2023 - 2026

Capability Gaps

EXECUTIVE REPORT

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DIREKTION Project

The number and severity of disasters are increasing in Europe, due to climate change, ageing of industrial facilities and infrastructures, geo-political instability, poor knowledge management for critical activities and the vulnerability of the population exposed (density, age, migration…). To face these challenges, firefighters, rescuers, emergency medical responders and civil protection staff, have to implement effective and affordable solutions to support their operations. The DIREKTION project has established and implemented mechanisms and procedures to enhance knowledge sharing by directing the development of innovative technologies answering the needs of practitioners and policymakers. The steering role of international organisations (CTIF, FEU) and end-users in the project guarantees useful and practical results.

The project has started with the deployment of tools assessing the relevance and interoperability of innovative technologies developed by EU Horizon projects. A structured analysis of needs and gaps and the screening of potential solutions has then been undertaken. The procedures have used the outcomes of projects like FIRE-IN, DRIVER+ / CMINE, MEDEA, the pilot for the Network of European Hubs for Civil Protection and Crisis Management and has followed the taxonomy of the EU security market study to ensure a structured use of results. Based on the capability-driven evaluations and a detailed analysis of the opportunities and constraints for the uptake of innovative solutions, DIREKTION has established priorities for future research programming and capacity building. Moreover, the project continues to further establish networking and dissemination opportunities of interest for the DRS community in close collaboration with existing communities of users. They involve industry, SMEs & start-ups, research organizations and practitioners, at EU and national levels. DIREKTION strengthens current practice and future research and innovation planning in disaster resilience.

Introduction

Work Package 2 (WP2) of the DIREKTION project provides a structured assessment of capability needs and gaps across European DRS capabilities. The analysis was conducted in three consecutive cycles and is grounded in a combination of responder-driven inputs, systematic gap analysis and the screening of existing research and innovation outcomes. D2.1 established a baseline of existing gaps based on consultations with responder organisations, analysis of operational practices and a review of relevant EU-funded projects. D2.2 refined and prioritised the gaps that remained unresolved through additional stakeholder engagement and iterative validation. D2.3 extended the analysis towards future challenges and capability needs by incorporating foresight elements, emerging risk trends and long-term technological developments looking ahead to 2035 and beyond. Together, these reports offer a comprehensive and forward-looking picture of where responder capabilities need to evolve.

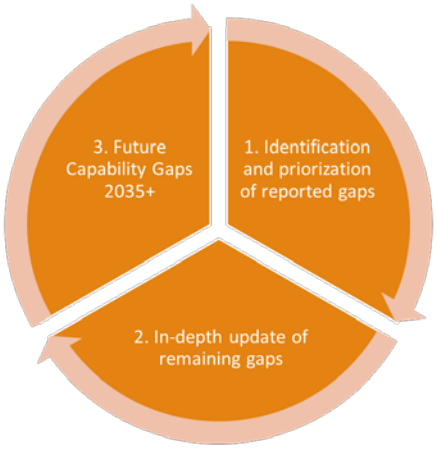


Figure 1: Screening and Mapping of Capability Gaps

1 Existing Current Capability Gaps

The first cycle focused on identifying current capability gaps based on consultations with responder organisations and an assessment of existing solutions, including outcomes from EU-funded research and innovation projects. This phase aimed to create a shared understanding of operational, technological and organisational shortcomings.

Key gaps identified included:

- Limited interoperability and information sharing between responder organisations and across borders.
- Slow uptake of innovative technologies, often due to lack of maturity or operational fit.
- Limited situational awareness, especially in complex or indoor environments.
- Insufficient situational awareness tools integrating multiple data sources.
- Gaps in training and skills, particularly regarding digital tools and new technologies.
- Responder health, safety and sustainability are insufficiently addressed.

2 Remaining Prioritised Gaps

Building on the initial findings, the second cycle revisited the identified gaps through deeper stakeholder engagement and prioritisation exercises. The objective was to understand which gaps persisted despite ongoing initiatives and why they continued to pose challenges for responder communities.

The analysis highlighted several persistent priority gaps:

- Ongoing interoperability challenges due to fragmented systems and lack of common standards.
- Insufficient collaboration between responders, technology providers, researchers and other stakeholders.
- Limited validation, testing and certification pathways for new technologies.
- Resource and capacity constraints affecting the adoption of innovative solutions.

3 Future Capability Gaps and Challenges for 2035+

The third cycle adopted a forward-looking perspective, incorporating foresight methods, emerging risk analyses and technology trend assessments. This cycle aimed to anticipate future capability gaps driven by climate change, digital transformation, societal expectations and increasing system complexity.

Key future-oriented gaps include:

- Capabilities to manage increasingly complex and cascading disaster scenarios.
- Readiness to integrate artificial intelligence and advanced data analytics into decision-making.
- Understanding and managing interdependencies of critical infrastructures.
- Long-term workforce development to ensure digital skills and adaptability.

