This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821282

Systemic historic area resilience assessment and monitoring: how to build multidimensional, cross-scale and systemic resilience assessment and monitoring workflows

tecnalia
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

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Main objective

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Objectives

To establish a knowledge generation methodology and build a robust, flexible and replicable resilience capacity measurement framework suitable for different scales, different heritage and different potential multi-hazards scenarios.

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Highlights

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Resilience capacity measurement framework

→ Conceptualize and design the SHELTER operative knowledge framework

→ Define the **anatomy of historic areas** and develop a methodology to collaboratively characterise heritage assets

→ Characterize **natural hazards and climate change threats, impacts and scenarios** in relation with heritage typologies

→ Develop a **knowledge generation methodology** to allow measuring the singularity of heritage vulnerability

→ Scenario building based on **Agent Based Modelling**

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Key challenges

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Challenges

→ Multidimensional, cross-scale and systemic resilience assessment and monitoring

→ The importance of the characterization of the system as a whole (SES approach) is frequently overlooked.

→ Assessing the risk to prioritise and plan is a crucial but represents a challenging step

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Main outputs

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Operative Knowledge Framework

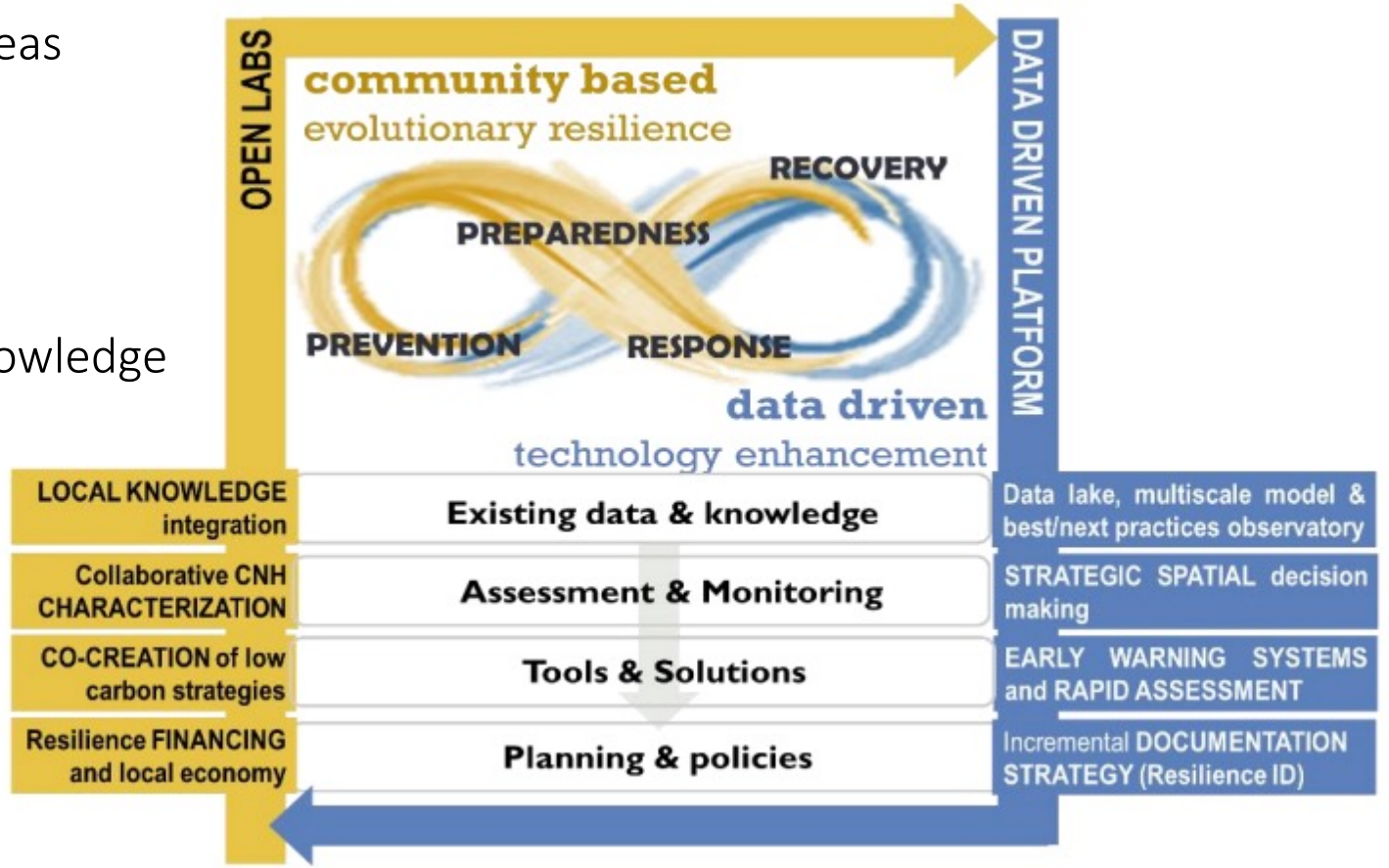
→ Defines the **concept of resilience** in historic areas

