



REMTECH EXPO

GEOSSMICA



20 Settembre 2018

LIQUEFAZIONE E INSTABILITA' DINAMICA DEI TERRENI

**Valutazione del rischio e della resilienza di comunita' e infrastrutture per disastri di liquefazione del suolo
(Community and Infrastructures Risk and Resilience Assessment for Soil Liquefaction Disasters)**

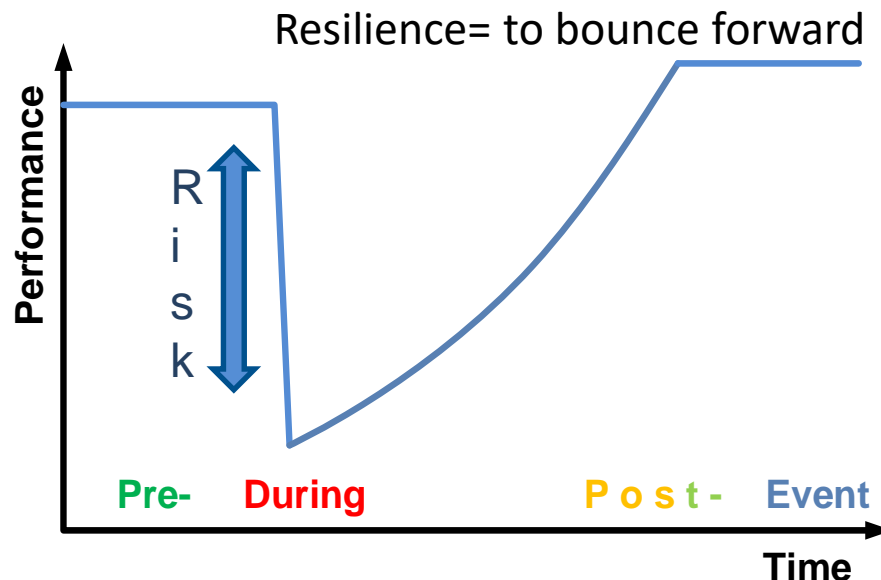
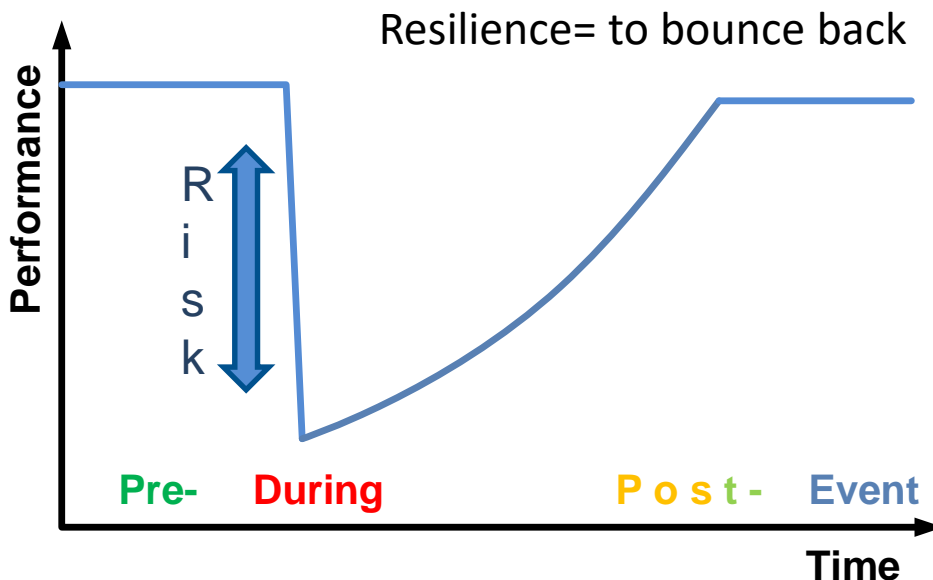
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RemTech Expo 2018 (19, 20, 21 Settembre) FerraraFiere

