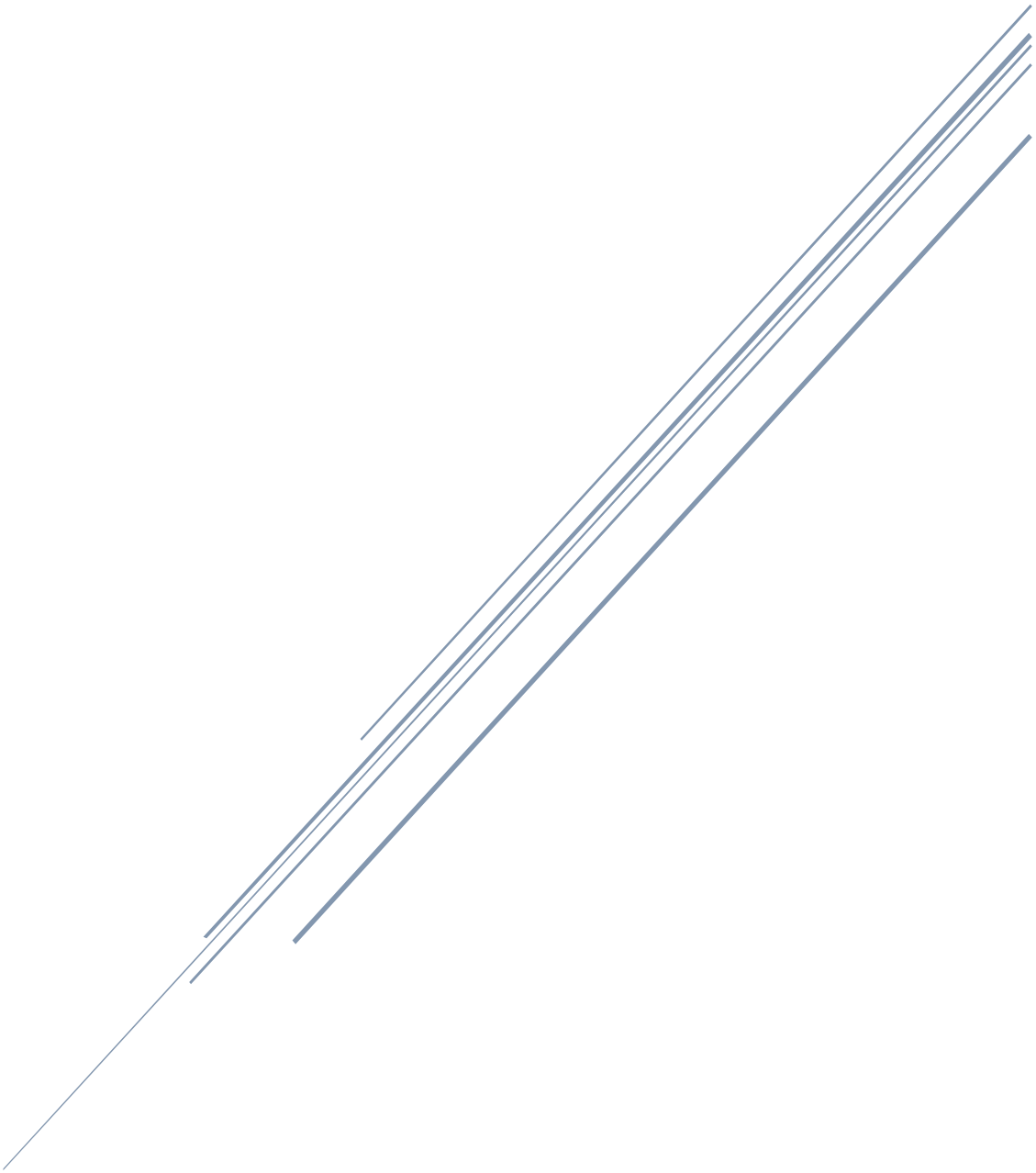
Interreg Co-funded by the European Union

Italy – Croatia

REALIST

# D1.1.1 MAPPING REPORT ON EXISTING EWS



Author: Innovation and Development ltd

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# 1. Executive summary

This document provides a structured “as-is” mapping of operational Early Warning Systems (EWS), related policies, and supporting platforms/instruments currently used for climate risk management across the Interreg Italy–Croatia Programme Area within the REALIST project. It consolidates partner-provided information into a comparable overview of the legal and institutional frameworks underpinning EWS operation and their links to relevant EU policy orientations, core EWS functional features and alerting practices, associated actions and communication fluxes (institutional and public-facing at a high level), and an inventory of available instruments and IT platforms used for monitoring, forecasting, alert dissemination, and operational support.

The mapping is developed under Activity 1.1 Mapping and benchmarking of existing EWS, policies and platforms and is based primarily on a structured partner questionnaire and consolidation into standardised reporting formats. The document is intentionally descriptive and evidence-based: it reports information explicitly available from partner inputs and documented sources. Where specific elements are not provided, they are marked as “Not specified in available sources” to avoid assumptions. The analysis is limited to practices relevant to the Programme Area and does not attempt to evaluate technical performance beyond what is necessary to interpret system characteristics and operational readiness at a baseline level.

Overall, the mapping confirms that partner territories operate within multi-level EWS ecosystems that combine technical monitoring/forecasting functions with civil protection preparedness and response arrangements. Partner inputs indicate that EWS implementation commonly relies on a combination of meteorological and hydrological information services, established operational procedures for alerting, and a mix of dissemination channels (e.g., official bulletins/portals, institutional channels, and locally implemented public communication mechanisms). The degree of detail and maturity described varies across territories, reflecting differences in mandates, institutional roles, and reporting visibility. In several cases, partners contribute to the EWS ecosystem primarily through coordination, support, research, or operational response roles rather than as alert-issuing authorities; these contributions are captured accordingly.

This document is designed to be used together with document Mapping of the governance and decision-making structures activated during an EWS alert, which maps the governance and decision-making chain of command activated during an EWS alert. While document Mapping of the governance and decision-making structures activated during an EWS alert focuses on “who decides and who activates”, this deliverable focuses on “what systems and tools exist, how they function operationally, and what communication and platform arrangements support them”. The combined baseline provides the foundation for subsequent

WP1. Benchmarking and assessment of existing Early Warning System (EWS) work on

identifying gaps and missing elements and formulating harmonisation and upgrade recommendations for a more cohesive and interoperable EWS landscape across the Adriatic area.

