Hellenic Rescue Team of Attica (HRTA)

Optimizing the deployment and use of new technologies in Search and Rescue: A recap from recent missions

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HELLENIC RESCUE TEAM

ATTICA

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Hellenic Rescue Team of Attica – H.R.T.A

- Collaborative training, synergies and participation in real SAR field deployments.
- Emergency response, first-responders, safety, SAR, humanitarian aid, training.
- **Operational sectors (SAR):** Mountain Rescue, Water rescue, Mass Disaster Rescue & Relief.

LAND SAR: Wilderness, non-urban
(mountain, canyon/river, forest)

WATER SAR: Surface, underwater, shore
(sea, large river, lake)

URBAN SAR: disaster response & relief
(earthquake, flood, fire, accidents)

FR mission planning

In pressing, dynamic and dangerous environments, every asset the FRs have at their disposal is invaluable in terms of enhancing any of the three main components of the deployment:

- **The FR team:** Personnel (safety, situational awareness, efficiency, endurance, cooperation, etc) and team assets (drones, cameras, sensors, communication devices).
- **The victims:** Detection (sensing), triage (informed decisions), extrication (safety, speed).
- **The operations:** Situational awareness (top-level), worksite triage (prioritization), asset dispatching (e.g. UxVs, medical teams), communications (horizontal/HQ, vertical/teams), logistics, infrastructure (camp), medium/long-term mission planning.

FR deployment priorities

For the FR teams, three main priorities are of utmost importance:

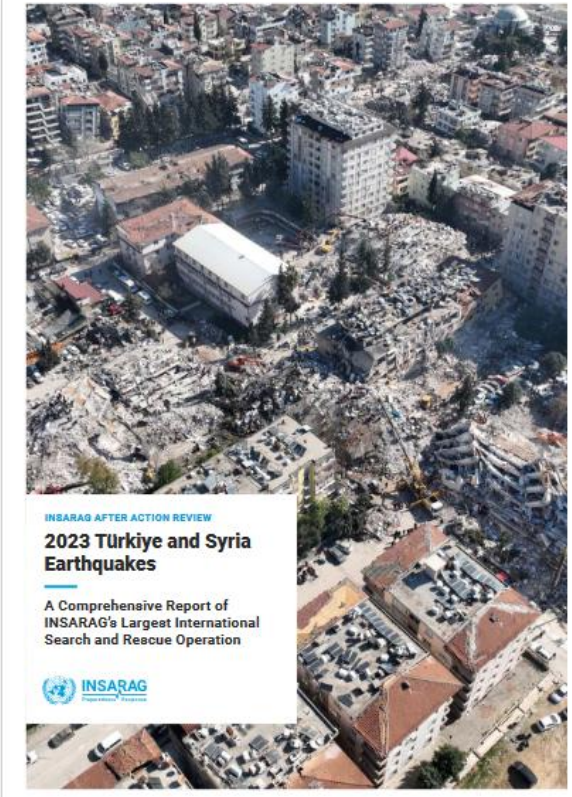
- **Safety:** Ensure individual and team-level risk mitigation regarding possible hazards.
  - ➢ *Enhance situational awareness via sensing modalities.*
- **Speed:** Have a clear and detailed understanding of the "hotzone".
  - ➢ *Use UxVs, but also information fusion, assessment, AI-assisted C&C.*
- **Sensing:** Mitigate exposure of FRs to hazards and risks within the "hotzone".
  - ➢ *Employ remote sensing capabilities (e.g. NV, IR/thermal, dangerous chemicals, etc).*

