

multi-Risk sciEnce for resilienT commUnities undeR a changiNgclimate

Codice progetto MUR: **PE00000005** – CUP LEAD PARTNER: I33C22006910006



Deliverable title: Inventory, Description and Classification of Interdependent Infrastructures and their Critical Assets

Deliverable ID: DV6.2.1

Due date: 30/11/2023

Submission date: 13/11/2023

AUTHORS

Luisa Lavallo, Maria Luisa Villani, Tatiana Patriarca (ENEA); Nicola Bazzurro, G.Serale, P.Cova, R.Converso, G. Delsoldato, V.Piramide, A.Ghillani, M.Adorni, M.DeGiovanni, M.Fiorini (Iren; Gabriele Freni (UniKore); Michele Torregrossa (UniPA); G.Giovannini (ANAS); A.Mauro, L.Agostini (RFI); Marco Ceresara, P.Carpanese, E.Saler, M.Donà, L.Badin, V.Follador, F.daPorto (UniPD); Pierluigi Claps, Paola Mazzoglio, G. Evangelista (PoliTo); Giuseppe Cammarata (ENG), G.Zani (PoliMI); Mara Lombardi, Davide Berardi, Elena Ridolfi, P. DeGirolamo, C.Codato (UniRoma1); Elena Toth, Cristiana Bragalli (UniBO)

Approved by Luisa Lavallo (WP leader)

Technical references

Project Acronym	RETURN
Project Title	multi-Risk sciEnce for resilienT commUnities undeR a changiNg climate
Project Coordinator	Domenico Calcaterra UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II domcalca@unina.it
Project Duration	December 2022 – November 2025 (36 months)
Deliverable No.	DV6.2.1
Dissemination level*	UNCLASSIFIED. The complete version of the deliverable is Confidential. Only the abstract is reported in this document.
Work Package	WP2 - Asset systems definition and characterization
Task	T2.1 - Acquisition, Inventory and Classification of CIs and mapping of interdependencies
Lead beneficiary	ENEA
Contributing beneficiary/ies	Iren, UniKore, UniPA, ANAS, UniRoma1, PoliTO, UniPD, ENG, PoliMI, UniBO

* PU = Public

PP = Restricted to other programme participants (including the Commission Services)

RE = Restricted to a group specified by the consortium (including the Commission Services)

CO = Confidential, only for members of the consortium (including the Commission Services)

Document history

Version	Date	Lead contributor	Description
0.1	31.10.2023	Luisa Lavallo (ENEA)	First draft
0.2	12.11.2023	RFI	Critical review and proofreading
0.3	13.11.2023	Luisa Lavallo (ENEA)	Edits for approval
1.0	13.11.2023	Luisa Lavallo (ENEA)	Final version

ABSTRACT

Critical Infrastructures are at the foundation of security, national economy, public health and well-being of any country. Yet, they are challenged by several natural and man-made threats, including the climate change extreme events. Climate change not only may lead to large-scale disasters but is also responsible of chronic stressors. As a warmer climate can't be avoided any more in the next decades according to any projected path, the homeland will continue to experience this impact for decades to come. Therefore, Critical Infrastructure operators need to be equipped with knowledge and tools to face a dynamic threat landscape, which includes an increased risk due to natural disasters and climate change.

Achieving this goal requires a strategy to join forces in new and innovative ways, and multidimensional public-private sector partnership is the key to success in this inherently complex mission area. To leverage the wide range of skills and expertise in the RETURN partnership, a co-creation process involving stakeholders, asset managers and domain experts has been started.

Such a large collaboration group is meant for a paradigm change, such as shifting from knowledge elicitation to a co-creation process that involves all the different expertise to create a shared understanding of the challenging objective. To this aim, it is beneficial that participants with different roles align and offer diverse insights, everyone gets a more holistic views of the problem and collaboratively find a viable solution by combining the suggestions from the individual domains of expertise. In this document, a preliminary analysis of (inter)dependencies among infrastructure sectors is also introduced. Analysis of (inter)dependencies is key to understand how infrastructure resilience contributes to community resilience because dependencies have a multiplicative effect, as a threat or hazard can result in the loss of services (such as electric outage) which can impact other critical infrastructures and escalate to cascading failures leveraging various dependency links. The identification of CIs (inter)dependencies may benefit from the participatory work under different perspectives and with different approaches too.

An inventory of the State-of the Art datasets related to the Italian Critical Infrastructure has led to the conclusion that the information and data already available in public repositories is not detailed enough to apply quantitative analysis methods to meet the objectives of the project. Hence, by actively involving the operators and scientific experts of the RETURN partnership, and considering the available resources, we started the analysis of Critical Infrastructures focusing on transportation (railways and roads) and water and wastewater. Thanks to additional expertise available in the partnership, also dams and industrial assets have been included in the analysis, although the approach only accounts for the scientific research perspective as the corresponding operators are not participating in the project.

For each domain, the infrastructure is described pointing out main assets and main operational aspects. The requirements list and their priority has been on the agenda of several meetings and long discussions, and the outcome is reported in two separates sections to account for the different perspectives. The current status of the data acquisition is reported in the document, along with preliminary results of the (inter)dependency analysis.

Please note that the complete version of this deliverable is confidential. Access may be granted upon request and subject to authorization by the RETURN Foundation.