Disaster Risk Knowledge for Volcanic Hazards: UNDRR's Perspective & Role in EW4All

7 July 2025

@undrr

UNDRR
UN Office for Disaster Risk Reduction

SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

UNDRR's Commitments & Mandate

Sendai Framework Target G

- "Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information."

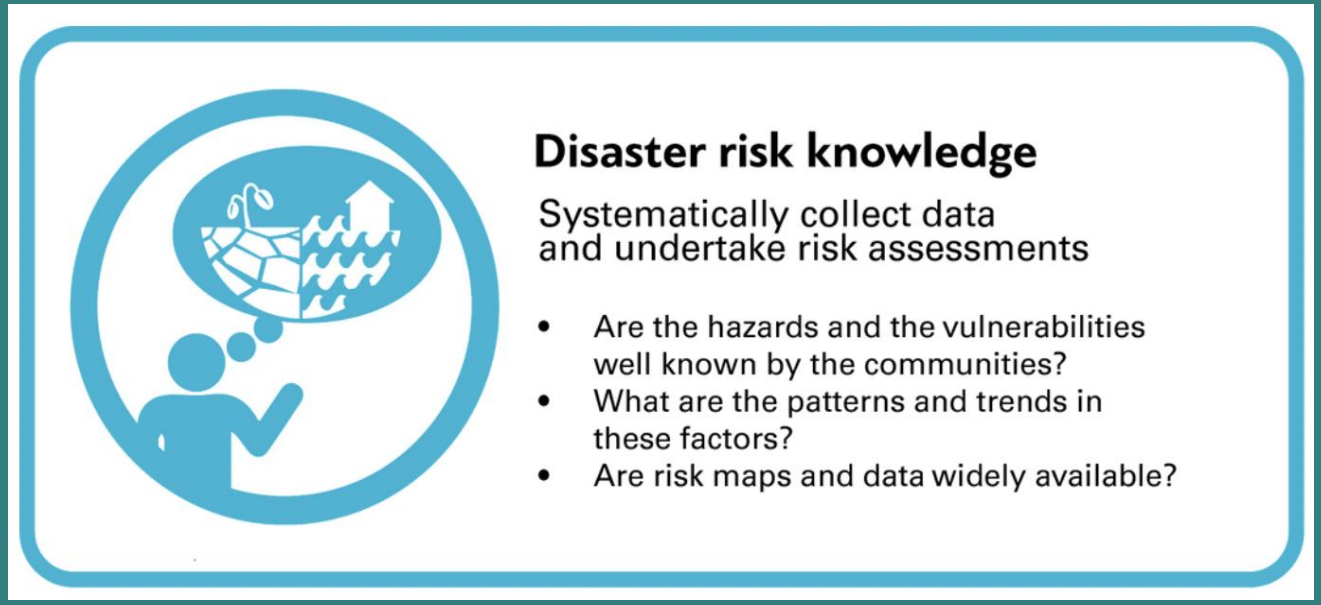
Early Warnings for All (EW4All)

- Goal of universal EWS coverage by 2027
- UNDRR leads Pillar 1 – Risk Knowledge

UNDRR's Role

- Helps countries in enhancing the generation and use of risk knowledge in EW-EA and DRR
- Supports efforts to reduce disaster risk and build resilience

PILLAR 1 STRUCTURE



UNDRR
UN Office for Disaster Risk Reduction

WORLD METEOROLOGICAL ORGANIZATION

IFRC

REAP

GEO

IOM • OIM

FAO FIAT PANIS

UN environment programme

UNFCCC

GREEN CLIMATE FUND

Pillar 1: The Seven Risk Knowledge Outcome Themes

Pillar 1: Risk Knowledge

Vision of Success:

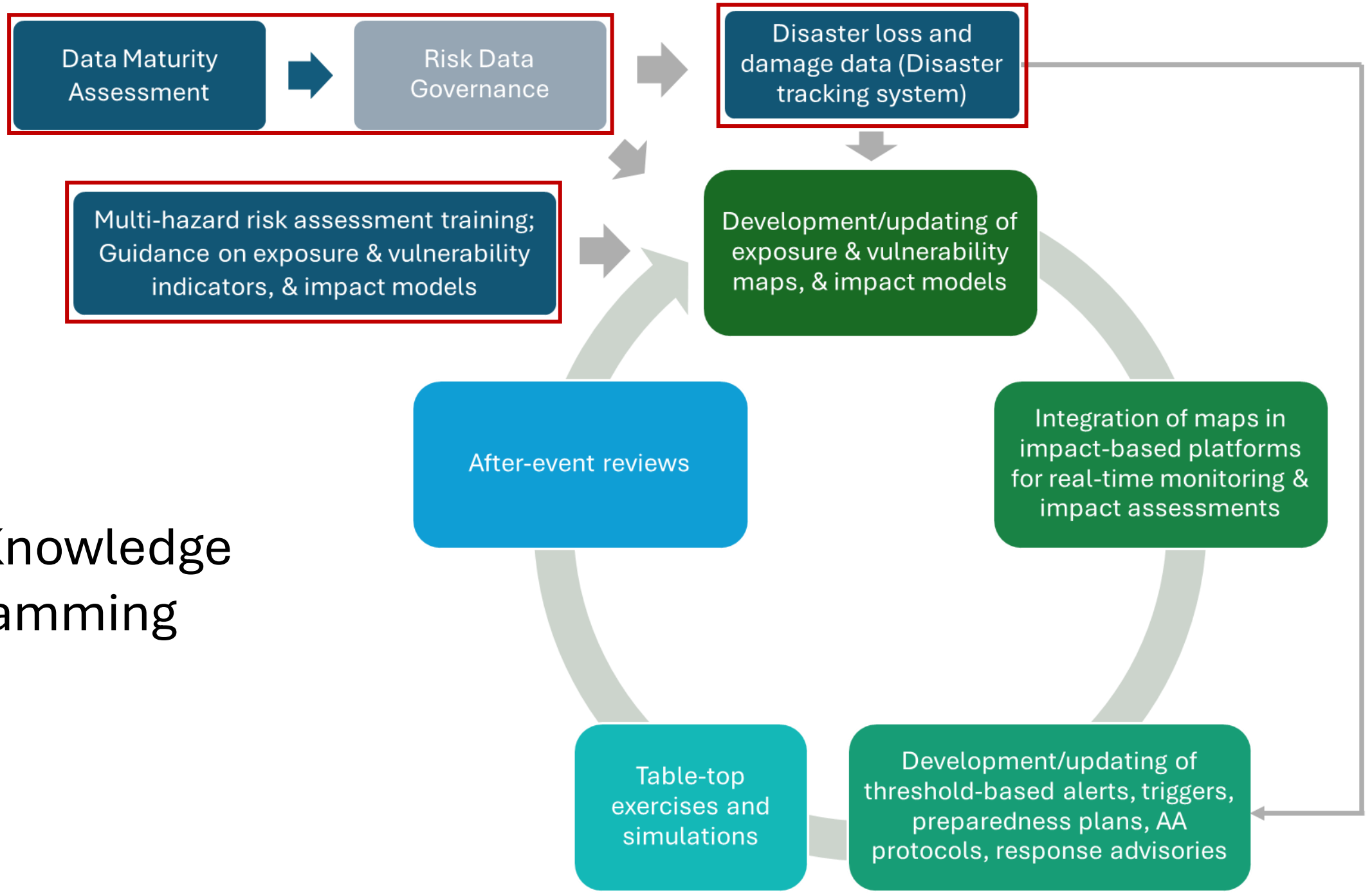
All countries produce and use risk information that informs and strengthens MHEWS in all four pillars, resulting in actionable and risk-informed warnings and targeted response.

In particular:

- disaggregated, timely and relevant risk data is regularly collected and risk assessments are conducted
- hazard exposure, vulnerabilities and coping capacity are well-known by decision-makers and communities
- risk maps and data are widely available
- all countries have geo-referenced data platforms and tools to issue impact-based forecasts
- all relevant regional, national and local authorities benefit from risk knowledge capacity building
- Sendai Target G is implemented