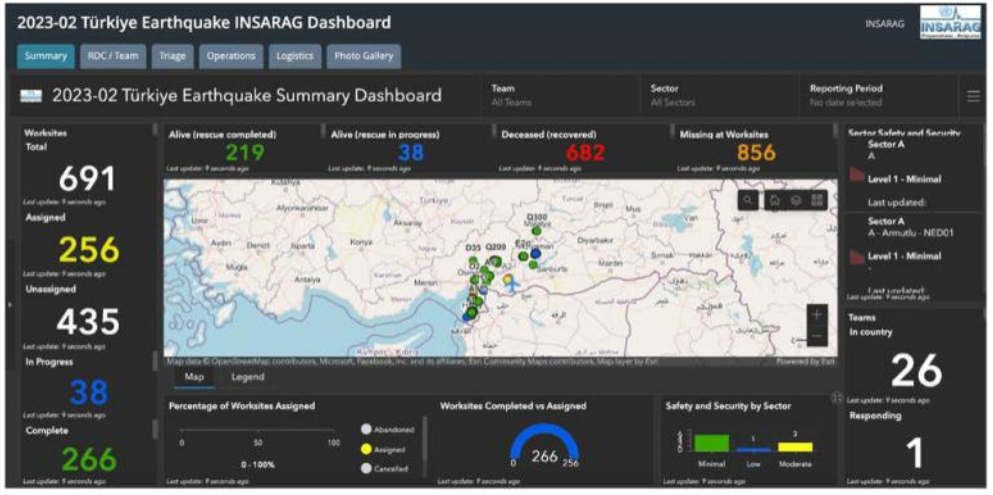
Evaluation of new technologies in SAR operations

1. What does it bring to the FR team in the field as added value in operational level?
2. What are its benefits and constraints in the tactical / technical level?
3. How does it relate to existing practices and similar assets already in use?
4. What is the integration and training plan in order to be fully operational?
5. *What is the purchase and maintenance cost for the team?*

