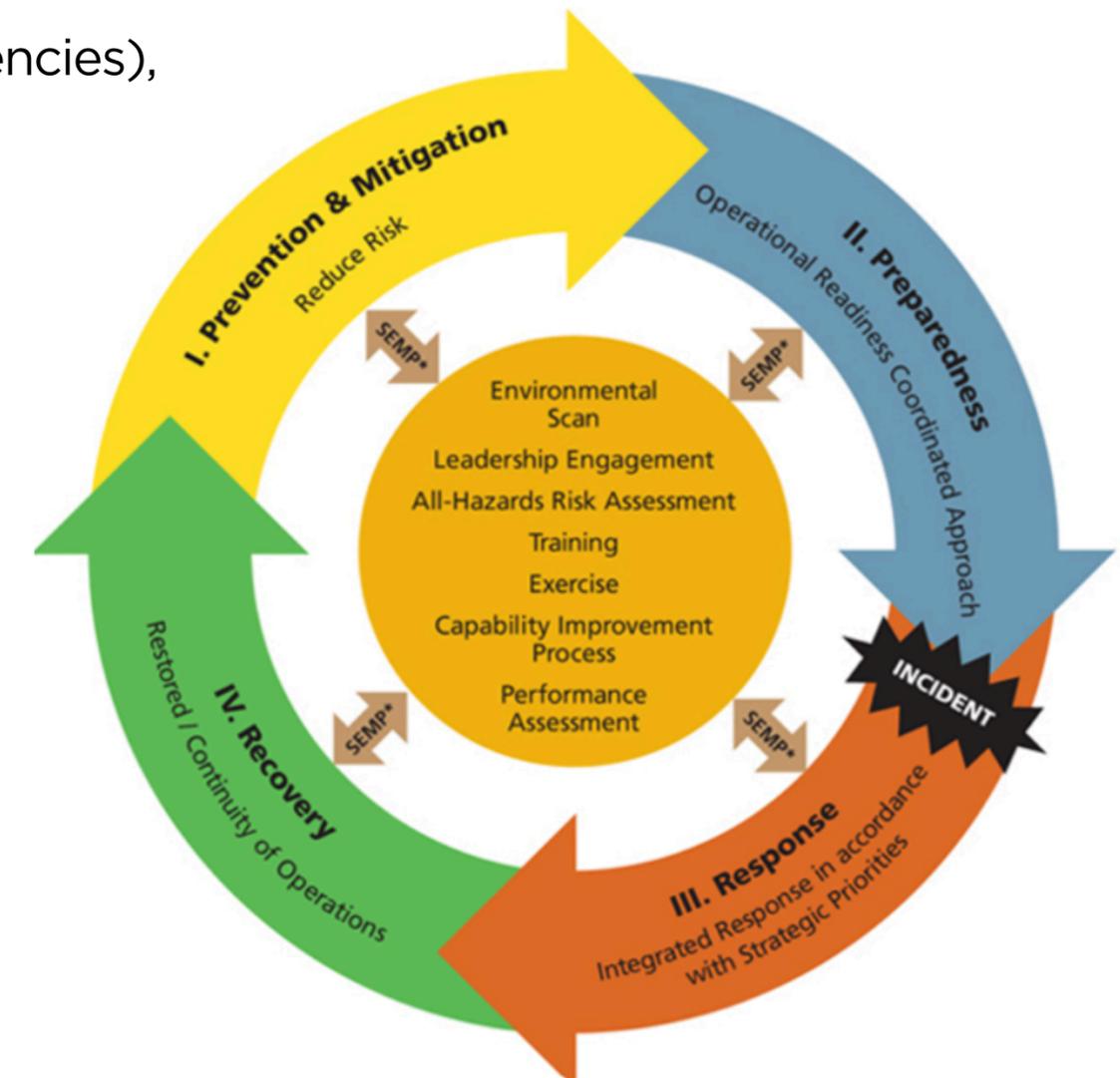
CIVIL PROTECTION: MISSION AND FUNCTIONS

MISSION

To reduce the risk and the impact of emergencies on people (collective emergencies), on **property** and on the **environment**

FUNCTIONS

- **Prevention and mitigation:** Risk assessment (urban planning reports, local and regional emergency plans and self-protection plans survey, etc.).
- **Preparedness:** regional, local and activities emergency plans implementation (design and carry out emergency exercises involving population and first responders)
- **Response:** Activation of plans, emergency management, logistics and coordination (remote: CECAT (Emergency coordination center of Catalonia) and on-site: ICP (Incident Command Post))
- **Recovery:** ensure essential services recovery -resilience approach.



