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Driving Innovation in Times of Crisis

WHITE PAPER

Crisis Definitions and Frameworks

Author: John Katsos, Ph.D. candidate at Queens University Belfast, and Ailun Gu, a postdoctoral research fellow at the University of Auckland.

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900 17th Street, NW, Suite 700, Washington, D.C. 20006

The Global Federation of Competitiveness Councils (GFCC) is a network of leaders and organizations from around the world committed to the implementation of competitiveness strategies to drive innovation, productivity and prosperity for nations, regions and cities. The GFCC develops and implements ideas, concepts, initiatives and tools to understand and navigate the complex competitiveness landscape.

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Introduction

Societies continue to grapple in a world filled with crises, ranging from climate change and extreme weather events to high inflation and rising cost of living, energy and food insecurity, as well as armed conflicts and critical infrastructure cyber-attacks. In sum, crises have become a constant, and learning to navigate turbulence is a highly valued competitive differentiator.

In 2022, the GFCC and its member, the Japan Science and Technology Agency (JST), started a new initiative called Driving Innovation in Times of Crisis (DITC) to deepen the understanding of crises and facilitate innovation and prosperity in adversity.

Through a series of activities and research products, the DITC aims to develop actionable recommendations to empower businesses, governments, and organizations to thrive in instability and unlock new opportunities for innovation and prosperity. This White Paper is part of our effort to support these stakeholders in identifying and comparing crises. Our main goal was to develop a concept document outlining the main ideas concerning crises and their implications.

The process involved onboarding two researchers working in organizations from our network of members: John Katsos, Ph.D. candidate at Queens University Belfast, and Ailun Gu, a postdoctoral research fellow at the University of Auckland. They were responsible for conducting academic research and interviews with members and fellows. Additionally, we held an exclusive workshop within our community to test concepts and gather recommendations.

We express our sincere gratitude and appreciation for the work of the research team, to Dr. Haruo Hayashi, President of the National Research Institute for Earth Science and Disaster Resilience (NIED) for his valuable inputs on the crisis concept and participation in our research selection process, and to Mr. Christopher Allen from the European Commission for his thorough review of the white paper. Finally, we thank our esteemed member JST for the inspiration, support, partnership, and funding throughout the initiative.

We are proud to present to you the first major result of this initiative, the white paper *Driving Innovation in Times of Crisis: Definitions and Frameworks*. We hope you enjoy it!

Driving Innovation in Times of Crisis: Definitions and Frameworks

In times of crisis, innovation can mean the difference between survival and failure for societies and organizations of all types, shapes, and sizes.

In response to a global economic crisis, a company faces a sharp decrease in demand for its top product and responds by investing heavily in the products of the future. During the Great Depression, Thomas J. Watson Sr.'s decides[1] that IBM should invest heavily in electronic typewriters—a decision that wouldn't pay off for another two decades. Similarly, in the midst of the Great Recession, Apple decides to invest in services—proving prescient during the COVID-19 pandemic a decade later.

In response to a pandemic, a government rolls out previously experimental technology for full-scale prevention. In response to the SARS outbreak of 2003, Singapore decides to roll out thermal imaging technology—then untested but subsequently used globally as a tool to limit pandemics of various types. Similarly, the UK government's heavy investment in airplane technology in the aftermath of World War I has led to a critical technology advantage twenty-five years later in World War II.

As the world continues to grapple with the COVID-19 pandemic, one thing has become abundantly clear: innovation is key to navigating a crisis. From developing life-saving vaccines to creating new business models, the ability to adapt and innovate has been essential in our collective efforts to overcome this unprecedented challenge.

But why is driving innovation during a crisis so important, and what can we learn from past examples of innovation in times of adversity? To answer these questions, we first needed to establish what is a "crisis." One of the major challenges in preparing to drive innovation during and out of crisis is establishing when a crisis is taking place. Looking at academic and practitioner attempts to do so over the past four decades, we come to a definition of crisis as: **"A recognized period of increased danger requiring action to limit severe and cascading consequences."** Next, we look at lessons from major crises of the past 100 years to learn what does (and doesn't) work in innovating out of crisis.

Background of the project

The current project is in its first year of a three-year effort. It began last year with a series of webinars, discussions, and a jointly call hosted by the Japan Science and Technology Agency (JST) and the Global Federation of Competitiveness Councils (GFCC). This year marks the beginning of the identification stage, which will include the publication of this white paper. In this paper, we define "crisis", explain the definition, and provide initial data about past crises. We then will categorize them according to a set of criteria and propose recommendations on how to innovate from crisis (rather than being stymied by it). The third year of the project will focus on disseminating the recommendations to relevant stakeholders and testing the findings through stakeholder support. Through this three-year effort, we hope to create a global network of experts and practitioners who can work together to help provide recommendations to governments and businesses on how to innovate out of crisis by making their countries and organizations more agile, resilient, and competitive. We also hope to develop an evidence-based approach to crisis management that can be used in different contexts and to create innovative solutions to pressing global challenges.