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Resilienza e Rischio

Resilience and Risk



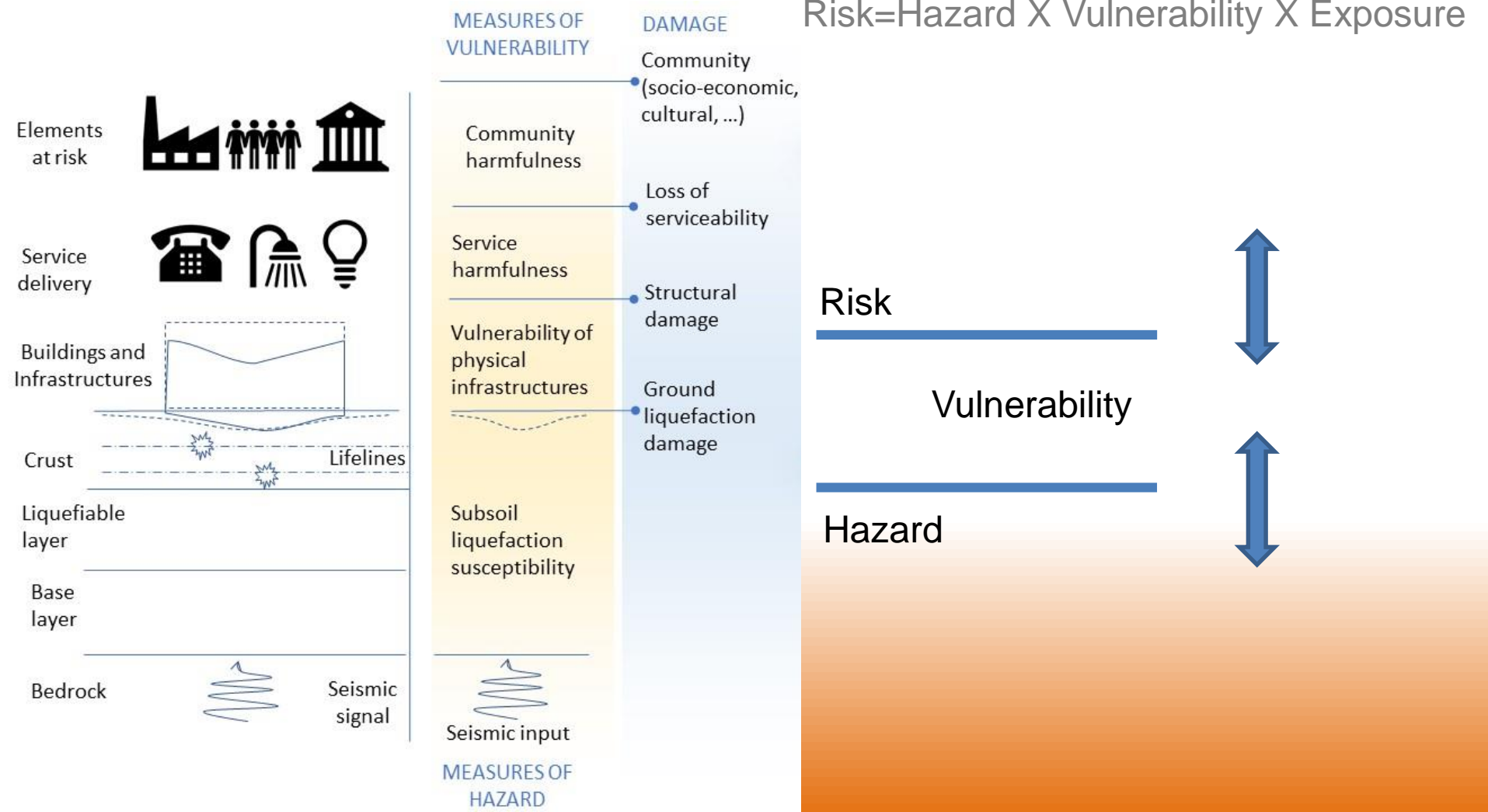
- **Resilienza** e' la descrizione della **dinamica** di un **sistema** il cui normale funzionamento e' improvvisamente sconvolto da un evento disastroso
Resilience is the description of a system dynamic behaviour which normal performance is abruptly disrupted by a disaster
- Il **rischio** e' la descrizione della **perdita di funzionalita'** del sistema che, nel caso di liquefazione del suolo e' **istantanea**
Risk is the description of the system **performance loss**, which in case of soil liquefaction is quite **instantaneous**