Consolidates Capabilty Gap Themes Across all Cycles

When viewed together, the three WP2 cycles reveal a set of cross-cutting capability gap themes that consistently affect disaster response effectiveness across Europe.

Across the three analysis cycles of WP2, the identified capability gaps consistently converge into six overarching themes. These themes emerge from the synthesis of detailed operational gaps identified in D2.1, the prioritisation and validation of unresolved gaps in D2.2, and the forward-looking assessment of future challenges in D2.3. Together, they reflect both current shortcomings and structural challenges that are expected to persist or intensify in the coming decades.

First, interoperability and information sharing remain a fundamental challenge across all cycles. This theme originates from recurrent findings in D2.1 related to fragmented communication, incompatible systems and unclear information flows between agencies and jurisdictions. D2.2 confirms that these gaps persist as priority issues, while D2.3 highlights that increasing system complexity will further amplify interoperability challenges if not addressed systematically.

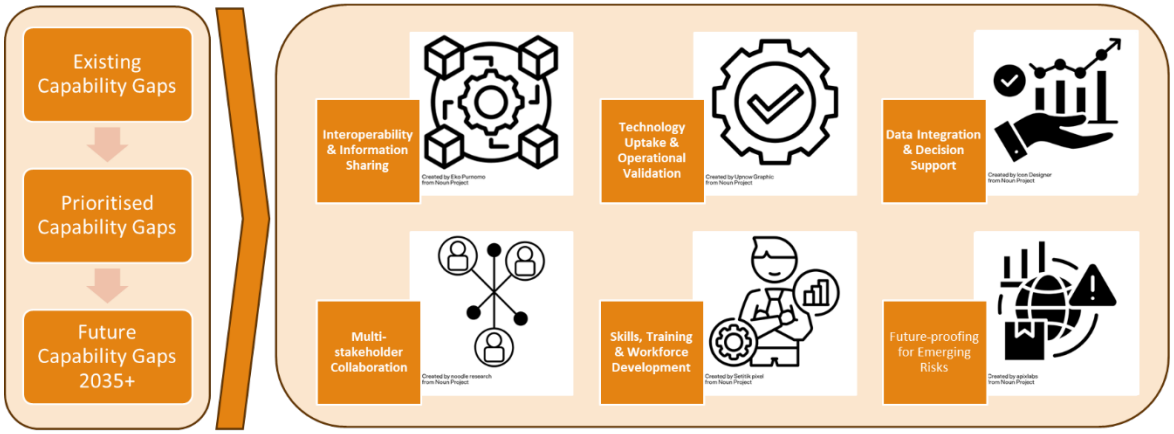
Second, technology uptake and operational validation emerge as a critical theme, rooted in the observation that many innovative solutions exist but are not effectively adopted by responder organisations. D2.1 identifies barriers related to maturity, usability and operational fit, while D2.2 highlights the lack of structured validation, testing and certification pathways. From a future perspective, D2.3 underlines the need for trusted and field-ready technologies to support increasingly complex response scenarios.

Third, data integration and decision support represent a cross-cutting capability gap throughout all three cycles. Initial findings in D2.1 point to limited situational awareness due to fragmented or overwhelming data streams. D2.2 reinforces this by identifying persistent difficulties in integrating and validating data from multiple sources. Looking ahead, D2.3 stresses that effective decision-making will increasingly depend on advanced analytics, real-time data integration and explainable decision-support tools.

Fourth, multi-stakeholder collaboration is identified as a structural capability gap, reflecting the growing need for coordinated action between responders, authorities, industry, researchers and citizens. While D2.1 highlights challenges in coordination and role clarity, D2.2 shows that collaboration gaps remain a priority, particularly in the context of innovation uptake and joint operations. D2.3 further expands this theme by emphasising the importance of inclusive governance models to address complex and systemic risks.

Fifth, skills, training and workforce development form a recurring theme across all cycles. D2.1 identifies gaps in training related to new technologies and complex operational environments. D2.2 confirms that insufficient skills and limited joint training opportunities hinder effective collaboration and technology adoption. From a long-term perspective, D2.3 highlights the growing need for continuous upskilling, digital literacy and adaptive training models to prepare responders for future challenges.

Finally, future-proofing capabilities for emerging risks captures the forward-looking dimension of the WP2 analysis. While D2.1 and D2.2 primarily focus on current and near-term gaps, D2.3 extends the assessment to long-term challenges driven by climate change, cascading crises, digitalisation and societal change. This theme underscores the need for anticipatory capability development and strategic planning beyond immediate operational needs.



So What? — Strategic Implications

The identified capability gaps have clear strategic implications. Addressing them requires coordinated action across policy, research, innovation and operational domains. Investments in interoperability standards, joint validation environments, continuous training and long-term capability planning are essential to ensure that European responder communities remain effective, resilient and prepared for future challenges.

Discover more by reading the full deliverables:

- D2.1 Description of existing gaps (1st cycle)
- D2.2 In-depth update on remaining prioritized gaps
- D2.3 Description of future challenges and gaps for 2035+ (3rd cycle)

https://www.direktion-network.org/results