Risk knowledge underpins all early warning and preparedness efforts

Risk Knowledge Programming



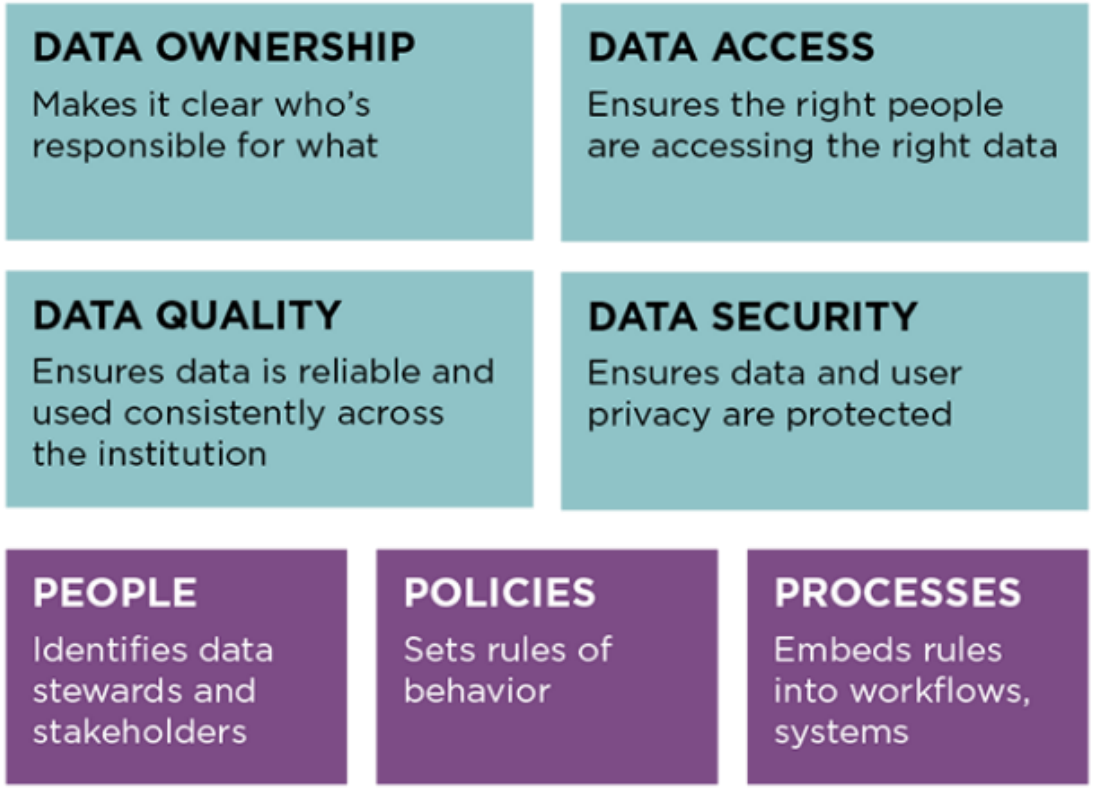
Data Maturity Assessment Framework

Incomplete/ad-hoc	Recognized but reactive	Managed and defined	Controlled, optimizing	Transformational, state of the art
• Data utilization for DRR is random and undocumented. • There is a lack of resources available to collect or improve risk and disaster data. • Data tend to be implemented in an ad hoc, uncontrolled manner by users. • There is no central coordinating actor in the ecosystem	• Actions are unpredictable and reactive. • Importance of data for DRR and EW is recognized by some actors yet they mostly work in silos, unaware of what data is being collected and how to access it. • Cooperation mostly occurs on a case-by-case basis • There are insufficient resources and no standard operational procedures.	• Common standards have brought some consistency in using data for DRR, though they are not optimally used yet. • Sufficient resources and capabilities are available to enhance DRR operations. • The key issues and priorities have been identified and there is a national data strategy in place that outlines the policy steps to be taken. • Full integration across the system is lacking which impacts performance.	• Data for DRM is effectively utilized across the ecosystem • There has been a shift in data culture which makes actors address root causes and tackle issues that hamper data quality proactively • There is an ongoing collaboration between stakeholders in the ecosystem • Actors engage with data in a pro-active and flexible manner	• Data utilization for DRM reflects the state of the art. • The country serves as an inspiration for others, it engages with (regional) partners to improve risk and disaster data globally. • Full implementation and integration across the data ecosystem are realized. • The DMA is fully aware and adaptable to the requirements and needs of involved stakeholders, which are constantly being identified and monitored.