Earthquake in Turkiye

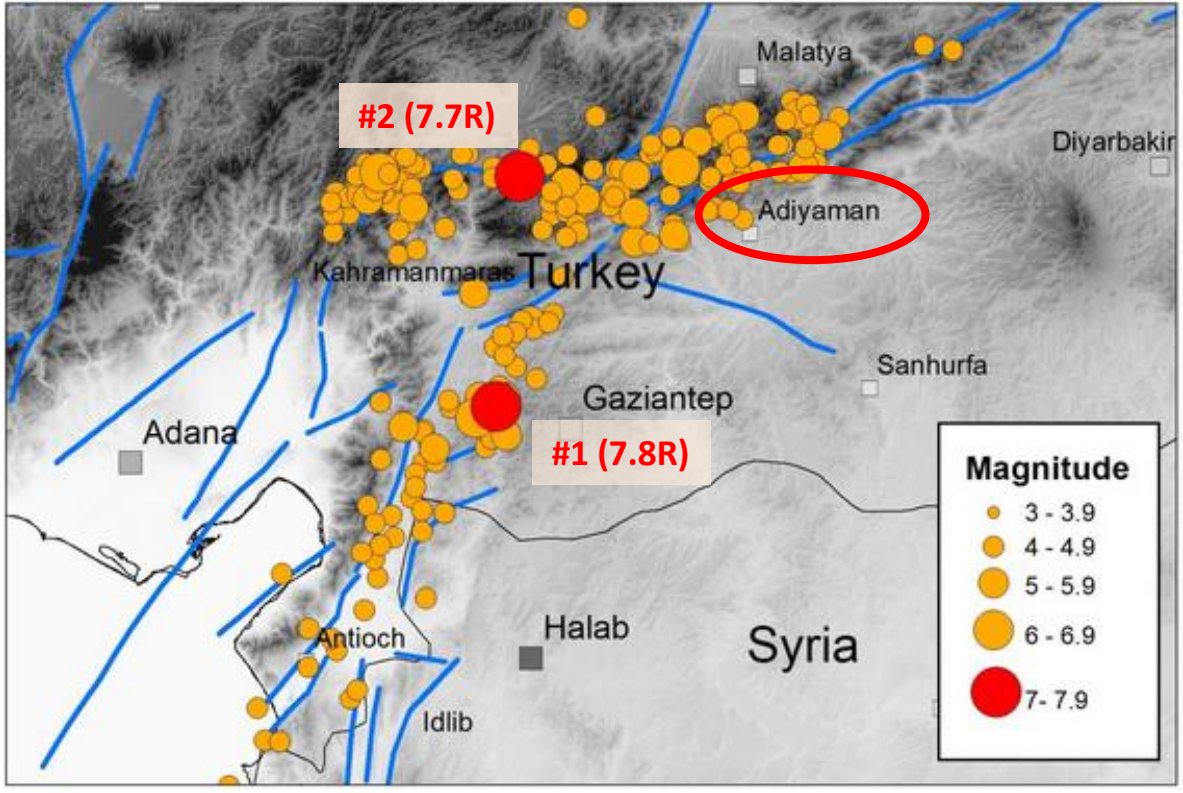
Earthquake in Turkiye





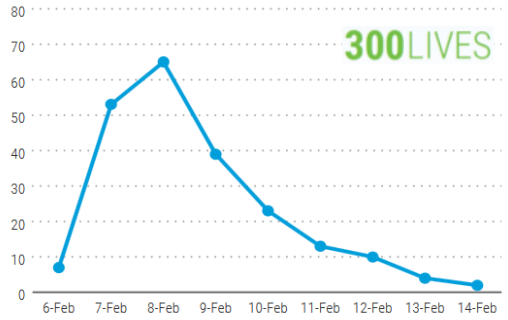
Dedicated to the brave search and rescue personnel who answered the call during the 2023 Turkey and Syria earthquakes. In honor of the victims, survivors, and all those affected – may their strength and resilience inspire hope for the future.

Earthquake in Turkiye



Source: British Geological Survey, UK

Figure 7: Live rescues reported by day

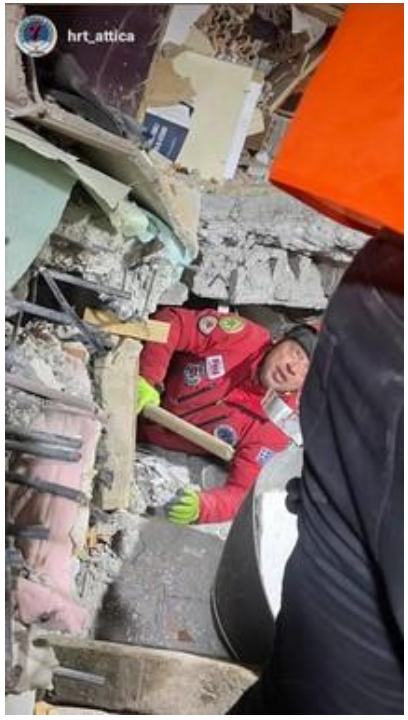


On 6 February 2023, at 04:17 local time, a magnitude 7.8 earthquake rumbled across southern and central Türkiye and northwestern Syria. Its epicenter was just 37km from the city of Gaziantep—a population center of more than 2 million people. A little over 9 hours later, at 13:24, a 7.7 magnitude earthquake struck 95km north of the first. The destructive force from the two earthquakes caused widespread damage across 350,000km2, an area about the size of Germany. In total, 59,259 people tragically lost their lives—50,783 in Türkiye and 8,476 in Syria.

