FORESEE: Processes and methods to define metrics and targets of levels of service, risk and resilience

H2020-MG-7-1-2017: Resilience to extreme (natural and man made events)

Guidelines to measure levels of service and resilience and to set target values

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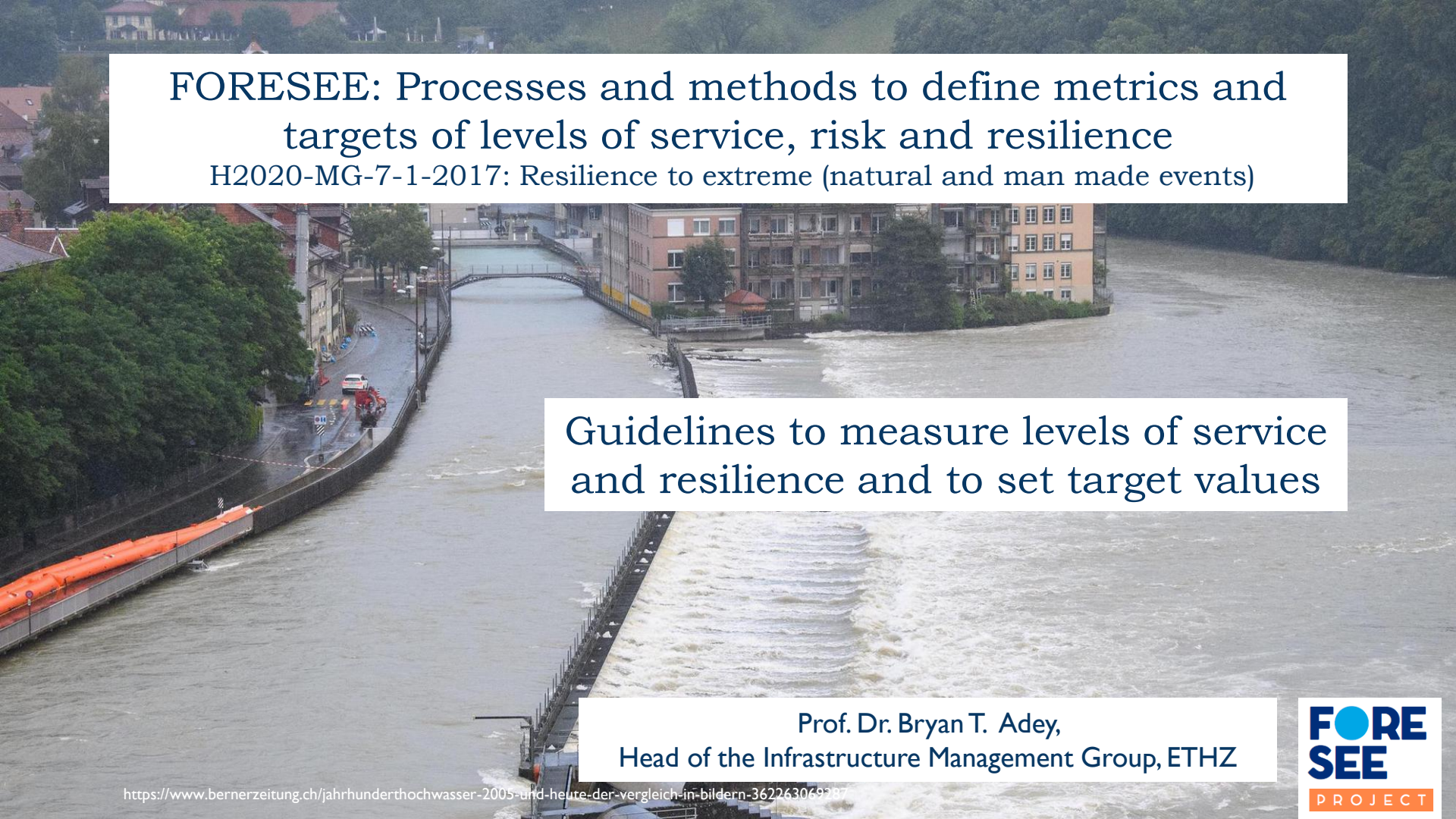

https://www.bernerzeitung.ch/jahrhunderthochwasser-2005-und-heute-der-vergleich-in-bildern-362263069287

