InfraStress Project
Protecting the infrastructure of Europe and the people in the European smart cities

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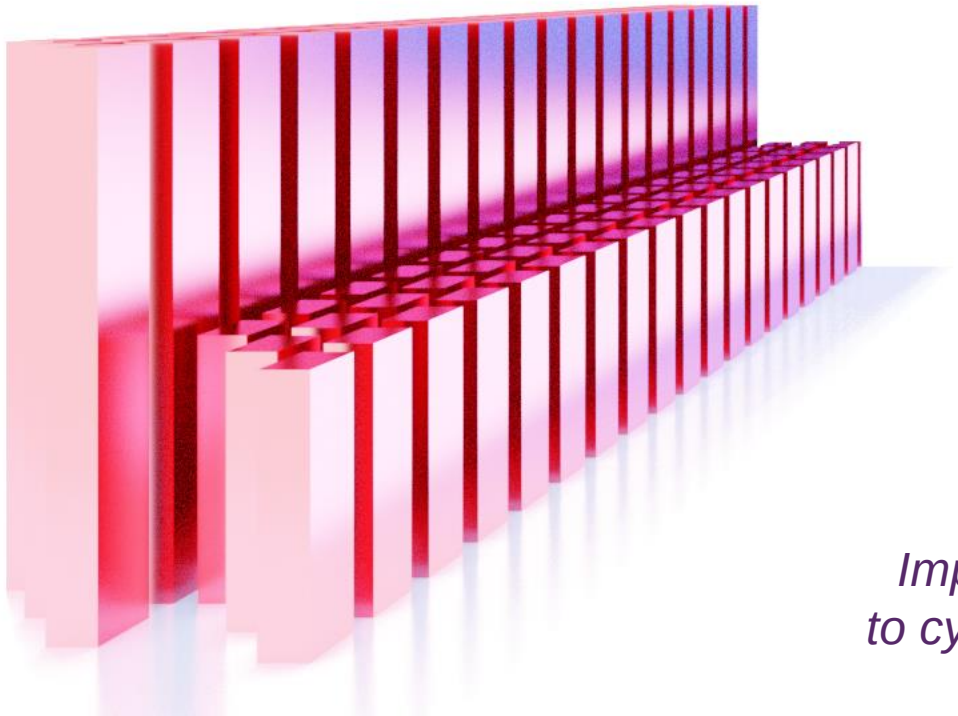
&
InfraStress Project Coordinator



Shaping the future of cybersecurity - Priorities, challenges and funding opportunities for a more resilient Europe
13 July 2021

INFRA STRESS

Improving resilience of sensitive industrial plants & infrastructures exposed to cyber-physical threats by means of an open testbed stress-testing system

Main Message

This project has received funding from the European Union's
Horizon 2020 research and innovation programme
under grant agreement No 833088

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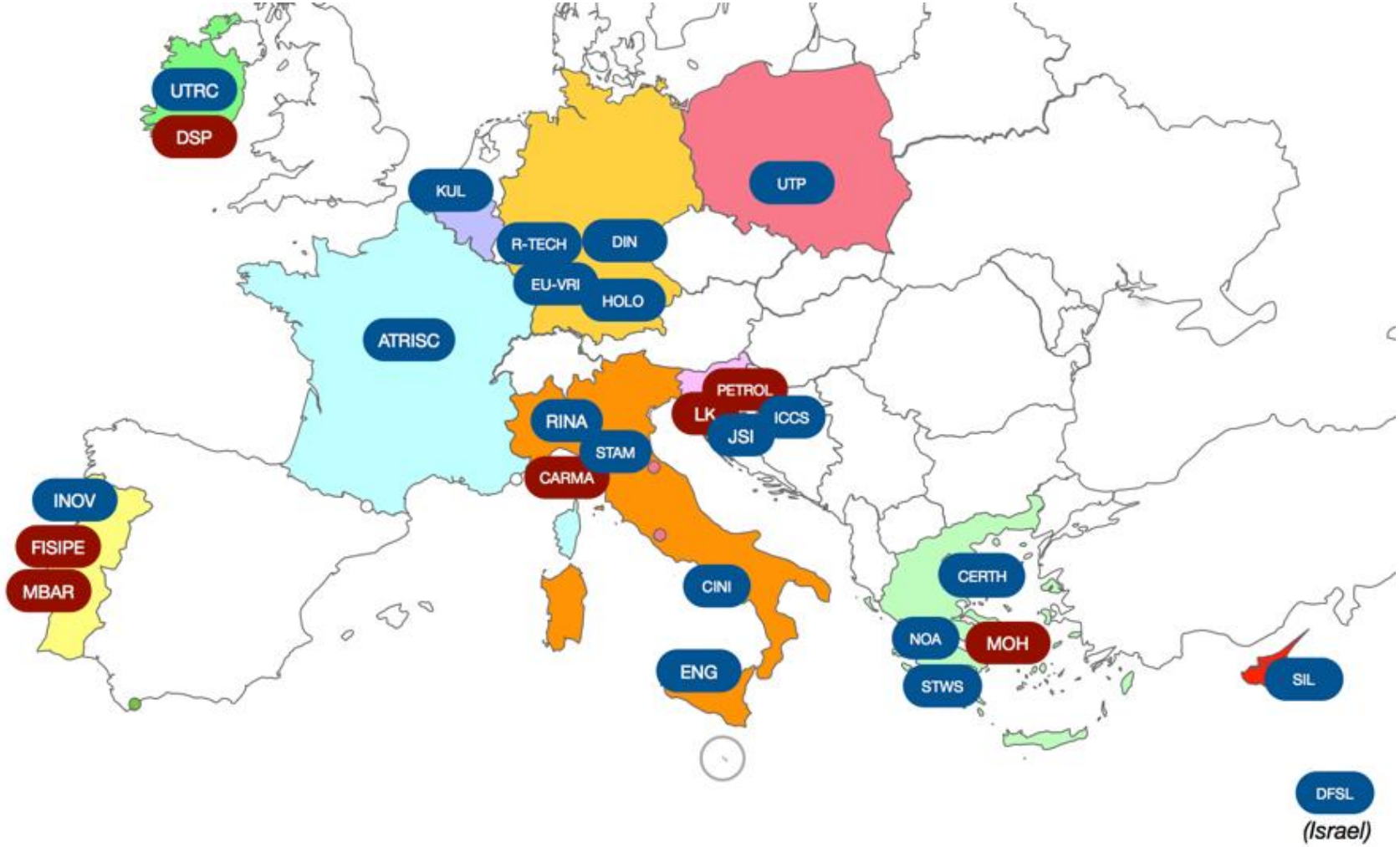
InfraStress 2019-2021

- InfraStress brings together 27 partners of excellence from 11 countries
- Cyprus
- France
- Germany
- Greece
- Ireland
- Israel
- Italy
- Netherlands
- Poland
- Portugal
- Slovenia



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InfraStress main objectives

- **Improve the resilience** and the protection capabilities of **Sensitive Industrial Plants and Sites** (**SIPS**) exposed to large-scale, combined, **cyber-physical threats and hazards**
- **Stress-testing resilience:** Guarantee continuity of **operations**, while minimizing cascading effects in the infrastructure itself, the environment, other Critical Infrastructures (CIs), and the citizens in vicinity, at reasonable cost
- InfraStress deals with **security** of both sensitive industrial production plants and sensitive storage sites, along with ICT infrastructures supporting them

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Methodology and expected outcomes

- The InfraStress **methodology** is based on a set of composite indicators of SIPS security and resilience, which will be embedded into the new risk and resilience ISO and CEN standards, and into education and training programs
- The **methodology** and **indicators** will yield breakthrough innovation and the benefits/savings to be achieved by the project will be assessed by users and advisory groups
- **Integrate**
  - Risk & resilience,
  - Safety & security
  - Situational Awarness & resilience

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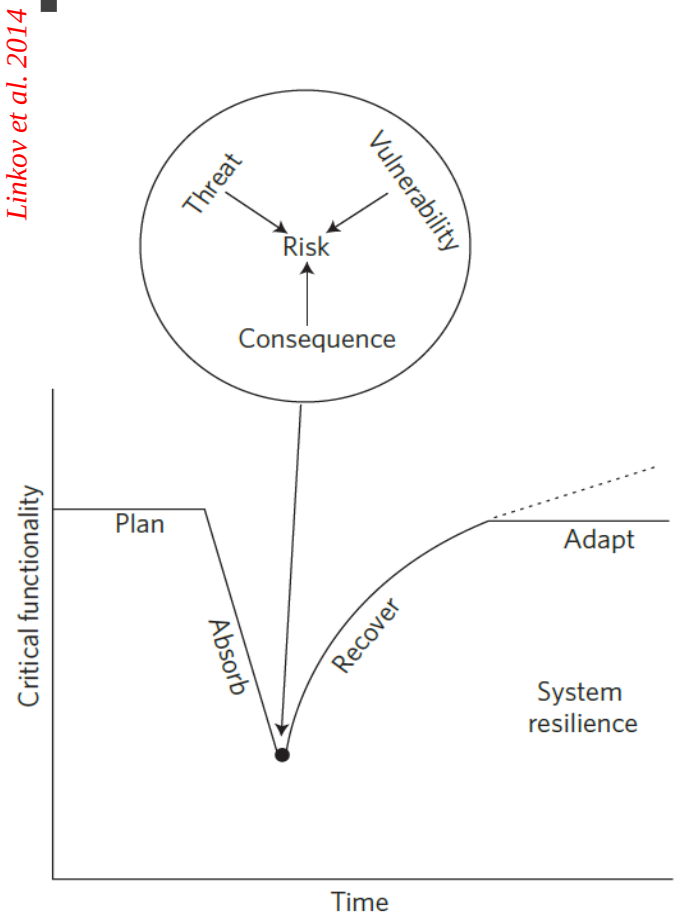
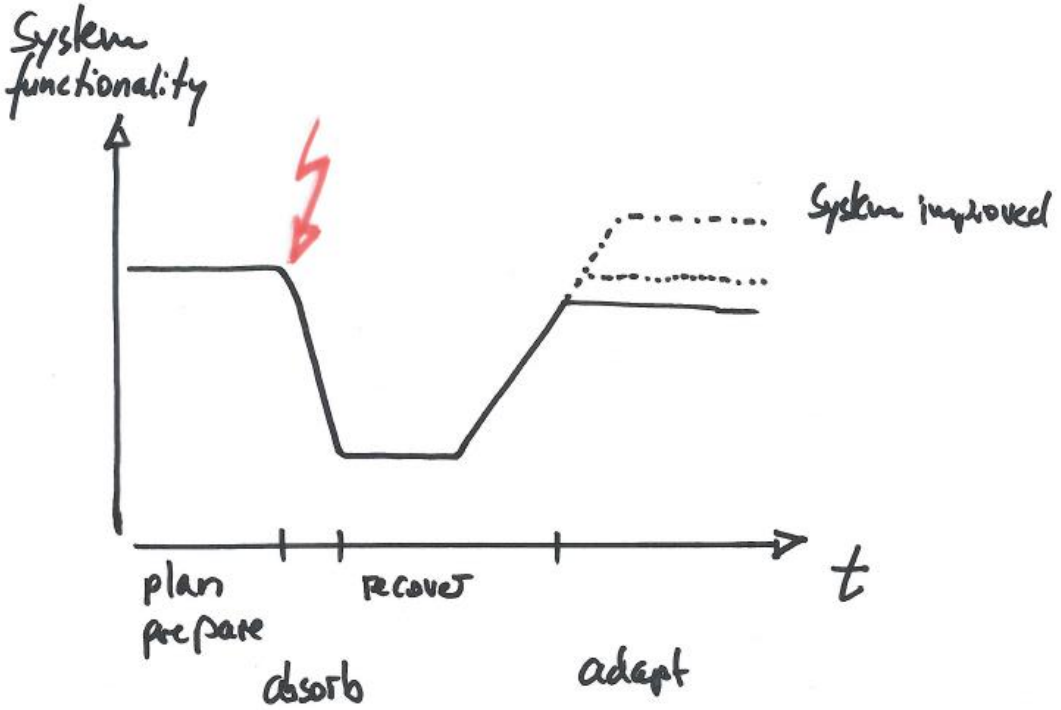
Resilience: what happens when risk happens?