→ Establishes the strategy for its **assessment** and **improvement**

→ Designs the **architecture** of the operational knowledge

→ Assigns the role of the **Open Labs as co-creators** and validators of the framework

→ Ensures that **SHELTER outputs** share a **common understanding**



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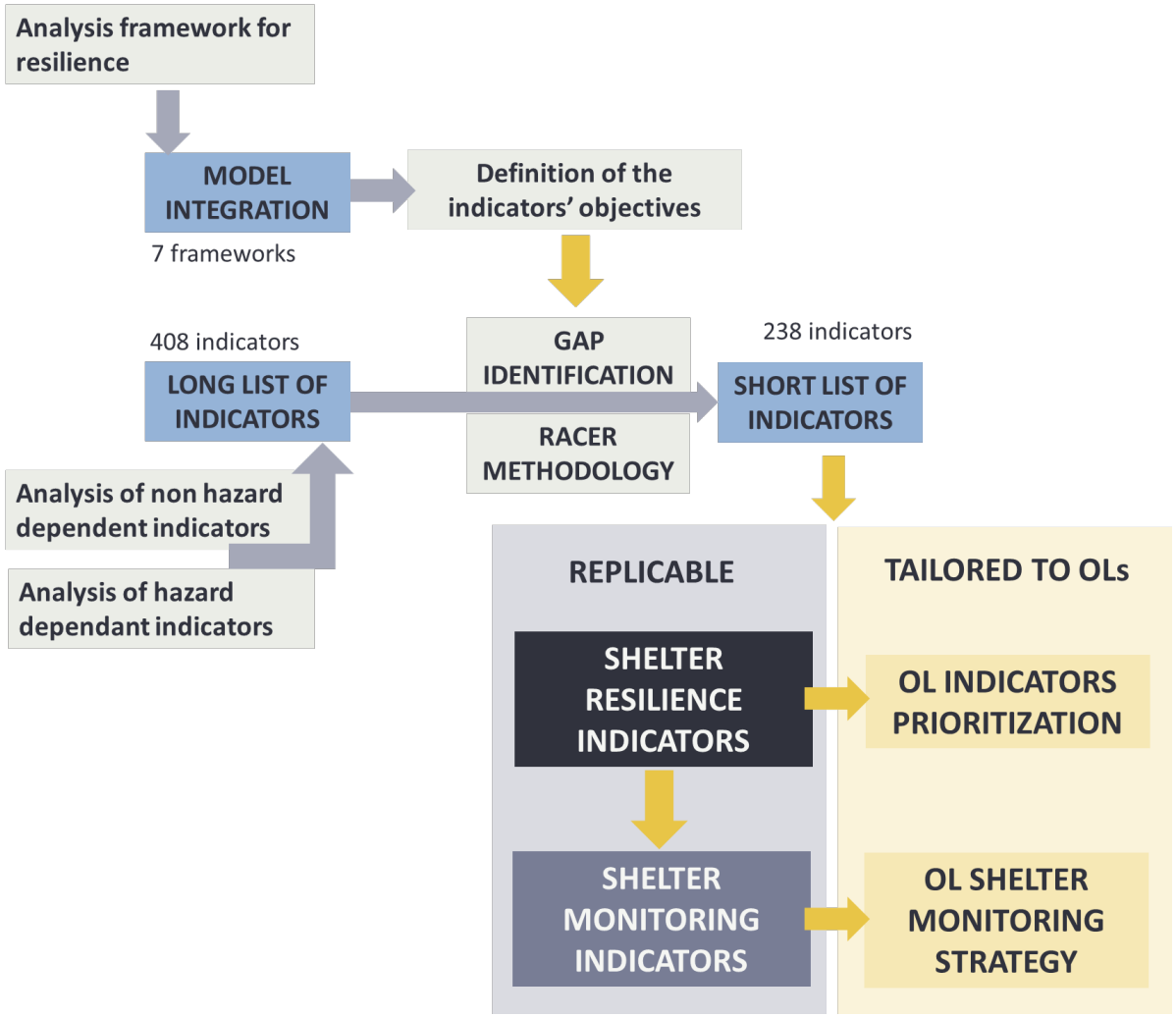
Systemic resilience assessment and monitoring framework

Indicators-based assessment aiming to quantify the performance of a system as a whole, suitable for different scales, different heritage and multi-hazards scenarios.

