TOSA: a Backcasting Tool for Dystopian Scenarios

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The aim of this research note is to present a method that has been developed in the frame of a European foresight-oriented project in order to capture insights about what to do to face extreme events at local level. The method is called TOSA (Threats, Opportunities, Stakes, Actions) and is to be encompassed in exercises based on narratives depicting disruptive events in the future. Traditional approaches such as the SWOT (Strengths, Weaknesses, Opportunities, and Threats) matrix are limited in this respect, which requires the development of new techniques.

According to Cuhls et al. (2024) foresight did historically mainly aim at detecting determined futures but has developed into different directions under different headings. Most processes make use of a combination of methods to explore and develop different possible, probable or desirable futures. Foresight concepts are more and more accepted, and the results are distributed and used - in companies, ministries, associations, NGOs or the European Commission.

As foresight was mainly conceptualised to identify opportunities (see Martin 1995), there was less interest in "negative thinking" or mainly in Wild Cards (Steinmüller or Markley). During the last years, there has been increasing interest in gamechangers, disruptions or radical changes including extreme eventsfor improving resilience. For Wild Card generation in scenarios, for each single event how to unfold or for thinking about crises new methods were developed and notably Science Fiction-related narratives (Roussie et al, 2024) were re-detected. The suddenness and complexity of today's (2025) challenges is increased, on the one hand, by the (observed and predicted) growing frequency and intensity of extreme events by getting to know, and, on the other hand, by the difficulty of foreseeing them locally. Crises such as severe weather conditions, threats to critical infrastructure, pandemics or hybrid conflicts must be prepared for without knowing if they will actually strike: they test the limits of existing preparedness strategies as well as willingness to maintain preparedness. In this volatile environment, building and strengthening the resilience of individuals, businesses, and public organizations is vital.

Following the analysis of Duchek (2020) and as summarized by Gnamm (2024), resilience can be conceptualized as the combination of three main dimensions. This highlights its multifaceted nature, encompassing proactive preparation, robust recovery, and adaptive evolution:

- Anticipation: Resilience can be viewed as an expression of anticipation, involving the proactive identification and mitigation of potential future dangers. This dimension focuses on preparing for and preventing or minimizing the impact of adverse events

through forward-looking strategies.

- Recovery: Resilience can also be understood as a form of recovery, where the emphasis is on withstanding shocks and aiming to return to a normal or stable state. This involves the capacity to absorb and cope with disruptions, with the ultimate goal of restoring functionality and equilibrium.
- Adaptation: resilience can be seen as a form of adaptation to a new environment. This perspective involves further developing and evolving in response to challenges, allowing systems or individuals to adjust and thrive in changing conditions. This adaptive and transformative resilience enables continuous growth and improvement, even in the face of adversity.

As underlined above, extreme events that defy prediction are challenging to address using conventional foresight tools. In fact, scenarios describing extreme events as such are seldom incorporated into the strategic planning processes of either private or public organizations, leaving gaps in their ability to respond effectively when the unexpected occurs. This makes the use of scenarios and their narratives particularly relevant and useful as it was demonstrated in a recent EU research project.

The IMMER (Increasing Municipal Mobility and Energy Resilience) project was part of the European Union funded Futuresilience project that groups 10 labs across Europe.[1] The overall project aims at reinforcing exchanges and information sharing about crisis situations specific to each region. More specifically, the IMMER lab aims at reinforcing resilience within the Strasbourg-Kehl area in terms of mobility and energy by 2050. The exercise brought together more than thirty French and German representatives from more than ten key local organizations, including businesses, fluvial ports, energy producers, mobility operators, public authorities, and academics. This diverse group worked collectively to envision disruptive futures, ultimately fostering new perspectives and creative solutions for enhancing local resilience (Muller et al., 2024).

The core of the project was built on the idea that dystopian Sci-Fi narratives present a promising way for enhancing resilience strategies of private companies and public organizations. Gendron et al. (2017) highlight the value of Sci-Fi as a form of thought experiment within the social sciences, while Calvez (2018) notes its particular strength in fostering "what if?" thinking. By

[1] This project has received funding from the European Union's Horizon Europe research and innovation program under grant agreement No 101094455. See: https://futuresilience.eu/

constructing rich, immersive worlds where established systems collapse or radically change, dystopian narratives ignite fresh perspectives and empower stakeholders to imagine alternative futures and devise innovative strategic responses. In essence, dystopian Sci-Fi disrupts conventional thought patterns and challenges cognitive biases by immersing audiences in unfamiliar—often deeply unsettling—future scenarios (Candy and Dunagan, 2017). This method of "fictitious time travel" enables participants to gain a richer, multidimensional understanding of the challenges ahead by allowing them to "experience" scenarios from various technical, political, cultural and emotional perspectives. Ultimately, the process yields a set of shared action points identified as crucial for turning uncertainty into opportunity, cultivating the creative and adaptive capacities essential for thriving amid disruption.