- ISO 22300:2018
  … ability to absorb and adapt in a changing environment.



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Integration,
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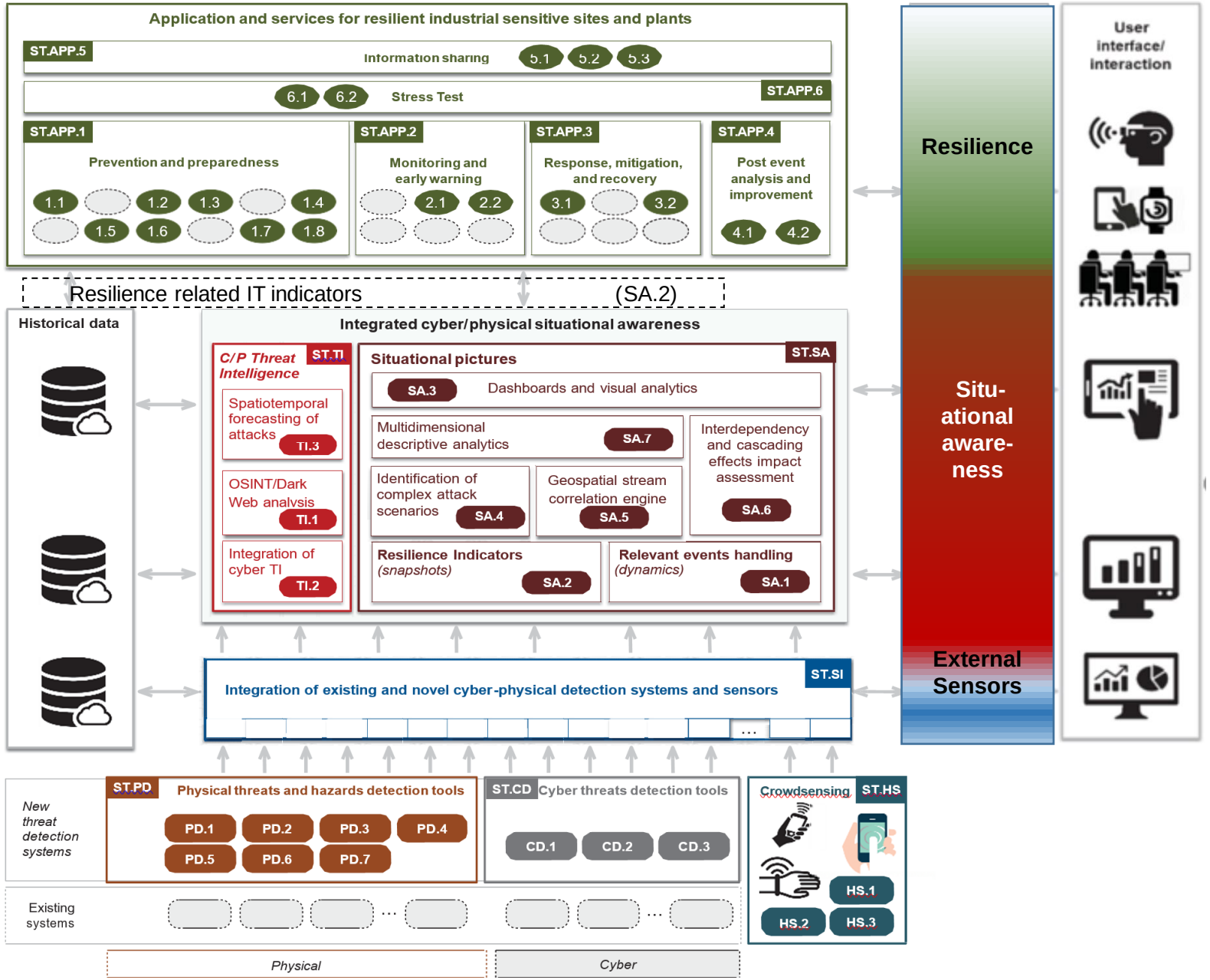

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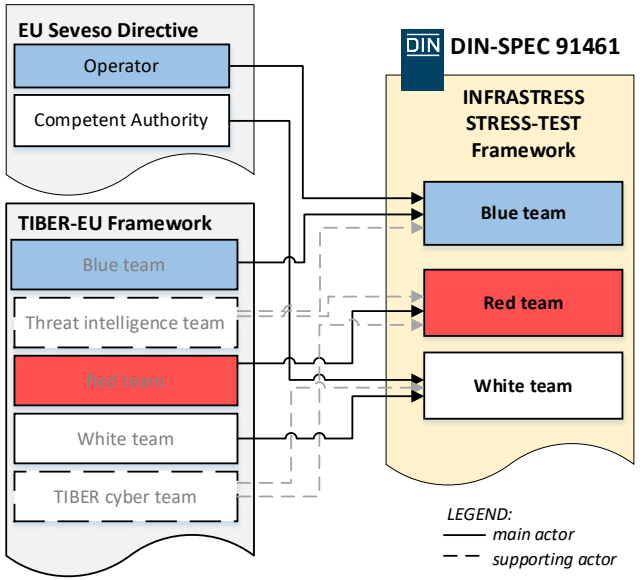
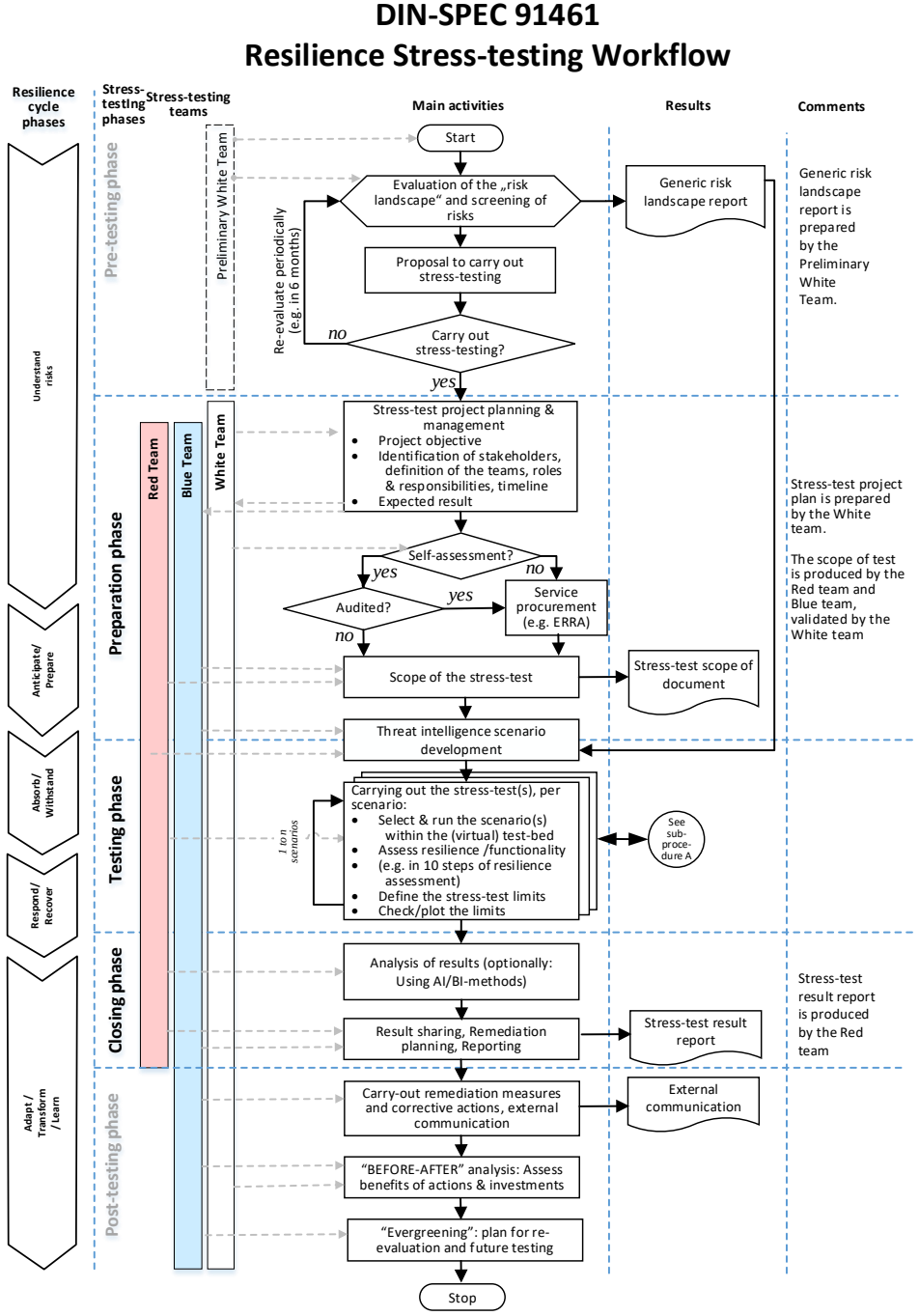
Conclusions: The way forward

- Standardized stress-testing





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SUPPORTING DETAILS…

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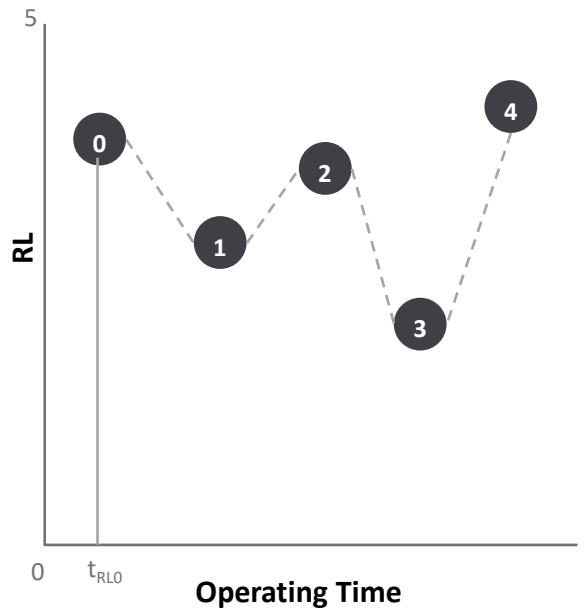
Goal

- assess and monitor the Resilience of my IT (cyber-physical) infrastructure
- assess the Functionality (operational loss) of my infrastructure for a threat/event

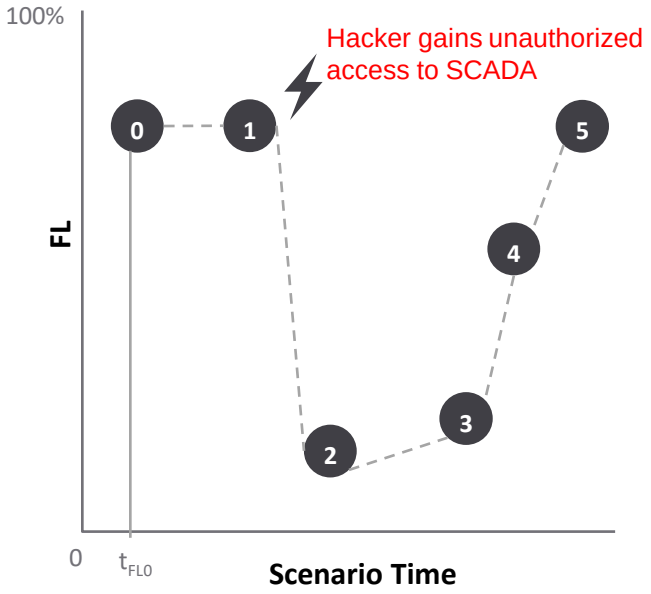
Resilience level (RL) Assessment



Assessment

- 0 Time t_0
- 1 Time t_1
- 2 Time t_2
- 3 Time t_3
- 4 Time t_4
- ⋮
- n Time t_n

