



Introduction to Information Resilience in the Context of National Preparedness

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WHAT IS INFORMATION RESILIENCE?

Changes in the global environment, the intricacies of decision-making, and the evolving role of social media have challenged traditional crisis preparedness and the security of supply frameworks. Securing the continuous flow of information and communication across various platforms has

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become a substantial challenge. The importance of information resilience in this context cannot be overstated.

A search conducted with Google Scholar on October 14, 2023, using the keyword *resilience* yielded approximately 4.3 million results. However, combining *information* and *resilience* produced only 1090 occurrences, underscoring the niche yet vital nature of the field. Scholars explore information resilience through various lenses: socio-ecological systems, interconnected system elements, dynamic information networks, and complex information ecologies. The systemic nature of the concept underscores that achieving information resilience requires a holistic perspective, recognising interconnectedness and the inherent dynamism and unpredictability (Sakurai and Chughtai 2020).

Information resilience is posited to be a means to manage uncertainties stemming from the natural environment and social conditions, aiding in adaptation within dynamic information contexts (Lloyd 2015; Anderson 2015; Pollak 2016; Bronstein 2019). Managing information resilience entails not just the use of information but also the acquisition of skills for information retrieval and comprehension (Lloyd 2017). The relationship between uncertainty and information resilience can be explored through concepts such as information environment fragmentation, infodemics, and information overload (Sakurai and Chughtai 2020). Additionally, the implications of digital technology, especially artificial intelligence (AI), are significant. Artificial intelligence can support information resilience by helping identify and filter misinformation and disinformation. Conversely, AI can be exploited to create deep fakes and bots that spread misinformation rapidly, highlighting a need for balanced and vigilant engagement with AI's role in information resilience.

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Information resilience can be seen as a concept that denotes an organization's ability to effectively respond and adapt to disruptions and challenges in their information environment. Information resilience thus involves integrating responsible and agile approaches to information use, allowing organizations to navigate uncertainties, recover from failures, and sustain their information-centric activities despite external disruptions or internal shortcomings. Sadiq et al. (2022) suggest that information resilience encompasses both responsible practices, such as data governance, privacy protection, and ethical information use, and agile practices, like adaptive strategies, quick response to changes, and flexibility in information management. By combining responsible and agile approaches, organizations can build a foundation that enables them to withstand information-related challenges, enhance their information capabilities, and ensure the continuity of their operations in a dynamic and uncertain digital landscape.

The above-described definition of information resilience corresponds to the typical operational framework of an adaptive organisation. In this situation, the organization's best operating strategy is built on excellent foresight, agility, and an adaptive operational culture. Taleb (2012) uses the term "anti-fragile" to describe systems or organisms that actually thrive and benefit from shocks, randomness, and uncertainty. Unlike organisations that are simply resistant to external shocks, antifragile entities become stronger, more resilient, or more successful as a result of challenges or disruptions. They are able to adapt and grow stronger through adversity.

To broaden a single-organisation perspective, information resilience can also be understood as a network's ability to recover information from alternative sources when the original source is unavailable or compromised. This approach focuses on the network's capability to maintain access to information even under adverse conditions by dynamically adapting and locating alternative sources to retrieve the required information (Al-Naday et al. 2014).

The objective of this book is to further explore the concept of information resilience from the perspective of individual organisations and networks, with a focus on examining its implications for society and systems as a whole. By adopting a systemic perspective on information resilience, this book aims to transition from descriptive to explanatory analyses of crisis preparedness. Information resilience is defined as the capacity of individuals, communities, and societies to withstand and recover from

misinformation, disinformation, and other forms of information manipulation (Rantamäki et al. 2024). Information resilience arises from the interaction of actors across societal layers, embodying the concept of emergence (Rantamäki 2024). These interactions not only result from but also shape information resilience, thereby strengthening information-related agency and mitigating information vulnerabilities. It is within the nexus of these multifaceted connections that resilience is both tested and strengthened. Entities engaged in this intricate network must adeptly manoeuvre through a dense web of informational exchanges and activities, which are inherently dynamic and often stochastic (Scholl and Patin 2013; Anderson 2015; Brassett and Vaughan-Williams 2015). The robustness of these entities, therefore, hinges on their ability to absorb, adapt to, and recover from the perturbations caused by the continuous and sometimes chaotic flow of information (Athayde et al. 2017; Hopp and Ferrucci 2020).