Resilienza e Rischio di Eventi di Liquefazione del Suolo

Resilience and Risk for Soil Liquefaction Events

Rischio=Pericolosità X Vulnerabilità X Esposizione

Risk=Hazard X Vulnerability X Exposure

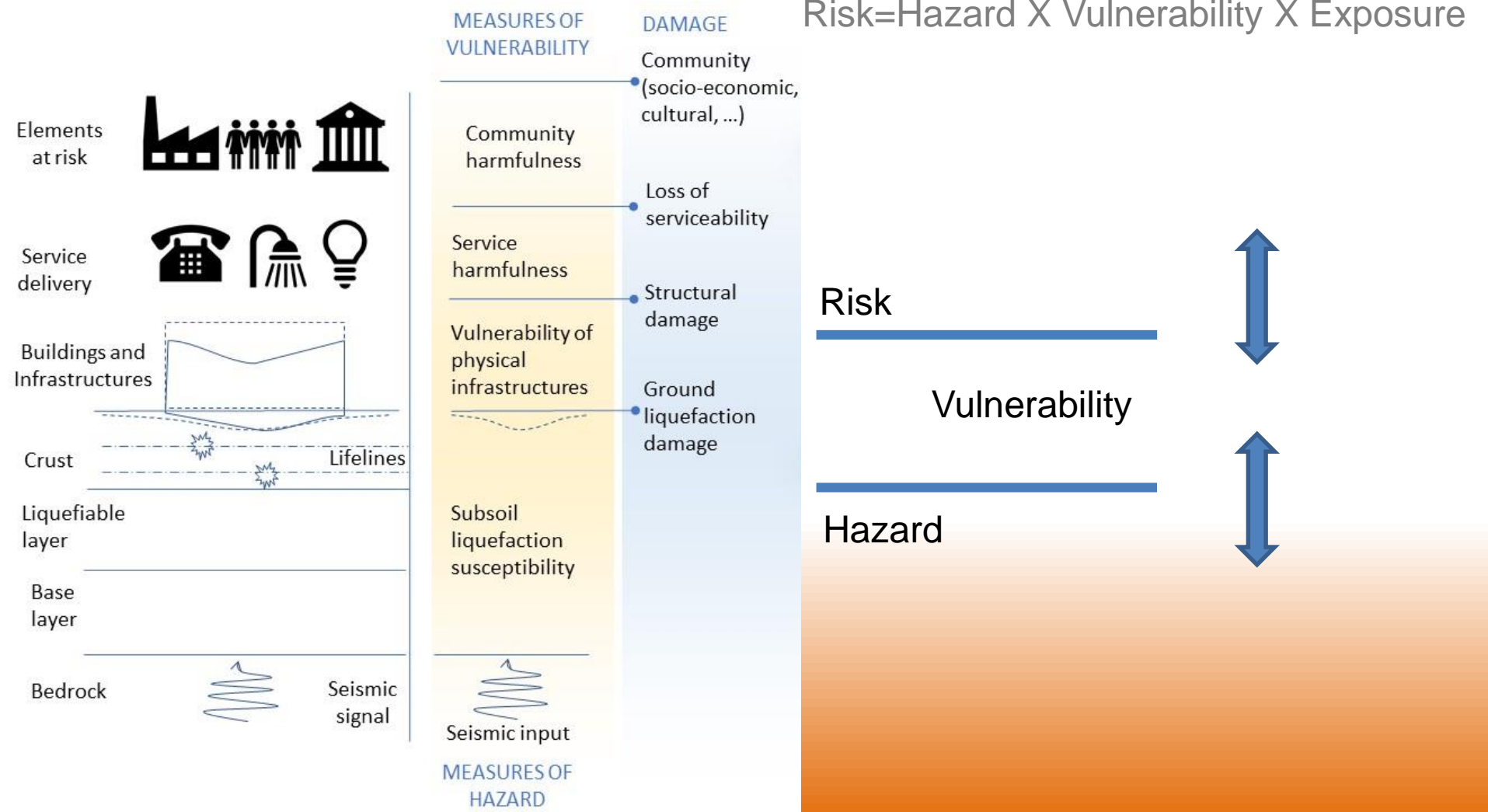


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MEASURES OF VULNERABILITY

Elements at risk

Community harmfulness

DAMAGE

- Community (socio-economic, cultural, ...)

MEASURES OF VULNERABILITY

Service delivery

Service harmfulness

Loss of serviceability

MEASURES OF VULNERABILITY

Buildings and infrastructures

Crust

Lifelines

Vulnerability of physical infrastructures

Structural damage

Ground liquefaction damage

MEASURES OF HAZARD

Liquefiable layer

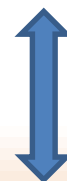
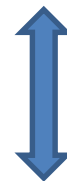
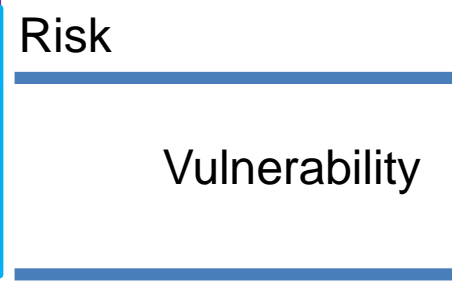
Base layer