Functionality level (FL) Assessment



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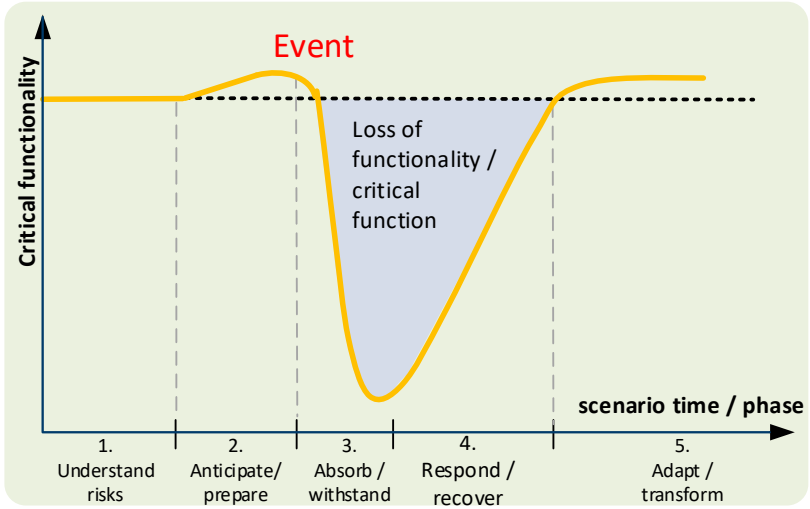
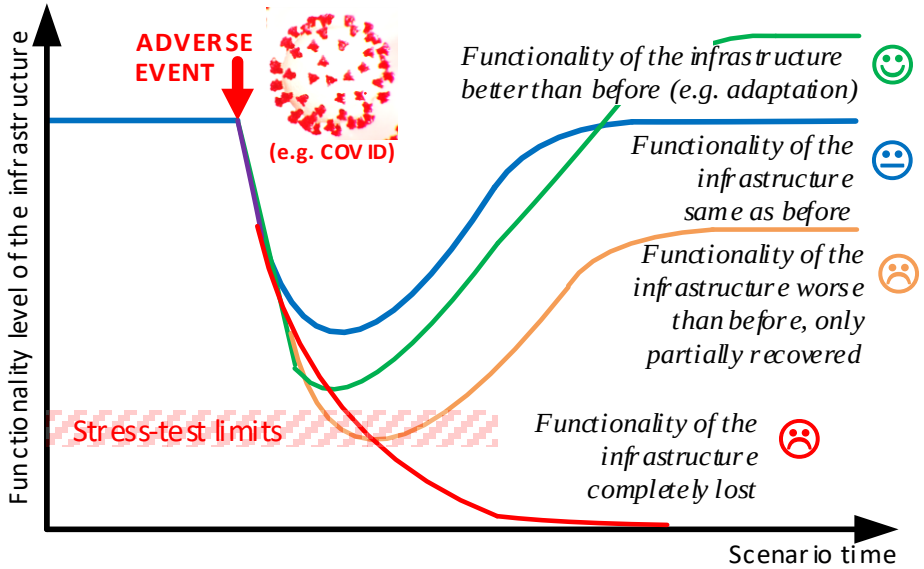
Resilience: what happens when risk happens?

SmartResilience project – “smart critical infrastructures”:

… ability to

1. **understand and anticipate risks** – including new/emerging risks – threatening the critical functionality of the infrastructure,
2. **prepare** for anticipated or unexpected disruptive events, optimally
3. **absorb/withstand** their impacts,
4. **respond and recover** from them, and
5. **adapt/transform** the infrastructure or its operation based on lessons learned, thus reducing the critical infrastructure fragility.





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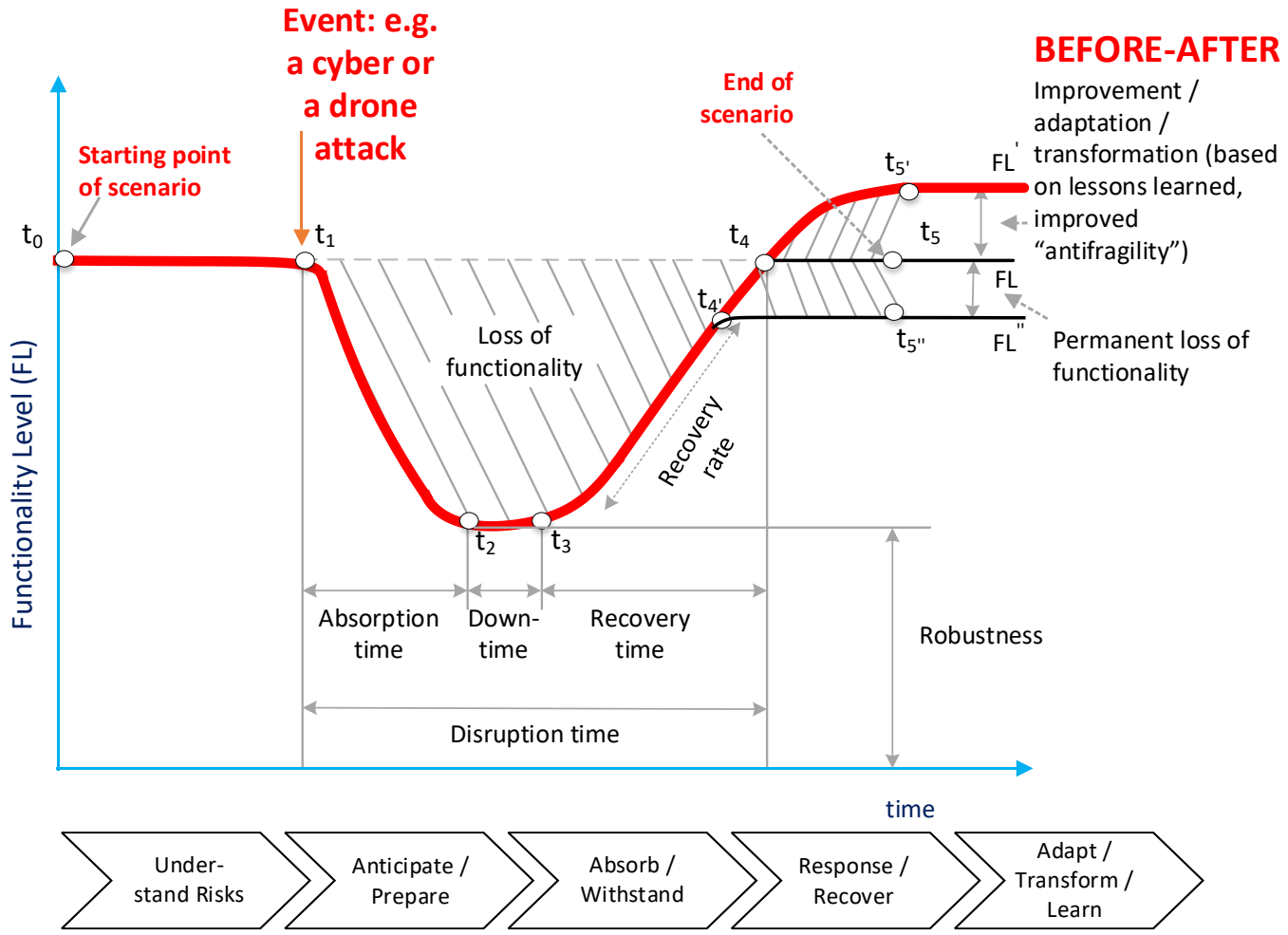
Integration of tasks and deliverables in InfraStress? Is it not the standard? ERRA?



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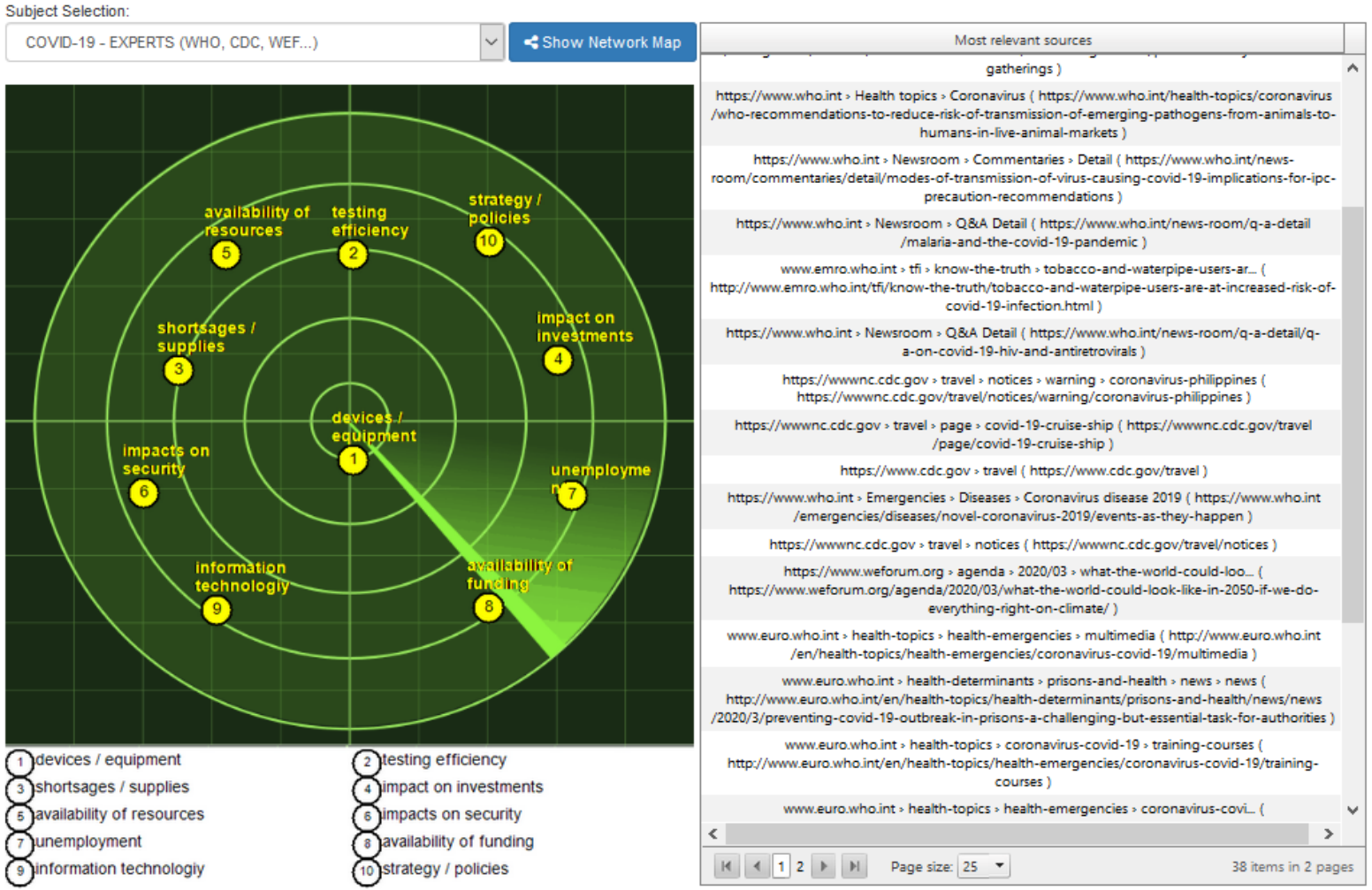
Perceiving threats – emerging risks radar