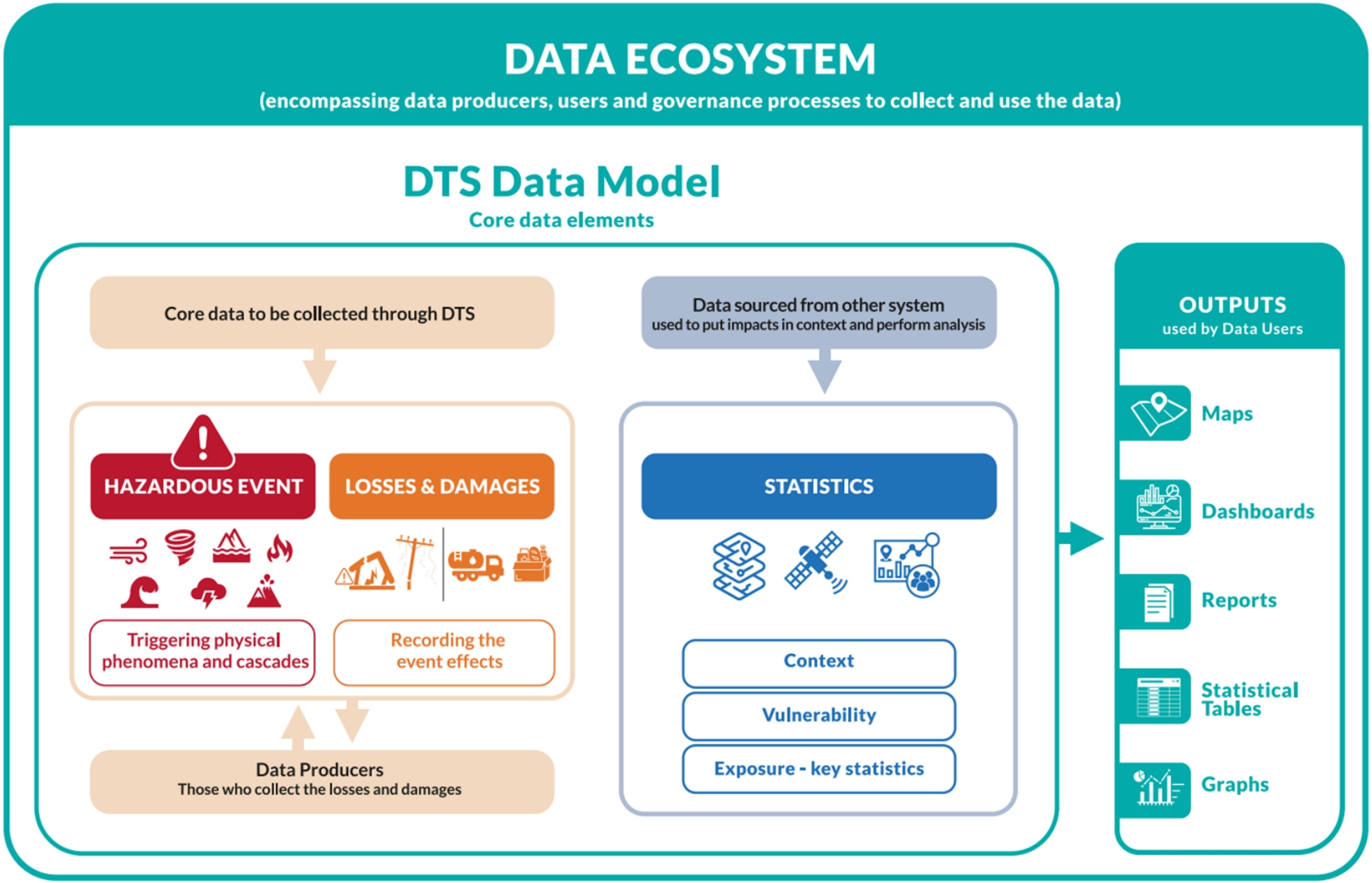
Data Maturity Assessment Framework

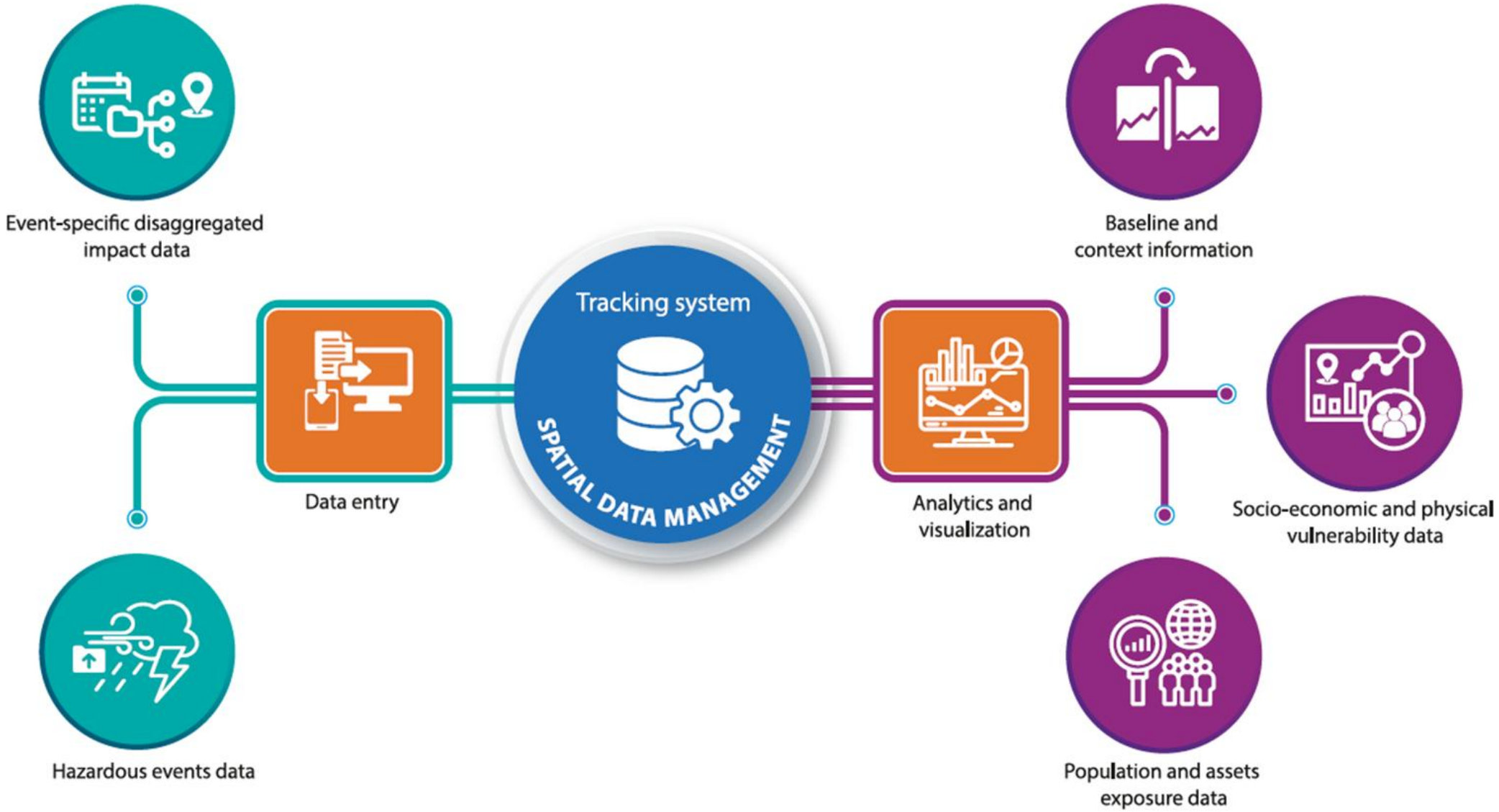
Dimensions	Elements (draft)
Actors & Roles	• Diversity of actors (providers, intermediaries, users, objects, buyers) • Stakeholders, roles & responsibilities
Data Value Chain - Supply	• Data quality (accuracy, completeness and consistency) • Degree of access (availability through open repositories, restricted platforms or proprietary sources) • Structuredness (format and organization)
Data Value Chain - Demand	• Specificity (extent to which users have a clear objective • Adaptability (ability to be repurposed beyond its original collection intent) • Impact (whether data use translates to decisions)
Data Value Chain - Infrastructure	• Availability (whether infrastructure is accessible and operational) • Interoperability (level of integration of different systems, formats, and platforms) • Scalability (adaptability to handle growing demands, increased volumes, velocities and varieties of data
Ecosystem Governance	• Technical aspects (standards, interoperability) • Social and institutional (power dynamics)

