



2ND IMPROVER / ERNCIP WORKSHOP

IMPROVED RISK EVALUATION AND IMPLEMENTATION OF RESILIENCE CONCEPTS TO CRITICAL
INFRASTRUCTURE

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Assessment of critical infrastructure resilience

- There are several national definitions of CI Resilience in Europe
- There is no EU definition of the term
- Most official European documents refer to societal resilience
 - e.g. EU Strategy for Supporting Disaster Risk Reduction in Developing Countries
- Relatively small body of work focussing on implementation of resilience to infrastructure:
 - Argonne laboratories RMI
 - AICC Guidelines for critical infrastructure resilience evaluation
 - Hollnagels Resilience Assessment Grid
- All rely on a summation of different levels of indicators



Analysing resilience (1)

- Guidelines for critical infrastructures resilience evaluation (AIIC)

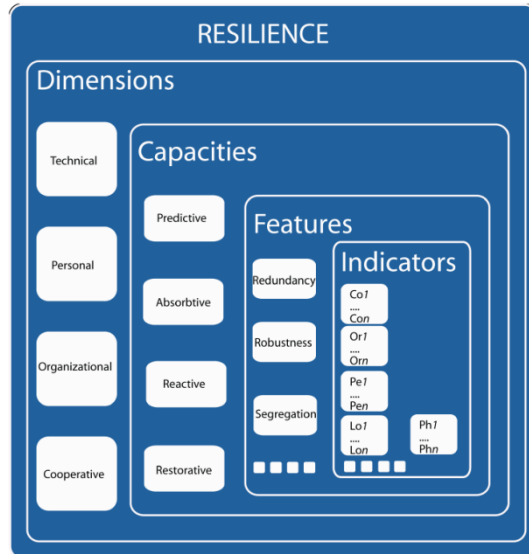
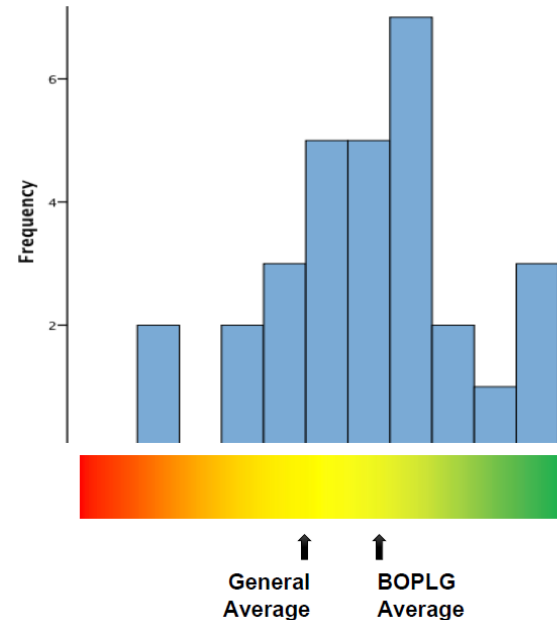


Figure 5. Hierarchical Representation of the Infrastructure Resilience Model
Indicators are presented in the Part II.

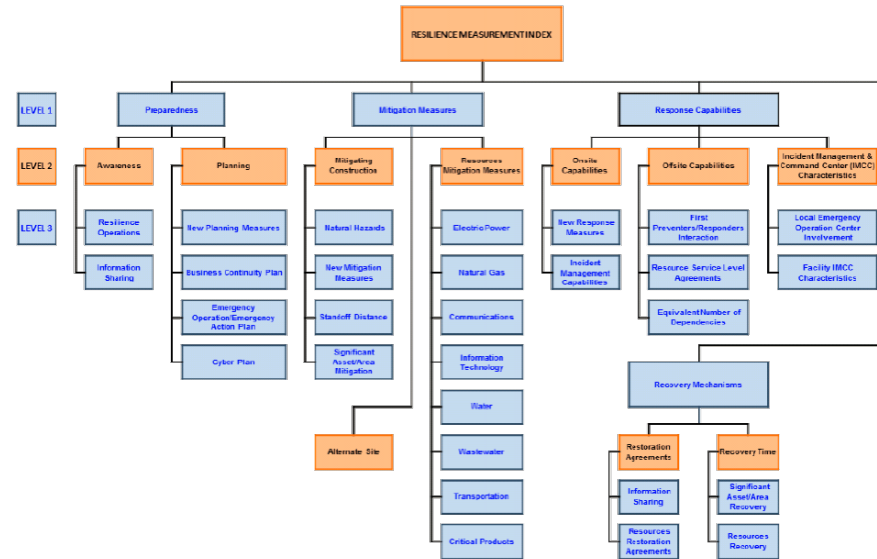
- Benchmark Resilience Tool (Resilient Organisations)