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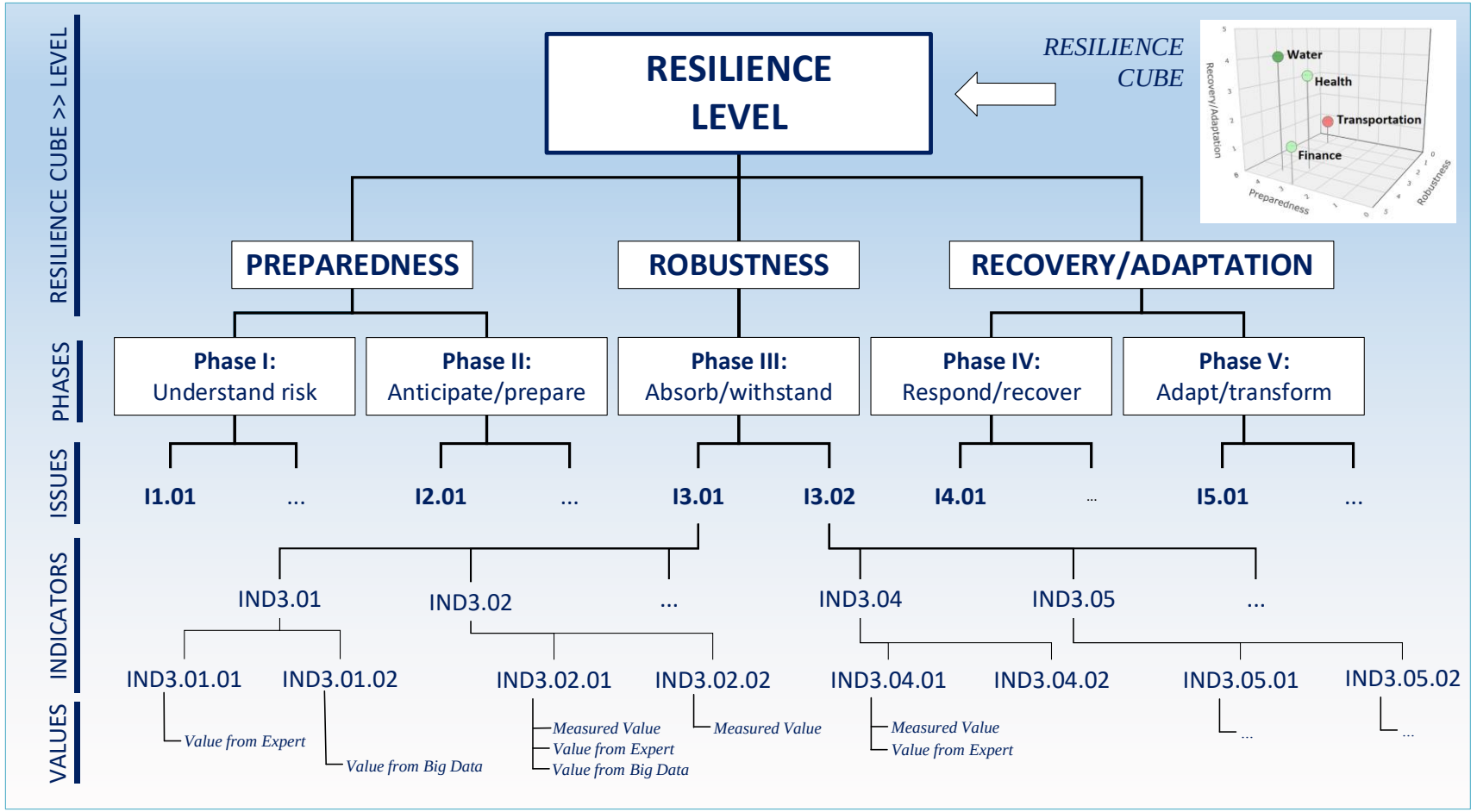
Resilience Level (RL)

A composite index based on resilience indicators



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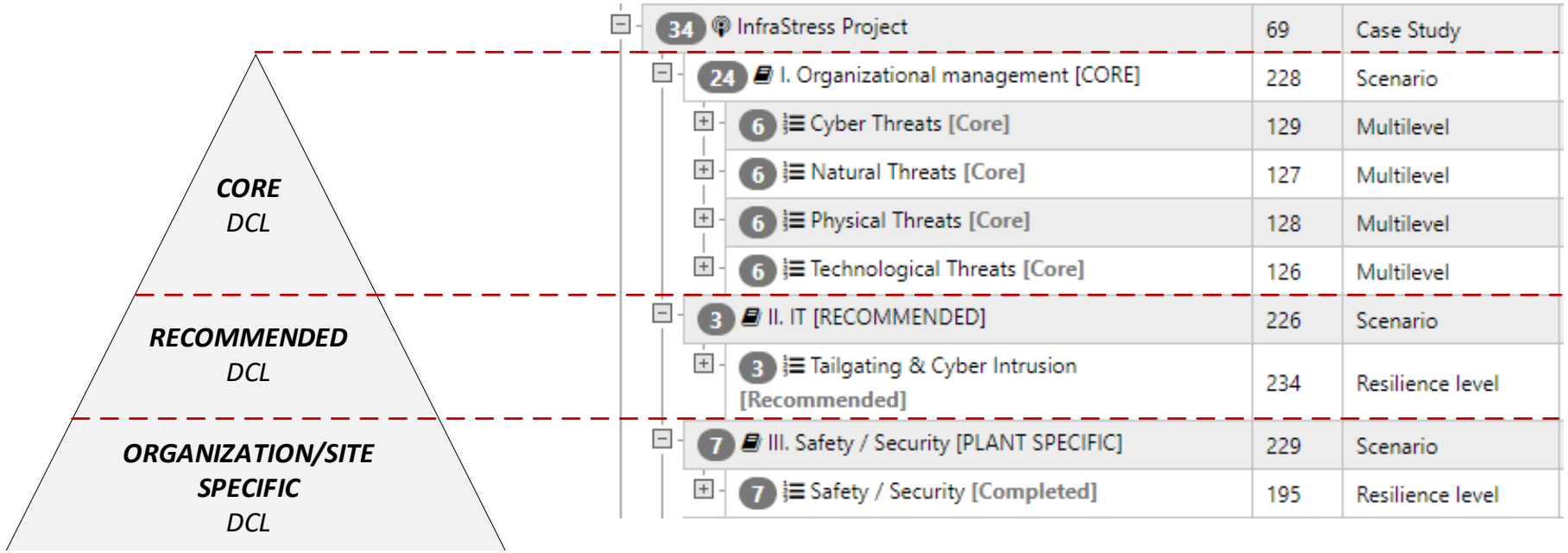
“Pyramid” of resilience assessment levels

- Crucial for
  - » Understanding of the concept
  - » Use of the



34 InfraStress Project	69	Case Study
24 I. Organizational management [CORE]	228	Scenario
6 Cyber Threats [Core]	129	Multilevel
6 Natural Threats [Core]	127	Multilevel
6 Physical Threats [Core]	128	Multilevel
6 Technological Threats [Core]	126	Multilevel
3 II. IT [RECOMMENDED]	226	Scenario
3 Tailgating & Cyber Intrusion [Recommended]	234	Resilience level
7 III. Safety / Security [PLANT SPECIFIC]	229	Scenario
7 Safety / Security [Completed]	195	Resilience level

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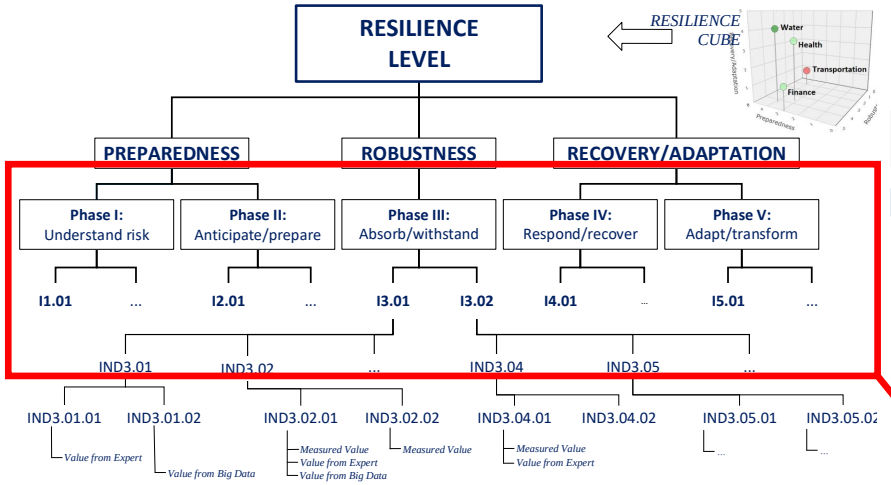

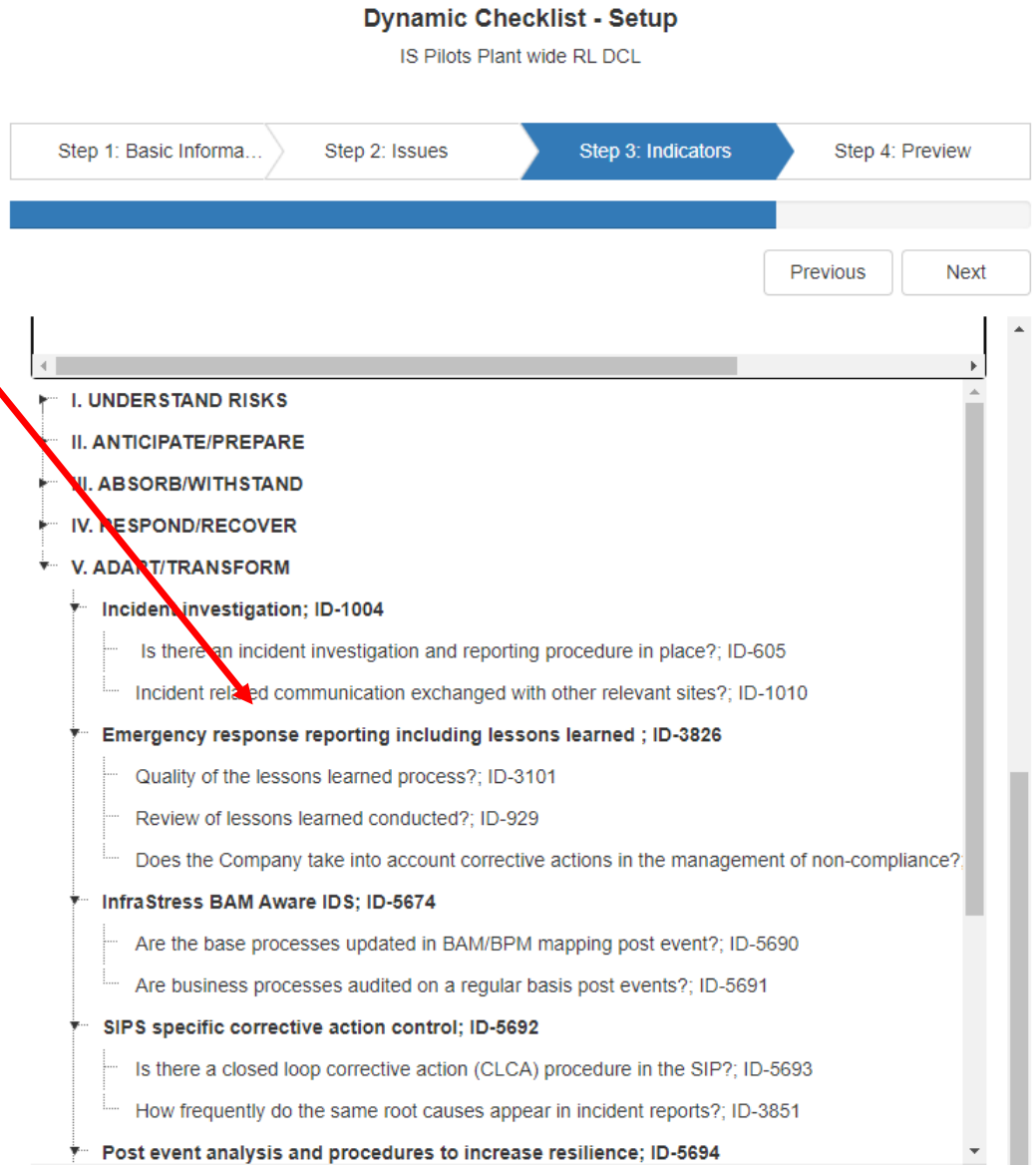

Working with pilot partners, SIPS relevant indicator lists are being developed in preparation for WP8 and implemented in the InfraStress ResilienceTool.