Risk Data Governance



Disaster tracking system




Event-specific disaggregated impact data
Baseline and context information
Tracking system
SPATIAL DATA MANAGEMENT
Data entry
Analytics and visualization
Socio-economic and physical vulnerability data
Hazardous events data
Population and assets exposure data
KEY
Data Management
External Data Sources
Events Data Sources
Modules

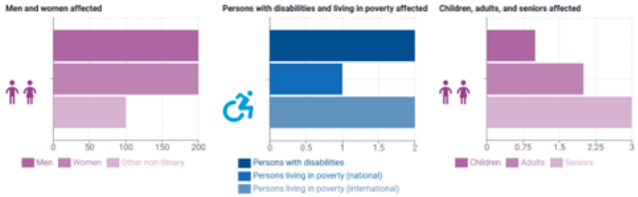
Disaster tracking system

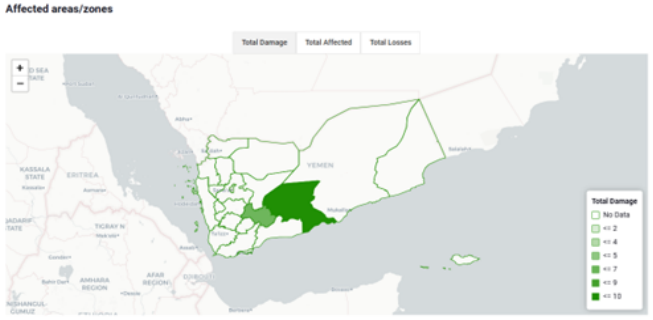
DTS Disaster Losses Tracking System - DTS

DATA ANALYSIS ABOUT SETTINGS LOG OUT

Visualize results of queries based on 3 entry points:

- Per hazard
- Per sector
- Per disaster event





Cyclone Tej (2023) (23 to 24 Oct 2023) - f06e4 impacts on sectors

Human direct effects

Total people affected: 0

Deaths: 0

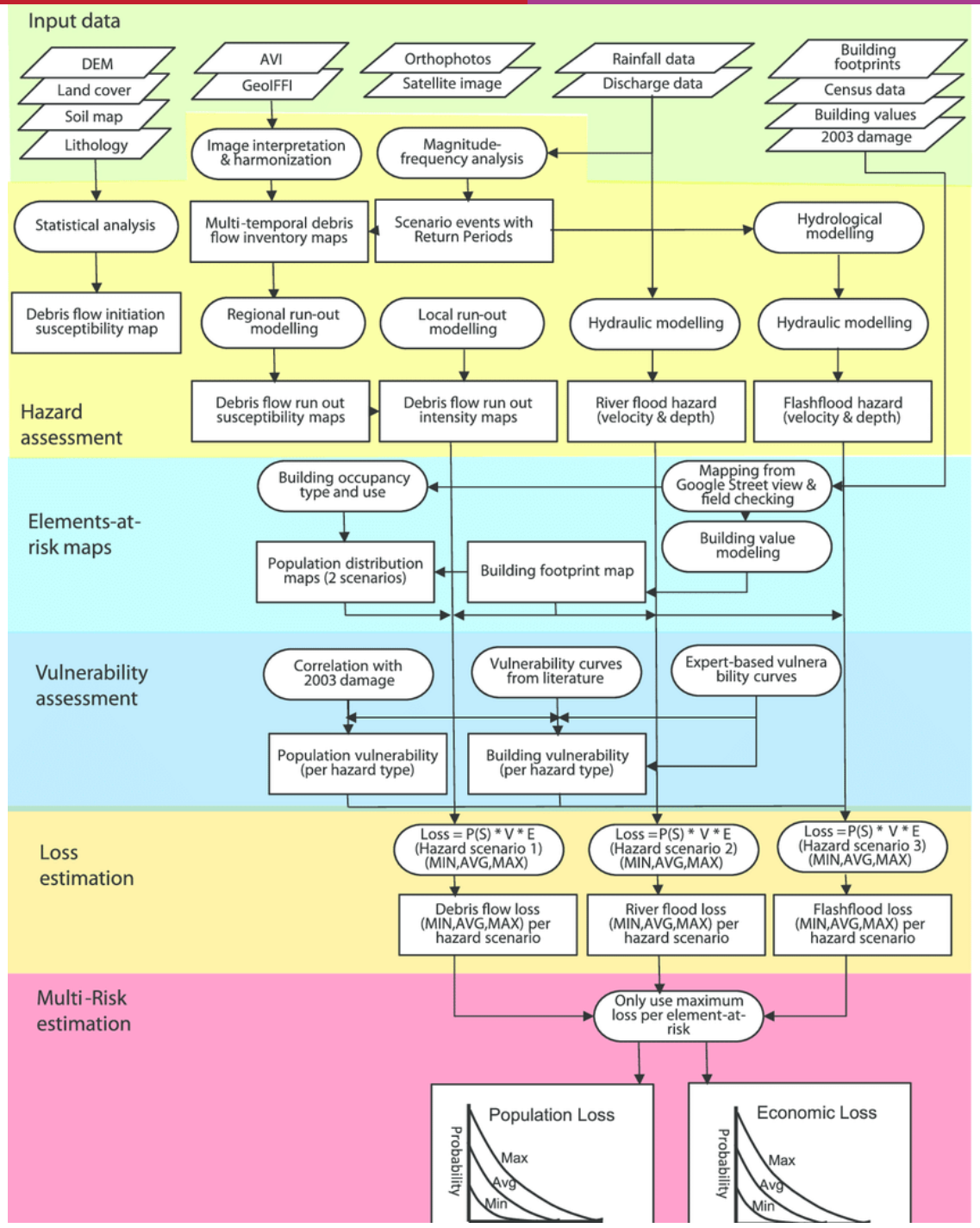
Injured: 0

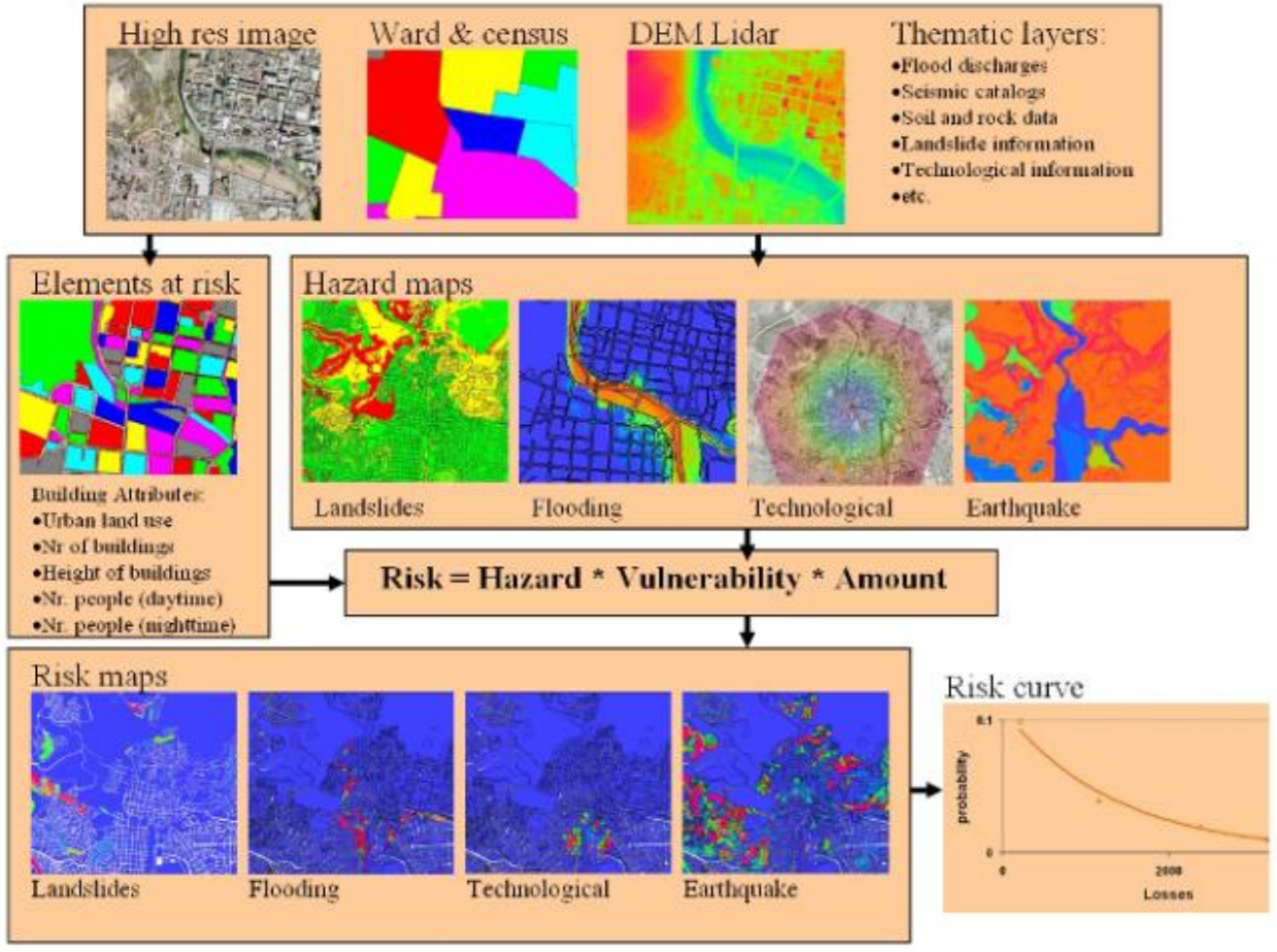
Missing: 0

People directly affected: 0

Displaced: 0

Multi-hazard risk assessment





Guidance on exposure and vulnerability indicators

- Guidance Documents: Selection Framework & Process and Indicator Bank

Define the objectives and scope of exposure and vulnerability assessment