In security policy discourse, information resilience is articulated as the ability to withstand and recover from the impacts of misinformation and disinformation. Establishing information resilience necessitates fostering cognitive skills, critical thinking, media literacy, and a robust information infrastructure. The emergence of information resilience is dependent on the interactions between individuals and the factors influencing these interactions. Recognising information resilience as enhancing informational agency and reducing associated vulnerabilities is essential for developing comprehensive situational awareness and a multi-dimensional evidence base for effective decision-making (Filipec 2019).

A SYSTEMS APPROACH TO INFORMATION RESILIENCE

The systems approach to national security emphasises the analysis of both stable and dynamic patterns of system behaviour. In contrast, historical analysis focuses on specific events, variations, decisions, and shocks in particular contexts and times. Complexity thinking synthesises these perspectives into a nuanced theory of change, incorporating intricate details and the interconnectedness of diverse elements to catalyse innovation, evolution, and learning (Boulton et al. 2015).

Systemic thinking is a cognitive process that seeks to understand complex systems by considering the whole, in parallel with integral interconnections and patterns (Stroh 2015). It can be described as a fusion of art and science in forming sound judgements about behaviour through a deeper understanding of underlying structures (Richardson 2008) or as a discipline for seeing the whole and patterns rather than just isolated

components, facilitating an appreciation of dynamic changes over static snapshots (Senge 2006). Systemic thinking recognises that regular occurrences create patterns of action shaped by an overarching systemic structure influenced by forces of change. Emergence relates to the rise of new, unexpected structures or patterns within a complex system whose properties cannot be predicted solely by examining its individual parts (Cilliers 1998; Sawyer 2005). These emergent properties are the result of interactions within the system, leading to outcomes more complex than the sum of their parts. In public policy research, various methodologies such as agent-based modelling, network analysis, and system dynamics modelling probe the intricate interplay within systems (Hummelbrunner 2011). Each methodology has its own rationale and proponents, with the choice depending on the intended application.

In this book, we explore information resilience using the causal loop diagram (CLD) technique in system dynamics modelling (Barbrook-Johnson and Penn 2022). A CLD includes variables, connections indicating relationships between variables, and feedback loops that dictate the system’s behaviour. Reinforcing loops (R) may lead to exponential growth or decline, while balancing loops (B) work to stabilise or counteract changes, striving for equilibrium. The conceptual model depicted below illustrates the multidimensionality of information resilience and its systemic dynamics, serving as a heuristic tool integrating the insights from the subsequent articles.

Figure 1 illustrates how nodes and edges are connected with positive and negative connections and how the status of *collective agency*,

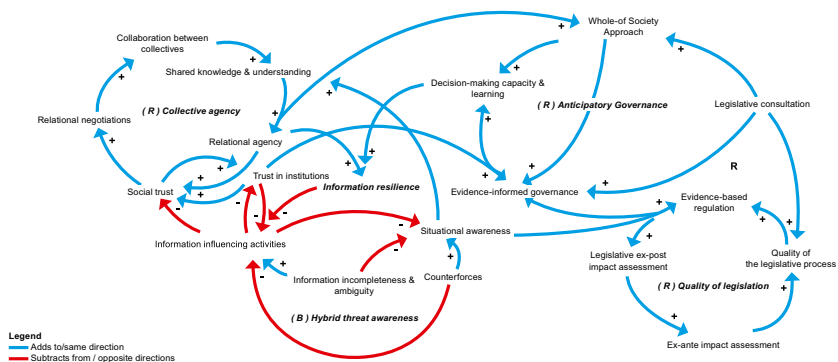


Fig. 1 A systems model (CLD) of information resilience in the context of comprehensive security

anticipatory governance, quality of legislation, and hybrid threat awareness feedback loops is represented by their positioning and additional annotation. The notations R1, R2, R2, and B1 refer to reinforcing and balancing loops. Information resilience forms the central node of the pattern. All feedback loops have causal connections to information resilience.