# 2. Purpose, scope, methodology, data limitations

This chapter outlines why this document is produced within project REALIST, WP1. Benchmarking and assessment of existing Early Warning System (EWS) and defines its scope within the Programme Area. It also describes the structured data collection and consolidation methodology applied to map existing EWS, policies and platforms, and clarifies the data limitations and interpretation rules used to avoid assumptions and ensure cross-territory comparability.

## 2.1 Purpose

This document provides a consolidated overview of the current Early Warning Systems (EWS) used within the Programme Area, as implemented across the territories of the REALIST project partners. In line with Activity 1.1 Mapping and benchmarking of existing EWS, policies and platforms, the report documents the "as-is" situation in terms of:

- the legal and policy context underpinning EWS operation;
- the core operational features of existing EWS (risk levels, methodologies, update and termination practices, where specified);
- the main actions and communication fluxes through which warnings are disseminated to institutions and, at a high level, to the public;
- an inventory of instruments and IT platforms supporting EWS operation and warning dissemination.

The mapping establishes a baseline for structured comparison across the Programme Area and supports subsequent WP1. Benchmarking and assessment of existing Early Warning System (EWS) work on identifying gaps and improvement opportunities, including recommendations for harmonisation and upgrading.

## 2.2 Scope

The mapping focuses exclusively on operational practices and tools used within the Interreg Italy–Croatia Programme Area, based on information provided by project partners and, where applicable, the competent organisations they consulted.

The report maps "what exists and is used" in partner territories, covering:

- Risk classification and warning levels (e.g., colour codes, phases, criticality levels, where used);
- Operational methodology (monitoring, forecasting, validation, warning issuance, dissemination, update cycles, and termination logic, where specified);
- Actions and communication fluxes (institutional dissemination chains and high-level

public/last-mile arrangements, where described);

- Instruments and IT platforms (monitoring and forecasting tools, dashboards, dissemination tools, official portals/channels, and repositories).

This deliverable is descriptive and baseline-oriented. It does not assess technical performance in depth and does not define new standards. Governance and decision-rights mapping is addressed in the complementary deliverable "Mapping of the governance and decision-making structures activated during an EWS alert", while this document focuses on existing EWS features, operational approaches, and enabling instruments/platforms.

## 2.3 Methodology

The report is based on a structured data collection process implemented through a standardised questionnaire distributed to all project partners. The questionnaire was designed to gather comparable information on existing EWS arrangements in use across the Programme Area, including system characteristics, warning levels, operational procedures, dissemination practices, and enabling instruments and platforms.

Partners completed the questionnaire directly and/or in coordination with relevant competent authorities and operational stakeholders responsible for EWS operation and civil protection/emergency management within their territories. Responses were consolidated into a common analytical structure to support comparability across different institutional settings.

The mapping and consolidation process followed four steps:

1. Collection and screening: responses were collected and screened for completeness against a minimum dataset required for this deliverable (legal/policy anchoring, warning levels, core operational flow, dissemination channels, and instrument/platform inventory).
2. Standardisation: answers were harmonised into a common reporting format (territorial fiches and inventory tables) using shared functional categories (e.g., monitoring/forecasting, warning levels, institutional dissemination, public-warning arrangements, and IT platforms).
3. Consistency checks: internal consistency was reviewed to ensure that described warning levels, channels, and operational flows do not contradict each other within a given territory. Where inconsistencies or ambiguities remained, they are reported descriptively rather than interpreted.
4. Benchmarking preparation: information was organised into summary tables to enable cross-territory comparison of warning-level taxonomies, dissemination channels, and platform categories.

## 2.4 Data limitations and interpretation rules

This document reflects the availability and detail level of partner-provided inputs. Partners differ in mandate and proximity to EWS operation: some operate as competent authorities (or are directly connected to them), while others contribute primarily as responders, support organisations, or research/coordination partners. As a result, the completeness and granularity of reported information vary.

To ensure transparency and avoid assumptions, the following interpretation rules apply:

- "Not specified in available sources" indicates that the requested information was not explicitly provided in partner inputs or that the partner indicated limited visibility/mandate to report on that element. The report does not infer missing values from other territories or from general national descriptions unless explicitly referenced by the respondent.
- "Not applicable" is used where a partner's role does not include that function (e.g., partners that do not issue warnings or do not operate dissemination platforms).
- Where information is partially provided, the report uses qualified statements (e.g., "as reported by partner") and records uncertainties as such rather than filling gaps.
- Differences in terminology (e.g., colour levels, phases, names of centres/rooms, platform labels) are treated as system features, not errors. Local terminology is preserved and, where feasible, presented in a simple functional crosswalk to support comparability.

The mapping is intended as a baseline snapshot of current arrangements in the Programme Area and provides structured input for subsequent WP1. Benchmarking and assessment of existing Early Warning System (EWS) work on gaps, missing elements, and harmonisation opportunities.

# 3. Legal & policy framework

This chapter summarises, at a high level, how Early Warning Systems (EWS) are formally anchored in Italy and Croatia within the Programme Area. It focuses on: the main legal and policy references reported by partners, and the functional allocation of mandates relevant to EWS operation (technical warning production, civil protection coordination, and warning dissemination). The overview is based on partner questionnaire inputs and therefore reflects legal references and institutional roles explicitly reported by partners. It is not intended as a comprehensive legal review.

## 3.1 Italy: national framework with regional operationalisation

Across the Italian partner territories, the EWS legal basis is consistently described as a national civil protection framework implemented through a distributed warning system, with national coordination and clearly defined regional operational responsibilities.

A recurring reference is Legislative Decree 1/2018 (Civil Protection Code), which frames civil protection functions (including warning systems) and clarifies responsibilities across the State, Regions, and Municipalities.

For hydro-meteorological, hydrogeological and hydraulic risks, partners repeatedly identify the Prime Minister's Directive (DPCM) of 27 February 2004 as a cornerstone of the national warning system, establishing roles and functional relationships and defining the network of Functional Centres (Central Functional Centre at national level and Decentralised Regional Functional Centres).