Analysing resilience (2)

- **Resilience Measurement Index and Infrastructure Survey Tool (Argonne)**

Resilience Measurement Index Structure



Measuring resilience (3)

- **Resilience Assessment Grid**



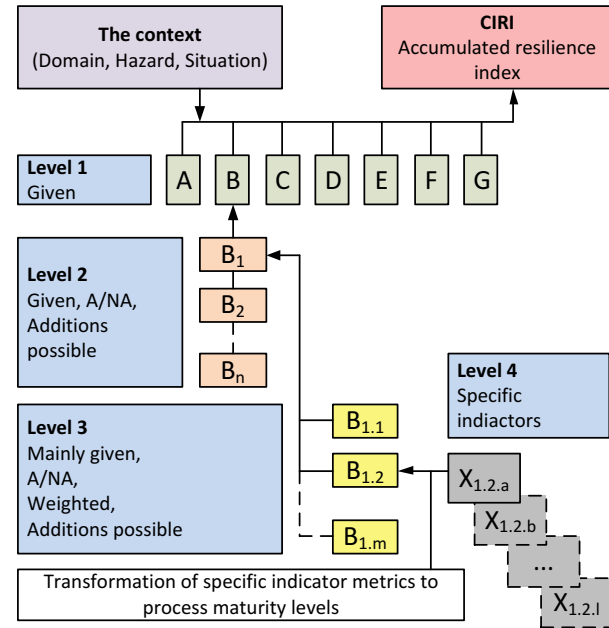
Critical Infrastructure Resilience Index (IMPROVER)

- Level 1 – the crisis management cycle
- Level 2 – generic indicators
- Level 3 – given, measurable indicators
 - Technological
 - Organisational
 - ...
- Level 4 – Sector / application specific, measurable indicators

■ Cobit

1. Non-existing
2. Initial / ad-hoc
3. Repeatable but intuitive
4. Defined process
5. Managed and measurable
6. Optimised

■ Measured / Calculated



Discussion

- The intended use of these methodologies varies significantly
 - Comparison against similar infrastructures or organisations
 - Measuring the resilience of a single asset
 - Monitoring resilience over time
- Radar charts
- Maturity scales



IMPROVER Framework

The successful implementation of the concept of resilience to CI relies on its successful integration in existing security activities; including the risk assessments at a CI operator, a system and a national (or regional) level.

- We propose a general framework for resilience assessment of CI, which remains compatible with the current guidelines for the MS
- Integrates the paradigm of resilience into the RA process according to ISO 31000
- Consists of three levels, namely the
 - (a) *asset* (focus on individual CI assets),
 - (b) *system* (focus on dependencies between CI assets) and
 - (c) *national or regional* (focus on societal aspects) levels
- Outputs risk and resilience treatment plans on both an asset and a system level
- Flexible – neither domain or analysis methodology dependent



Definitions

- Starting from definitions used in ISO 31000 for RA we map these to resilience:
 - **Resilience analysis** is the process to comprehend and to determine the level of resilience, based on selected resilience indicators
 - **Resilience evaluation** is the process of comparing the results of resilience analysis with criteria or objectives to determine whether resilience level is acceptable and identify areas for improvement
 - **Resilience assessment** is the overall process of resilience analysis and evaluation
 - **Resilience treatment** is the process to modify resilience, focusing on the absorptive, adaptive or restorative capacity
 - **Resilience management** comprises coordinated activities to direct and control an organisation with regard to its resilience, including the above processes