The data behind the model include interviews with 31 governance experts: 12 national, nine regional, six local, and four from the private sector. The Delphi panel utilised was facilitated by the eDelphi platform and involved 64 experts from a range of sectors, fostering both information collection and generation. In addition, 49 professionals attended three workshops, promoting collaborative analysis and in-depth discussions on the research data.

Information Resilience as Anticipatory Governance

Anticipatory governance is a dynamic and integrated approach that leverages evidence-informed policies, decision-making capacity, a whole-of-society perspective, and legislative consultation to navigate the complexities of modern governance. It embraces the diversity and interconnectedness of societal systems, seeking not only to respond to immediate challenges but also to build long-term resilience through continuous adaptation and learning (Folke et al. 2005). This approach is especially pertinent in an era where the pace of change is rapid and the nature of problems is intrinsically complex, requiring governance systems that are both robust and nimble (Ansell et al. 2021).

Evidence-informed governance is crucial in the context of anticipatory governance as it ensures that decisions are made based on the best available information, analyses, and assessments. It connects directly to the concept of information resilience by enabling governance structures to absorb, adapt, and respond to new evidence (e.g. Janssen and van der Voort 2020). This form of resilience is especially important in complex systems where obsolete or inflexible decision-making processes may result in ineffective policies or unintended outcomes (Boin and Lodge 2016). In such environments, there is a distinct need for ‘offensive resilience’, which refers to the ability to either anticipate and pre-empt emerging challenges or cultivate new competencies to manage the unforeseen (Rajala and Jalonon 2022).

Anticipatory governance also relies on decision-making capacity and the ability to learn from both past experiences and real-time feedback. A governance model that prioritises learning will adapt its strategies and policies in response to emerging information and changing conditions (Sharma-Wallace et al. 2018). This adaptability is a critical component of resilience, allowing governance systems to evolve and refine their approaches to meet future demands. Continuous learning mechanisms, such as ex-post evaluations of legislation and policy outcomes, contribute to an ever-improving governance process that is better equipped to foresee and respond to societal needs (e.g. Varone et al. 2023).

A whole-of-society approach is central to anticipatory governance as it involves the inclusion and mobilisation of various societal stakeholders in the governance process. This inclusive approach ensures that a diverse range of perspectives and expertise is considered, enhancing the system's capacity to anticipate and respond to complex challenges (Dubé et al. 2014). The whole-of-society approach also fosters social resilience by creating collaboration networks among citizens, government agencies, businesses, and other organisations. Such networks encourage collective problem-solving and shared responsibility for governance, which are essential for maintaining social cohesion and trust in a rapidly changing world.

Legislative consultation is an integral aspect of anticipatory governance that supports information resilience by engaging citizens and stakeholders in the policy-making process (e.g. Chalmers 2014). Early and ongoing consultations allow policymakers to gather an array of insights and knowledge, which can be used to inform legislation that is attuned to the nuanced dynamics of the society it serves. Moreover, legislative consultation enhances transparency and accountability, which are key to public trust and compliance. By involving stakeholders from the outset, the governance system can pre-empt potential issues and design policies more likely to be effective and accepted by those they impact.

Information Resilience as Collective Agency

Social trust is a linchpin of collective preparedness, acting as both the initial catalyst and the resultant product within the cycle of collective agency. Trust plays a critical role in society as it simplifies social complexities by fostering risk-taking and generalisation (Luhmann 1995). Conversely,

choosing distrust constricts the flow of information, compelling individuals to either hoard resources or neglect their needs.