Source: INSARAG

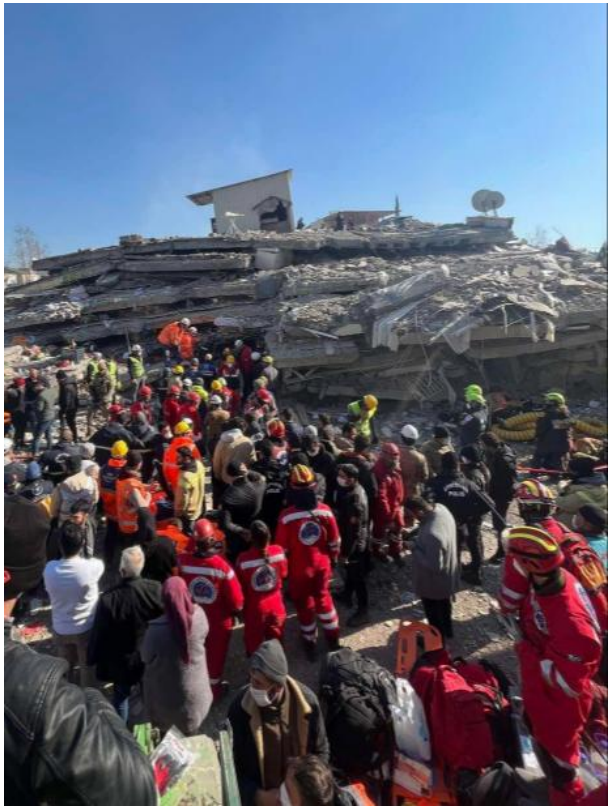
Earthquake in Turkiye

Earthquake in Turkiye



Earthquake in Turkiye

- Need for reliable communications inside the “hotzone”.
- Adaptive, fast logistics support for the teams.
- Reporting and support from the remote C&C (long-range).
- Contingency planning, highly adaptive deployment.
- Minimize exposure time, maximize distance from hazards.
- *AAA&R: “Capacity Building, Localization, Information Management, ...” (INSARAG)*



Train crash at Tempi (Greece)

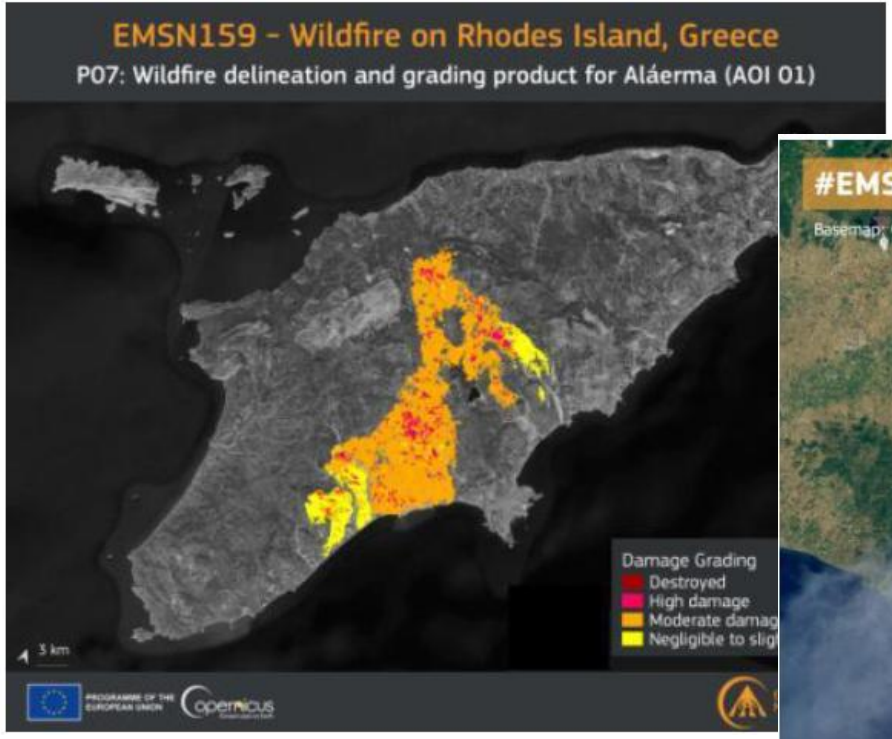
Train crash at Tempi (Greece)