At regional level, the mandate is reported as being operationalised through region-specific regulatory acts and procedures. Examples reported by partners include:

- Emilia-Romagna, which references a dedicated regional act defining organisational and functional management of the regional alerting system (including colour-coded criticality and operative phases);
- Veneto, which references regional regulation through a regional council resolution and subsequent modifications;
- Puglia, which references a regional civil protection system law and associated operational acts defining the Regional EWS, the Decentralised Functional Centre, and standard alert procedures by colour code and operational phase.

Across Italian inputs, the legally anchored system typically includes:

- the Department of Civil Protection (national level) and the Central Functional Centre (strategic coordination and national integration);

- Regional civil protection structures and Decentralised Functional Centres (forecasting, monitoring, and production of alert bulletins);
- Prefectures and municipal authorities (implementation and territorial coordination functions, including last-mile arrangements and activation of local procedures, as applicable).

Where referenced in partner inputs, the Italian framework also includes an institutional interface to national public warning mechanisms (e.g., IT-Alert) as a bridge between alerting procedures and public warning.

## 3.2 Croatia: national mandate through the 112 system and specialised technical authorities

Croatian partner inputs describe an EWS framework where national legislation defines roles for civil protection coordination, specialised technical warning authorities, and structured public alerting procedures. A common reference is the Civil Protection System Act (with amendments), which defines organisation, coordination, and responsibilities for early warning and emergency management.

Partners also identify additional mandate-defining acts for key technical authorities:

- The Meteorological and Hydrological Activities Act, assigning DHMZ responsibilities for producing and disseminating weather- and hazard-related warnings;
- The Water Act, assigning Croatian Waters responsibilities for flood risk monitoring, warning procedures, and related measures.

The Croatian framework is also described as including sub-legislation (rulebooks) regulating public alerting procedures and channels, including siren signals and procedures for alerting the population and transmitting early warnings and instructions via multiple channels (e.g., sirens, media, web-based publication, and SMS-based systems), as reported by partners.

Mandated actors (functional view). Questionnaire responses consistently identify:

- the Civil Protection Directorate (Ministry of the Interior) as the lead coordinator for alert activation/routing through the 112 system;
- DHMZ (meteorological and hydrological warnings) and Croatian Waters (flood-related warning functions);
- county and municipal civil protection headquarters as territorial implementing structures for local activation and dissemination through civil protection plans.

## 3.3 Connection to EU principles and frameworks

Partner responses explicitly connect national/regional arrangements to EU and international principles relevant for civil protection, disaster risk reduction, and climate-risk preparedness, supporting a common policy baseline for Programme Area mapping.

**Union Civil Protection Mechanism (UCPM)**

Italian and Croatian inputs refer to alignment with UCPM principles and the ability to cooperate with EU-level coordination mechanisms during major emergencies. Emilia-Romagna explicitly mentions interaction with UCPM-related coordination (including ERCC) in the reported framework context. Croatian partner inputs similarly refer to cross-border alerting/data sharing and participation in EU-level initiatives, as reported in the questionnaire responses.

**EU Floods Directive (2007/60/EC)**

Multiple Italian partner inputs identify the Floods Directive and its national implementation as a relevant policy anchor for flood risk mapping and flood risk management planning, influencing warning-related procedures and operational practice.

**Sendai Framework for Disaster Risk Reduction**

Partners in both countries reference Sendai principles (risk understanding, governance, preparedness, multi-hazard early warning) as reflected in national frameworks and operational practice, including the role of scientific competence and risk knowledge.

**Use of EU-level services and cooperation channels**

Where noted in partner inputs, interoperability and operational linkages with EU-level services/platforms (e.g., Copernicus EMS) and cooperation mechanisms are captured as part of the broader operational context.

## 3.4 Implications for the Programme Area mapping

Overall, partner inputs confirm that EWS operation in the Programme Area is anchored in multi-level civil protection governance, with technical warning generation and validation embedded in mandated scientific/technical bodies and dissemination and operationalisation routed through civil protection structures. Reported linkages to EU principles and frameworks (UCPM, Floods Directive, Sendai, and EU-level services where referenced) provide a common policy context for benchmarking and for identifying interoperability-relevant improvement areas, while respecting national and regional competences.

# 4. Current EWS features in the Programme Area

This chapter summarises the main operational features of Early Warning Systems (EWS) reported as in use within the Programme Area, based on partner questionnaire inputs. It consolidates: risk classification and alert levels, and the typical operational workflow from monitoring through validation, warning issuance/publication, dissemination, updates, and termination. The chapter describes “what exists and is used” at a functional level; governance decision-rights and chain-of-command aspects are addressed in the complementary document Mapping of the governance and decision-making structures activated during an EWS alert.

## 4.1 Risk classification and alert levels across the Programme Area

Across the Programme Area, partners report that EWS commonly classify risk using predefined territorial units (e.g., alert zones, basins, or municipal areas) and communicate severity through standardised alert levels. Many partner territories use colour-coded levels (often green/yellow/orange/red). However, the operational meaning (e.g., which preparedness measures are triggered and how escalation is managed) may vary by hazard, territory, and governance level and is therefore described here only where explicitly reported in partner inputs.

Partner inputs indicate that Italian regional systems generally apply a nationally harmonised colour criticality logic, implemented through Regional Functional Centres and civil protection structures. Alert levels are typically published in official bulletins and, where specified, linked to operational phases (e.g., attention, pre-alert/pre-alarm, alert/alarm) that guide readiness and coordination measures. In several regions, dissemination to institutional recipients is supported through official portals and direct notification channels, as reported by partners.

Croatian partner inputs describe a multi-hazard national early warning ecosystem in which specialised technical authorities provide hazard warnings (e.g., meteorological/hydrological and flood-related warnings), while civil protection and emergency communication structures support routing and dissemination to counties, municipalities, responders, and the public. Colour-based warning practice is reported for meteo-related warnings; flood-related readiness may also be reflected through operational phases and locally implemented measures, where specified. Public warning and last-mile communication are implemented through a mix of national and local channels, as described in available sources.