In collective agency predicated on information, the knowledge shared by others is central, for it has the potential to cultivate a collective understanding through trust-based collaboration. Such collaboration, deeply rooted in the exchange of information, forms the essence of the collective agency's cycle (Ostrom 2000). Trust in societal systems (Luhmann 1995), which transcends the individuals' representing institutions, is fundamental in contemporary societies and indispensable for information resilience. The pandemic tested citizens' trust in the information and directives issued by healthcare authorities and governments, revealing a propensity in many instances to rely on personal contacts more than institutional systems (Zhang and Wang 2023). The situation underscores the difficulties of sustaining societal trust in contrast to the trust in known individuals, particularly within a climate of informational uncertainty.

A crucial element of information resilience is the *radius of trust* that gauges the extent of trust applied beyond one's immediate community (Fukuyama 1995). Expanding the trust intrinsic to intimate associations to wider contexts represents a societal challenge that enhances information resilience (Yamagishi 2011). Trust is even more indispensable when navigating uncertainties with strangers, serving as a societal lubricant. Trust in data provided by experts, authorities, or the empirical insights of laypeople is essential for cooperation and the division of labour in readiness contexts.

The overarching role of information resilience means it relies on both particularised and generalised trust. A citizen's particularised trust stems from historical and anticipated future interactions and from information derived from social networks (Schilke et al. 2021). Such accrued trustworthiness becomes the bedrock for societal information resilience. Accordingly, the effective generation and dissemination of information within relational networks hinge not only on institutional and communal efforts to foster trust but also on the moral and pragmatic dimensions of personal relationships (Christens 2012). From this basis, generalised trust is cultivated at communal and societal levels. At its most expansive, the relational aspect of trust extends to a fundamental trust in humanity, which is particularly pivotal when confronting global challenges like climate change, biodiversity loss, and famine.

In addressing collective agency, our focus is on information-centric collaboration in the realm of preparedness. Key challenges to social trust

include ideological, affective, and factual belief polarisations that can erode the foundations of modern institutions and societal cooperation at all strata (Rekker and Van Spanje 2022). To prevent such polarisation, we underscore the importance of social trust in fostering positive relational negotiations.

Information Resilience as Quality of Legislation

Legislation is the primary instrument used to steer society in a desired direction. Accordingly, an assessment of the quality of regulation should predominantly focus on the legislation itself. Enhanced regulation policy aims to improve the capacity of governments to enact high-quality regulation. The process can be referred to as meta-regulation because it establishes the rules governing the legislative process. That process encompasses policy formulation, enforcement, compliance, and the ex-post review of regulations (Radaelli and De Francesco 2007). The quality of the legislative process can be defined and measured in various ways, including examining the resources allocated for drafting legislation, the competence of the drafters, the organisation of the drafting process, and the management quality of the legislation.

A proficient legislative process furnishes decision-makers, such as members of parliament, with information. In evidence-based regulation, draft legislation aims to supply decision-makers with information to discern and debate the most effective solutions to a policy issue before making a decision. Regulatory impact assessment (RIA) is a primary method of generating such information. Consulting stakeholders, benchmarking against other countries' legislation, and reviewing prior experiences and studies are additional means to inform decision-making.

Regulatory impact assessment entails various analytical steps: identifying the problem, setting objectives, pinpointing alternatives, evaluating impacts, comparing options, and considering both the implementation and the ex-post evaluation of legislation. Ex-post impact assessment helps to analyse the effectiveness and success of the policy, such as whether any unanticipated effects have emerged. Insights from an ex-post impact assessment can reveal issues that may have to be addressed by legislative amendments. Accordingly, impact assessment serves as a tool for implementing the policy cycle (Larouche 2009). Alongside RIA, consulting stakeholders and citizens yields valuable insights for legislative drafting,

providing perspectives on the impacts of proposed legislation and issues related to its practical application.

