# Scenario planning to enable foresight in crisis management

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## ABSTRACT

In today's interconnected society, we are witnessing crises traversing into new domains and effortlessly cross boundaries. Therefore, it is crucial to develop adequate foresight in order to chart a course of action. In this paper, we propose *scenario planning* as a key technique. Based on an explorative study of 30 interviews with representatives from all Dutch safety regions, we answer the question: *in what ways can scenario planning facilitate foresight in crisis information management?* Our results indicate that all regions in the Netherlands are investing in training and capacity building for scenario planning, but there is no consensus on the chosen methods and institutionalization. Qualitative approaches to scenario planning are dominant, while opportunities arise for quantitative approaches. We propose *real-time* and *strategic foresight* as a promising research agenda, and suggest ways for information systems research to develop data-driven tools that may help chart the impact of future contingencies.

### Keywords

Scenario planning, foresight, polycrisis, sensemaking, information systems.

## INTRODUCTION

When a crisis emerges, agencies are confronted with an acute threat that requires immediate action. Time pressure, incomplete information, and the demand for prompt decision-making add to the sense of urgency crisis managers experience (Rosenthal & Kouzmin, 1997). This urgency pulls crisis managers into the 'here and now', which often results in a reactive modus operandi with a limited time horizon (Jaques, 2010). Consequently, persons managing a crisis often find it difficult to look ahead and incorporate future contingencies in their decision-making. This short-term focus is also reflected in the academic debate, which tends to focus on the response phase. Crisis research is packed with single case studies that offer in-depth analyses of the response to a specific crisis (Wolbers et al., 2021). Yet, the dominant focus on single case studies limits our view on multiple dimensions or spill-over effects of crises, which could be problematic. Like the saying has it 'trouble always comes in threes'.

In late 2022, the Financial Times columnist and historian Adam Tooze coined the concept of a 'polycrisis'. Tooze argued that the world is enmeshed in a variety of crises that are entangled and strengthen each other. He described the interplay between the COVID-19 pandemic, the war in Ukraine and the energy, cost-of-living and climate crises (Tooze, 2022). In a polycrisis, different crises interact so that the whole is even more overwhelming than the sum of its parts (c.f. Jervis, 1998). While the term polycrisis resonates predominantly in the public realm, in the academic debate we are familiar with typologies that describe how crises become too complex to manage when crossing geographical or functional boundaries. We speak of a transboundary crisis *"when the functioning of multiple, life-sustaining systems is acutely threatened"* (Boin & Rhinard, 2008, p. 3).

The manifestation of a transboundary crisis tends to morph as its impact prolongs. When a transboundary crisis impacts multiple domains, the nature of the crisis itself may also change. For example, the alleged Russian 'Not-Petya' cyber-attack during the Russia-Ukrainian war showed how the crisis almost instantly traversed domains around the world. Within minutes the bug rendered both the FedEx distribution system and Maersk worldwide

container shipping network unusable (Greenberg, 2018). Such escalation pathways point us to the necessity for crisis managers to look ahead for ways to address a crisis traversing into new systems and domains. They require crisis managers to develop *strategic foresight*, the capacity of decision-makers to chart the organization's future course of action (Vecchiato, 2012). Developing strategic foresight entails identifying factors that are likely to induce future changes, while also dealing with those changes by deciding on currently appropriate organizational responses (Iden et al., 2017).

Developing strategic foresight during a crisis is not easy. In an extreme situation, limited awareness of possible escalation pathways may result in the 'collapse of the future', when the long-term perspective disappears from crisis managers' time horizon (Pot et al., 2022). Short-term decisions can have consequences that stretch far beyond the critical period. If crisis managers do not take the long-term into account, they will miss cues that point to opportunities for de-escalation, or miss cues that point to the escalation of the crisis into other domains. Therefore, crisis managers need to create moments of reflection and look for decision-support tools that can help them refocus on the long-term in order to foster strategic foresight. Foresight support systems may play a crucial role here as they feature a combination of information system and decision-support tools (Von der Gracht et al., 2015).

