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D3.1 - Map of urban vulnerable hotspots in three pilot areas Part 1

Deliverable summary

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Executive summary

The deliverable *D3.1 – Map of Urban Vulnerable Hotspots in Three Pilot Areas – Part 1* is the initial version of hazard mapping developed within the RETIME project, due in Month 18 (October 2025). This document presents the identification and mapping of natural hazards across three pilot sites: Lisbon, Žilina, and Tartu. This deliverable compiles an inventory of hazard types and relevant data sources, integrating pan-European, national, and local datasets to produce hazard maps that inform further RETIME activities such as alert triggers, exposure databases, and emergency planning tools. Key natural hazards identified include urban and river flooding, wildfires, extreme heat, drought, landslides, windstorms, and earthquakes. Data sources range from global platforms like the Risk Data Hub and Copernicus services to high-resolution local geoportals.

The deliverable further introduces an interactive hazard map platform enabling consortium members to visualise, access, download, and collaboratively comment on hazard datasets by pilot site, enhancing project-wide data sharing and integration. The platform is designed for continuous updates and will evolve toward a subsequent deliverable iteration planned at Month 36 of the project (April 2027), incorporating consortium feedback to address emerging data needs.

This report is intended for all local stakeholders (e.g., residents and local workers), temporary stakeholders (e.g., tourists), building users, owners, and managers in the three pilot areas, as well as policy and decision makers, investors, and SMEs.

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RETIME Deliverable D3.1 - Map of urban vulnerable hotspots in three pilot areas Part 1 - 22.10.2025-version-0.4	0.4	Review and Added Information	Frankwin van Winsen (WEO)	22.10.2025
RETIME Deliverable D3.1 - Map of urban vulnerable hotspots in three pilot areas Part 1 - 31.10.2025-version-1.0-Final	1.0	Final review	Catarina Ferreira da Silva (ISCTE)	31.10.2025

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List of acronyms and abbreviations

CEMS	Copernicus Emergency Management Service
C3S	Copernicus Climate Change Service
C3S Atlas	Copernicus Interactive Climate Atlas
C3S CDA	Copernicus Climate Data Atlas
CMIP6	Coupled Model Intercomparison Project Phase 6
EC	European Commission
EDO	European Drought Observatory
EFEHR	European Facilities for Earthquake Hazard and Risk
EFFIS	European Forest Fire Information System
EGMS	European Ground Motion Service
ESDAC	European Soil Data Centre
ESWD	European Severe Weather Database
EU	European Union
DRMKC	Disaster Risk Management Knowledge Centre
GIS	Geographic Information System
PGA	Peak Ground Acceleration
RDH	The Risk Data Hub
SHMU	Slovak Hydrometeorological Institute
WBGT	Wet-Bulb Globe Temperature
WP	Work Package

1. Introduction

This document provides a technical brief on the demo *D3.1- Map of Urban Vulnerable Hotspots in Three Pilot Areas – Part 1*, developed under task *T3.1 - Hazard Identification in Three Pilot Areas*. This task aims at mapping natural hazards across the three RETIME pilot sites to support resilience planning. Part 1 represents the first iteration of this task, with hazard maps released in month 18 of the project (October 2025) of the RETIME project, while Part 2 will be the second iteration, incorporating feedback from consortium members and stakeholders into the map and expected in month 38 of the project (April 2027).
The focus of this document is threefold:

- Hazard identification for each pilot site
- Compilation of an inventory of existing maps and data sources relevant to natural hazard mapping
- Acquisition, processing, and dissemination of hazard maps within the RETIME consortium

This deliverable is a living document, and it is structured as follows: *Section 1.2* outlines the integration of this task with other RETIME tasks. *Section 2* presents an overview of existing hazard datasets at European and global scale. *Section 3* presents the identified hazards and corresponding data sources for each RETIME pilot site. *Section 4* provides an overview and user guide for the data portal, enabling RETIME consortium members and other users authorised by WEO[1] and ISCTE team to access the collected and processed hazard maps for each pilot site.