Establishes the baseline and monitoring strategy for case studies, measuring the success of policies and strategies, the integration of early warning systems, the adoption of appropriate contingency plans, emergency procedures and adaptive solutions reconstruction.



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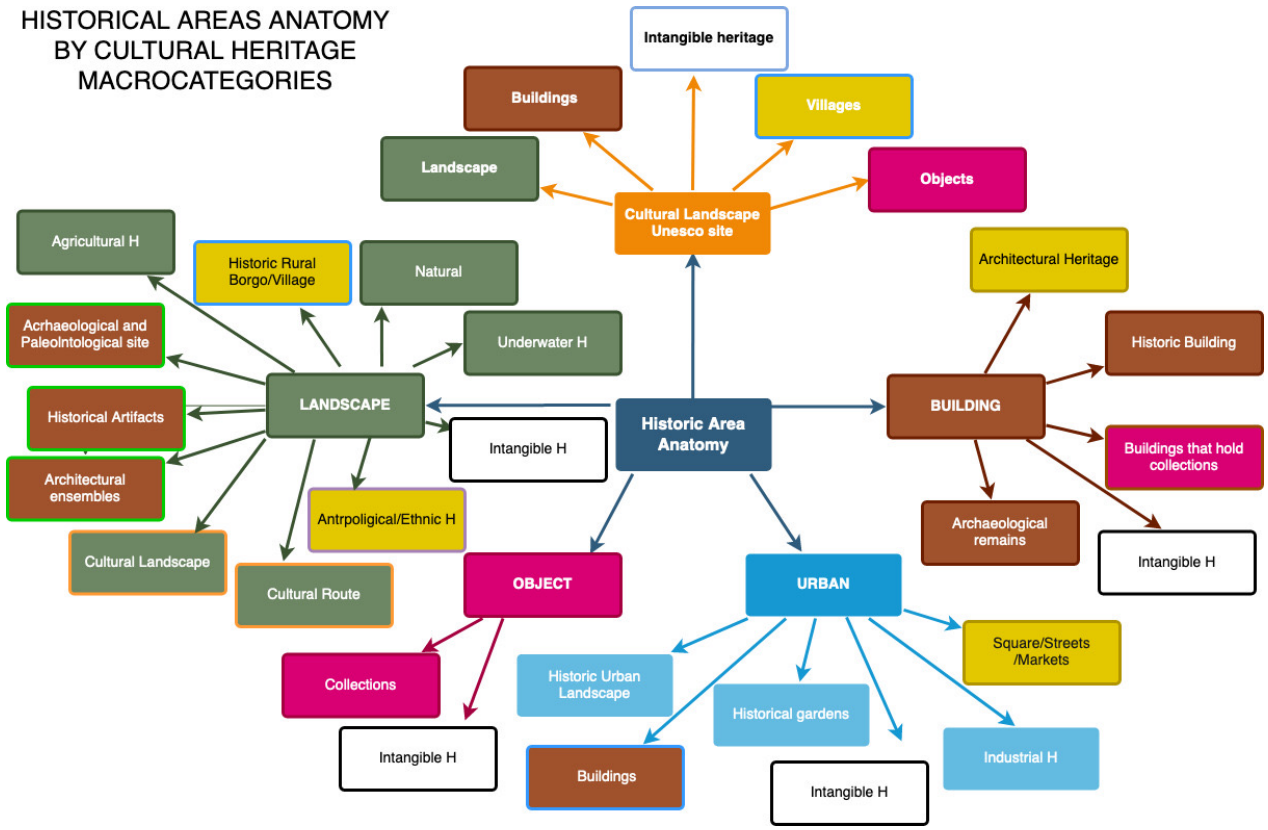
Anatomy of Historic Areas

Methodology to categorise Cultural and Natural Heritage assets in a Disaster Risk Management perspective