Select indicators from the Indicator Bank

- Hazard Filtering
- Sector Filtering

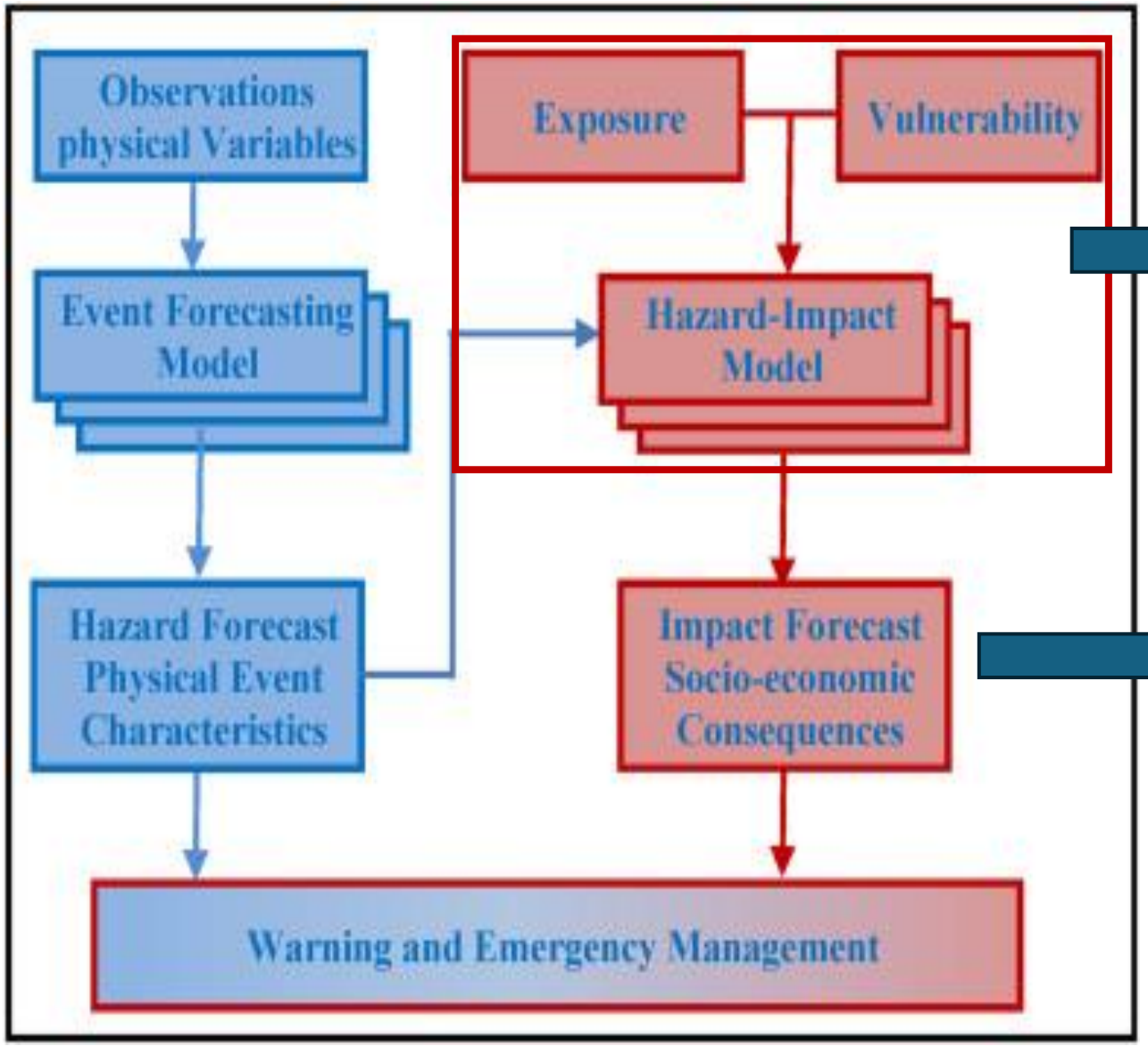
Ranking and prioritization using Delphi process with at least 8 experts, conducted in 3 rounds

- Indicator selection and ranking
- Re-ranking with feedback
- Final prioritization and weighting

Quality assessment of short-listed indicators – each indicator is assessed across the 6 criteria and rated low (0-0.3), medium (0.4-0.6) or high (0.7-1.0)

- Availability & accessibility
- Reliability
- Validity
- Legal & ethical considerations
- Standardization
- Timeliness