1.2. Interrelated RETIME deliverables

This task builds directly on the outcomes of two work packages (WPs): *WP1 – RETIME frameworks for multi-risk assessment, adaptation solutions, related data specification requirements, and resilience cost business models* and *WP2 – Pilot site socio-cultural and economic contexts and stakeholder engagement strategy development*. An initial list of relevant natural hazards was compiled based on those identified in deliverable *D1.1 – Report on Urban Vulnerability and Risk Assessment (Multi-Risk Resilience) Methodologies and Tools*.[2] Existing data sources for hazard map development, as outlined in D1.1, were expanded to include additional geoportals and repositories at local, national, European, and global levels. Emphasis

[1] https://www.weo-water.com/
[2] *Section 6 - Overview of Existing Datasets and E-Tools Relevant to RETIME and provided hazard data through the pilot site representatives* and *Section 7 - Multi-Dimensional Analysis of Vulnerability, Risk Scenarios, and Hazard Characteristics in RETIME Pilot Sites.*

was placed on governmental and open-access platforms to ensure data reliability and accessibility.

The preliminary natural hazard profiles defined in D1.1 for the three RETIME pilot sites were further refined through site-specific analyses to ensure comprehensive and context-sensitive coverage. This refined list underwent review and validation to confirm consistency with expert feedback and project objectives.

The main output of this task is a series of natural hazard maps for each of the three pilot sites. These maps serve as key inputs for downstream RETIME activities, including task *T3.2 – Design of impact-based triggers for automated monitoring and management systems* (on alert triggers), *T3.3 – Exposure and vulnerability database* (on exposure database), and *WP4 – Infrastructure Resilience plans and innovative adaptation measures for urban areas at risk* (on emergency planning, building passports, and digital twins), either directly or indirectly supporting their implementation.

2. Data sources

Several key platforms provide pan-European and global natural hazard data:

- The Risk Data Hub (RDH) of the Disaster Risk Management Knowledge Centre (DRMKC): Covers most identified hazard, although spatial resolution is typically coarse.
- Copernicus Emergency Management Service (CEMS): Offers risk assessments for hazards such as flood, and drought, landslides, and wildfires across Europe.
- European Drought Observatory (EDO): Supplies near real-time drought monitoring and historical drought indicators for Europe, including soil moisture, precipitation anomalies, and vegetation stress.
- European Severe Weather Database (ESWD): Collects reports on extreme weather events, such as windstorms, hail, heavy snowfall, and tornadoes. Spatial resolution may be limited depending on the event and reporting source.
- Copernicus Interactive Climate Atlas (C3S Atlas), the web application of the Copernicus Climate Change Service (C3S): Offers climate projections and historical trends for multiple climate-related hazards, including drought, extreme heat, cold waves, and flooding.
- European Forest Fire Information System (EFFIS): Delivers real-time wildfire monitoring, forecasting, and historical fire data at high spatial resolution for all EU countries and neighbouring regions.
- European Facilities for Earthquake Hazard and Risk (EFEHR): Maintains high-quality seismic hazard and risk data, including probabilistic seismic hazard maps and exposure models for Europe.

These platforms are suitable for initial hazard identification and comparative analysis but in many cases, the spatial resolution available do not support site-specific analysis or analysis at the building level (Table 1). For hazard maps at a higher spatial resolution, for example, at the neighbourhood or block level rather than city-wide, the integration of local-scale data, such as those from national or municipal geoportals, scientific studies, or environmental monitoring agencies, is required. A full list of the identified datasets by pilot site is given in Annex A.

Table 1.European hazard data sources with their respective spatial resolution.

Hazard	Source	Risk	Spatial Resolution
Coastal Flood	Climate Central	prediction / scenario	5m
Drought	Copernicus Interactive Climate Atlas (C3S Atlas)	prediction / scenario	from 2º to 0.05º
Earthquake	DRMKC RDH	index	10km
Earthquake	EFEHR	index	0.01º
Extreme Cold	Copernicus Interactive Climate Atlas	prediction / scenario	from 2º to 0.05º
Extreme Heat	Climate Data Store	historic	0.25°
Extreme Heat	Copernicus Interactive Climate Atlas	prediction / scenario	from 2º to 0.05º
Extreme Heat	DRMKC RDH	risk	~600m
Landslide	European Ground Motion Service	historic	100m
Landslide	ESDAC	risk	200m
Landslide	DRMKC RDH	risk	250m
River Flood	DRMKC RDH	risk	~90m
Extreme Rain Fall	Copernicus Climate Data Atlas (C3S CDA)	prediction / scenario	from 0.25° to 0.02°
Wild Fire	EFFIS - European Forest Fire Information System	historic	site specific
Wild Fire	EFFIS - European Forest Fire Information System	risk	~10km
Wild Fire	EFFIS - European Forest Fire Information System	prediction / scenario	~10km
Wild Fire	DRMKC RDH	risk	25km
Windstorm	DRMKC RDH	risk	~5km