→ Identifies **macro categories** and **attributes** to enable categorization of Historic Areas

→ Bassed on existing ontologies, harmonised with INSPIRE and Shelter developments

→ Address the concept of heritage characterisation in relation to **risk informed thinking**



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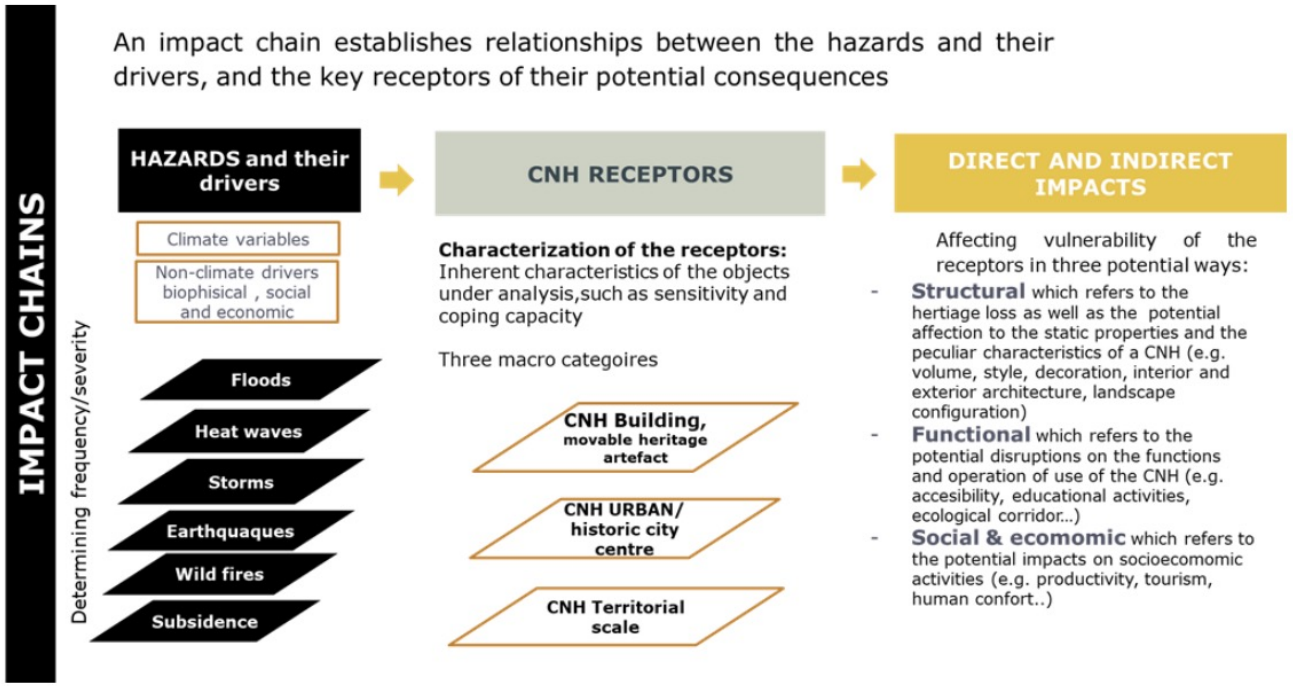
Hazards, climate change events, impacts and scenarios

Common, flexible and adaptive methodology for the characterization of different hazards

→ Identifies **direct and indirect impacts** and consequences of natural hazards

→ Tailored for **Cultural and Natural Heritage at different scales**

→ Defines **impact chains** describing a cause-effect relationship between the hazard and an exposed receptor



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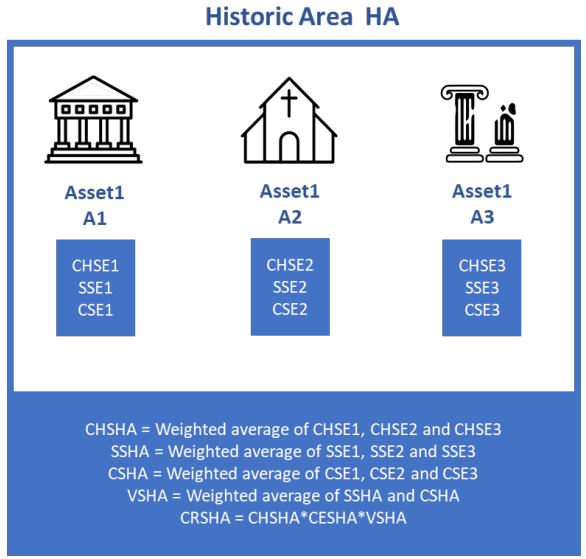
Specific hazard risk assessment