The goal is a single DCL for all participating pilots for standardization and benchmarking.

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Integration of tasks and deliverables in InfraStress? Is it not the standard? ERRA?

- **BEFORE-AFTER? What is the quantified impact?**
- SUGGESTION: At the end of the pilots

» Identify SA-indicators and create the respective DCLs

» Assess the “BEFORE” resilience based on the DCLs

» Assess the “AFTER” resilience based on the DCLs

» Show the improvement based on indicators

» Propose

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“BEFORE” and “AFTER” resilience assessments at Pilot 4

BEFORE

Indicators

AFTER

Name	Type	Syst a	Info b	Org c	Soc d	DeM e	Score	Resilience Level
Resilience index level	Root						3.95	Good
I.Understand risks	Phase						2.45	Average
I.1. Available formal management systems adopted in the organization; ID-5652	Issue	✓	✓	✓	✓	✓	3	Average
I.1.1. Does the organisation hold a ISO 9000 series certification or similar?; ID-5653	Indicator						5	Excellent
I.1.2. Are internal audits and management reviews conducted regularly?; ID-5654	Indicator						5	Excellent
I.1.3. Is there a formal environmental management system adopted in the organization (e.g., ISO 14000 series or EMAS scheme)?; ID-5842	Indicator						5	Excellent
I.1.4. Does the organisation hold a valid ISO 14000 series/EMAS certification or similar?; ID-5843	Indicator						5	Excellent
I.1.5. Is there a formal occupational health as safety management system adopted in the organization (e.g., OHSAS 18001 or ISO 45001 standards)?; ID-5844	Indicator						5	Excellent
I.1.6. Does the organisation hold a valid ISO 45001 or OHSAS 8001 certification or similar?; ID-5845	Indicator						0	Critical
I.1.7. Is there a formal Safety Management System adopted in the organization (aspect of major accidents prevention)?; ID-5846	Indicator						0	Critical
I.1.8. Does the organization hold a valid environmental permit for its operations as specific SIPS?; ID-5847	Indicator						0	Critical
I.1.9. Did the organization implement any related industry sector specific standard/recommendations in its management system?; ID-5848	Indicator						0	Critical
I.1.10. Does the organization hold a valid certificate related to the possible above mentioned standards/codes?; ID-5849	Indicator						5	Excellent

Name	Type	Syst a	Info b	Org c	Soc d	DeM e	Score	Resilience Level
Resilience index level	Root						4.8	Excellent
I.Understand risks	Phase						4.56	Excellent
I.1. Available formal management systems adopted in the organization; ID-5652	Issue	✓	✓	✓	✓	✓	4.5	Excellent
I.1.1. Does the organisation hold a ISO 9000 series certification or similar?; ID-5653	Indicator						5	Excellent
I.1.2. Are internal audits and management reviews conducted regularly?; ID-5654	Indicator						5	Excellent
I.1.3. Is there a formal environmental management system adopted in the organization (e.g., ISO 14000 series or EMAS scheme)?; ID-5842	Indicator						5	Excellent
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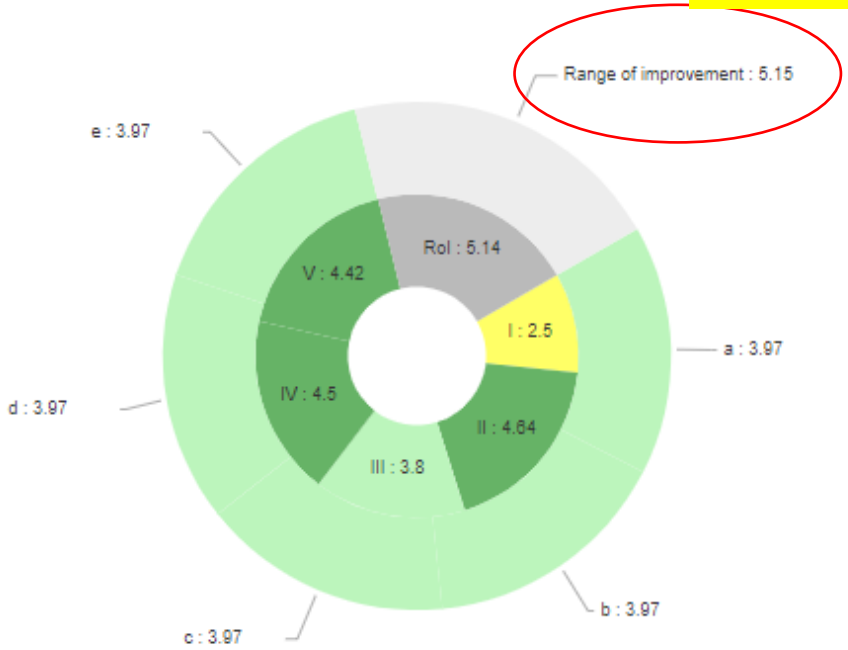
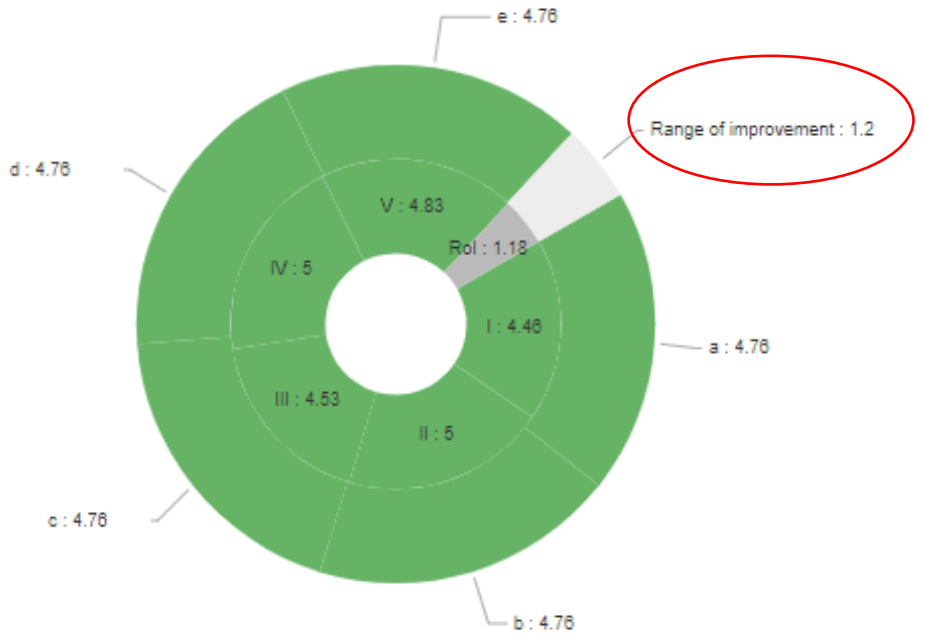
“BEFORE” and “AFTER” resilience assessments at Pilot 4

Range of improvement

BEFORE



AFTER



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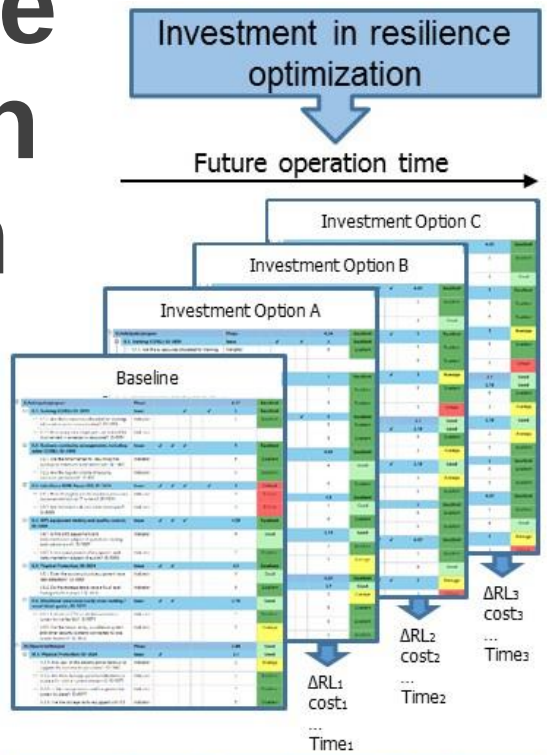
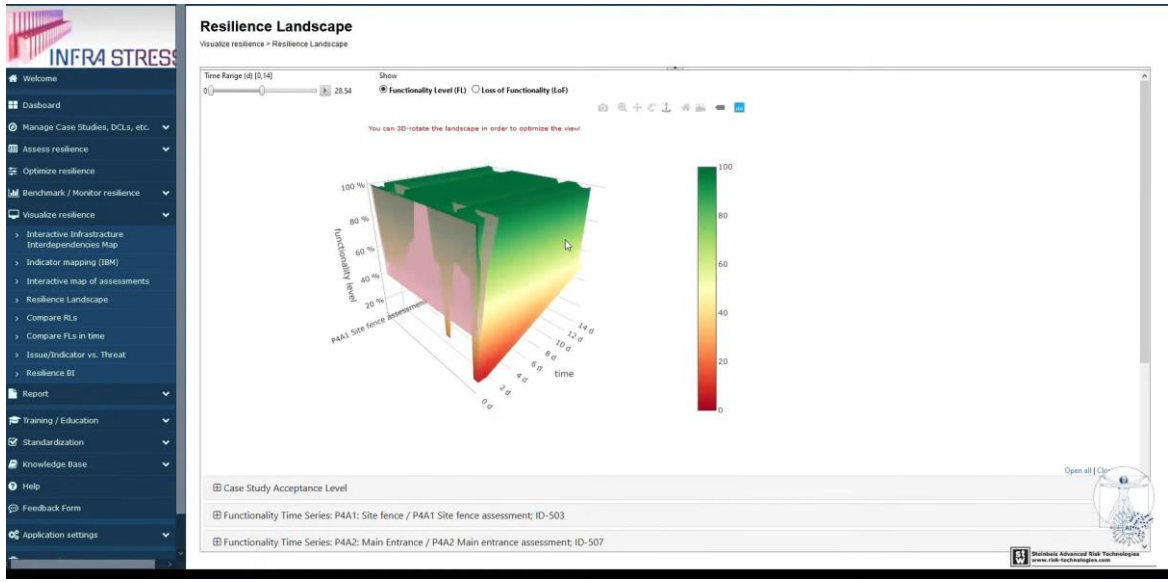
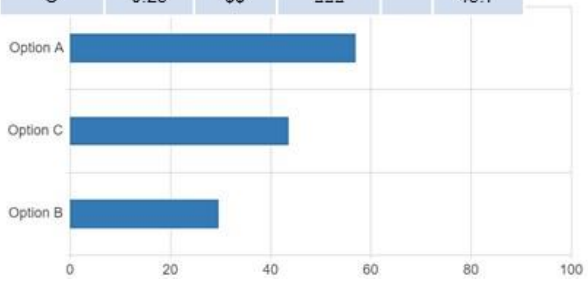
How to get the best return on investment in resilience?