How we gathered information

The process of gathering data for this white paper began with interviews of GFCC members and webinar feedback. This was followed by a literature review of academic and practitioner sources to gain further insight into the topic. The literature review allowed us to identify and analyze existing trends,

1 "What IBM's experience during the Great Depression can teach today's tech CEOs", Lockhead, accessed on September 2023, https://lochhead.com/blog/what-ibms-experience-during-the-great-depression-can-teach-todays-tech-ceos/.

develop a more comprehensive understanding of the subject, and draw conclusions from the data. We also used the data to craft the recommendations outlined in the paper.

Relevance of "crisis"

While crises can be challenging and disruptive, they can also provide important opportunities for organizations and societies in several ways that can lead to innovations. We identified four opportunities that arise from a moment of crisis. First, the urgent need to solve an issue during a crisis can drive innovation. Second, a moment of crisis can present and opportunity for restructuring societies and organizations. Third, a crisis can drive increased collaboration and better coordination across stakeholders. Finally, a crisis can present an opportunity to test the resilience of individuals, organizations, and societies.

Necessity drives innovation: The reality that necessity—not scarcity—drives innovation is one recognized by humanity for thousands of years from ancient morality tales[2] to the development of modern products such as e-ink.[3] Crises can create necessity—or a feeling of it—that drives solutions to problems previously thought impossible. In the context of the climate crisis for instance, renewable energy sources such as solar and wind are being developed to replace traditional sources of energy,[4] such as coal and oil. Additionally, new technological solutions are being implemented at an accelerating rate[5] to reduce energy consumption, such as smart home appliances, LED lights, and energy efficient buildings. At the same time, new policies are being developed to incentivize the adoption and use of these technologies, such as carbon taxes and emissions trading. Such innovation can help to reduce the impacts of climate change and ensure a more sustainable future. Necessity can thus lead to innovation and creativity, as individuals and organizations are forced to think outside the box to find new ways of doing things. In turn, this can drive progress and competitiveness.

Opportunity for restructuring: Crises can also present an opportunity to restructure the way societies, organizations and individuals do things. For instance, the COVID-19 pandemic has prompted many countries to restructure their healthcare systems,[6] allowing for more flexibility and access to care, while also ensuring better coordination[7] between and among nations, regions, and international organizations like the World Health Organization (WHO). At the organizational level, companies have had to rethink their strategies and processes[8] to respond to the changing environment. Individuals too have had to restructure their lives, from the way they work to how they spend their free time. In all cases, a crisis can be an opportunity to create more efficient and effective systems that can lead to long-term change. Organizations that undergo a period of restructuring due to a crisis can capitalize on new opportunities while also reducing costs and increasing efficiency. This can be done through the introduction of new strategies, policies, and procedures, as well as the elimination of outdated practices. Restructuring can also enable organizations to become more agile and adaptive to changing external conditions. This can allow for more efficient and effective processes, as well as better allocation of resources. By doing so, societies can emerge stronger and more competitive than before the crisis.

Increased collaboration: Crises often require collaboration across various stakeholder groups, including government, the private sector, and civil society. This collaboration can lead to greater coordination and cooperation even after the crisis has ended. In turn, this can foster a culture of collaboration and innovation, which can improve national competitiveness in the long run. For instance, the Fukushima Daiichi[9] nuclear disaster prompted increased collaboration[10] between the Japanese government and international organizations such as the United Nations and the International Atomic Energy Agency (IAEA). This collaboration allowed for better coordination of emergency response, as well as a more comprehensive assessment of the safety and environmental impacts of the disaster. Increased

2 "The Crow and The Pitcher", AESOP, accessed September 20, 2023,https://fablesofaesop.com/the-crow-and-the-pitcher.html.

3 "Necessity, not Scarcity, is the Mother of Invention", Harvard Business Review, accessed September 20, 2023, https://hbr.org/2011/03/necessity-not-scarcity-is-the.

4 "Renewable energy – powering a safer future", United Nations, accessed September 20, 2023, https://www.un.org/en/climatechange/raising-ambition/renewable-energy.

5 "5 charts that show how renewable energy generation has soared", World Economic Forum, accessed September 20, 2023, https://www.weforum.org/agenda/2022/11/renewable-energy-generation-soars/.

6 "COVID-19 and resilience of healthcare systems in ten countries" Nature Medicine, accessed September 20, 2023, https://www.nature.com/articles/s41591-022-01750-1.

