

Resilience management guidelines and Operationalization applied to Urban Transport Environment

RESOLUTE Exploiting Smart resilience indicators

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Why measuring system resilience?

- To evaluate the effectiveness of the political initiative
- To estimate the cost-benefit/opportunity of the decisions and actions
- To evaluate the impact on the society at economical and social level
- To gain a better understanding about the community dynamics
- To support local, national and European decisions
- To move from the definitions to the operations
- To assess the trend of resilience (not only now but in the future)
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Resilience is a multifaceted concept

- Property ?
- Process ?
- Ability ?
- Outcome ?
-

- **Maybe all of them -> Not a single measurement but a set of indicators that constitute a resilience profile**



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FRAM-based UTS system modeling



Functional Variability



**Variability propagation
through function
interdependency**



**Possible functional Resonance
(failing in damping variability)**



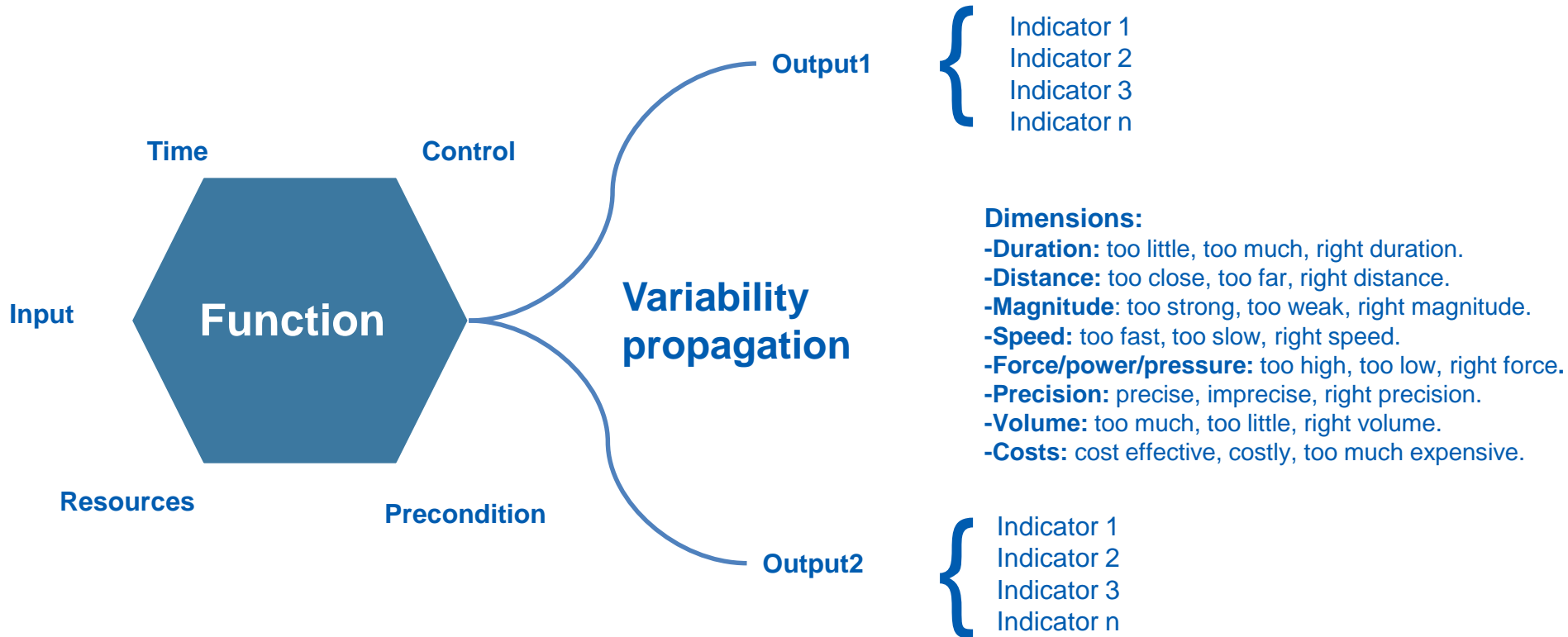
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How to measure functional variability?



Function exhibits its variability through its output performance



RESOLUTE evaluation indicators definition

ERMG functions	Function's output	Preliminary KPI for pilots validation
ANTICIPATE		
Develop Strategic Plan	Strategic Plan	<p>A. Presence of a strategic plan</p> <p>B. Adherence to plan in previous business periods (i.e. performance review)</p> <p>C. External contextual factors accounted in the resilience policy/strategy (ref. Indicator ID 1029 – Smart Resilience)</p> <p>D. Resilience policy defined (ref. Indicator Id 983 – Smart Resilience)</p> <p>E. Frequency of plan revision needs</p> <p>F. Plan delivered with foreseen timeframe (i.e. according to business process)</p>
Manage financial affairs	SLA (Service Level Agreement)	G. Compliance with budget in previous business periods (i.e. performance review)
	Budget	<p>H. Presence of a well-defined (multi) annual budget</p> <p>I. Budget base on Reliability, Availability, Maintainability and Safety (RAMS) aspects.</p> <p>J. Frequency of budget revision</p>



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Resolute – SmartResilience collaboration

Training staff	Training performance data	<p>A. Frequency of training for operators employee (ref. Indicator ID 992 – Smart Resilience)</p> <p>B. Training performance assessment (scores and grades)</p> <p>C. Trainee feedback and review of training activity</p> <p>D. General & specific resilience training procedure exist (ref. Indicator ID. 989 – Smart Resilience)</p> <p>E. Training for resilience management in place (ref. Indicator ID 986 – Smart Resilience)</p> <p>F. Regular drills/ emergency preparedness exercises conducted (ref. Indicator ID 1001 – Smart Resilience)</p>
	Staff trained	<p>G. Percentage of employees trained in resilience-related training (ref. Indicator ID 1024 – Smart Resilience)</p> <p>H. Percentage of employees trained in resilience-related training (ref. Indicator ID 1002 – Smart Resilience)</p> <p>I. Assessment/monitoring of organisational change and organisational culture</p>

Not reinventing the wheel



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Resilience assessment issues

- 1. Semantic disambiguation of the terminologies used in the indicator definition -> Social dialogue**
- 2. Need of indicators acceptance in the community/system of reference**
- 3. Indicators actual measurability (data exist? Are they accessible? Are the cost of measurement sustainable?, etc..)**





Thank you



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