In this paper, we highlight the role that scenarios can play to embrace uncertainty and focus on the long-term (Wilkinson & Kupers, 2013; Wright, 2005). Scenarios are a tool to help decision-makers chart possible future developments by *"making the unexpected expectable by developing a set of narratives that incorporate uncertainty"* (Wright, 2005, p. 95). In developing alternative futures, crisis managers can challenge dominant frames in the current crisis. As such, scenarios form prospective sensemaking devices that can facilitate structuring the future in order to identify opportunities for action (MacKay, 2009; Burt & van der Heijden, 2003).

Given that scenario planning is a trend in crisis management, it is helpful to explore and chart the ways in which scenarios are used. We relate the relevant literature on scenario planning and use that to map the current state-of-the-art developments in scenario planning in the Netherlands. We pose the question: *in what ways can scenario planning facilitate foresight in crisis information management?* We base our analysis on an explorative study consisting of 30 interviews with regional crisis agencies in the Netherlands. Based on this analysis, we explore the goals, different scenario methods and design choices that characterize scenario planning in said agencies. This enables us to reflect on state-of-the-art developments and identify an agenda for future research that may inspire crisis scholars investigate ways in which to support scenario planning and the development of foresight. For information systems scholars, we identify opportunities to complement qualitative scenario processes by integrating quantitative methods to support real-time and strategic foresight.

## DEVELOPING SCENARIOS TO ENABLE FORESIGHT

From the very first impact of the crisis onwards, it can be helpful for crisis managers to develop strategic foresight to foresee and plan for possible escalation pathways and chart a future course of action (Vecchiato, 2012). In order to rethink plausible developments and generate options for action, many crisis teams are currently investing in scenario methods (Ramírez & Wilkinson, 2014). Scenarios are a helpful tool for ordering one's perceptions about alternative futures to inform decision-making (Schwartz, 1996). They can function as a tool to enable prospective sensemaking (Wright, 2005), which is referred to as the process in which actors anticipate future developments and construct expectations about the future (Sandberg & Tsoukas, 2015). This is similar when crisis managers engage in the process of scenario development, where they engage in continuous inquiry and re-evaluation of interpretations that helps them to make sense of a rapidly changing context (Ansell & Boin, 2019).

Different concepts are used to describe the process of generating scenarios, such as scenario planning, scenario thinking and scenario development. In this paper we use the definition provided by Bishop et al. (2007) who suggest that scenario planning is part of a foresight study, where scenarios help to *"create actual stories about the future. Scenario planning is a far more comprehensive activity, of which scenario development is one aspect"* (Bishop et al., 2007, p. 6). As scenario planning is booming in business continuity and crisis management, a multitude of methods are being developed, contributing to a wide array of concepts and approaches (Martelli, 2001). Surprisingly, in the crisis management literature there is scarce attention for scenario planning and foresight.

Scenario methods can be categorized into different schools representing either *plausibility* or *probability* based approaches (Bradfield et al., 2005). *Plausibility-based approaches* are qualitative approaches that aim to explore possible futures and focus on facilitating prospective sensemaking. In this approach, scenarios are used as prospective sensemaking devices that help to transition from a retrospective to a future-oriented focus by patterning cues and plots into frames to imagine alternative futures (Wright, 2005; Ramírez et al., 2013; Wolbers & Boersma, 2013).

A well-known approach is the 'intuitive logics' approach, first developed by Shell in the 60s to envision trends in the energy sector beyond the year 2000. In contrast, *probability-based approaches* are quantitative approaches that aim to predict the future by modelling historical data to extrapolate trends and determine what consequences the probability of unprecedented events has on these trends (Bradfield et al., 2005). Approaches like 'Trend-Impact Analysis' and 'Cross-Impact Analysis' are used to determine conditional or proportional probabilities to calculate impact and generate a range of alternative futures. During Covid-19 we have seen the extensive use of quantitative methods and modelling, primarily regarding infection rates, covid related deaths and ICU-capacity, to support strategic policy decisions (i.e. Shinde et al., 2020). Such data can help foster grounds for decision making, yet evaluations stressed the importance of the validity of data and the need to keep assessing whether assumptions are still valid as the crisis progresses (Dutch Safety Board, 2023).