A replicable spatially explicit risk assessment methodology applicable at different scales, covering all SHELTER CNH hazards from a multi-dimensional perspective

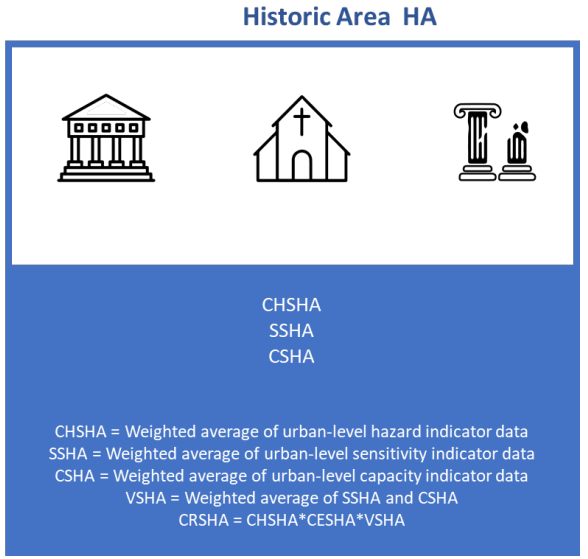
→ Follows an **indicator-based approach** to establish a holistic assessment of the hazard, exposure and vulnerability

→ Provides the **indicators calculation methods**

→ **Vulnerability, sensitivity, adaptive, coping and transformative capacities** as risk parameters



a. HA level assessment using asset-based data



b. HA level assessment using areal data

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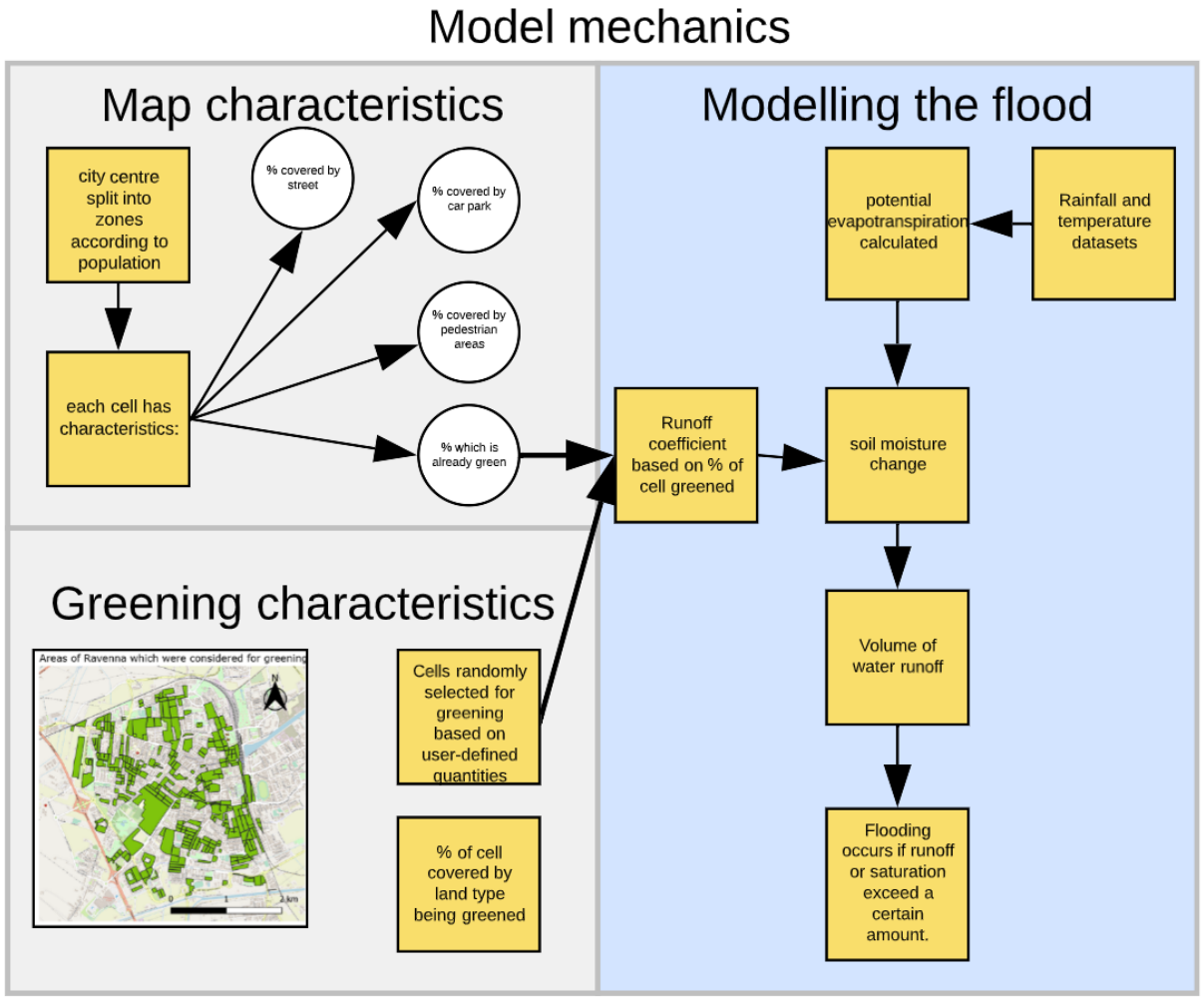
Agent-based modelling for scenario analysis