3. Hazard identification and data sources by pilot site

3.1. Lisbon

3.1.1. Natural hazards

The natural hazards identified as relevant to the Lisbon Metropolitan Area and specifically to the Bairro da Boavista pilot site are listed in Table 2.

Table 2. Identified natural hazards for Lisbon.

Hazard	Relevance / Justification
Urban Flooding	Heavy rainfall, especially during intense storm events, can lead to flash flooding. The risk is elevated in built urban areas where stormwater drainage capacity may be exceeded during extreme weather events.
Wildfires	There is a heightened wildfire risk in areas near forested zones, such as Monsanto Forest Park.
Extreme Heat / Heat Waves	Rising temperatures, intensified by the urban heat island effect and climate change, pose a growing threat of extreme heat events.
Drought	Lisbon, including the Bairro da Boavista area, is increasingly vulnerable to drought due to its subtropical-Mediterranean climate. Climate change projections indicate a decrease in annual rainfall and a rise in the frequency and duration of drought periods.
Windstorms	Strong winds associated with Atlantic storms may cause disruptions, particularly in exposed areas and those with vulnerable infrastructure.
Earthquake	Lisbon is located in a region of moderate seismic activity. This hazard is particularly significant in the *Bairro da Boavista* area with historical, unreinforced masonry buildings that are more susceptible to damage.
Landslides	Although landslides are not a major hazard within the Bairro da Boavista pilot site, slope instability and heavy rainfall in parts of the greater Lisbon area may cause localised landslide events.
Tsunami	As a coastal city, Lisbon faces long-term risks from erosion and rising sea levels, which could impact infrastructure and coastal communities. Although tsunami events are rare, the possibility exists due to seismic activity in the Atlantic Ocean. The Bairro da Boavista pilot site is situated at a moderately high elevation and is not considered vulnerable to coastal flooding or tsunami events.

3.1.2. Data Sources

While the identified global and European hazard datasets provide information on natural hazards relevant to the Lisbon metropolitan area in general and specifically in the *Bairro da Boavista* pilot site, many of these datasets operate at relatively coarse spatial resolutions. They are essential for understanding regional trends and risks. However, several local sources also offer high-resolution data. Most notably, the Lisboa Interactiva Data Portal aggregates high-resolution, locally collected data specific to the city of Lisbon.[3] Key hazards covered for the *Bairro da Boavista* pilot site include earthquakes, landslides, and wildfires. Moreover, the portal provides detailed information on coastal flooding and river flooding, which while assessed as less significant for the pilot site, remain relevant for understanding broader hazards across the greater Lisbon metropolitan area

3.2. Žilina

3.2.1. Natural hazards

The following natural hazards have been identified as relevant to the Žilina pilot site in Table 3.

Table 3. Identified natural hazards for Žilina.

Hazard	Relevance / Justification
Urban and River Flooding	Three rivers flow through Žilina, the Váh, Kysuca, and Rajčianka, making the area prone to riverine flooding, particularly during periods of intense rainfall or rapid snowmelt. Urban flash flooding can also occur when drainage capacity is exceeded during heavy precipitation events.
Wildfire	Wildfires pose a moderate risk in Žilina's forested and peri-urban areas, especially during hot, dry spells. Although less frequent than in southern Europe, climate change is increasing the likelihood and severity of wildfire events.
Extreme Heat / Heat Waves	Although less frequent than in southern Europe, heat waves are becoming more common due to climate change, increasing risks to vulnerable populations, particularly in densely built-up urban areas.
Landslides	The surrounding hilly terrain and certain unstable slopes in the Žilina region present a risk of landslides, especially following prolonged rainfall.
Drought	Periods of drought can impact water supply and urban green spaces, particularly during unusually dry summers.
Windstorms	Strong windstorms can cause damage to infrastructure, disrupt services, and exacerbate other hazards such as landslides and wildfires.