What becomes clear from these different approaches of scenario planning is that they serve different goals and outcomes (Burt & Van der Heijden, 2003). For the use of scenarios in crisis management, it matters whether scenarios are used in the acute phase of a crisis to enhance option awareness about escalation pathways (Liu et al., 2011; Pfaff et al., 2023), or if scenarios are used to devise alternative futures in a slower paced or creeping crisis (Sætren et al., 2023, Mascio et al., 2020). In the acute phase, when there is little time, intuition will play a key role in scenario developers' ability to recognize and analyse cues and patterns (Barlett et al., 2013). In a slower or creeping crisis, a more structured form of sensemaking can be based on the extrapolation of risk calculations from databases. Information systems support can be helpful to create these databases. Glenn (2015), for example, argues the use of collective information systems as a way of using and supporting foresight methods, and Keller et al. (2015) propose a foresight database to serve as a 'knowledge pool' for foresight support systems. Needless to say, the quality of such risk calculations will depend on the availability of relevant (historical) data.

## METHODS

In order to map the current developments in scenario planning amongst crisis actors in the Netherlands, the primary author conducted an explorative study into the use of scenario planning in all 25 safety regions in the Netherlands (Luesink & Boin, 2023). A safety region is a regional crisis management organization facilitating interdisciplinary cooperation of emergency services during a (major) incident or crisis. For the study, 30 respondents were interviewed, who were selected based on their involvement with scenario planning in education, training and practicing within the safety regions. This resulted in 24 interviews with representatives from the 25 safety regions (two regions share their staff). The study is thus representative of crisis management at the regional level in the Netherlands. In addition, six interviews were held with relevant crisis management partners who also teach scenario planning to crisis managers: the Police Academy, National Academy for Crisis Management, the Public Health Academy, Intelligence & Security Academy of the Ministry of Defense, a consultancy firm, and the Netherlands Institute for Public Safety. In semi-structured, open interviews, respondents were asked to reflect on the process of implementing scenario planning trainings between 2016 and 2022. They reflected on the choices made in this process and shared their experiences with scenario planning in crisis situations. The interviews lasted around 60 minutes. All interviews were recorded and transcribed. The transcripts were coded in the manner of grounded theory (Charmaz, 2014). During the coding process, the authors discussed the interpretation of the data and possible categories with each other on a weekly basis in the course of a month. The categories were identified that included the characteristics of the scenario processes, the goals that were set for scenario planning, the design and methods used, and the intended audience for the scenarios (Luesink & Boin, 2023). Together this created a solid overview of the state-of-the-art developments in scenario planning in the Netherlands.

## FINDINGS

### *Goal & Purpose*

Scenario planning gained traction in the Netherlands in the wake of the Covid-19 pandemic, as crisis teams began to chart possible futures to gain a sense of control over the prolonged crisis. Respondents point to a desire to 'get out in front of the crisis' in order to organize a proactive, rather than a reactive, response (Luesink & Boin, 2023). While a multitude of regions had already invested in teams that structurally monitored safety related developments in the 'cold' phase, the pandemic gave the quest for foresight a final push. Across all safety regions, agencies rapidly allocated human resources, hired trainers and established teams to carry out scenario planning in order to advise decision-makers. As of now, most regions and national crisis centers in the Netherlands use some form of scenario planning in crisis management. This rapid scaling up has given rise to a great diversity of applied scenario methodologies.

Overall, respondents noted two main purposes of scenario development. A primary goal is to create awareness about possible future developments. Scenario teams aimed to create a shared idea of possible futures so they could provide crisis managers with plausible grounds on which to devise a future course of action in an uncertain context. Some respondents focused on getting a grip on an uncertain situation by stating that *"the aim is to keep some level of control over the situation and to recognize how a crisis is developing."* Others emphasized the need *"to walk through a possible scenario together to make sure we are all on the same page"* (Luesink & Boin, 2023, translation ours).

A secondary, complementary goal that respondents identified is anticipating possible future developments and (proactively) taking measures accordingly. This goal corresponds with the need to formulate appropriate organizational responses (Iden et al., 2017). Even though the situation might be highly uncertain, and little verified information is available, decisions and measures can be taken in consideration of plausible escalation pathways of the situation at hand. A respondent stated that the purpose of scenario planning is *"to recognize the scenario we are in and to identify preventive and reactive measures"* (Luesink & Boin, 2023). The first goal can be described with the 'what if' question. The second goal entails the subsequent 'then what' question.