Regulatory impact assessment and the engagement of stakeholders and citizens do more than merely generate information for the decision-making process. Ideally, they enhance both the quality of legislation and increase the transparency of the law-making process and the accountability of the legislators. That, in turn, bolsters the legitimacy of decisions, fostering compliance, trust in the authorities and decision-makers, and supports democratic implementation by offering a platform for deliberation (Larouche 2009).

Although the principles of a good legislative process might appear straightforward to implement, the process can be complex. A primary challenge is that political decisions leave little room to thoroughly identify and evaluate different regulatory options. Consequently, a government proposal may be crafted to support a preselected solution, with RIA utilised to validate specific legislative actions (Bohne 2009).

Another impediment to an effective legislative process is the inadequacy of stakeholder participation, which often occurs too late, typically after a law or regulation has been drafted. At this juncture, substantial amendments to the legislative proposal are uncommon. With improved legislative management and more meticulous planning, stakeholder involvement could occur at an earlier stage, facilitating data collection and the identification of various solution options. Moreover, poor regulatory management can also hinder the legislative process (Popelier 2017). Scenarios marked by insufficient resources for legislative drafting, overly ambitious deadlines, and a lack of expertise among those charged with drafting law are indicative of legislative management failures and are likely to undermine the quality of the legislative process.

Information Resilience as Hybrid Threat Awareness

In recent years, there has been huge interest in the state of the information environment. While the democratisation of the internet has had many positive effects, it has also created new opportunities for malicious actors to spread harmful content and information. Using disinformation and other types of malicious information to influence society has become routine among malicious actors. This trend will most likely continue as fast-developing technologies, such as AI, not only increase the speed at which

information is spread but also make creating fake information that appears convincing relatively simple.

In the cycle of hybrid threat awareness, the focus is on detecting and countering malicious information while building resilience to information-influencing activities. The hybrid threat term is an umbrella definition used to describe conventional, irregular, and asymmetric security challenges within the complex and multidimensional global environment (Pawlak 2015). Disinformation operations and information-influencing activities are only elements of the framework. Recent information-influencing activities with wide impacts, such as disinformation campaigns during the COVID-19 pandemic and the Russian war of aggression in Ukraine, have played a part in forming societal hybrid threat awareness in Western countries. At the centre of this phenomenon is long-term hybrid influencing.

Forming situational awareness of information-influencing activity is important because such activity is a low-cost means to undermine democratic societies. The method has been especially effective in countries whose democratic foundations have been weakened (Weikmann and Lecheler 2023). Information-influencing activity, such as disinformation operations, can have wide societal impacts, from blurring decision-makers' situational awareness to eroding social trust. Therefore, information resilience in the context of hybrid threats and disinformation operations is especially important as it forms the basis of resilience to the efforts of malicious parties to affect or, in the worst case, paralyse entire societies. Information incompleteness and ambiguity, whether caused by the intentional spread of disinformation or the unintentional spread of misinformation, enhances the effects of information-influencing activity and adversely affect building situational awareness (more on the comprehensive nature of hybrid threats see Smith in this book).

Today's information environment is filled with many forms of malicious information. Not all of it can be countered through fact-checking, social media monitoring, or other countermeasures. Nevertheless, disinformation and information-influencing counterforces are necessary to improve situational awareness of a wide range of malicious influencing methods. It is also important to note that information-influencing activity is not only directed towards citizens but also public institutions, whether indirectly by eroding citizens' trust in public institutions or directly through targeted online harassment.

Building situational awareness facilitates making informed decisions, even in an information environment plagued by disinformation. Ultimately, situational awareness of hybrid threats and influences from different directions creates the kind of understanding and awareness required to establish information resilience. In the best-case scenario, we can talk about shared situational awareness that creates shared knowledge and understanding that benefits evidence-based regulation, good governance, and overall decision-making capability.