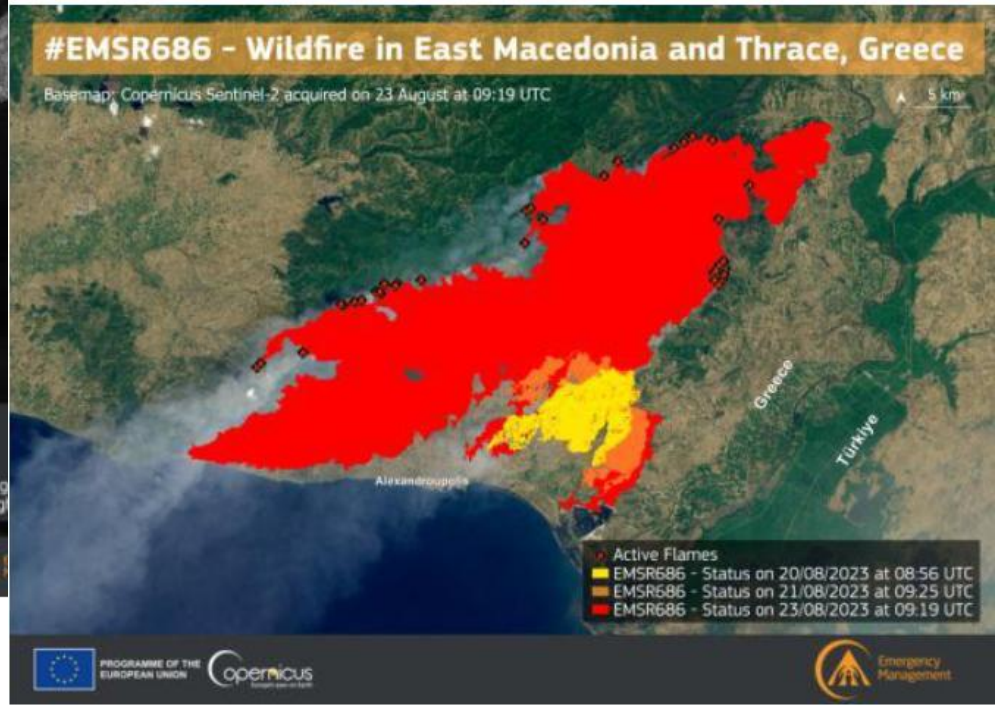
- Remote sensing was problematic (night, smoke, fire).
- Rapid victim extrication was crucial for survival rates.
- Mapping was fast, but highly dynamic (volatile hazards).

Figure 2. The crash site after the train collision near the villages of Tempi / Evangelismos in central Greece in Feb.2023 (Source: Euronews, CNN Greece, Wall Street Journal).

Wildfires in Attica (Greece)

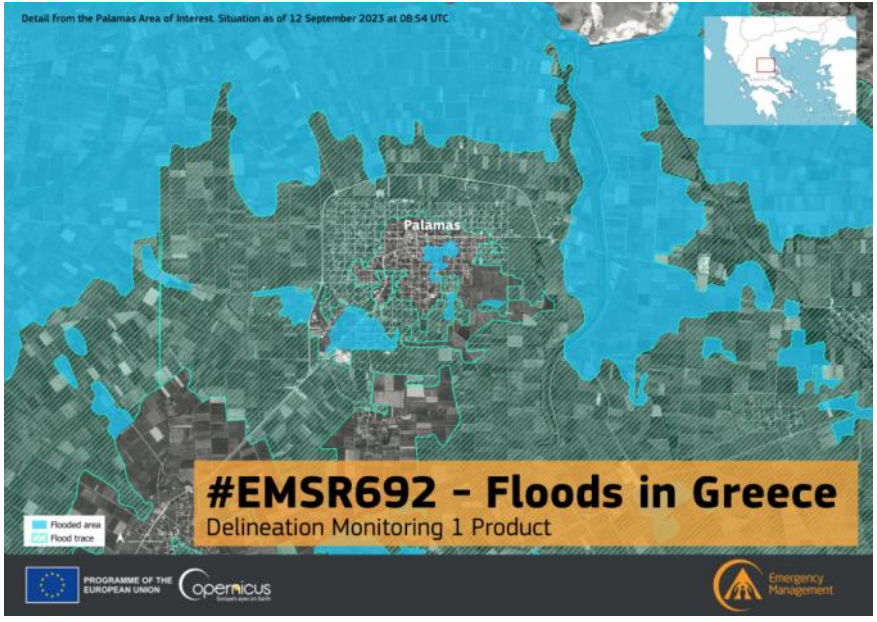
Wildfires elsewhere (Greece)





Flash floods in Thessaly (Greece)

- Rapid response initially to avoid immediate casualties from floods.
- Next 4+ days dedicated to extrication, provisions, medical assistance.