[3] https://websig.cm-lisboa.pt/MuniSIG/visualizador/index.html?viewer=LxInterativa.LXi

Earthquake	While seismic activity is relatively low in Slovakia, minor earthquakes have been recorded in the region. The risk is considered low but not negligible.

3.2.2. Data Sources

In addition to the global and European data sources on hazard risk, the national geoportal of Slovakia (Národný geoportál),[4] provides high resolution information on drought / extreme heat, historic river floods and flood predictions, and landslide inventory maps. The information is provided via various national institutes such as the Slovak Hydrometeorological Institute (SHMÚ), Slovak Geological Institute. In addition, the National Forest Centre (Národné lesnícke centrum) supplies information on forest monitoring and management.

3.3. Tartu

3.3.1. Natural Hazards

The natural hazards in Tartu are outlined in Table 4.

Table 4. Identified natural hazards for Tartu.

Hazard	Relevance / Justification
River Flooding	Tartu is situated along the Emajõgi River, making it susceptible to riverine flooding, particularly during spring snowmelt and periods of heavy rainfall. Flooding can impact low-lying urban areas and critical infrastructure.
Extreme Cold and Snow	Tartu experiences harsh winters with heavy snowfall and prolonged periods of extreme cold, which can disrupt transportation, utilities, and pose risks to vulnerable populations.
Extreme Heat / Heat Waves	Although less frequent than in southern Europe, heat waves are becoming more common due to climate change, increasing risks for health and urban infrastructure.
Drought	Occasional summer droughts can affect water supply, urban greenery, and agricultural areas surrounding the city.
Windstorm	Severe wind events can cause damage to buildings, infrastructure, and urban trees.
Earthquake	Although Tartu is located in a region of generally low seismic activity, minor earthquakes can occasionally occur and have a potential impact, especially on older structures.
Landslides	While not a major hazard, certain riverbank areas may be affected by minor landslides or erosion, particularly during high water events.

[4] https://geoportal.gov.sk/

3.3.2. Data Sources

Multiple platforms, for example Estonian Environmental Data Portal (Eesti Keskkonna Andmete Portaal)[5], provide access to hazard maps, especially for flood risk. The Estonian Land Board (Maa-amet)[6] offers high-resolution topographic and land use maps. The Estonian Rescue Board[7] maintains a database of emergency incidents, including all registered forest and landscape fires. Additionally, the Estonian Weather Service monitors and forecasts severe weather events such as extreme temperatures, windstorms, and heavy precipitation.

[5] https://keskkonnaportaal.ee/
[6] https://geoportaal.maaamet.ee/
[7] https://www.rescue.ee/

4. Hazard map platform for visualisation, data access, and collaboration

4.1. Purpose of the demo

This demo serves as a repository and interactive visualisation tool for natural hazard datasets covering the three RETIME pilot sites (Lisbon, Žilina, and Tartu). This platform enables RETIME consortium members and other users authorised by WEO to efficiently access, explore, and download relevant hazard data. Furthermore, it fosters collaboration through geospatially anchored comments.

The platform comprises three dedicated FELT maps, a cloud-based Geographic Information System (GIS) platform. Users need to be authorised to access the RETIME hazard maps; authorisation can be granted by WEO[8]. The FELT maps interface for the RETIME hazard maps provides a single, dedicated map for each pilot site (Figure 1), with each map visualising in multiple layers the natural hazards identified as relevant for that specific location.

[8] Please contact Imeshi Weerasinghe [iweerasinghe@weo-water.com] to obtain access.