Bedrock

Seismic signal

Seismic input

Subsoil liquefaction susceptibility



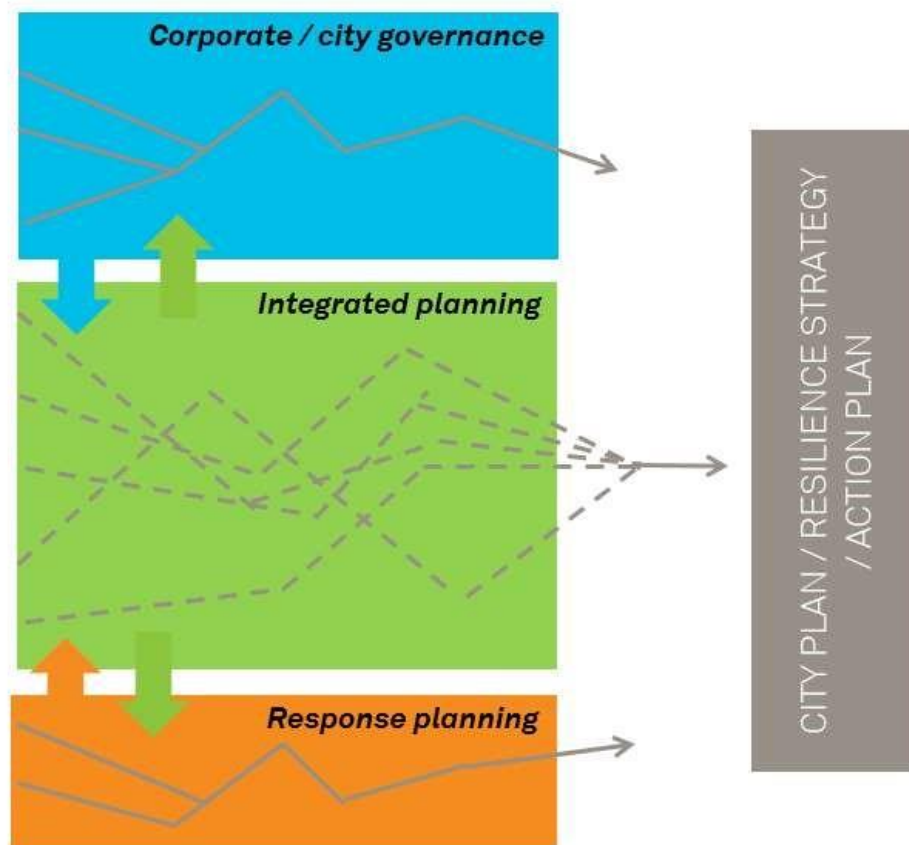
UNISDR scorecard per citta' resilienti

UNISDR scorecard for resilient cities

95

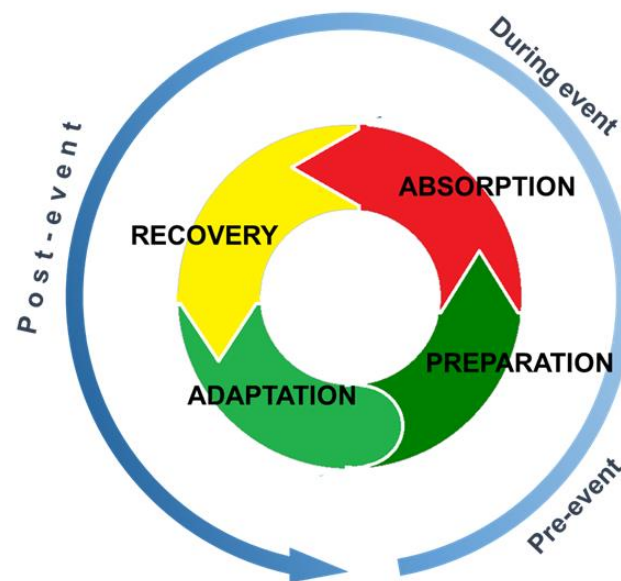
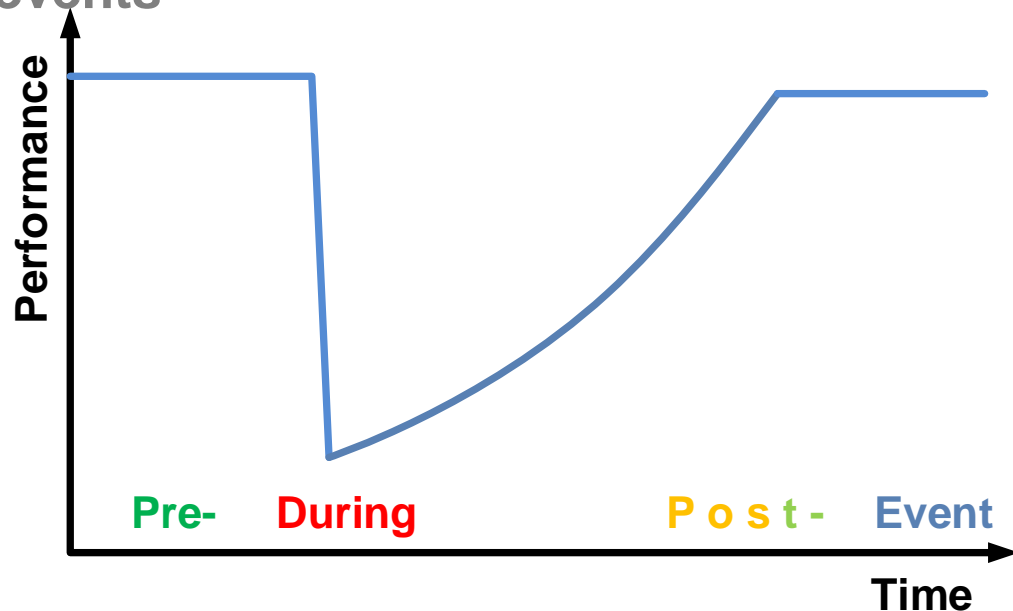
- 1 Organise for disaster resilience
- 2 Identify, understand and use current and future risk scenarios
- 3 Strengthen financial capacity for resilience
- 4 Pursue resilient urban development and design
- 5
- 6 Strengthen institutional capacity for resilience
- 7 Understand and strengthen societal capacity for resilience
- 8 Increase infrastructure resilience
- 9 Ensure effective disaster response
- 10 Expedite recovery and build back better