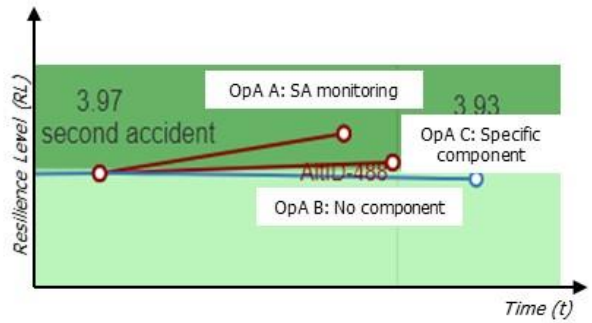




Investment in SA

Option	ΔRL	Total cost	Time	...	Score
A	0.41	$$$	⧗⧗		58.8
B	0.15	$	⧗		28.1
C	0.23	$$	⧗⧗⧗		43.7





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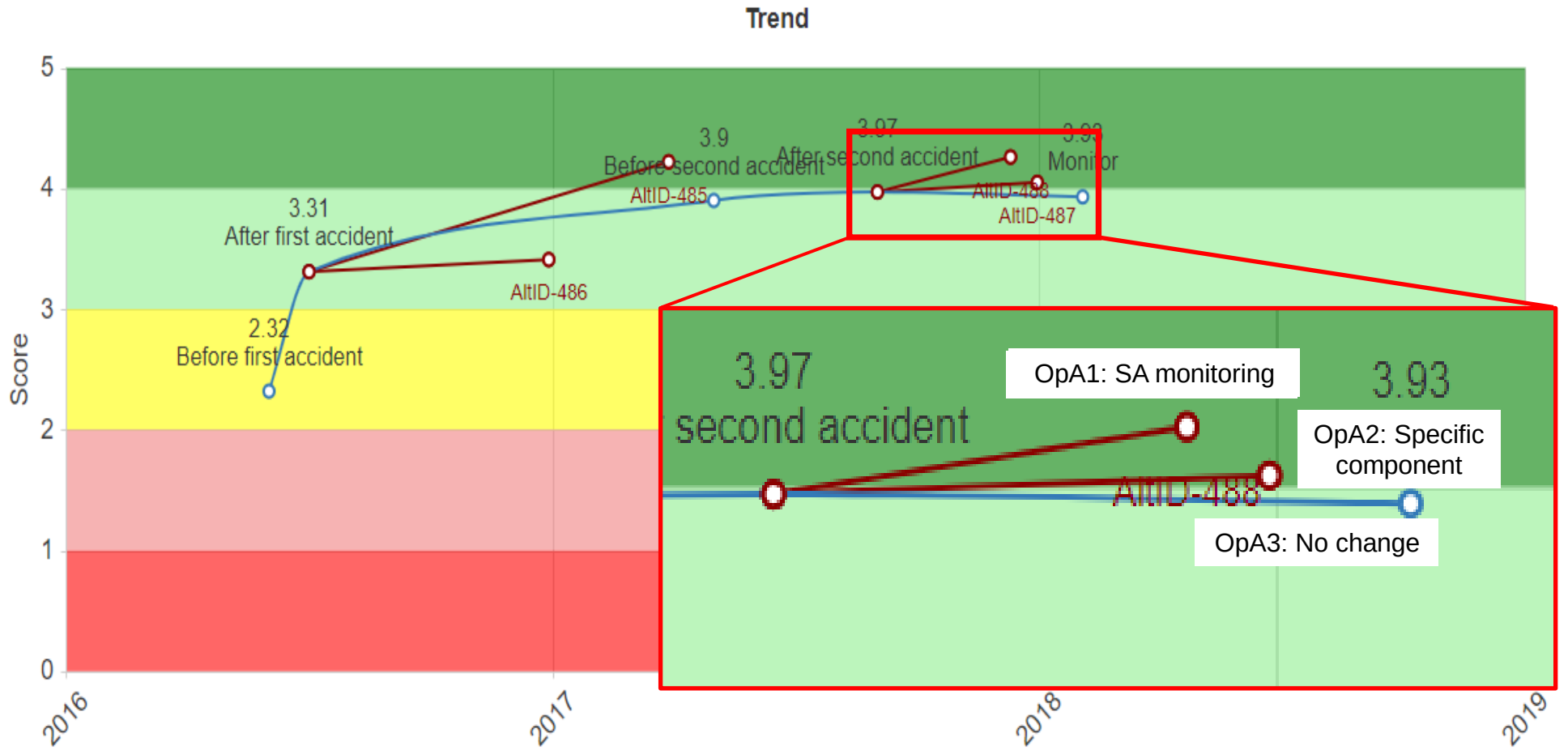
Optimization development in the MCDM tool



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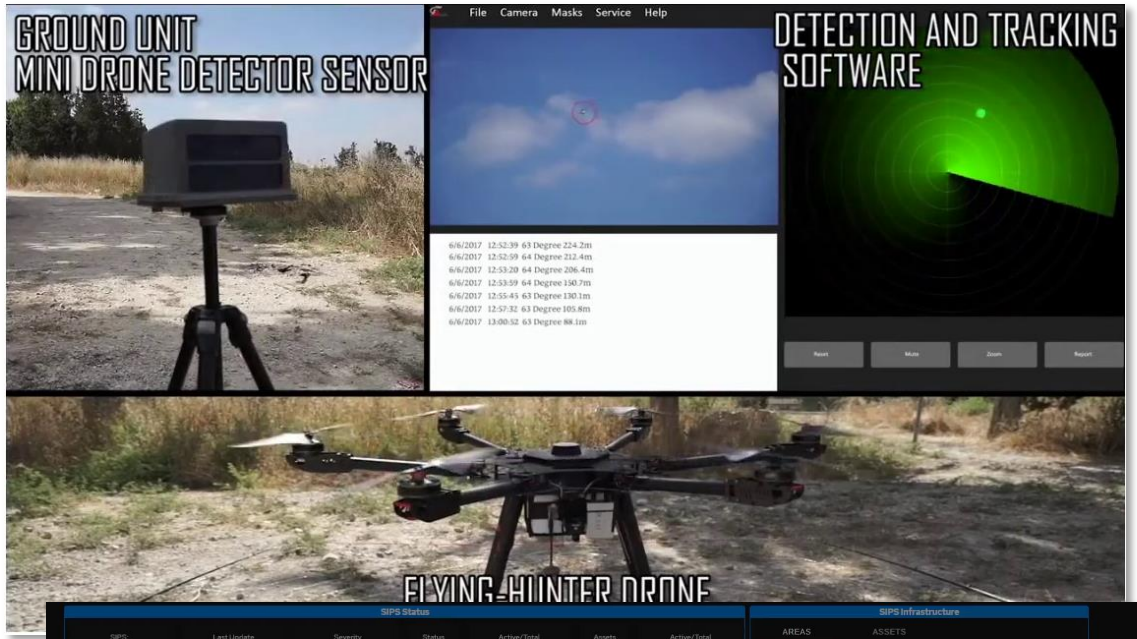