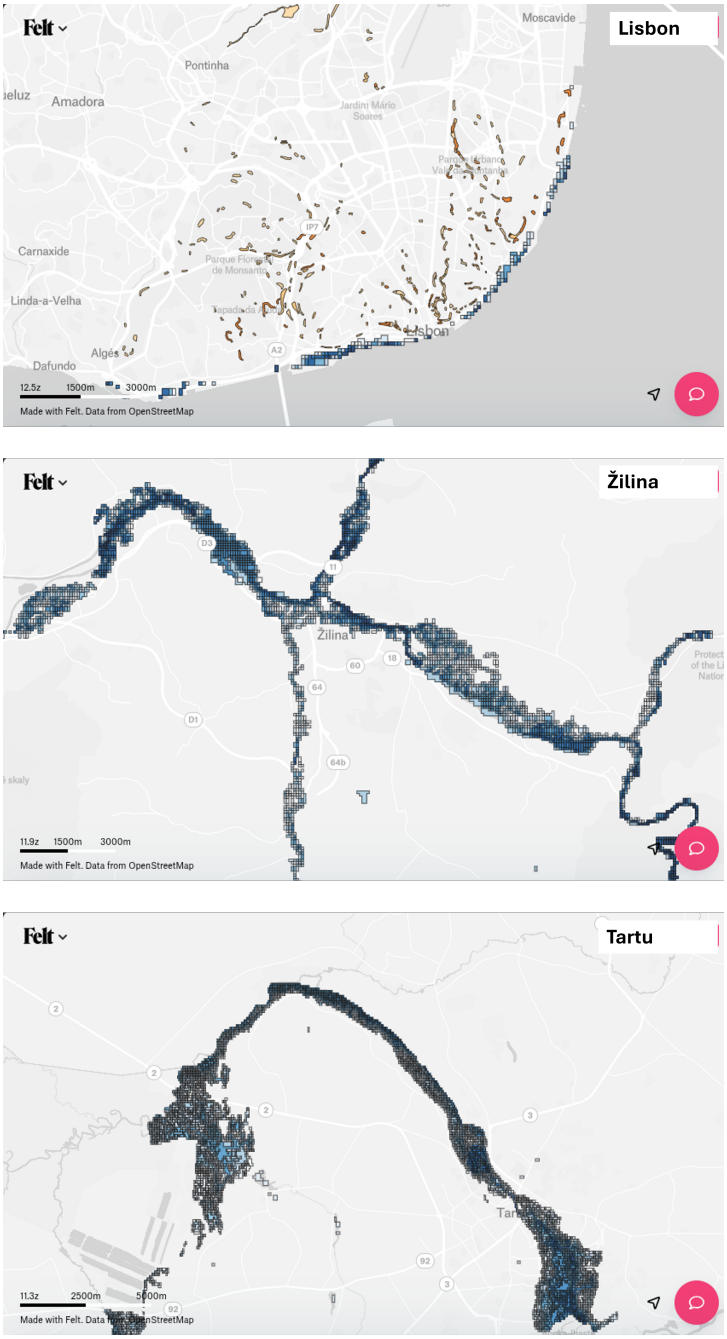


Figure 1. Screenshot depicting the selection of RETIME pilot sites for hazard map access.

Hazard maps are grouped by category, with a slider tool that allows users to browse through a series of layers for a given hazard category, such as flood layers organised by expected return period. Users can toggle the visibility of individual hazard categories to customise the map display according to their needs.