Impact-based forecasting and anticipatory action



MHRA Training

Selection of Exposure and Vulnerability Indicators, Defining relevant Impact Models

Development of Hazard- and Sector-Specific Exposure and Vulnerability Maps

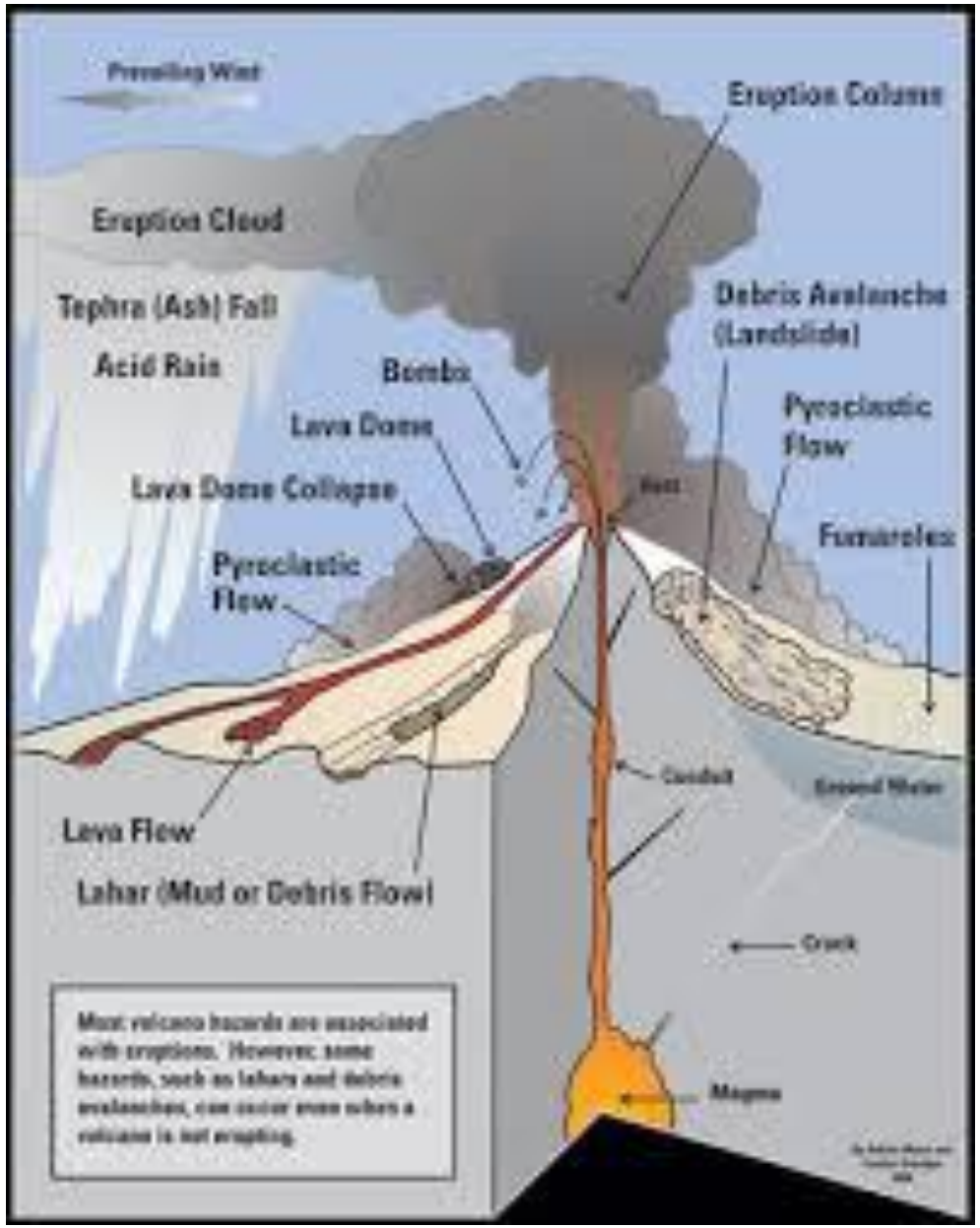
Validation of the Exposure & Vulnerability Maps

Define impact levels (triggers), corresponding early or anticipatory actions & advisories

Governance Work (i.e., adoption of the methodology & process for vulnerability analysis & mapping, impact modelling, threshold and trigger identification, & EAP development)

Collaboration areas

- Volcano observatories as active partners of NDRMAs and UNDRR
  - Stronger collaboration on data sharing and modelling
  - Joint development of multi-hazard risk assessment methodologies
  - Inclusion in risk governance dialogues
  - Integration of volcanic hazard priorities in EWS Roadmaps and Action Plans



Volcanoes as Multi-Hazard Labs

- **Volcanic hazards**
  - Primary hazards: lava flows, pyroclastic density currents, ash emissions, gas releases
  - Secondary hazards: lahars, landslides, tsunamis, remobilized ash
  - Cascading impacts: aviation disruption, climate effects, long-term livelihoods impacts
- **Lessons for risk knowledge**
  - Complexity of signals and monitoring
  - Multi-scale, cross-border risks
  - Low-frequency but high-consequence events

Thank You

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