Flash floods in Thessaly (Greece)

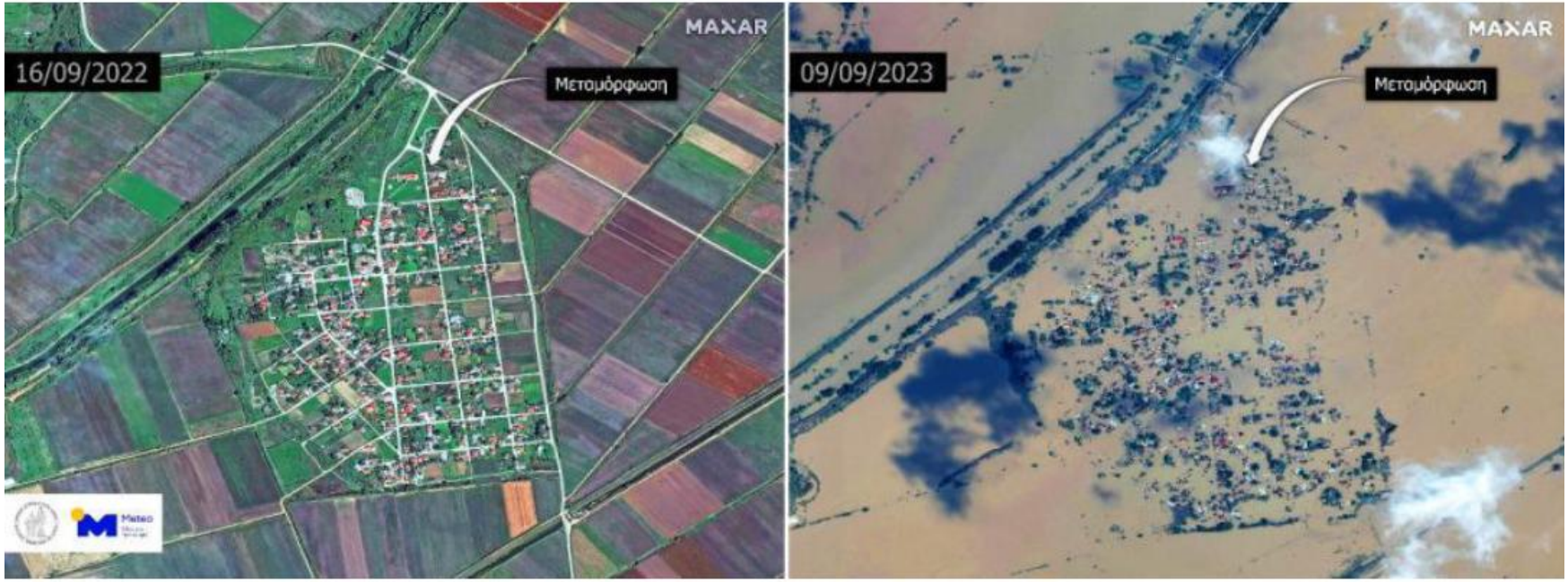


Figure 4. The village of Metamorfosi near Karditsa in central Greece, prior and after the floods in Sept.2023 (Source: National Observatory of Athens – NOA / meteo.gr)

Operational and Mission-Specific Issues identified

- ☒ Lack of Coordination and Perimeter Monitoring (see: Turkiye).
- ☒ Operational Shifts in Focus and Use of Assets (e.g. use of IR/NV/UAV).
- ☒ Citizens as Sensing Resources (see: “Citizen Observatories”).
- ☒ Process Improvement via Post-Mission Assessment (e.g. SPI in s/w).
- ☒ Spontaneous Volunteers (especially after the main event).
- ☒ The “Last Mile Gap” (provisions, access, information).
- ☒ Changes in First Aid Operations (e.g. need for field hospitals).
- ☒ **Areas of Need for New SAR Technologies.**