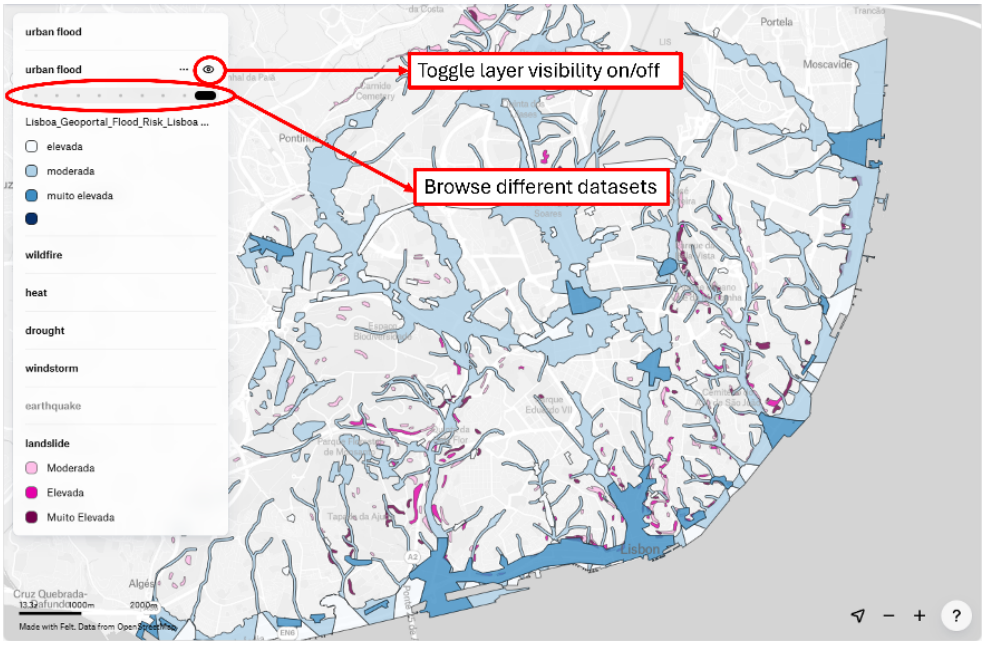


Figure 2. Screenshot demonstrating features for browsing and visualisation of the different hazard maps.

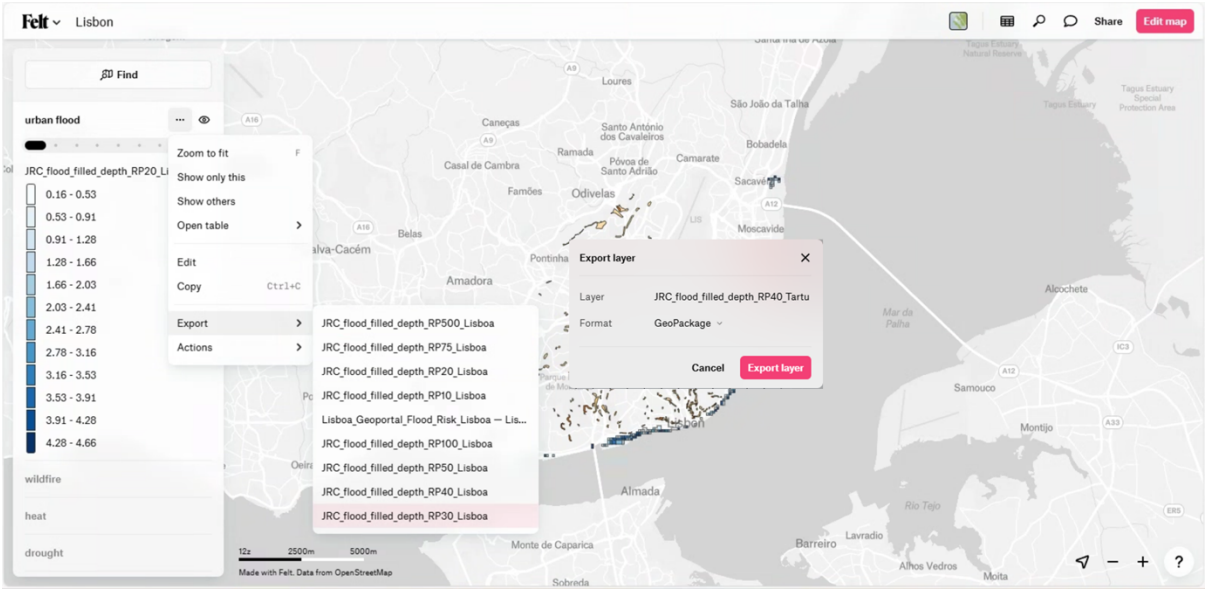


Figure 3. Screenshots depicting the download of hazard datasets.

For ease of data retrieval, users may download hazard maps and associated geospatial datasets directly through the platform. By clicking the three dots next to a hazard type, selecting the export option, and choosing the desired dataset and output format, users can obtain data suitable for integration into local GIS workflows or for archiving to support subsequent project activities.

The platform will be updated with new data throughout the project, evolving toward the second iteration of the deliverable expected in Month 36 of the project (April 2027). Input from RETIME consortium members regarding downstream tasks and additional hazard data needs will guide future platform development and ensures emerging data requirements are addressed. To facilitate feedback on the maps, a commenting feature is available, allowing users to place comments directly on the map at desired locations. Currently available maps are summarised in Table 5.

Table 5. Available hazard layers per RETIME pilot site.