As part of the IMMER project within FutuResilience, the research team created original dystopian scenarios for the year 2050, drawing inspiration from early exchanges with partner institutions and companies. The participants were immerged in three different dystopian scenarios: 'Fluvial tsunami', 'Societal collapse' and 'Blackout' (cf. box 1).

Box 1: The starting points of three dystopian scenarios

Blackout 2050

Spring 2050 marks a turning point, as the vulnerability of energy and transportation infrastructures becomes starkly evident. The accelerating climate crisis is placing unprecedented strain on energy generation and distribution systems, while also disrupting road, rail, and river transport networks. Concurrently, the economic, political, and social landscape is deteriorating, and global tensions are running high. On Friday, May 13, 2050, a shadowy, unidentified organization launches a coordinated attack on critical nodes of the electricity grid in France and Germany. Sabotage teams infiltrate several power plants, planting high-impact explosive devices that detonate with devastating precision. Major distribution hubs are also targeted, while sophisticated cyberattacks are unleashed simultaneously to amplify the chaos. By nightfall, the entire energy system grinds to a halt. In the aftermath, a state of emergency is declared. The reliability of electricity supply is thrown into question, communication networks collapse, and the flow of information comes to an abrupt stop. Public authorities, deprived of essential coordination tools, are effectively paralyzed.

Tsunami 2050

Weeks before the river tsunami hits, scientific monitoring stations begin detecting significant permafrost melt and deep fractures in the glaciers of the Alpes. When the first ice caps break off—two to three days before the Rhine river wave reaches the Strasbourg-Kehl region—research institutes and civil protection authorities alert senior officials in Switzerland, Germany, and France of the impending disaster. As signs of a major mountain collapse emerge, images, videos, and eyewitness reports flood social media, quickly picked up by news channels and broadcast to a wider audience. On Friday, May 13, 2050, in the final hours before impact, widespread alarm turned into panic. Thousands attempt to flee to higher ground considered safe, but the sudden exodus creates chaos, blocking roads and crippling the region's mobility. Flooded areas make many routes impassable, trapping

some evacuees. Energy infrastructure is hit, halting rail services. Traffic lights fail, worsening congestion—even in areas not directly affected. A partial radio network outage disrupts communications, including mobile phones, isolating residents and hampering the authorities' ability to issue safety instructions.

Collapse 2050

By 2050, global vulnerability is acute. The prolonged economic crisis has deepened inequality and strained governments, while geopolitical tension and sporadic conflicts fuel a wave of migration that overwhelms already fragile systems. Against this backdrop, a new, unidentified virus quietly emerges in South America. The threat goes largely unnoticed until disturbing videos on social media show sufferers in Amazonian towns becoming violently aggressive. Initially dismissed as fake news or conspiracy, the evidence mounts. Experts speculate about the source—mutant rabies, poisoning—but the World Health Organization hesitates to declare an emergency. Meanwhile, the virus spreads rapidly and mutates, becoming transmissible via saliva. Desperate governments try to hide the scale, but outbreaks erupt globally. Medical responses fail: treatments are ineffective, rushed vaccines catastrophic. Unchecked, the infection sparks unpredictable violence in communities. On Friday, May 13, 2050, reality breaks through denial as mainstream news airs footage of chaos at major airports: infected people attacking indiscriminately, gripped by hallucinations and rage. The world faces a pandemic of mass hyperviolence, with institutions and public order collapsing under the weight of the crisis.

Each scenario was discusssed at different times, when the event occurs, one year later in 2051 and what that means for today (2024), means three stages: 2050, 2051 and 2024. The three themes chosen for the narratives from the interviews formed the basis of this workshop. Participants were asked to envision and describe the world after such crises. Groups were rotated so that each participant could contribute to one stage of each scenario. Each stage corresponded to a specific time period: 2050, 2051, then 2025. The idea here was to share the knowledge and ideas of all participants for each of the narratives. Strategic management in this respect is about striving for better outcomes. To achieve this, it is essential to identify various potential risks and understand their causes and consequences.