7 "Covid-19 — Implications for the Health Care System, The New England Journal of Medicine, accessed September 20, 2023, https://www.nejm.org/doi/full/10.1056/NEJMsb2021088.

8 "Adapt Your Business to the New Reality", Harvard Business Review, accessed September 20, 2023,https://hbr.org/2020/09/adapt-your-business-to-the-new-reality.

9 "Fukushima Daiichi Nuclear Accident", International Atomic Energy Agency (IAEA), accessed September 20, 2023, https://www.iaea.org/topics/response/fukushima-daiichi-nuclear-accident.

10 "UN atomic energy agency to work with Japan on Fukushima water disposal", United Nations, accessed September 20, 2023, https://news.un.org/en/story/2021/04/1089652.

collaboration between organizations can also lead to more effective strategies and policies, as well as more efficient use of resources. By collaborating more effectively, organizations can create stronger partnerships that can lead to more sustainable solutions to the crisis.

An opportunity to test resilience: Finally, crises provide an opportunity to test the resilience of individuals, organizations, and communities. Resilience is the capacity to withstand, absorb, and adapt to shocks, while also being able to bounce back from challenging situations. Those groups that are able to "weather the storm" emerge stronger. This can be a source of long-term competitive advantage, as organizations and industries that are able to adapt and thrive in the face of adversity are more likely to succeed in the long run. For instance, during the 2008 Global Financial Crisis, many banks and financial institutions went bankrupt due to their inability to weather the storm. However, some were able to survive and even thrive. These organizations had the ability to adapt to the changing environment and take advantage of these opportunities. They also had a better understanding of the risks and were able to make better decisions regarding their operations. This allowed them to remain resilient[11] and recover from the crisis. Similarly, individuals and communities can also use crises as an opportunity to test their resilience and bounce back from difficult times. They can do this by developing strategies and plans to protect themselves and their assets, as well as by taking advantage of new opportunities that arise due to the crisis. By doing so, individuals, organizations, and communities can emerge stronger and more prepared for future challenges.

Definitions of emergency, disaster, and crisis

It is a challenge to provide a precise and concise definition for the terms emergency, disaster and crisis, and it is impossible to have a single unified definition.[12,13] On the one hand these terminologies are used interchangeably and in combination. On the other hand, they are differentiated to refer to different timelines or scales of influence.[14] But it is crucial to sustain a terminological distinction of these terms not only for academic purposes but also to provide an in-depth understanding of what is particularly involved in these scenarios, such as planning and management.[15] Table 1 provides a summary of the various definitions with further descriptions.

Definitions of emergency. Regarding definitions of emergency, some studies provide distinct features of an emergency while others consider emergency as an umbrella term covering various scenarios and events.

According to the Oxford English Dictionary, emergency is "a serious, unexpected, and often dangerous situation requiring immediate action." The WHO defines emergency as "a sudden and usually unforeseen event that calls for immediate measures to minimize its adverse consequences." The term has also been defined as "an imminent or actual event that threatens people, property or the environment and which requires a coordinated and rapid response."[16]

Unlike the above specific definitions, the United Nations Office for Disaster Risk Reduction (UNISDR)[17] points out that the terms emergency and disaster are sometimes interrelated, for instance, "in the context of biological and technological hazards or health emergencies, which, however, can also relate to hazardous events that do not result in the serious disruption of the functioning of a community or society."[18]

However, despite a concrete definition of emergency, the definition of emergency management as "short-term measures taken to respond to particular hazards, risks, incidents or disasters"[19] indicates emergency management is the management of hazards, risks, incidents or disasters; thus the line among the definitions of these terms is becoming blurred. With the recognition of the interchangeable use of emergency and disaster, UNISDR[20] proposes that emergency management is sometimes also known as disaster management, which involves schemes and organizational projects, coordinating the work of the government, private sectors and volunteers in order to respond to a range of needs arising in an emergency.

11 "First Global Bank Stress Test Highlights Increased Financial Resilience", IMF Blog, accessed September 20, 2023,https://www.imf.org/en/Blogs/Articles/2022/04/06/first-global-bank-stress-test-highlights-increased-financial-resilience.

12 Alexander, D. (2005), "Towards the development of a standard in emergency planning", Disaster Prevention and Management, Vol. 14, No. 2, pp. 158-175.

13 Quarantelli, E.L. (1987), "What Should we Study? Questions and Suggestions for Researchers about the Concept of Disasters", Internation Journal of Mass Emergencies and Disasters, Vol. 5, No. 1, pp. 7-32.

14 O'Brien, S. & Cadwell, P. (2017), "Translation Facilitates Comprehension of Health-related Crisis Information: Kenya as an Example", The Journal of Specialised Translation, Issue 28, pp.23-51.