These two main purposes of scenario development, as identified by respondents, correspond with the dual tasks related to fostering strategic foresight (Iden et al., 2017): anticipation and taking (preventive) measures. The first step is exploring the situation at hand and identifying factors that could influence future developments. The second step is imagining and, possibly, preparing intervention measures to facilitate desirable and prevent undesirable developments.

### *Design & Methodology of Scenario Development*

In the literature on scenario planning, several authors including Martelli (2001) decry the 'methodological chaos' in the field that stems from a plethora of scenario methods. Luesink & Boin (2023) find a similar diversity of scenario methods in the Netherlands. This is not necessarily a problem. After all, there seems to be no 'one size fits all' scenario method, since the selection of the most appropriate method should be guided by goal and organizational context of the scenario developers (Burt & Van der Heijden, 2003).

We provide an overview of the different scenario methods used in the crisis management landscape in the Netherlands in Table 1. These are four main methods taught in safety regions during scenario development training: 'Forward Thinking', 'IRS model', 'Imagination', and the 'Shell method' (i.e. intuitive logics) (see Table 1 for an explanation of each). These four scenario methods are all qualitative methods yet differ from one another in several ways. An important difference is that the 'Forward Thinking', 'IRS model' and 'Imagination' methods were designed or adapted to cater to the needs of crisis managers, whereas the 'Shell method' was designed to facilitate long term strategic thinking in a competitive business environment. The scenario formulation process of the first three methods also takes up less time than the 'Shell method', thereby offering a good fit for more high-paced crisis situations.

The 'Forward Thinking' and the 'Shell method' are both focused on strategic crisis processes. By engaging in these methods of scenario planning, crisis managers can get a better handle on the inherent uncertainty of a crisis situation and open their minds to multiple possible futures. The 'IRS model' and 'Imagination method', on the other hand, are characterized by an action-oriented purpose whereby the scenarios are intended to facilitate the identification of options for intervention and possible measures. Particularly in the 'IRS model', the scenarios are not the main outcome. Rather, scenarios aid in imagining a possible future state in order to formulate possible measures for intervention during the crisis.

These scenario methods portray a different operationalization of the dual tasks of strategic foresight. Whereas all methods engage with the situation at hand to explore possible futures, and subsequently identify options for response, the way scenarios help to identify these options differs. The 'Forward thinking', 'IRS model' and 'Imagination' methods demarcate the future through a best-case and worst-case scenario: developments that fall "between" these two scenarios are deemed most likely and should be considered when making decisions. In the 'Shell method', scenarios are created by ranking factors on uncertainty and their impact. Consequently, the scenarios are created based on the perceived uncertainties of the situation at hand.

**Table 1. Overview of four common scenario methods as used by safety regions (between 2016 and 2022) to train crisis managers in scenario development.**

| Method | Source/based on | Crisis management level | Purpose | Approach | Process | Outcome |
|---|---|---|---|---|---|---|
| Forward thinking | Crisis management training consultancy | Strategic level | Coping with uncertainty | Strategic analysis | 1. Analyze the current situation<br>2. Develop a favorable and unfavorable scenario<br>3. Identify strategic dilemmas for each scenario<br>4. Prioritize strategic decisions | Two scenarios and prioritized strategic decisions |
| IRS model | National Police | Operational and tactical level | Identifying and prioritizing measures | Risk analysis | 1. Identify risks<br>2. Rank risks based on probability and impact<br>3. Develop a best, realistic and worst-case scenario for the high priority risks<br>4. Propose measures (preventive and reactive) for one or more scenarios | Risk matrix |
| Imagination | National Academy of Crisis Management | Operational, tactical, and strategic level | Identifying opportunities for intervention | Exploration of different future pathways | 1. Analyze the current situation<br>2. Develop best, realistic and worst-case scenarios<br>3. Identify scenario drivers<br>4. Describe opportunities for intervention | Three scenarios, scenario drivers and opportunities for intervention |
| Shell method | Schwartz (1996) | Strategic level | Challenging mindset of decision makers | Exploration of possible alternative futures | 1. Identify the focal issue or decision<br>2. Identify key forces in the micro-environment<br>3. Identify driving forces in the macro-environment<br>4. Rank the key and driving forces based on uncertainty and importance<br>5. Place the two key uncertainties on the axes of the 2 x 2 matrix<br>6. Write the four scenarios<br>7. Explore the implications of each scenario<br>8. Select indicators and triggers for monitoring | Four scenarios and robust response options |

Data retrieved from interviews with respondents from the scenario methods; 1. Nijhof Teamadvies (consultancy), 2. National Police, 3. National Academy of Crisis Management, and 4. the Shell method as described by Schwartz (1996).