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Results

1. Adey, B.T., Martani, C., Kielhauser, C., Robles Urqulijo, I., Papathanasiou, N., Burkhalter M., (2019), Guideline to measure levels of service and resilience in infrastructure, Deliverable 1.1, EU Grant number 769373, pages 84 pages, DOI: 10.3929/ethz-b-000403298.
2. Kielhauser, C., Martani, C., Adey, B.T., (2019), Guideline to set target levels of service to be provided by, and resilience of, transport infrastructure, Deliverable 1.2, EU Grant number 769373, 27 pages, DOI: 10.3929/ethz-b-000388318.
3. Adey, B.T., et al., (2021), CEN/CLC/WS 018 "Guidelines for the assessment of the resilience of transport infrastructure to potentially disruptive events", 83 pages, https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/RI/cwa17819_2021.pdf.
4. Adey, B.T., Martani, C., Kielhauser, C., Robles Urqulijo, I., Papathanasiou, N., Burkhalter M., (2021), Estimating, and setting targets for, the resilience of transport infrastructure, Special Issue: Resilient infrastructure for improved disaster management, Infrastructure Asset Management, 8(4), 167-190, DOI: 10.1680/jinam.20.00011.
5. Martani, C., Adey, B.T., Robles, I., di Gennarod F., Pardi, L., Beltran-Hernando, I., Concepcion Toribio Diaz, I., Jimenez Redondo, N., Antonio Moli Díaz, A., (2021), Estimating the resilience of, and targets for, a transport system using expert opinion, Special Issue: Resilient infrastructure for improved disaster management, Infrastructure Asset Management, 8(4), 191-208, DOI: 10.1680/jinam.20.00029.

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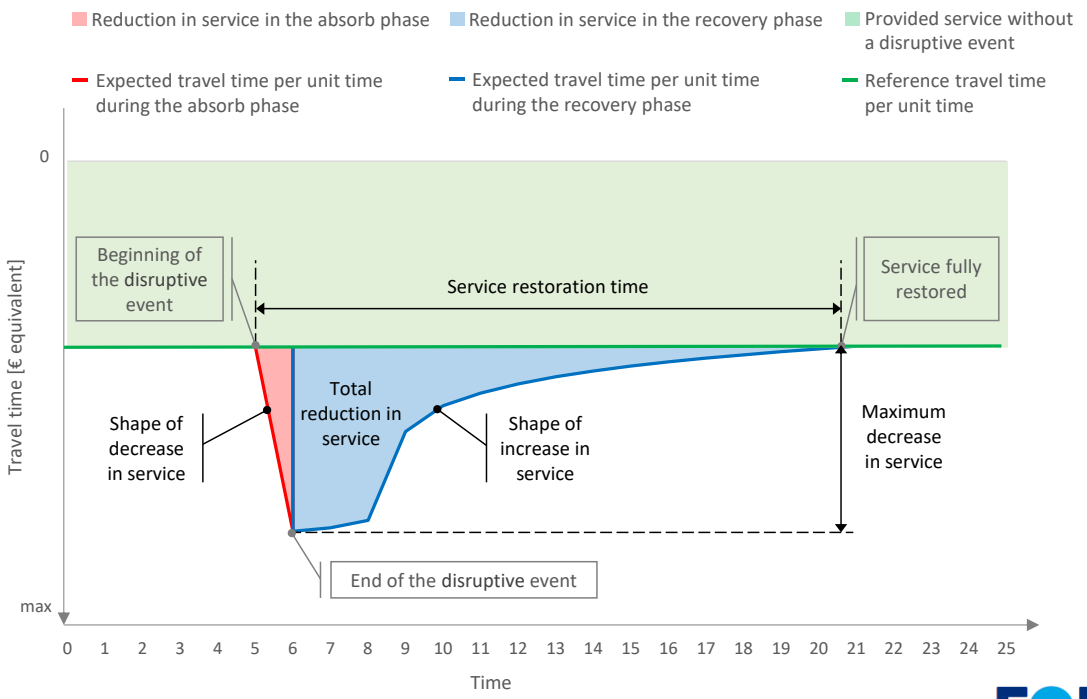
Service and resilience