To support consistent reporting, Table 1 provides a pragmatic terminology bridge based on labels commonly referenced in partner inputs. It does not imply full equivalence of legal effects or mandatory actions and is used only for functional comparability in this deliverable.

*Table 1. Pragmatic alert-level terminology bridge (Italy–Croatia, functional reference)*

| Common label (for this report) | Italy – typical meaning in partner inputs | Croatia – typical meaning in partner inputs |
|---|---|---|
| **Green / No alert** | No alert or routine monitoring baseline (where used). | Green level in colour-coded warning practice (where used). |
| **Yellow / Low–ordinary** | Ordinary/low criticality; minimum activation may start (e.g., "Attention", where reported). | Yellow level in colour-coded warning practice for heightened awareness (where used). |
| **Orange / Moderate** | Moderate criticality; escalation to "Pre-alert/Pre-alarm" type posture (where reported). | Orange level in colour-coded warning practice for significant expected impacts (where used). |
| **Red / High** | High criticality; "Alert/Alarm" posture expected, with intensive coordination (where reported). | Red level in colour-coded warning practice for very high expected impacts (where used). |

Note: In several Italian systems, partners report an explicit link between alert level and operational phase in procedures, whereas Croatian inputs often describe parallel hazard-specific streams (e.g., meteo warnings vs. flood-related warning/readiness) and multi-channel dissemination with strong local implementation. Where a partner did not specify the operational meaning of a level, this deliverable does not infer it.

## 4.2 Operational methodology

Despite organisational differences, partner inputs describe an operational cycle that can be mapped consistently across the Programme Area. The steps below provide a structured summary of the most common EWS workflow as reported, focusing on functional operations rather than decision-rights.

**Step 1: Monitoring and data acquisition**

EWS operations rely on combinations of observation networks (including telemetry), radar and/or satellite products, and model outputs. These inputs support situational awareness and detection of early signals requiring further assessment.

**Step 2: Validation and interpretation**

Forecasts and observations are checked for plausibility and interpreted in terms of expected impacts. In several territories, threshold-based logic is complemented by expert judgement (e.g., antecedent conditions and local exposure factors), where reported.

**Step 3: Classification into alert levels (and, where applicable, operational phases)**

Validated information is translated into an alert classification (criticality level). In systems using operational phases, partners report that the alert level may be accompanied by a phase indication or recommendation guiding preparedness posture.

**Step 4: Issuance and publication of official products**

Where applicable, alert status is formalised through official bulletins/messages and published on recognised platforms. This provides an authoritative reference for institutional recipients and supports coherent downstream communication.

**Step 5: Dissemination (institutional notification and public last-mile at high level)**

Institutional dissemination is typically routed through structured channels to authorities, responders, and municipalities. Public communication is frequently implemented at the municipal level using locally appropriate channels, while remaining anchored in official alert products, where described in partner inputs.

**Step 6: Updates, downgrade/termination, and closure**

Several territories treat warnings as a managed process, issuing updated bulletins or notifications as conditions evolve. Downgrading and termination are implemented through updated bulletins and stand-down communication, where described. Where post-event review/learning practices are referenced, they are noted at a high level without assessing effectiveness.

## 4.3 Baseline feature set for consistent reporting

Based on collected inputs, the following elements recur across most territories and are used as a baseline set for consistent reporting in territorial fiches and inventory tables:

- Alert levels used: colour scale/number of levels and any hazard-specific scales (where specified).
- Territorial reference unit: alert zones, basins, municipal areas, and typical evaluation frequency (e.g., daily bulletins), where reported.
- Classification logic: threshold-based components and any expert-judgement overlays, where described.

- Official products issued: bulletin/message types and publication points (portals/platforms), where reported.
- Dissemination pattern: institutional channels versus public last-mile arrangements (national and local channels), where described.
- Update and termination approach: whether updates are issued as conditions evolve and how downgrades/closures are communicated, where specified.

*Note:* Governance arrangements for authorisation, escalation, and command-chain activation during an alert are mapped in document Mapping of the governance and decision-making structures activated during an EWS alert and are not duplicated here.

# 5. Actions & communication fluxes

This chapter describes how warnings and alerts are translated into actions and communicated across the Programme Area, focusing on the end-to-end communication flux from technical alerting to institutional notification and public warning. In line with the scope of this document, the chapter is process- and channel-oriented and does not re-map governance decision rights, which are analysed in the complementary document Mapping of the governance and decision-making structures activated during an EWS alert. Where relevant, this chapter points to document Mapping of the governance and decision-making structures activated during an EWS alert as the reference for "who decides", and focuses here on "who receives what, through which channels, and what is typically triggered", as reported in partner inputs.

## 5.1 Institutional communication flow

Across Italian and Croatian partner territories, partner inputs describe an institutional communication chain that follows a broadly comparable logic:

1. Technical detection/assessment produces an official alert product (bulletin or message).

2. The alert is routed to civil protection operational structures (e.g., regional/county operative rooms, 112 structures).

3. Operational structures disseminate alerts to municipalities, responders, and sectoral actors (e.g., utilities, transport, critical infrastructure where applicable), enabling preparedness and response measures.

In Italian regional systems, institutional routing is commonly anchored in the Functional Centre network, where validated assessments are issued through official bulletins/messages and routed through regional civil protection operational structures, as reported by partners.

- Emilia-Romagna reports that official alert documents are published on the regional platform and distributed to institutional recipients via SMS and e-mail, with additional dissemination through the regional civil protection website.
- Marche and Molise describe a standard chain where the Functional Centre transmits the alert to the regional operative room, which then notifies actors and municipalities via PEC, SMS, and website publication.
- Veneto similarly reports dissemination from the Functional Centre through the operative room via PEC/SMS/website and highlights 24/7 support structures (e.g., SSV) that complement institutional routing during critical events.

- Puglia describes institutional dissemination via publication on the civil protection website and direct notification mechanisms, including PEC or fax and SMS to institutional stakeholders, with SOIR coordinating emergency communications and interfacing with Prefectures and municipalities.