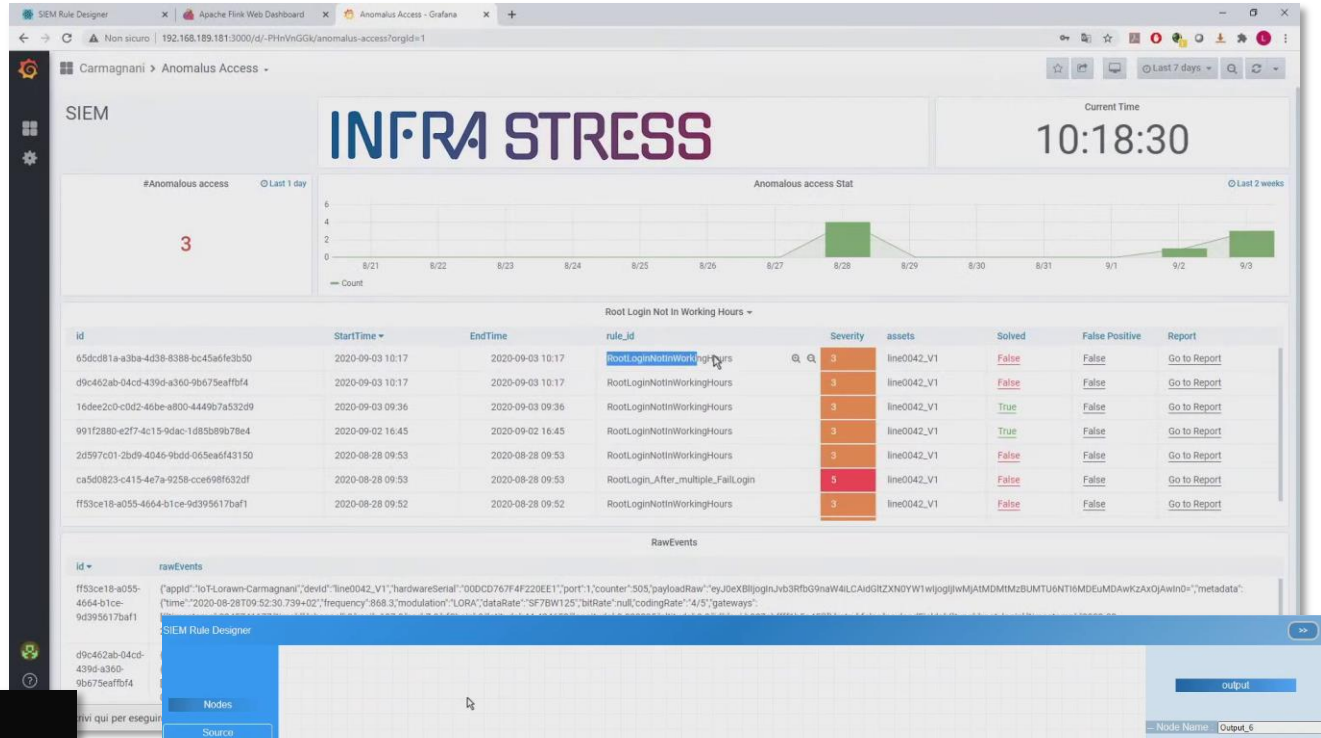

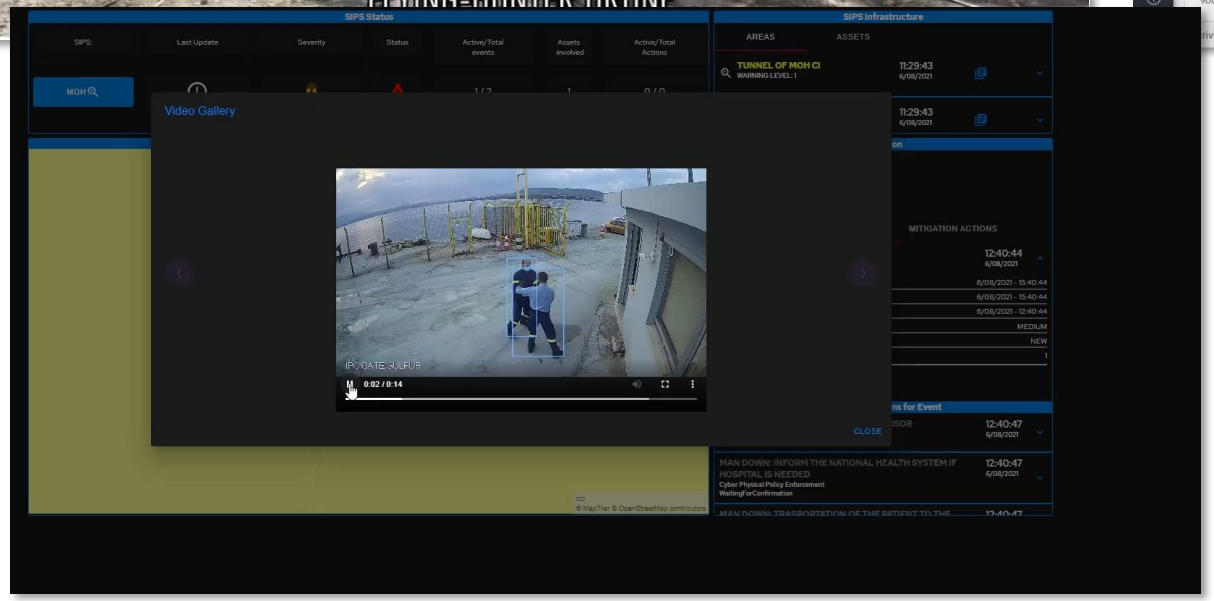

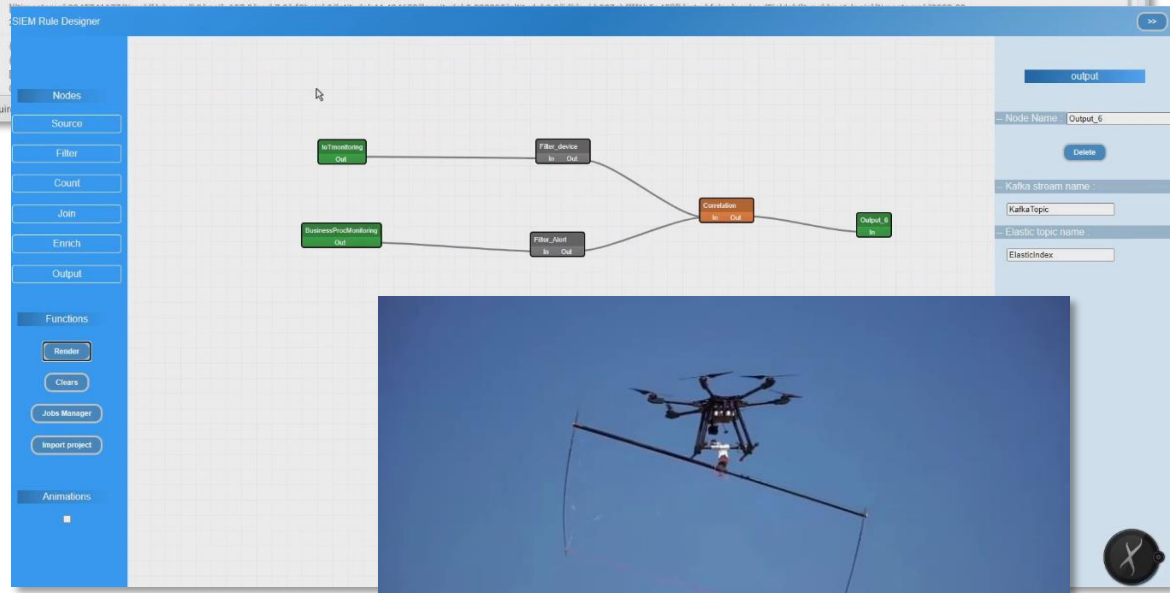

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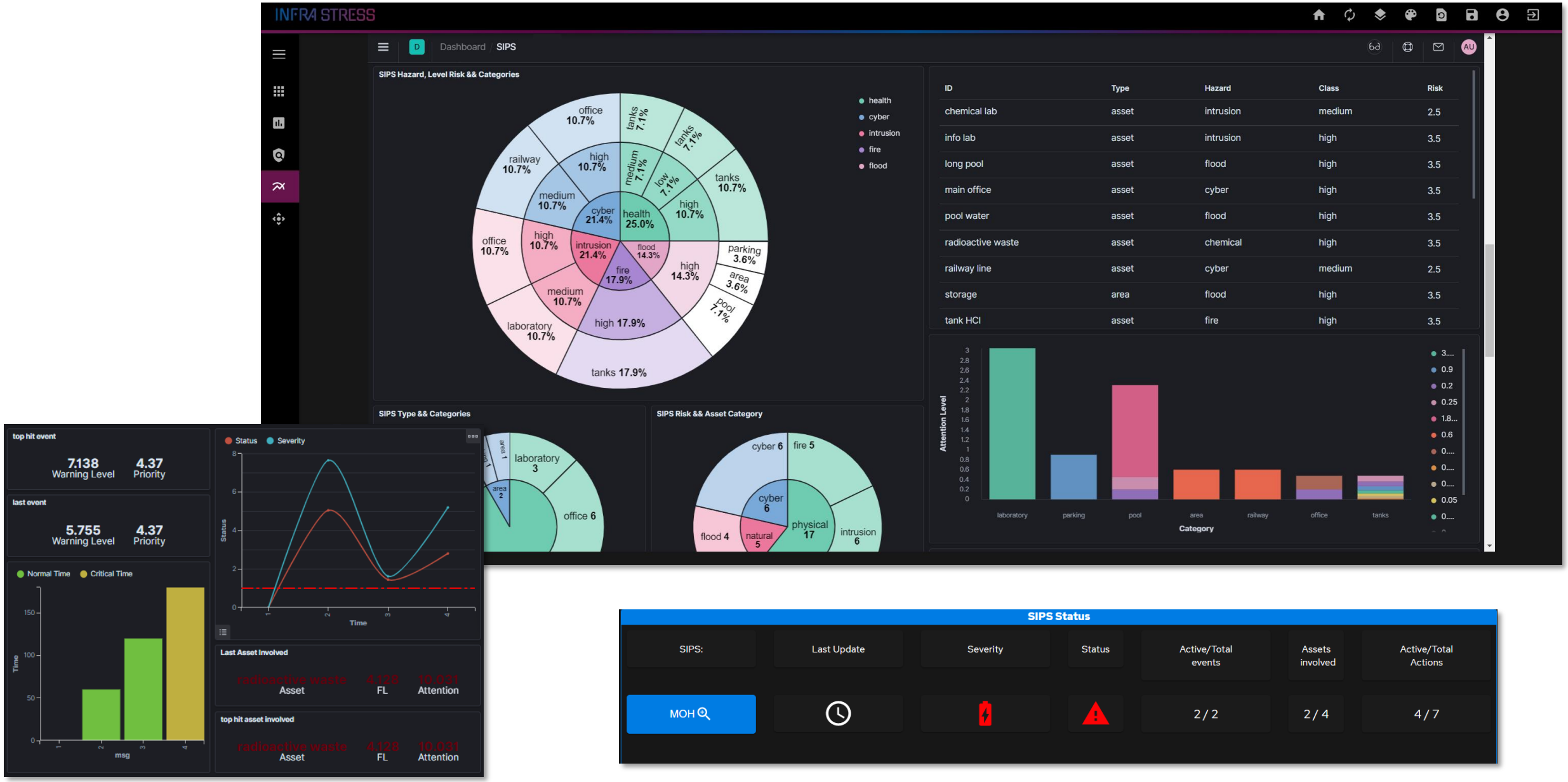

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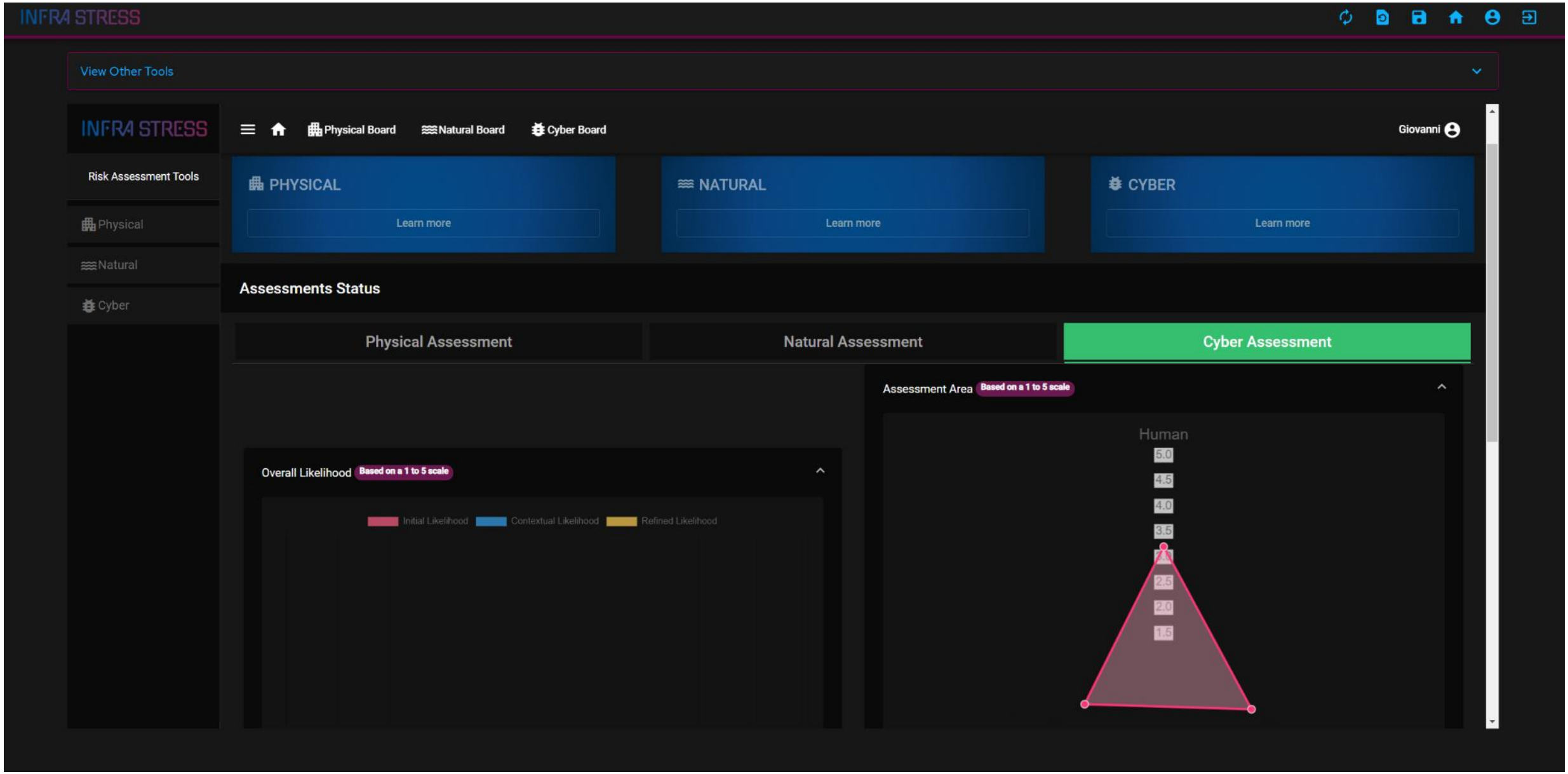