→ From INSARAG AAA&R, Turkiye-Syria earthquake: Flexible response (e.g. floods), use of telemedicine, drones, sensors, …

Areas of Need for New SAR Technologies

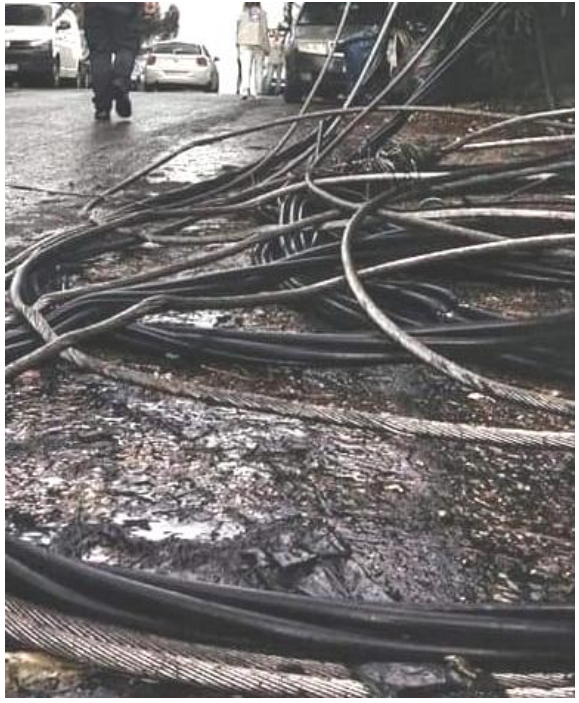
- FR safety at the personal level (gear, wearables, localization, biometrics).
- Team safety via hazard mapping, coordination, monitoring.
- Area assessment, marking, dynamic mapping, movement coverage (especially indoors).
- Fast automated visual screening of images, videos, maps (for victims and hazards).
- Remote sensing via multiple modalities (visual, chemical, sound, seismic, etc).
- Remotely operated or fully autonomous robots, putting distance between FRs and the scene.
- Automated access routing and navigation for the FR team.
- Mini-robotics & soft-robotics, used for specific tasks (e.g. search shafts).
- Victim detection, localization, access discovery, medical assessment.
- Indoor positioning & tactical communications (intra-team and team-C3).
- Augmented situational awareness for the FR team via VR/AR tools.

Flexibility /adaptability and ASR levels	Use scenarios and inputs that highlight the importance of decision-making process at all stages (i.e., Include situations that forces decisions where possible ASR levels happen simultaneously)

Source: INSARAG (AAA&R, Turkiye-Syria earthquake)

What is needed: Remote Sensing

What is needed: Team localization & hazard mapping



What is needed: Live event monitoring (floods)

What is needed: Live event monitoring (wildfires)

Recommendations for R&D projects in SAR

- ☑ **Early end-user involvement:** Involving the FR organizations in the process from day one, not just as end-users defining top-level requirements and assessing the final products in piloting activities.
- ☑ **Expectation management:** Find a common ground between the sets of expectations from both sides, end-users and technology experts.
- ☑ **Extensive field trials:** There is a large gap to cover between FRs and technology experts to transform lab prototypes into field-capable SAR toolkits that can be assessed and validated for real-world operations.
- ☑ **Standardization and interoperability:** New tools have to be completed or at least progressed towards final stages, before they can be fully integrated in the toolbox and assets of operational SAR organizations.

SYNERGISE

- SYNERGISE will design, develop, integrate, deploy, test, validate and demonstrate a Novel Integrated Toolkit for Collaborative Response and Enhanced Situational Awareness (NIT-CRES), at the service of response agencies which ensures an upgrade to managing of complex incidents.
- The ultimate aim of the project is to empower First Responders by unveiling an innovative toolkit, enhancing incident management and response efficiency.
- Participants: 15 (EU, Japan, S. Korea, USA)
- Duration: Sept'23 – Feb'27

SYNERGISE

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Related paper:

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