Hazard	Pilot Site	Maps
Flood	Lisbon, Žilina, Tartu	Filled Depth for return period of 10, 20, 30, 40, 50, 75 100 and 500 years
Flood	Lisbon	Hazard index (Low, Moderate, High, Very High)
Wildfire	Lisbon, Žilina, Tartu	EFFIS Wildfire classes (3.1, 3.2, and 3.3)
Wildfire	Lisbon	Hazard Index
Heat	Lisbon, Žilina, Tartu	Maximum Wet-Bulb Globe Temperature (WBGT) for return periods of 5, 20, and 100 years
Drought	Lisbon, Žilina, Tartu	Maximum consecutive dry days under CMIP6 scenario
Windstorm	Lisbon, Žilina, Tartu	Maximum windspeed for return periods of 2, 10, 50, 100, 200 and 500 years
Earthquake	Lisbon, Žilina, Tartu	Peak Ground Acceleration (PGA) for return periods of 50, 101, 476, 976, 2500 and 5000 years
Earthquake	Lisbon	Hazard index
Landslide	Lisbon, Žilina, Tartu	Hazard Index

5. Conclusions

The RETIME Deliverable D3.1 provides a hazard mapping platform integrating multi-scale data for three pilot sites: Lisbon, Žilina, and Tartu. It identifies relevant hazards including floods, wildfires, drought, heat waves, windstorms, landslides, and earthquakes. The platform consolidates data from global, European, national, and local sources, enabling visualization, download, and collaborative feedback. This hazard data repository supports downstream RETIME tasks such as the alert triggers and exposure database. The first iteration delivers broad hazard coverage while future updates will build on these maps based on stakeholder input.

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Annex A: Preliminary list of hazard datasets

Hazard	Pilot side	Region	Categories	Units	Spatial Resolution	Source
Coastal Flood	Lisbon	Global	coastal flood with climate change scenario	-	5m	Climate Central: Coastal Risk Screening Tool
Urban Flood / Extreme Rain Fall	Lisbon, Žilina, Tartu	EU	Number of precipitation days exceeding 20mm	days	from 0.25° to 0.02°	Climate Data Store
Extreme Heat	Lisbon, Žilina, Tartu	Global	ERA5-HEAT (Human thErmAl comforT)	mean radiant temperature (MRT)	0.25°	Climate Data Store
Drought	Lisbon, Žilina, Tartu	EU	days (change)	Consecutive dry days	from 2º to 0.05º	Copernicus Interactive Climate Atlas
Extreme Cold	Lisbon, Žilina, Tartu	EU	days (change)	Frost days	from 2º to 0.05º	Copernicus Interactive Climate Atlas
Extreme Heat	Lisbon, Žilina, Tartu	EU	days (change)	Days with maximum temperature above 35 ºC	from 2º to 0.05º	Copernicus Interactive Climate Atlas
Coastal Flood	Lisbon	Lisbon	coastal flood risk zone	coastal flood risk zone	1m	Data Portal: Lisboa interativa
Earthquake	Lisbon	Lisbon	seismic vulnerability of soils	moderate,elevated, high	1m	Data Portal: Lisboa interativa
Landslide	Lisbon	Lisbon	-	-	1m	Data Portal: Lisboa interativa
River Flood	Lisbon	Lisbon	flood risk zones	moderate,elevated, high	1m	Data Portal: Lisboa interativa
Earthquake	Lisbon, Žilina, Tartu	EU	ESHM20, SA (5 Hz) – Mean Return Period 475yrs	POE 10%50years	0.01º	EFEHR
Wild Fire	Lisbon, Žilina, Tartu	specific EU regions	Wild fire maps of specific regions	-	site specific	EFFIS - European Forest Fire Information System
Wild Fire	Lisbon, Žilina, Tartu	EU	Aggregated wildfire risk index	-	~10km	EFFIS - European Forest Fire Information System