These flows support timely situational awareness and enable activation of predefined procedures (e.g., duty shifts, monitoring escalation, mobilisation readiness, coordination briefings), as reported in available sources. The precise governance triggers and command structures differ by territory and are documented in document Mapping of the governance and decision-making structures activated during an EWS alert.

Croatian partner inputs describe a national system in which alerts and warnings issued by specialised technical authorities (notably DHMZ for meteorological warnings and Croatian Waters for flood-related warning functions) are operationalised and routed through civil protection coordination structures, including Centres 112 and civil protection headquarters at county and municipal levels.

- Partners reference multi-channel routing mechanisms, including SRUUK for mobile-device distribution of warning messages, alongside other institutional notification channels.
- At county/local level, civil protection headquarters and responder organisations (including fire services) receive alerts and implement operational measures according to local plans and established procedures (e.g., readiness escalation, field preparedness, resource allocation), as reported by partners.

## 5.2 Public warning and “last-mile” communication flow

Partner inputs indicate that public communication frequently follows a two-layer model:

- an official alert layer (regional/national bulletins and warnings accessible via official websites and distributed to institutions), and
- a last-mile guidance layer (municipal/local communication to residents, often including operational advice and geographically specific instructions).

This model enables local adaptation but can also create variability in reach and message consistency. These aspects are treated later in this report under gaps and missing elements (where applicable and as evidenced in available sources).

Italian partner inputs frequently position municipalities as key last-mile communication actors, for example:

- Emilia-Romagna notes that municipalities are responsible for warning the population and may use locally managed communication channels, sometimes complemented by citizen registration systems and direct messaging services.
- Puglia lists multiple last-mile methods (e.g., apps, sirens, social networks, variable message signs where available, volunteers, door-to-door support), including considerations for accessibility (e.g., tailored outreach for vulnerable groups), as reported by the partner.
- Veneto highlights that municipal authorities may adapt the operational phase locally and communicate protective measures, indicating strong local responsibility for public messaging in line with local operational needs.

Across these examples, public warning is not limited to publishing an alert bulletin; it combines visibility of official alert products with action-oriented guidance (self-protection measures, restrictions, evacuation readiness, shelter information, and risk-area avoidance), where described.

Croatian partner inputs describe public warning as a combination of nationally supported channels and local dissemination. Public alerting may include sirens, mass media (TV/radio), digital channels (official websites and social media), and mobile-based warning distribution through SRUUK (where activated).

Local authorities and local civil protection structures contribute to last-mile guidance for geographically specific risks and local measures.

Responder organisations (e.g., fire services) may also act as a last-mile interface during acute events by providing on-site information and coordinating with local authorities, as described in partner inputs.

## 5.3 Channel typology observed in the Programme Area

Based on partner inputs, the main channel categories used for institutional and public dissemination include:

- official web portals (regional civil protection / functional centre platforms; national warning portals);
- institutional messaging (PEC/e-mail, SMS, fax in some cases);
- operational coordination channels (operative rooms, duty phones, 24/7 contact numbers);
- public alerting channels (sirens, TV/radio, SRUUK mobile messages, municipal apps, social media);
- field-based last-mile methods (e.g., volunteers and door-to-door approaches in specific contexts).

For reporting purposes, these channel categories are captured in the inventory tables (Chapter 6), with partner-by-partner specification where provided.

## 5.4 Process view: typical actions triggered by alerts

Although activation decisions are governed by local command structures (documented in Mapping of the governance and decision-making structures activated during an EWS alert), partner inputs indicate a recurring set of actions commonly triggered once an alert is issued, such as:

- Escalation of monitoring intensity (more frequent updates and expanded duty hours);
- Activation/strengthening of operational rooms and coordination functions (including 24/7 posture in higher-severity events, where described);
- Institutional briefings and coordination calls (including interfaces with prefectures and municipalities where applicable);
- Mobilisation readiness for responders (fire services, municipal services, volunteers);
- Public guidance measures (risk-area avoidance, temporary closures, movement restrictions, and, in extreme cases, evacuation support), where reported.).

## 5.5 Implications for mapping and benchmarking

The mapping confirms that EWS communication in the Programme Area operates through structured institutional dissemination combined with decentralised last-mile public warning. This structure supports operational flexibility but creates benchmarking-relevant variability in channel mix, consistency of public guidance, and clarity of the interface between official bulletins and local instructions. These aspects are captured in the inventory and in the governance-focused mapping of document Mapping of the governance and decision-making structures activated during an EWS alert and provide a practical baseline for subsequent WP1. Benchmarking and assessment of existing Early Warning System (EWS) work on benchmarking and harmonisation opportunities.

# 6. Inventory summary: instruments & IT platforms

This chapter provides a consolidated, high-level inventory of the main instruments and IT platforms reported by Project Partners (PPs) as being used to support Early Warning Systems (EWS) in the Programme Area. The aim is to document the "as-is" landscape in a comparable way ("what exists and is used"), without providing deep technical descriptions or assessing performance.

The inventory includes only tools explicitly mentioned in partner questionnaire inputs. Where a partner refers to "national competent authorities' platforms" without naming a specific system, this is recorded as such. The label "Not specified in available sources" indicates that the relevant information was not provided in the available responses and/or is outside the mandate/visibility of the responding organisation.

Across Italian territories, partners consistently report:

- monitoring networks and modelling outputs managed within the Functional Centre / Civil Protection system;
- authoritative regional web portals used to publish bulletins and support situational awareness;
- institutional notification channels (e-mail/PEC and, in some cases, SMS), complemented by public-facing web publication and social media.

Several regions describe SMS-based procedures as being tested or partially implemented, while municipal-level apps may exist without full coordination at regional level, as reported in partner inputs.

Croatian partner inputs describe a nationally anchored toolset: meteorological warnings and forecasts (DHMZ) and hydrological monitoring and flood-defence phases (Croatian Waters, incl. HIROS databases), operationalised through the Civil Protection Directorate / 112 interfaces (incl. SRUUK and the 112 Information Management System) and implemented via county/municipal structures and responder organisations. Partner inputs also reference complementary local assets and projects (e.g., 193/ŽVOC firefighting operations interfaces, municipal channels such as websites/social media and sirens in selected locations, and EU-funded telemetry/GIS and Copernicus EMS mapping where applicable).