*Organization and Institutionalization*

A key difference noted in the safety regions in the Netherlands concerned the organizational level at which scenario development should take place and, thus, which crisis managers should be trained. In safety regions, crisis management is organized at three levels: the operational level (focused at the crisis response on the incident ground), the tactical level (focused at supporting the operational level and/or advising the strategic level) and the strategic level (focused at longer-term decisions by public local/regional authorities). Twenty-two respondents regarded the tactical level, and particularly the leader of that team, as the most suitable context for the development of scenarios. In the words of one respondent: "*the crisis team at the tactical level is most suited for scenario planning because they have more time to develop scenarios than the operational level and because the team takes both the operational and strategic level into account"* (Luesink & Boin, 2023). The crisis managers at the tactical level are expected to consider information from the operational level and translate it to long term effects and strategic dilemmas. The subsequent scenarios can be focused on either the operations or the strategy of the crisis response.

Many respondents pointed out challenges for scenario planning at the operational and strategic levels. Respondents argued that the operational level already has a great deal of tasks to complete in very little time, making scenario planning too much to ask even if it could be to their own advantage. A concern regarding the strategic level that several respondents shared is that the strategic crisis team would focus too much on the operational level instead of sticking to strategic dilemmas and decisions. Indeed, previous studies have often established that strategic teams which engage with operational units frequently fall prey to 'operational fixation' (Boin et al., 2017; Wolbers, 2022). Moreover, the majority view among respondents is that tactical crisis managers can strengthen their advice to strategic decision makers through the use of scenarios. *"The strategic level has advisors at the tactical level which support them in their decision making through scenario planning"*, in the words of one respondent (Luesink & Boin, 2023).

The discussion of who should engage in scenario planning concerns not only the level at which it should be done. We also noted different approaches to where in the organization to embed scenario planning: integrated in the work of every crisis manager of the responsibility of a designated scenario team? A quarter of the respondents argue in favor of keeping scenario development closely related to other crisis management processes such as sensemaking and decision-making, and thus integrated within the crisis team. Sixteen respondents, see advantages to having a separate scenario team. *"A separate scenario team would have more time to develop scenarios during a crisis and could consist of crisis managers who have more affinity with foresight"*, as one respondent stated (Luesink & Boin, 2023). Eight of the sixteen respondents, however, argue that a scenario team would only work during complex and/or protracted crises. The utility of a scenario team during shorter, less complex crises is drawn into question by these respondents, who note that by the time scenarios are developed and relayed, acute decisions will have already been taken and the crisis might already be under control. Setting up rapid scenario teams could also make the number of actors involved in the crisis response disproportionately high, resulting in higher coordination costs (Luesink & Boin, 2023).

## CONCLUSION AND THE ROAD AHEAD: DEVELOPING REAL-TIME AND STRATEGIC FORESIGHT

After the COVID-19 pandemic, scenario planning and foresight have received much attention. Actors across safety regions and national crisis agencies in the Netherlands have invested in training and capacity building. Organizations are fully engaged with anchoring scenario methods in crisis response processes and structures through scenario teams. Currently, however, the variation in opinions and approaches between the regions and organizations is telling. No consensus between the crisis organizations exists on the questions of when, how or by whom scenario planning should be done. Flexibility and adaptability are key in crisis management, so scenario practices do not have to be pinned down completely – still, respondents attest to missing common ground. Within, but especially between, the 25 safety regions, sharing a common understanding of the goal of scenario planning and methods is deemed most applicable for different types of scenario development.

Looking towards the future ourselves, we note two pathways of interest that will help in advancing scenario planning: *real-time foresight* and *strategic foresight*.

*Real-Time Foresight*

Scenario planning is often related to broader processes of risk analysis and monitoring. Real-time foresight concerns the process by which crisis organizations *"concurrently prepare for and respond to a crisis"* (Wells et al., 2021, p. 35). It entails foreseeing future developments that can be acted upon by crisis managers. In that sense, real-time foresight links to the third level of situational awareness, which entails the anticipation of future developments, based on a detailed understanding of the situation at hand (Endsley, 1995).