City Resilience Scorecard



Liquefact scorecard per infrastrutture resilienti a eventi di liquefazione del suolo

Liquefact scorecard for infrastructures resilient to soil liquefaction events

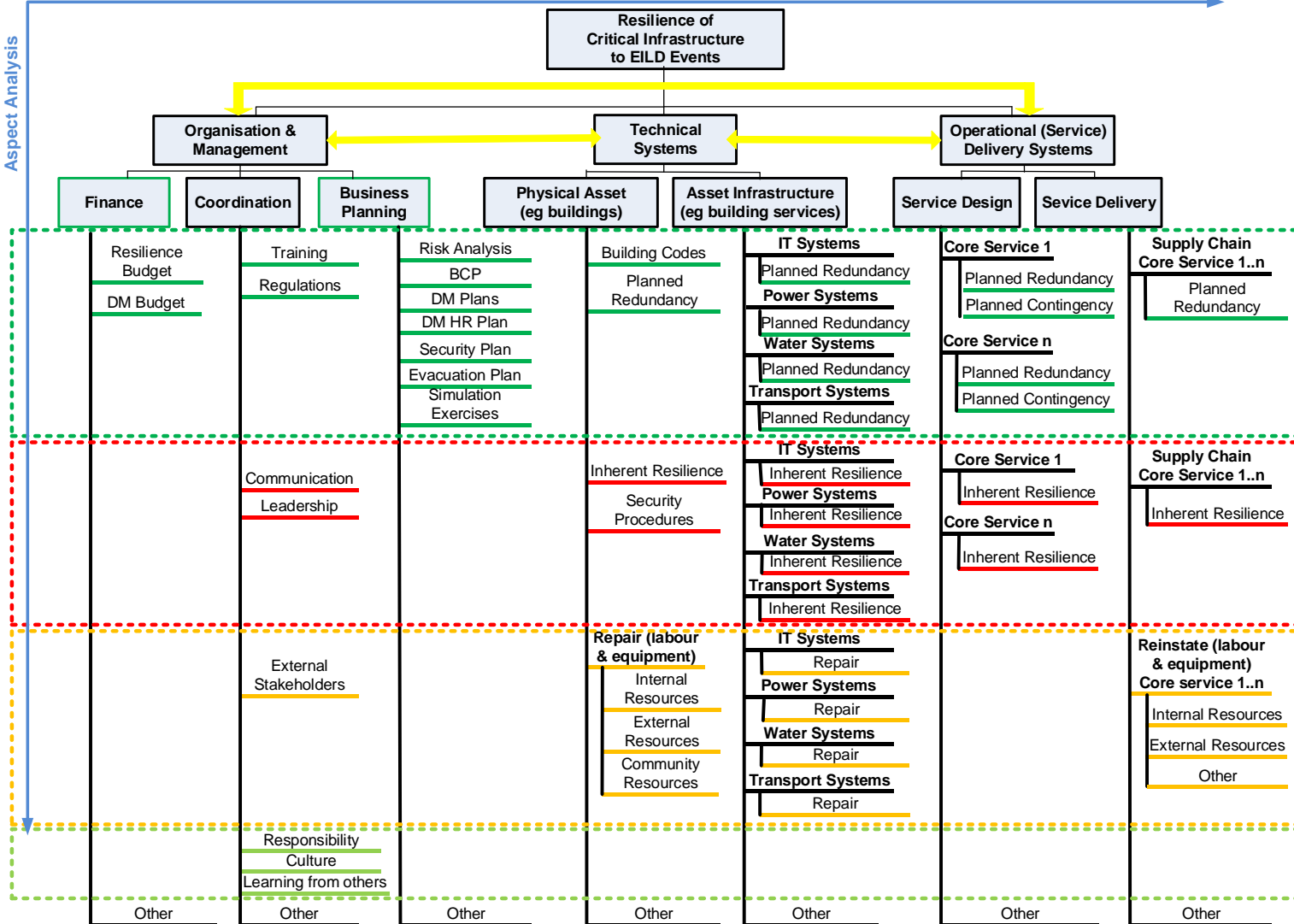


Liquefact scorecard per infrastrutture resilienti a eventi di liquefazione del suolo