One of the effects of disinformation is to create an information environment where individuals feel compelled to question everything and trust nothing. To reiterate, information resilience in the context of information-influencing activities means the ability to withstand and tolerate malicious information without civil-societal movements generating their own perceptions of the truth (Krieg 2023). It is impossible to completely erase malicious information spreading online as it does so extremely quickly. At the same time, no authority has the resources to monitor all social media platforms, let alone correct or react to all incorrect information it discovers (Alaraatikka et al. 2022; Koistinen et al. 2022). In democratic societies, regulations on free speech and data collection limit the action authorities can take to counter incorrect information. Doing so necessitates mobilising volunteers and organisations in the third sector. In conclusion, it is important to enhance societal resilience against all forms of information manipulation.

THE STRUCTURE OF THE BOOK

The book examines information resilience under four thematic topics. The first part relates to resilience and preparedness. It examines information resilience via the lens of anticipation, ecosystem analysis of hybrid threats, resilience approaches, and critical infrastructure. The subsequent part examines this topic via the lenses of complexity, with a primary focus on information resilience as part of societal governance and regulation.

The third part investigates the role and significance of information resilience in identifying and rejecting disinformation and combating violent extremism in the arc of instability. In addition, the part looks at the relationship between AI and information resilience.

The final section discusses information resilience and collective agency. Three different chapters give a relational perspective on collective preparedness, the role of networks in the emergence of individuals'

perceptions of security risks, and how civil society's collective informational capacity shapes societal resilience.

FROM KNOWING TO DOING

This book provides a comprehensive resource for those wishing to understand and implement the information resilience strategies that are crucial for securing national interests in an increasingly interconnected and information-driven world. By integrating the concept of information resilience into broader resilience research, the book lays the groundwork for robust, informed, and integrated strategies to address the challenges and complexities of the contemporary information landscape. Specifically, this book contributes to the debate on:

- *Expanding the concept of resilience:* Traditional resilience has focused on an entity's ability to withstand, recover from, and adapt to shocks or adverse events. This work extends resilience research to the realm of information, emphasising the capability to maintain information integrity and usability amid misinformation, disinformation, cyber-attacks, or other threats.
- *Building systemic resilience:* The book advances the resilience discourse by proposing a more inclusive and holistic approach. Its premise is that all stakeholders—including the public and private sectors, academia, and media—are integral to nurturing resilience at a systemic level.
- *Crisis management and preparedness:* By incorporating information resilience into crisis management practices, this work supports rethinking and redesigning traditional crisis preparedness models to better suit the complex information landscape, acknowledging the evolving nature of crises and the central role of information in modern society.
- *Influencing policy and legislation:* Policymakers will find this book clarifies the importance of information resilience and its impact on national security, potentially guiding the development of policies and legislation prioritising information resilience.
- *Enhancing decision-making capacity:* The book underscores the necessity for a multi-dimensional evidence base to support decision-making, positing that strengthened information resilience is crucial

for informed and judicious decision-making, especially in matters of national security.

- *Fostering a culture of resilience*: The text advocates information resilience becoming a societal priority, asserting that it should be an integral part of societal values and practices. This perspective is significant in treating resilience as a cultural characteristic that can be cultivated and engrained within society rather than solely as a capacity or capability.
- *Building collaborative frameworks*: The book recognises that national security is a collective responsibility involving various stakeholders beyond government agencies. It offers guidance on the preconditions, manifestations, and consequences of information resilience for a collaborative approach.
- *Hybrid threats awareness*: In the face of weaponised misinformation and disinformation, the book is a timely resource that can equip individuals, communities, and institutions with robust detection mechanisms and countermeasures to discern truth from falsehood and combat the spread of false information.

This book collates the perspectives on information resilience of specialists from several fields. The topic is addressed from the standpoint of governance, legislation, civil society, and the hybrid information landscape. The book will assist academic scholars and subject-matter experts working with public policy, the media, and the corporate world, as well as those involved with national security or preparedness.

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