Shelter

SCAN ME

Adaptive solutions portfolio for CNH resilience

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

The purpose is to provide a solutions and strategies portfolio together with a prioritization tool for decision making as well as a tool for cost-benefit analysis (CBA) for heritege resilience enhancement and sustainable reconstruction of historic areas.

The Portfolio includes solutions and strategies related to the different DRM phases: Emergency, Prevention, Preparedness, Response and Recovery. Solutions and strategies are also addressing different hazard typologies such as flood, earthquake, storm,subsidence, wildfire and heatwaves.

How

Integrated Value Model for Sustainability Assessment (MIVES).

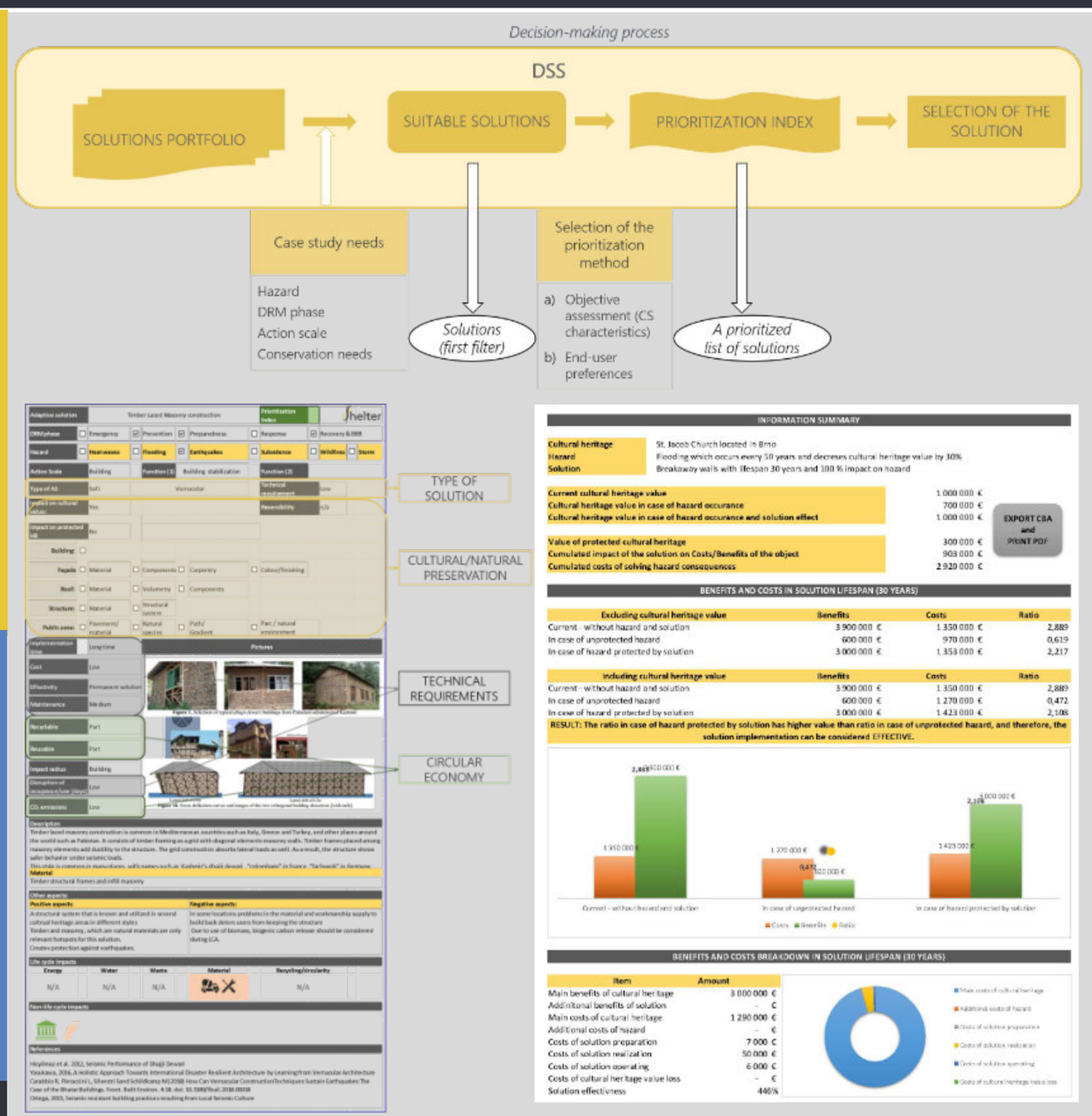
MIVES allows an objective comparison of the solutions from different dimensions. An expert panel defined the relative importance of the dimensions. Afterwards, MIVES was applied to the portfolio.

Cost-benefit analysis

The CBA tool is created using macros in an Excel file. It provides an economical part of project management and helps with the decision-making process from the cost-benefit point of view. It can compare the economic impact of different choices.

Tool | Results

Adaptive solutions portfolio for resilience enhancement of the Cultural and Natural Heritage (CNH) together with a prioritization methodology, Cost-Benefit Analysis (CBA) and Life cycle Assessment (LCA) aimed at supporting decision making.



Functionality

The prioritization methodology and CBA tool will be implemented in the Decision Support System (DSS) developed into the SHELTER dashboard.

PRIORITIZATION: As input, end-users will define their specific needs, DSS will show a ranking of all suitable solutions. In addition, end-users of the tools can assign specific weight to the dimensions according to their preferences, so that the result can response to their necessities.

CBA TOOL: The user can quantify the benefits and costs of implementing the selected solution, visualize the output, compare the options, and export the report.

Adaptive solution	Hazard		DRM Phases				PI		
			Prevention	Preparedness	Response	Recovery & BBB	Territory scale	Urban scale	Asset scale
Jacketing through composite material strips	Earthquakes					X			0.347
Coccioforte vaults consolidation	Earthquakes					X			0.359
Steel hooping for columns, pillars and beams	Earthquakes					X			0.540
Aquadam	Storm	Flooding	X	X			0.565	0.538	0.557
Underground drain system	Storm	Flooding		X		X	0.380	0.364	0.366
Cleaning under high voltage lines	Wildfires			X			0.561	0.544	0.555
Design access paths	Wildfires			X			0.597	0.623	0.642

CBA VARIANTS EXPORT

Cultural heritage	St. Jacob Church located in Brno
Hazard	Flooding which occurs every 50 years and decreses cultural heritage value by 30%
Current cultural heritage value	1 000 000 €
Cultural heritage value in case of hazard occurance	700 000 €

CLEAR EXPORT

Including cultural heritage value	Benefits	Costs	Ratio
Current - without hazard and solution	3 900 000 €	1 350 000 €	2,889
In case of unprotected hazard	600 000 €	1 270 000 €	0,472

Solution	Cultural heritage value in case of hazard occurance and solution effect	Value of protected cultural heritage	Cumulated impact of the solution on Costs/Benefits of the object	Cumulated costs of solving hazard consequences	Benefits Including cultural heritage value In case of hazard protected by solution	Costs Including cultural heritage value In case of hazard protected by solution	Ratio In case of hazard protected by solution
Breakaway walls with lifespan 30 years and 100 % impact on hazard	1 000 000 €	300 000 €	903 000 €	2 920 000 €	3 000 000 €	1 423 000 €	2,108