Wild Fire	Lisbon, Žilina, Tartu	EU	Long-term fire weather forecast	-	~10km	EFFIS - European Forest Fire Information System
Landslide	Lisbon, Žilina, Tartu	EU	Yearly InSAR displacement data	mm/year	100m	European Ground Motion Service
Landslide	Lisbon, Žilina, Tartu	EU	0 = no data; 1 = very low; 2 = low; 3 = moderate; 4 = high; 5 = very high	landslide risk	200m	European Landslide Susceptibility Map version 2 (ELSUS v2)
Extreme Heat	Lisbon, Žilina, Tartu	Europe	Future weather simulation	-	-	Future Weather Generator
River Flood	Lisbon	Lisbon	moderate, elevated, high	flood risk	1m	Lisboa Interativa
Wildfire	Lisbon	Lisbon	very low, low, medium, elevated, high	wildfire risk	1m	Lisboa Interativa
Wildfire	Lisbon	Lisbon	very low, low, medium, elevated, high	wildfire risk	1m	Lisboa Interativa
Landslide	Lisbon, Žilina, Tartu	EU	2,5,10,20,50,100,200,500 years return period	Likelihood of Occurrence	-	Risk Data Hub
Earthquake	Lisbon, Žilina, Tartu	EU	101, 476, 976, 2500, 5000 years return period	PGA (g)	-	Risk Data Hub
Wild Fire	Lisbon, Žilina, Tartu	EU	2,10,30 years return period	Annual Max FWI	-	Risk Data Hub
Windstorm	Lisbon, Žilina, Tartu	EU	2,10,50,100,200,500 years return period	Wind speed	-	Risk Data Hub
River Flood	Lisbon, Žilina, Tartu	EU	10,20,30,40,50,75,100,200,500 years return period	Flood depth	3 arc seconds	Risk Data Hub
Extreme Heat	Lisbon, Žilina, Tartu	EU	5,20,100 years return period	Wet-Bulb Globe Temperature (WBGT)		Risk Data Hub
River Flood	Lisbon, Žilina, Tartu	EU	Flood hazard maps for different return periods: 10,20,30,40,50,75,1	-	3 arc seconds)	River flood hazard maps for Europe and the

			00,200,500 years return period			Mediterranean Basin regio
Earthquake	Lisbon, Žilina, Tartu	EU	-	-	-	ThinkHazard!
Extreme Heat	Lisbon, Žilina, Tartu	EU	-	-	-	ThinkHazard!
Landslide	Lisbon, Žilina, Tartu	EU	-	-	-	ThinkHazard!
River Flood	Lisbon, Žilina, Tartu	EU	-	-	-	ThinkHazard!
Urban Flood	Lisbon, Žilina, Tartu	EU	-	-	-	ThinkHazard!
Wildfire	Lisbon, Žilina, Tartu	EU	-	-	-	ThinkHazard!
River Flood	Tartu	Estonia	10 years return period river flood maximum water level	water level	1m	geoportal. Estonia
River Flood	Tartu	Estonia	The probable rise in water levels over 10, 50, 100, and 1000 year	-	-	Flood Risk Areas and Risk Regions in Estonia
Wildfire	Tartu	Estonia	historic wild fires	yearly data	municipality level	Forest and Landscape Fires
Drought	Žilina	Slovakia	1 to 10 reflect the degree of risk to municipalities from drought based on the evaluation of data on municipalities in Slovakia	risk score	municipality level	geoportal.gov.sk
Extreme Heat	Žilina	Zilina	-	drought risk		Climaax
Extreme Heat	Žilina	Slovakia	1 to 10 reflect the degree of risk to municipalities from extreme heat based on the evaluation of data on	risk score	municipality level	geoportal.gov.sk

			municipalities in Slovakia			
Landslide	Žilina	Slovakia	-	-	10m	geoportal.gov.sk
River Flood	Žilina	Slovakia	flood risk map	-	1m	E-tool: Floods-risk map
River Flood	Žilina	Slovakia	0.5, 1.0, 2.0, 4.0, 6.0m	meter	-	-
Urban Flood / Extreme Rain Fall	Žilina	Slovakia	1 to 10 reflect the degree of risk to municipalities from extreme rain fall based on the evaluation of data on municipalities in Slovakia	risk score	municipality level	geoportal.gov.sk
Wildfire	Tartu	Estonia	Current wildfire hazard prediction	-	1km	Estonian Environment Agency
Earthquake	Lisbon, Žilina, Tartu	EU	mean return period of 475 years	Peak ground acceleration	10km	http://www.efehr.org/start/