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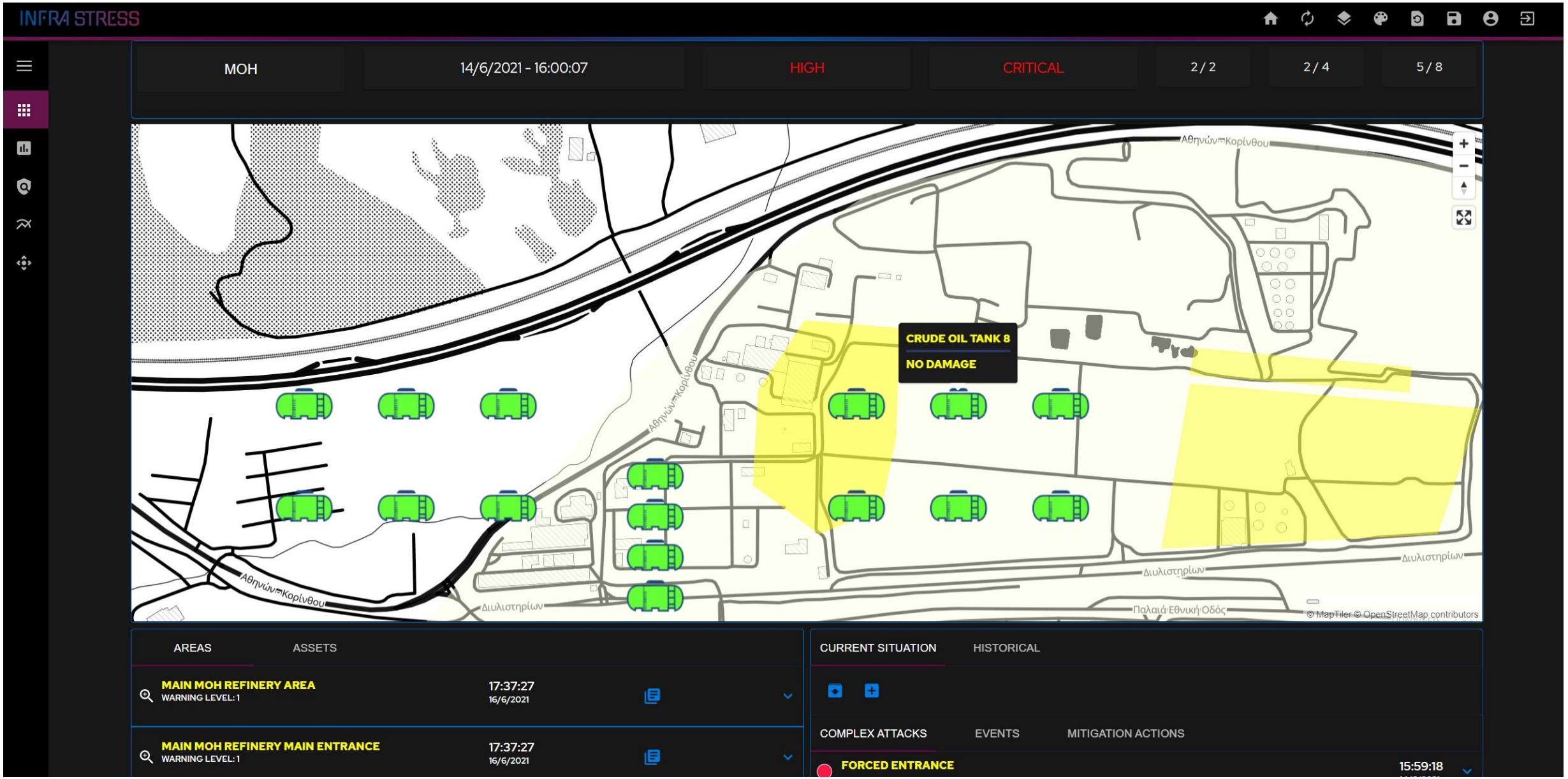

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InfraStress Pilots

- InfraStress solutions are being tested and demonstrated in **5 SIPS pilots involving the owners/operators** (4 Seveso) as well as their neighbouring facilities from 5 EU Countries (Italy, Portugal, Ireland, Greece, Slovenia): a design-implementation-validation approach.
- Piloting at evaluation and integrating **input from the involved stakeholders** and the feedback from the pilot execution.
- Pilots collectively cover a variety of high-impact **multithreat scenarios** to SIPS CIs, ranging from natural disasters to direct cyber-physical attacks to critical assets
- Last, but not least: The InfraStress solutions will be “anchored” in the new ISO **31050** standard (“**Guidance for managing emerging risks to enhance resilience**”)

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Pilot 1: Motor Oil Hellas - Greece

Refinery – Petrolchemicals

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Pilot 2: DePuy Synthes, Cork - Ireland

Medical manufacturing plant (orthopaedics)

DePuy is a franchise of Johnson & Johnson

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Pilot 3: Carmagnani, Genoa - Italy

Chemical storage site and terminal

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Pilot 4: Petrol + Port of Koper - Slovenia

Petrol *infrastructure for storing and transport of fuel and* ***Port of Koper*** *terminal*

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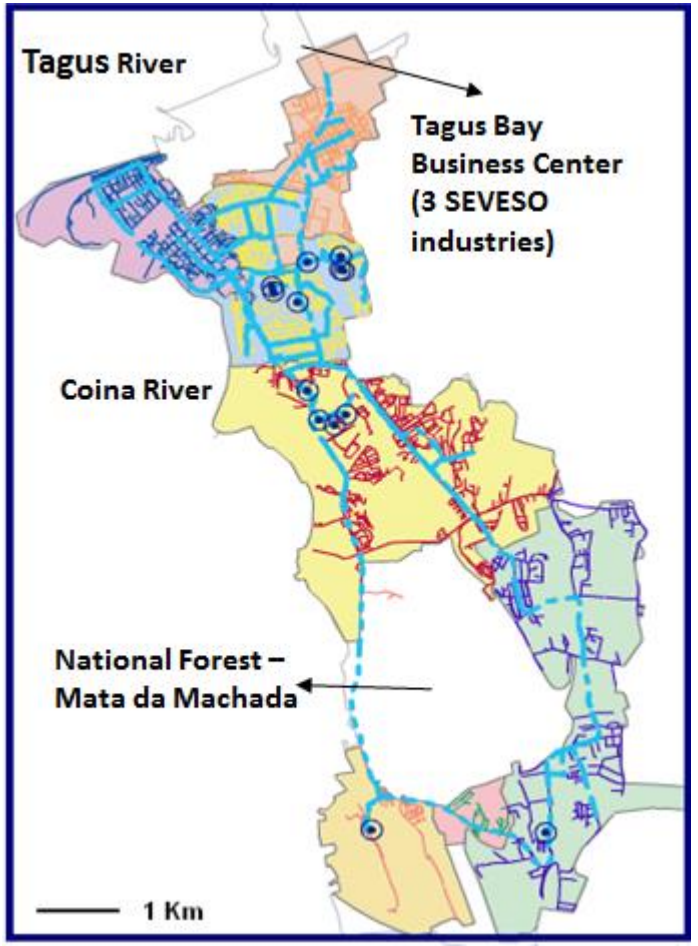
Pilot 5: Municipality of Barreiro + SGL



***SGL** industrial facilities and*
***Barreiro municipality** critical infrastructure*

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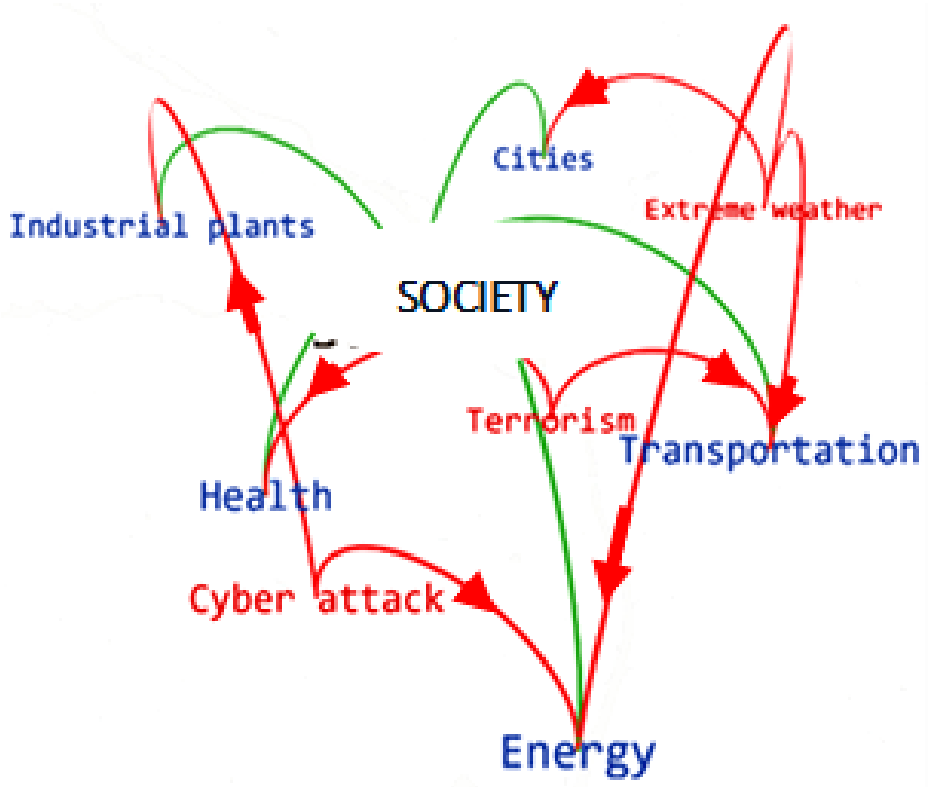
Conclusions

1. Away from (just) first response
2. Integrate
   - Past (cases, experience..)
   - Present (situational awareness, “radars”)
   - Future (scenario/resilience analysis)
3. Increase resilience & efficiency, decrease vulnerability of the society as infrastructure/network-of-critical-infrastructures/functions
4. Interdependencies
5. x-Threats (multiple/new/unknown/emerging threats)



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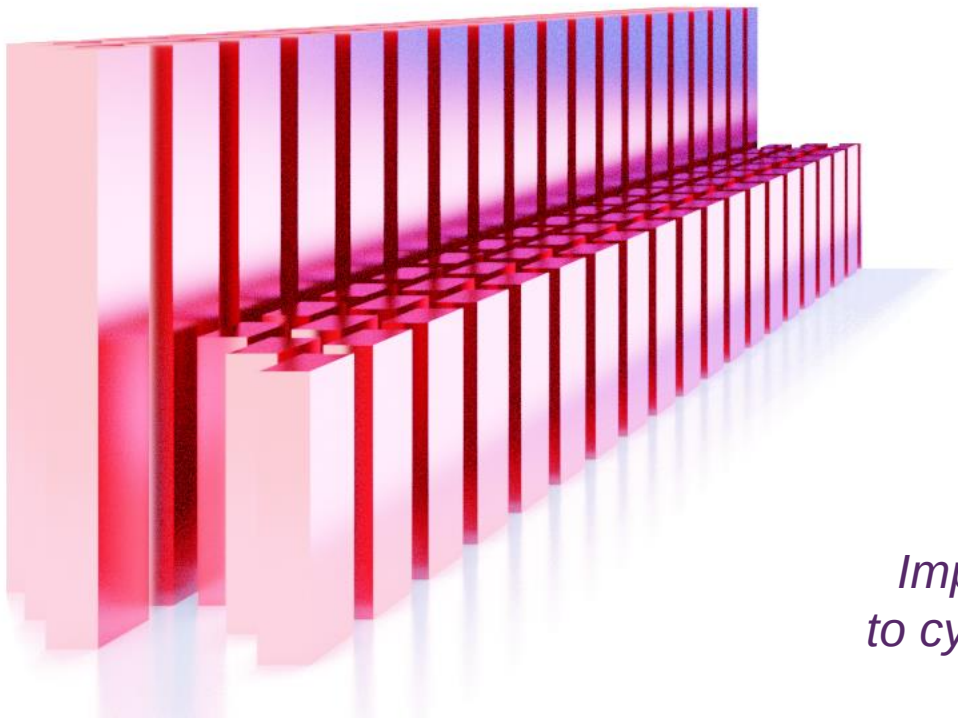

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Improving resilience of sensitive industrial plants & infrastructures exposed to cyber-physical threats by means of an open testbed stress-testing system