TECHNOLOGY AND CIVIL PROTECTION

112
emergències

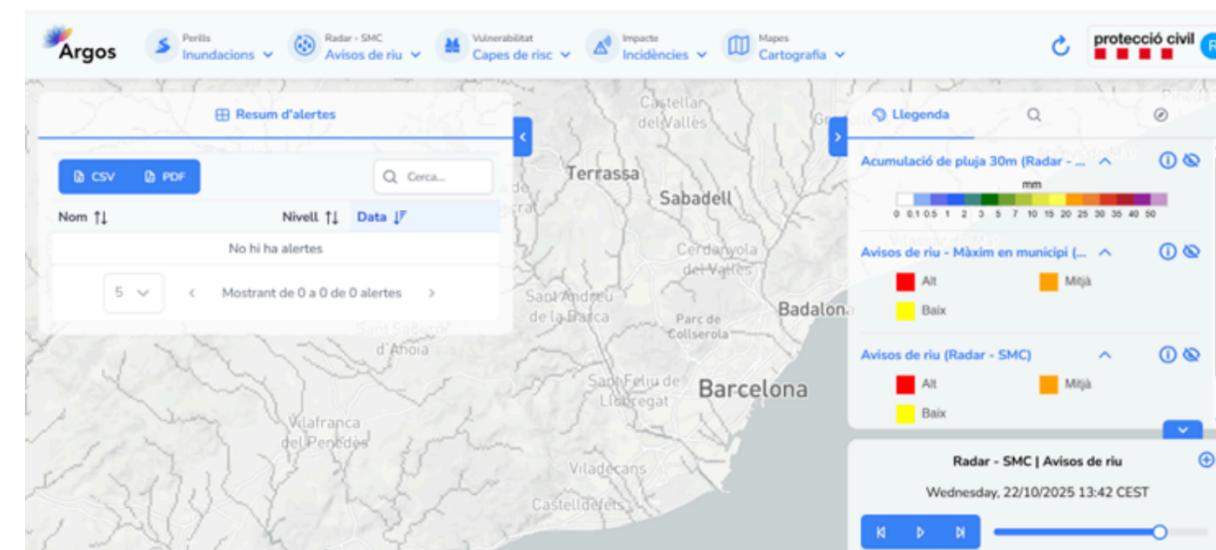
- **Prevention and mitigation:** CP map, modeling and simulators software (forecast, forest fires, chemical leaks), Generalitat's open data catalog, cost-benefit analysis.
- **Preparedness:** Exercices program: improvement coordination, enhancing decision making, strengthens communication and dissemination, building and raising awareness, fostering teamwork.
- **Response:** Constant risk monitoring. Public warning system EsAlert messaging. Fact24, TETRA, chemical sirens, emergency management software SICECAT (agencies involved data integration -SMC, Hermes, etc.), Generalitat's open data catalog.
- **Use of social media to inform, and to get informed:** Data mining to identify risk situations, detect (high interaction), inform (images), self-protection instruction dissemination; mitigating the risk of misinformation.
- **Recovery:** Damage assessment



Alerta de protecció civil

Pluges continuades i torrencials al Garraf i Barcelonès les properes 3 hores. Extreure les precaucions, eviteu desplaçaments innecessaris, allunyeu-vos de rieres i barrancs, encara que no plugui poden baixar amb intensitat. Es poden produir esllavissades. Lluviats continuats y torrencials al Garraf y Barcelonès las próximas 3 horas. Extreme las precauciones, evite desplazamientos innecesarios, alejese de rieras y barrancos, aunque no llueva pueden bajar con intensidad. Se pueden producir desprendimientos.

D'acord





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OPEN
Q&A



The EXTRACT Project has received funding from the European Union's Horizon Europe programme under grant agreement number 101093110.

The CREXDATA Project has received funding from the European Union's Horizon Europe programme under grant agreement number 101092749.



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THANK YOU!

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