To facilitate the process of real-time foresight, we can look to foresight support systems, such as dashboards, collective intelligence systems, data-mining, and web 2.0 approaches (Von der Gracht et al., 2015). When organizations are able to access or construct databases that help to identify trends and prognoses, it could deliver indicators that can be monitored. We have already seen examples in the Netherlands of dashboards monitoring the influx of Ukrainian refugees and virtual assistants in crisis teams to provide actionable advice.

The difficulty in monitoring is knowing what to look for. No crisis unfolds exactly like its predecessors. The explorative study of scenario planning demonstrates the current focus on qualitative, intuitive logics scenario planning in crisis management (Luesink & Boin, 2023). This type of scenario planning can be useful for analyzing the current situation, exploring possible future developments and identifying indicators which can be monitored. Once relevant indicators have been established, quality and availability of data become the next obstacles. Very few databases will likely be available to conduct trend analysis at the start of a crisis. However, a prolonged crisis, like climate change or migration, can give the necessary time to construct relevant databases.

*Strategic Foresight*

Developing strategic foresight is the major challenge of the era of the polycrisis. While most scenario teams are still focused on a singular crisis, recent developments require that attention to the possibility that crises may entangle and strengthen each other. The polycrisis points to the importance of foreseeing escalation pathways and imagining the relationship between different domains. For example, the World Economic Forum Global Risk Perception Survey (2023) has identified a range of escalation pathways between crises. Looking ahead for ways to address a crisis that might traverse into new systems and domains can be facilitated by using specific scenario methods that help to foster strategic foresight (Vecchiato, 2012). To find the right approach, researchers and practitioners need to explore a variety of scenario tools that may help 'zoom out' from the acute threats of a single crisis and let crisis managers consider the interrelated nature of our worldwide networks and infrastructures. As systems become ever more connected, and the destructive potential and cascading effects of crises increase accordingly, scenario planning may play a crucial role in supporting the anticipation and mitigation of future crises.

*The Road Ahead: Developing Information Systems for Scenario Planning*

Scholars widely recognize the unique capabilities of technology to enhance foresight (Marinković et al., 2022). Information systems research provides promising avenues into data-driven and quantitative tools that help to assess the relevance and possible impact of future contingencies (Von der Gracht et al., 2015). As we witness the increasing availability of new data sources, such as social media, web 2.0 and open data, in combination with machine learning algorithms and computing capacity, a rich set of possibilities is opening up to advance the capacity for foresight (Geurts et al., 2021). It is time to take the next steps to develop systems that provide collective intelligence capabilities in order to increase the analytical leverage for crisis managers struggling to engage in foresight processes and scenario planning. Especially the integration of qualitative and quantitative methods can strengthen foresight processes. Examples of such steps in different contexts can be seen in, for instance, the Regional Innovation System (Keller et al., 2015) and the Risk Assessment and Horizon Scanning project (Durst et al., 2015). Through such information systems foresight processes are enhanced, by offering consistency checks, collaboration of geographically dispersed experts, and database construction.

Still, we are not there yet. First, academic research on foresight seems to be primarily focused on business strategy, business continuity and innovation, whereas research on foresight in crisis management is scarce. Second, a persistent challenge is to explicate the required capabilities of participants in foresight processes (Durst et al., 2015). Without a clearer idea on what foresight processes entail in crisis management, what kind of information is required, and what kind of assessments help to foresee escalation pathways, it remains hard to offer a fitting technological infrastructure. Our research indicates that training in scenario planning is currently primarily focused on qualitative methods, while adequate risk assessment and monitoring require the integration of quantitative tools and databases. Such integration may help to validate and test the intuitive future contingencies that crisis managers foresee. Furthermore, it remains a key challenge to assemble the right information in the middle of a crisis. It would be interesting to explore whether other countries face similar challenges or have already found solutions. A lot of potential is offered by unlocking new data sources, such as artificial intelligence, web 2.0 and open data, in order to provide a richer and more responsive data environment to the crisis manager. To enable both real-time and strategic foresight in the midst of a crisis, we need to combine best of both worlds to design a fitting technological infrastructure. We hope the ISCRAM community can play a leading role in fostering such innovative capacity for crisis managers struggling to set a future course of action in the rugged and unpredictable landscape of the polycrisis.

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