## 6.1 Consolidated inventory table (Programme Area)

| Territory / Partner | Main monitoring & data sources | Key processing / decision-support tools | Operational EWS platform(s) / dashboards | Institutional dissemination | Public / last-mile channels | Notes |
|---|---|---|---|---|---|---|
| **Emilia-Romagna (ARPAE)** | Hydro-pluviometric monitoring network; meteorological radar network | Numerical/statistical modelling (atmospheric, hydrological, meteo-marine/coastal); threshold-based triggering | https://allertameteo.regione.emilia-romagna.it | Portal-based distribution + institutional channels per regional procedures | Public access via the same portal (bulletins + real-time monitoring) | Single official web platform explicitly indicated by partner input |
| **Abruzzo (Regional Civil Protection)** | Official weather-station network visualised on a proprietary web-GIS platform (Polaris) | Regional alerting platform (restricted operators' section + public bulletin archive); myDewetra for soil saturation assessment | Regional alerting platform (public + restricted sections) | Certified e-mails / e-mails / SMS to predefined civil protection mailing lists | Official website + social media (Facebook) for citizens | Platform can receive citizen/field reports, though not activated (as reported) |
| **Marche Region** | Monitoring network feeding a dedicated database; modelling outputs for forecast/nowcasting | Web applications for visualisation; dedicated webGIS platforms (regional/national) | https://allertameteo.regione.marche.it/ | Website + text message/e-mail (institutional) | Phone calls, social media, website; SMS procedure reported as being tested | Municipal apps/systems may exist (coordination not specified in available sources) |

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|---|---|---|---|---|---|---|
| **Molise Region** | Monitoring network feeding a dedicated database | Web applications for visualisation; webGIS platforms for modelling outputs (regional/national) | PITAGORA website (collection/processing/dissemination) | Website + text message/e-mail/PEC (institutional) | Website; SMS procedure reported as being tested | Regional alert also visualised via national common platform WebAlert (as reported) |
| **Veneto Region** | Instrumental monitoring networks; ARPAV services supporting the Decentralised Functional Centre (CFD) | Dedicated database + web applications; modelling outputs visualised via webGIS (regional/national) | https://www.regione.veneto.it/web/protezione-civile/centro-funzionale-decentrato | PEC, SMS and website (towards civil protection actors and municipalities) | Not specified in available sources | Partner input indicates alignment with the common regional dissemination pattern; further channel detail not specified |
| **Puglia Region** | Multi-source observation data (radar, satellite, ground-based) accessed via national integrated tools | DEWETRA platform used for data collection/visualisation and operational reference | www.protezionecivile.puglia.it (bulletins, warnings, alerts, updates) | PEC/fax for official alert message; SMS notification to authorities that the document is published | Municipal last-mile tools (e.g., infoALERT365), web + Facebook/Telegram; sirens/loudspeakers; door-to-door supported by | Last-mile public warning is described as strongly municipal-driven; accessibility measures |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | volunteers/local police; local media via regional press office | referenced (as reported) |
| **Italy – system-level reference (ItaliaMeteo)** | Regional sensor networks feeding national databases (as reported) | NWP and specialised deterministic/statistical models (HPC); oceanographic/storm surge models (coastal hazards) | Civil Protection Network proprietary platforms linking DPC and regional Functional Centres (CFRs) | Secure DPC/CFR dissemination via proprietary network/platforms | Public-facing interfaces and alert mechanisms (e.g., IT-Alert), as referenced | High-level reference description; not intended as an exhaustive national technical architecture |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Zadar County (ZADRA NOVA, HR)** | Multi-hazard county-level implementation of Croatia's national EWS anchored in DHMZ (meteorology) and Croatian Waters (hydrology/flood defence) and operationalised through the Civil Protection | DHMZ monitoring and forecasting network; Croatian Waters / HIROS hydrological monitoring and flood defence levels; STREAM telemetric system and surveillance cameras (where referenced). | DHMZ MeteoWeb and forecasting models; HIROS / Croatian Waters databases; GIS-based risk mapping systems; Copernicus EMS mapping (where referenced). | SRUUK; 112 Information Management System; DHMZ MeteoAlarm; (local GIS / telemetry interfaces where referenced). | 112 alerts and institutional notifications; routing of operational messages via 112 to county/municipal structures; telephone calls to critical institutions. | 112 public alerts; DHMZ warnings (MeteoAlarm and online); SMS / cell broadcast alerts (in specific cases); radio and TV; municipal websites and |

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| | Directorate / 112 chain, with county and municipal structures and responders (incl. fire brigades / ŽVOC) supporting activation. | | | | social media; sirens in selected municipalities. |
| **Split-Dalmatia County (SDC, HR)** | Multi-hazard county-level implementation of Croatia's national EWS anchored in DHMZ (meteorology) and Croatian Waters (hydrology/flood defence) and operationalised through the Civil Protection Directorate / 112 chain; additional national monitoring bodies | DHMZ monitoring and forecasting network; Croatian Waters / HIROS hydrological monitoring and flood defence levels; additional national monitoring bodies for earthquakes and wildfires (as listed in partner input). | DHMZ MeteoWeb and forecasting models; HIROS / Croatian Waters databases; GIS risk mapping; EU-funded systems (where referenced); Copernicus EMS mapping (where referenced). | SRUUK; 112 Information Management System; DHMZ MeteoAlarm; I-FLOOD PLATFORM (where referenced). | 112 alerts and institutional notifications; routing of operational messages via 112 to county/municipal structures and responders; telephone calls to critical institutions. | 112 public alerts; DHMZ warnings (MeteoAlarm and online); SMS / cell broadcast alerts (in specific cases); radio and TV; municipal websites and social media; sirens in selected |