The fundamental philosophy of this approach is that by envisioning a catastrophic scenario, it becomes possible to backcast and identify actionable solutions to enhance the preparedness capacity of local organizations. Imagining assumed low-probability, high-impact scenarios aids in identifying critical vulnerabilities and potential points of failure within the system during a crisis.

Nevertheless, one important methodological issue was to be solved: how to capture effectively the solutions envisioned by the participants? Due to its problem-solving character, the exercise corresponds clearly to a backcasting approach in the meaning of Dreborg (1996) and is in this

respect well suited to these kinds of long-term problems. This approach is based mainly on the development of strategies aiming at reaching desirable goals. Furthermore, it appeared clearly that it was necessary to go beyond a traditional tool such as the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. The SWOT analysis is indeed a strategic planning tool and may help decision-makers understand both internal and external factors that can affect the attainment of objectives (Rowe et al., 1994). Nevertheless, a SWOT relies on the current situation, therefore, it is in foresight mainly used as first analytical tool or for structuring, and is not well suited for "gaining lessons from the future" when it comes to disruptive events.

In order to achieve the best possible outcomes from the exercise, it was necessary to define a set of conditions reflecting its specific requirements. These requirements can be summarized as follows and ultimately lead to the development of an analytical framework:

1. Comparability of the information generated, despite the heterogeneity of the participants and the diversity of the scenarios considered.
2. Consistency of the results and respect for the systemic nature of the scenarios, both in their causes and effects, to avoid reducing the analysis to fragmented or isolated interpretations.
3. Identification of the levers for action available to the organisations concerned, distinguishing between what is within their influence and what is beyond their control.
4. Results that can be applied both to the local system as a whole and to each participating organisation, enabling the construction of a coherent collective vision and the possibility of operational adjustment at the level of each actor.
5. Feasibility of the strategies and measures envisaged in the short and medium term, even if the disruptive events considered are placed in a far future.

Accordingly, the TOSA (Threats, Opportunities, Stakes, Actions) framework was developed specifically for the project:

Threats encompass the potential negative impacts or risks identified within a given dystopian scenario. The purpose of identifying threats in the TOSA framework and foresight exercise is to highlight vulnerabilities and areas where the current system is fragile, needs change or preparedness. Participants were guided to brainstorm and detail these challenges, drawing directly from the immersive scenarios. This step was crucial for understanding what needs to be addressed to enhance resilience.

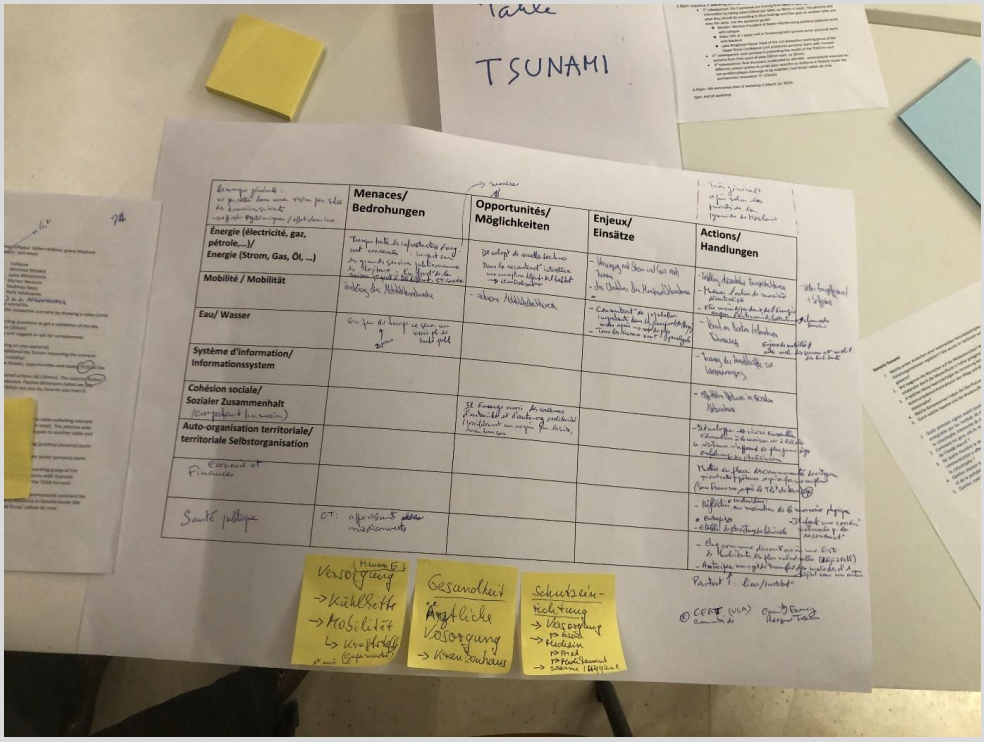
Opportunities represent the potential positive outcomes, innovative solutions, or areas for improvement that emerge even within a dystopian context. In the foresight exercise, identifying opportunities served to encourage creative problem-solving and to move beyond a purely reactive stance. Participants were encouraged to proactively identify innovative solutions and new avenues that emerged from the disruptions, aiming to construct a more resilient future.