Explorative type of computer modelling which looks at the actions and interactions between agents.

→Creates scenarios of the preparedness of agents taking into account interactions and behavioral patterns including social adaptation of citizens

→Can be used as a rapid assessment tool to examine potential solutions for reducing hazard impact



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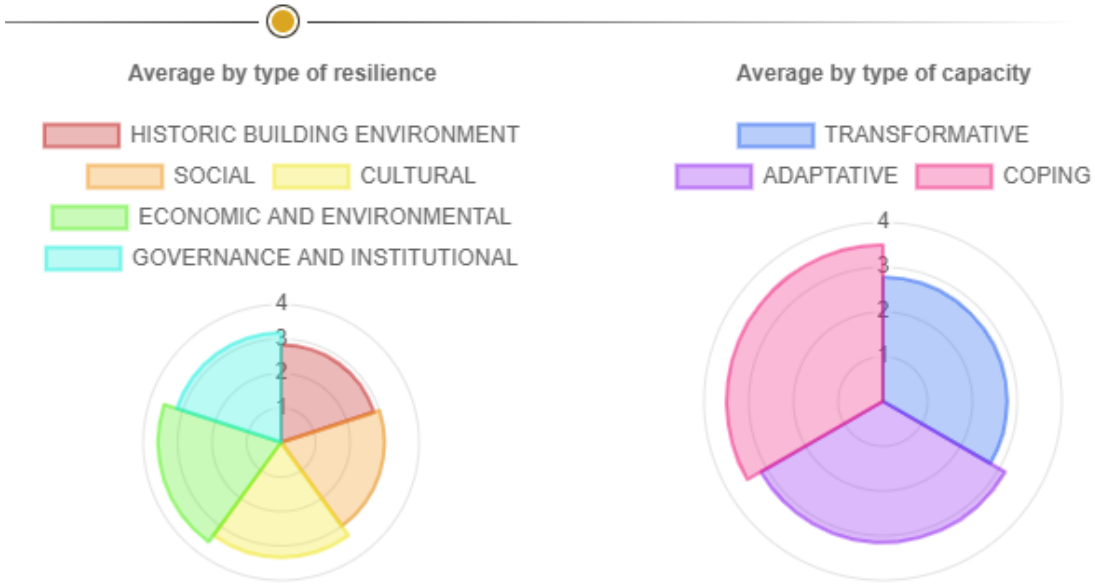
Cross-scale systemic resilience assessment methodology

User oriented framework and resilience assessment to guide the DSS workflow

→**Resilience Index** integrates multidimensional resilience assessments results and identifies the required data analysis and index computation

→Develop the **impact of the solutions** in the risk and resilience baseline: solutions inventory is used to reduce sensitivity and exposure and enhance coping capacity, adaptive capacity and transformative capacity

47 INDICATORS: 36 for CNH, 3 for CH and 8 for NH



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Conclusions

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Conclusions

→ Climate change matters: extreme events but also progressive changes affect heritage

→ Characterization of Historic Areas should be focused on defining heritage as a valuable and sensitive receptor including its specific values and vulnerabilities

→ Local context, idiosyncrasy and the socio-economic drivers determine hazard characterization

→ CNH intrinsic value matters

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THANK YOU!

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