Using the measure of service expected yearly cumulative travel time, of infrastructure enabling the transport of goods and persons from A to B for a scenario, where a single hazard event occurs and the infrastructure is restored so that it provides that same level of service as it did before the hazard event



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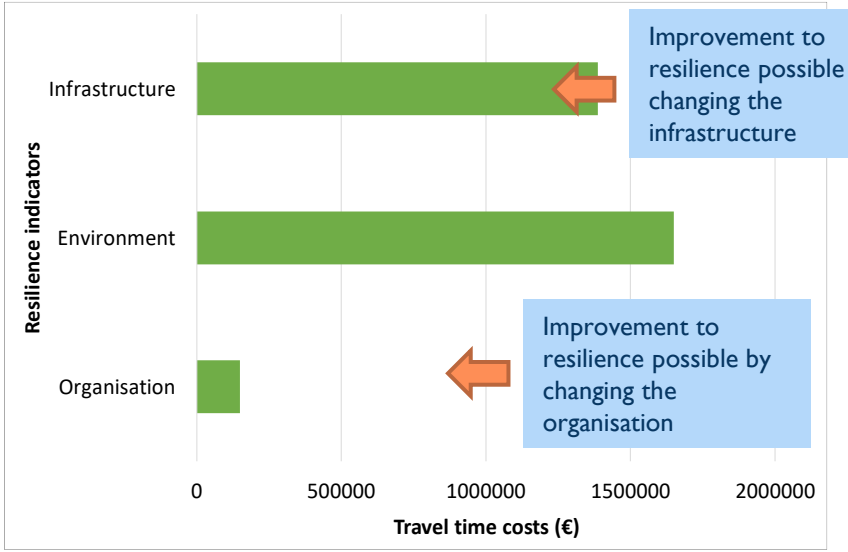
Steps to measure resilience

1. Define transport system
2. Measure service (Define service / Determine how to measure service / Measure service)
3. Measure resilience (Identify relevant parts of transport system / Determine how to measure resilience / Measure resilience)

- The specific method to be used could be either
  - directly using service and intervention costs
  - using indicators, or if measurement not possible
  - the estimation of the percentage of fulfilment of resilience indicators



Results of resilience measured using transport systems parts, differentiated weights and travel time costs.

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Steps to set targets

1. Gather all relevant stakeholders
2. Determine legal requirements
3. Determine stakeholder requirements
4. Set targets

The specific method to be used to set targets depends on:

- how resilience is measured, i.e. using simulations or indicators, and
- whether or not cost-benefit analysis is used.

Target set	Label	Des-cription	Targets per type of target		
			travel time reduction	restor-ation time	restoration intervention costs
1	No changes in service	No change in travel time given a 100-year flood	None	Not specified	Not specified
2	Legal minimum	All legal requirements are fulfilled	Largest legally allowed	Largest legally allowed	Not specified
3	Restoration budget	Available budget will be used fully, in order to maximise the service	Not specified	Not specified	Under the specified restoration budget

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Vision

- Consistent assessments of the resilience of transport systems
- Consistent appraisals of resilience enhancing projects
- Allocation of resilience funds to maximize resilience
- Resilient transport systems

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