Dimensional Analysis

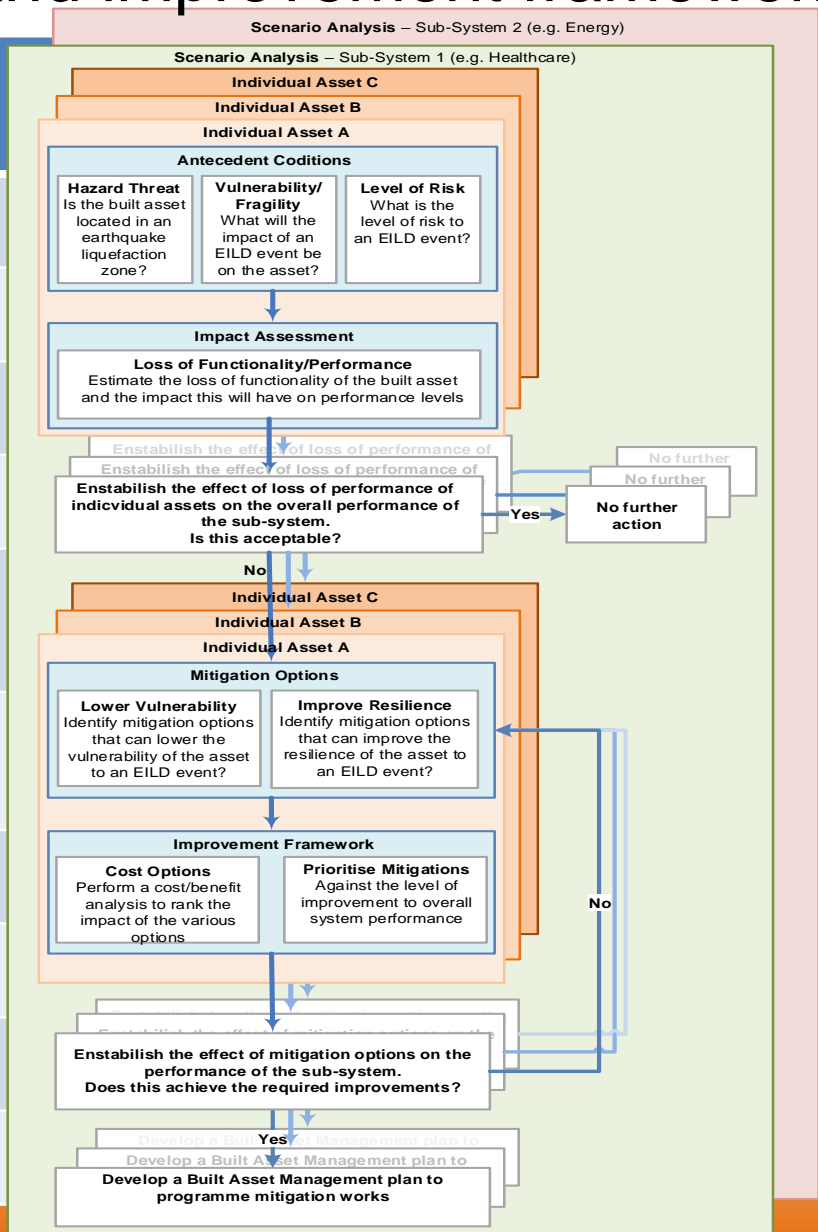
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Aspect Analysis



RAIF: Resilience assessment and improvement framework

Step	Task
1	Establish hazard threat
2	Establish Vulnerability / Fragility
3	Assess level of risk
4	Estimate loss of functionality (asset)
5	Estimate loss of functionality (sub-system)
6	Identify mitigation options (vulnerability)
7	Identify mitigation options (resilience)
8	Cost options (Options Appraisal)
9	Prioritise options
10	Develop implementation plan





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