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| | for earthquakes and wildfires are referenced in partner input. County/municipal structures and responders (incl. firefighting coordinated via ŽVOC)support activation. | | | | | municipalities. |
| **Fire Department of the Istrian Region (VZIZ, HR)** | Responder organisation within the Croatian civil protection chain: receives nationally issued warnings (DHMZ; Croatian Waters/HIROS) via 112/county structures and operationalises them for firefighting | Receives meteo and hydro warnings from DHMZ and Croatian Waters / HIROS via 112/county structures; field situation reporting from firefighting units. | DHMZ MeteoWeb and forecasting models; HIROS / Croatian Waters databases; EU project platforms referenced (I-FLOOD PLATFORM); Copernicus EMS mapping (where referenced). | SRUUK; 112 Information Management System; DHMZ MeteoAlarm; MeteoWeb; I-FLOOD PLATFORM (where referenced). | 112 alerts and institutional notifications; operational coordination with county/municipal civil protection structures; telephone calls to critical institutions (where applied). | 112 public alerts; DHMZ warnings (MeteoAlarm and online); SMS / cell broadcast alerts (in specific cases); radio and TV; municipal websites and social media; |

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| | readiness, mobilisation, and field reporting/coordination. | | | | | sirens in selected municipalities. |
| **Lika-Senj County (LIRA, HR)** | DHMZ meteorological monitoring; Croatian Waters hydrological monitoring; local GIS hazard mapping | DHMZ MeteoWeb/forecast models; HIROS + Croatian Waters databases; 112 information management; SRUUK | SRUUK; 112 Information Management System | 112 alerts; notifications to institutions; telephone calls to critical institutions | Sirens (selected municipalities), radio/TV, municipal websites/social media; SMS/CBC in specific cases | Also references EU project platforms (I-FLOOD PLATFORM) and Copernicus EMS mapping (as reported) |
| **Karlovac County (VZKŽ, HR)** | DHMZ + Croatian Waters monitoring; EU-funded telemetric systems, surveillance cameras, sirens (as reported) | DHMZ MeteoWeb/forecast models; HIROS + Croatian Waters databases; 112 information management; SRUUK | SRUUK; 112 Information Management System | 112 public alert system; telephone notifications to critical institutions | Sirens (selected municipalities), radio/TV, municipal websites/social media; SMS/CBC in specific cases | County relies on national-level operational platforms; local GIS used for hazard mapping (as reported) |

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| **Dubrovnik-Neretva County (DNR, HR)** | Sectoral competent authorities' near-real-time platforms (not specified by name) | Not specified in available sources | Not specified in available sources | E-mails (institutional), as reported | Phone calls, social media; SMS testing reported; official web pages and apps (e.g., HRT METEO, NIS) referenced | Core systems owned/managed by national competent authorities and sectoral services (as reported) |
| **Croatia – competence-centre/support view (RBI, HR)** | Not specified in available sources (partner input focuses on national warning/communication mechanisms) | ALADIN-HR model; data exchange with Croatian Waters (as reported) | Not specified as a single platform (described through national system components) | Distribution via civil protection structures and 112; media protocol referenced | Sirens, public address systems, SMS via SRUUK, radio/TV, websites/mobile apps, social networks | Support/overview perspective; not presented as an issuer/operator inventory |

# 7. Gaps & missing elements

This chapter summarises the main gaps and elements not consistently specified in available sources identified through the mapping of existing EWS features (Chapter 4), actions/communication fluxes (Chapter 5), and the inventory of instruments and IT platforms (Chapter 6) across the Programme Area. The focus is intentionally high-level and descriptive, oriented toward identifying improvement-relevant areas that can inform WP1. Benchmarking and assessment of existing Early Warning System (EWS) benchmarking and recommendation-oriented activities. In line with the scope of this deliverable, gaps are grouped into four categories: procedural, communication, platform integration, and cross-border, followed by a note on data availability.

## 7.1 Procedural gaps

Across territories, partners describe structured warning cycles; however, the mapping indicates several recurring procedural elements that are not consistently described in available sources, affecting comparability and clarity in fast-evolving or prolonged events:

- Update and termination logic not consistently specified. Several responses describe issuance of bulletins and escalation during critical events, but provide limited detail on how alerts are formally updated (including versioning), downgraded, or terminated ("all clear"), and how these steps are documented and communicated.
- Standard operating procedures (SOPs) not consistently evidenced. While many systems clearly rely on formal procedures, partner inputs do not always specify whether SOPs exist for all key steps (validation, issuance, dissemination, updates/termination), or whether review/exercise cycles are described.
- Time expectations rarely reported. Target timelines (e.g., expected time from detection/validation to dissemination) are rarely specified, limiting structured benchmarking of responsiveness using the available dataset.

These gaps do not imply absence of practice; rather, they reflect a lack of consistently reported minimum procedural information across partner

## 7.2 Communication gaps

The mapping confirms that communication relies on a combination of institutional and public channels; however, common communication-related gaps emerge from available sources:

- Fragmented last-mile arrangements. In multiple territories, last-mile public warning is described as largely municipal, with heterogeneous use of apps, social media, local alert lists, sirens, and direct outreach. This supports local adaptation but can result in

variable reach and message consistency between neighbouring municipalities affected by the same event.

- Uneven redundancy of public warning channels. Some systems rely strongly on websites and social media, while mass-reach channels (e.g., mobile alerting/broadcasting, sirens) are described as partial, locally variable, or being tested in some contexts.
- Accessibility and inclusiveness not consistently described. Only some responses explicitly reference measures for vulnerable groups or accessible communication approaches. For other territories, the mapping cannot confirm whether accessible formats, multi-language options, or alternative channels are routinely applied.

Overall, the recurring issue is not "lack of channels", but the limited visibility, within available sources, of minimum common practices supporting consistent last-mile delivery and inclusiveness across the Programme Area.

## 7.3 Platform integration gaps

While the inventory identifies multiple operational platforms and IT tools, the mapping points to platform-related elements that are not consistently specified and may affect comparability and interoperability at Programme Area level:

- Parallel tools and heterogeneous architectures. Regions report their own portals, databases, webGIS tools, and dissemination mechanisms. This reflects territorial operational organisation, but reduces interoperability unless common data/metadata conventions and exchange interfaces are in place (not systematically described in available sources).
- Limited visibility of system interfaces. Partner inputs do not always clarify how monitoring/forecasting tools, decision-support dashboards, and dissemination tools are integrated (or whether workflows rely on manual transfer and parallel procedures).
- Variable maturity of mobile-based public alerting. Several territories describe mature institutional dissemination (PEC/SMS/e-mail) while public mobile-alerting is described as uneven or partially implemented/testing in some contexts, potentially limiting rapid reach.