Stakes are the critical elements or values that are at risk or are essential for the functioning of the system in the face of the identified threats. The purpose of defining stakes was to clarify what truly matters for societal resilience and what needs to be protected or restored. This helped participants prioritize interventions and understand the underlying societal, economic, and environmental values impacted by the dystopian scenarios.

Actions are the concrete, implementable measures and strategies that can be developed to mitigate threats, capitalize on opportunities, and address the identified stakes to figure out who would lose what in case of emergency. In the foresight exercise, the 'Actions' component was designed to translate the analytical insights into practical solutions. Participants were guided to propose specific, feasible interventions, ranging from policy changes to technological developments and community-based initiatives, thereby fostering proactive planning for future resilience.

This framework guided each group of participants in systematically analysing critical aspects of societal resilience across various disaster scenarios. Box 2 provides an example of intermediary step as fulfilled by a group of participants (working in this case on the Tsunami 2050 scenario).

Box 2: picture of a TOSA framework being fulfilled by a group of participants



The results of the TOSA analysis provided insights into how different sectors—such as energy, mobility, water, and social cohesion—might respond to and be impacted in each scenario. By addressing potential threats, uncovering opportunities, identifying key stakes, and formulating actionable measures, participants developed a nuanced understanding of the interdependencies and vulnerabilities within their system. This allowed a synthesis of the results in a final step (cf. box 3).

Box 3: the results of the TOSA analysis

Threats:

- Communication is always threatened first in each scenario
- Each scenario highlighted the failure of critical infrastructures such as energy grids, water systems, and communication networks, leading to severe shortages and chaos.
- Rapid spread of disease or lack of medical supplies overwhelms healthcare systems, causing widespread health crises.
- Each scenario pointed to potential increases in violence, anarchy, and social instability due to fear, isolation, or resource scarcity.

- Limitations in transportation and mobility are common, affecting the distribution of essential goods and services.

Opportunities

- Adoption of simpler, more sustainable solutions such as manual water pumps, renewable energy sources, and non-motorized transport options.
- Enhanced local community bonds and self-organization, fostering closer relationships and localized interactions.
- Potential for developing decentralized systems, including energy and food production, which can increase resilience and autonomy.
- Development of new technologies and adaptive strategies in response to crises, such as alternative energy sources and localized production methods.

Stakes now

- Ensuring access to essential resources like water, food, and energy is a critical stake across all scenarios.
- The need for effective governance that balances control with flexibility to adapt to evolving situations.
- Maintaining social cohesion and trust within communities is crucial for collective resilience and recovery.
- The importance of resilient infrastructure that can withstand and quickly recover from disruptions.

Actions now and in the future

- Establishing decentralized and autonomous systems for energy, water, and food supply to enhance local resilience.
- Training and educating communities on resilience practices, including survival skills, first aid, and local resource management.
- Strengthening local networks and cooperation, including cross-border collaborations, to improve crisis response and resource sharing.
- Utilizing traditional and low-tech communication methods to ensure information dissemination during infrastructure failures.
- Implementing proactive measures such as stockpiling essential supplies, developing evacuation plans, and preparing survival kits.
- Investing in infrastructure that supports alternative energy sources, mobility solutions, and robust local supply chains.

In conclusion, the TOSA framework is effective in identifying elements relevant to resilience-building. Its application enhanced systemic resilience to low-probability, high-impact events by fostering community engagement, supporting infrastructure adaptation, and promoting proactive planning. Strategies derived from this approach offer pathways to mitigate risks, seize opportunities, address challenges, and implement measures to strengthen economic, environmental, and societal resilience. When completed together, the exercise created new connections among participants, fostering motivation to jointly initiate one of the actions. This outcome alone is already valuable.

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