These points are reported as mapping-level observations based on available sources; no additional technical assumptions are introduced.

## 7.4 Cross-border gaps

A core REALIST objective is to strengthen resilience and responsiveness across the Adriatic area. Within the available partner inputs, cross-border governance and exchange

arrangements are not systematically described, and the mapping therefore identifies the following baseline visibility gaps:

- Cross-border protocols not consistently specified. In most responses, alerting and public warning are described as nationally/regionally organised processes, with limited explicit reference to structured cross-border notification, shared thresholds, or joint situation reporting.
- Shared situational awareness mechanisms not consistently visible. Standard cross-border dashboards, shared reporting templates, or structured bulletin exchange routines are not consistently evidenced in mapped "as-is" descriptions.
- Potential coherence challenges in adjacent territories. Where neighbouring territories face the same event, differences in alert taxonomies, channels, and timing patterns (as described) may complicate message coherence across borders unless explicit alignment mechanisms are in place (not consistently specified in available sources).

These gaps are presented as baseline mapping outcomes and provide context for subsequent benchmarking and harmonisation-oriented work.

## 7.5 Data availability gaps

Finally, the mapping identifies a practical limitation: some partners provided limited detail and/or reported restricted visibility due to their institutional role. This affects completeness of certain fields (e.g., channel rules, update/termination procedures, and platform interface descriptions). Where information was not provided, it is reported consistently as "Not specified in available sources" in the relevant tables and fiches.

Summary of priority gap clusters (as evidenced in available sources). Across the Programme Area mapping, the most recurrent gap clusters are:

1. Procedural completeness (update/termination/versioning, timelines, and SOP coverage as described);

2. Last-mile consistency and inclusiveness (minimum common practices and redundancy of channels);

3. Platform interoperability visibility (clarity on interfaces, data flows, and harmonised exchange);

4. Cross-border coordination visibility (shared situational awareness and structured exchange during events).

# 8. Conclusions & baseline for harmonization

This mapping confirms that the Programme Area has functioning Early Warning System (EWS) arrangements supported by established civil protection structures, technical warning capabilities, and multi-channel communication practices, as reported in available sources. At the same time, the "as-is" picture shows differences in warning-level taxonomies, dissemination practices, the maturity and redundancy of last-mile public warning channels, and the explicit visibility of cross-border coordination mechanisms in partner-reported information. The baseline statements below summarise the most material, evidence-based observations from this mapping and are intended to inform the subsequent recommendation-oriented work under WP1. Benchmarking and assessment of existing Early Warning System (EWS).

Baseline statements (inputs for harmonisation and upgrading considerations)

1. A shared EWS functional backbone is visible, but comparability depends on a common minimum dataset. Most territories describe a broadly similar operational cycle (monitoring/forecasting, validation, warning-level assignment, institutional dissemination, operational activation, updates/closure). Consistent cross-territory comparison would benefit from a minimum dataset reported in a uniform way (warning levels used and their operational meaning, dissemination channels, update/downgrade/termination approach, and key operational products), while transparently retaining "Not specified in available sources" where partner inputs do not provide a given element.

2. Colour-coded warning levels are widely used, but operational meaning is not consistently comparable across territories. Italian partner inputs generally describe green/yellow/orange/red criticality logic, in some cases linked to operational phases and predefined procedures. Croatian inputs describe parallel hazard-warning streams and nationally routed dissemination/operationalisation through civil protection structures. This indicates that functional crosswalks (what a level implies operationally, including typical activated postures/structures) are more informative for benchmarking than labels alone where detailed equivalences are not specified.

3. Institutional dissemination chains are consistently described; last-mile public warning is the main source of variability. Institutional routing (technical bodies → civil protection/operational structures → municipalities/responders) is described across multiple territories. By contrast, public warning and actionable last-mile guidance often depend on municipal practices and locally selected channel mixes, which can result in variability of reach, timing, and message consistency across neighbouring areas affected by the same event.

4. Redundancy of public warning channels and mobile-alert maturity vary across territories. Partner inputs frequently reference web/portal publication and media/social channels, while mobile-based public warning (e.g., SMS/cell broadcast–type approaches) is described as uneven, partially implemented, or under testing in some contexts. Where redundancy arrangements are not explicitly described (e.g., fallback channels if a primary channel fails), the mapping cannot confirm common minimum practices across the Programme Area using the available dataset.

5. Update, downgrade, and termination practices are not consistently documented in comparable detail. Some partners report structured update bulletins and formal downgrade/closure steps, while other responses provide limited detail on versioning, "all clear" decisions, stand-down communication, and how coherence is maintained between institutional notifications and public-facing messages. This limits benchmarking of lifecycle traceability and closure reliability on the basis of available sources.

6. Platform landscapes are territorially specific but broadly convergent by function. Regions operate different portals, databases, webGIS tools, and dissemination mechanisms; however, they commonly serve similar functional needs (monitoring/data consolidation, situational awareness, alert publication and routing). This suggests potential for interoperability-oriented improvements through shared templates, metadata and minimum content standards, exchange formats, and interface arrangements—without requiring a single unified platform.

7. Cross-border operational coordination mechanisms are not systematically visible in available sources. While national/regional systems are described primarily as internally organised processes, partner inputs provide limited explicit description of structured cross-border notification, shared situation reporting, or jointly agreed thresholds/protocols. This constitutes a baseline visibility gap relevant to Programme Area interoperability and should be treated as a priority topic for WP1 follow-up work.

8. Data gaps identified through mapping are actionable baseline outcomes. Where information is reported as "Not specified in available sources", this indicates either a documentation gap, a mandate/visibility boundary, or an element not reported within the available dataset. These gaps provide a practical checklist of topics requiring clarification and/or standardised reporting if Programme Area comparability and interoperability are to be strengthened.

Together, these baseline statements provide a focused foundation for developing harmonisation and upgrading recommendations under WP1. Benchmarking and assessment of existing Early Warning System (EWS), ensuring that subsequent measures address the most material operational differences and visibility gaps identified through the Programme Area mapping.