15 Quarantelli, E. L. (2000), "Disaster Planning, Emergency Management and Civil Protection: The Historical Development of Organized Efforts to Plan for and to Respond to Disasters", Disaster Research Center, University of Delaware, Preliminary Paper.

16 Alexander, D. (2005), "Towards the development of a standard in emergency planning", Disaster Prevention and Management, Vol. 14, No. 2, pp. 158-175.

17 UNISDR rebranded on 1 May 2019, aligning its acronym with its name and purpose: United Nations Office for Disaster Risk Reduction (UNDRR).

18 "Disaster", United Nations Office for Disaster Risk Reduction, International Strategy for Disaster Reduction, accessed September 20, 2023, https://www.undrr.org/terminology/disaster.

19 Alexander, D. (2005), "Towards the development of a standard in emergency planning", Disaster Prevention and Management, Vol. 14, No. 2, pp. 158-175.

20 "Disaster", United Nations Office for Disaster Risk Reduction, International Strategy for Disaster Reduction, accessed September 20, 2023, https://www.undrr.org/terminology/disaster.

Table 1. Definitions and key characteristics of emergency, disaster, and crisis

Term	Definition	Key Characteristics
Emergency	A sudden and usually unforeseen event that calls for immediate measures to minimize its adverse consequences[21]	• Happens abruptly and without prior warning • Requires immediate action • Can be localized or affect a large region • Short-term in nature • Typically poses a risk to human life, well-being, assets, or the natural environment • Require rapid response that focuses on saving lives and protecting property
Disaster	A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources[22]	• Typically caused by natural or human-made hazards • Involves widespread destruction and loss of life • Affects a large region or population • Can have long-term impacts • Response typically focuses on relief and rebuilding efforts
Crisis	A recognized period of increased danger requiring action to limit severe and cascading consequences (GFCC, 2023	• Not a single event, refers to a wide range of events (e.g., polycrisis) • A social construct recognized by its stakeholders • May be a novel situation that have not been experienced before, including the type and/or scale of the situation • Has a significant impact, but not necessarily result in widespread physical damage • Systemic impacts • Transboundary (real or imagined boundaries) • High potential for cascading severe consequences • Response may involve finding a solution to a complex situation

21 "NCDs in emergencies", World Health Organization (WHO), accessed September 20, 2023, https://www.emro.who.int/noncommunicable-diseases/publications/questions-and-answers-on-prevention-and-control-of-noncommunicable-diseases-in-emergencies.html#:~:text=An%20emergency%20is%20a%20sudden,to%20minimize%20its%20adverse%20consequences.

22 "2009 UNISDR Terminology on Disaster Risk Reduction", Reliefweb, United Nations Office for Disaster Risk Reduction , accessed September 20, 2023, https://reliefweb.int/report/world/2009-unisdr-terminology-disaster-risk-reduction?gclid=Cj0KCQjw9rSoBhCiARIsAFOipImPNNbdIBAhz3ygmAfQFo3zY6fjTYa2il2N4gpF64MmM6sx2ZD7V3gaAp4TEALw_wcB.

Definitions of disaster. Disaster, as an established term used by researchers and scholars for nearly a century, has abundant definitions and conceptions in different disciplines and areas. There is no universal definition as it depends on the geography, economy and politics of the respective countries and regions. Thus, the definition can only be meaningful in a particular context with an explicit goal and specific audience. It should also be clarified whether the term is characterized as a concept or a field of study, despite an unavoidable overlap.

As a concept, definitions of disaster serve as decision-making about disaster declaration and resource leveraging related to prevention, preparedness, response and recovery.[23] International agencies and organizations provide similar yet different definitions. UNISDR20 defines disaster as "a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources"; it is a consequence of three factors, i.e., "hazards, conditions of vulnerability, and insufficient capacity or measures" to mitigate or deal with the possible adverse impacts. Similarly, The Centre for Research on the Epidemiology of Disasters (CRED)[24] defines a disaster as "a situation or event which overwhelms local capacity, necessitating a request to a national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering."

Emergency Events Database (EM-DAT)[25] considers disaster as a sudden and often unexpected event that results in "great damage, destruction and human suffering", which can be caused by both nature and humans. A disaster must have at least one of the following consequences: "(1) ten or more people reported killed; (2) 100 or more people reported affected; (3) declaration of a state of emergency; (4) call for international assistance."

Academically, disaster study is interdisciplinary but also predominantly well-developed in social science, particularly in sociology. Although there is no standardized definition in sociology, there is a quantitative and qualitative difference between daily emergencies and disasters.[26]

In the field of mental health, researchers focus on the influence of disasters on the wellbeing and health of the affected population and their possible mental health consequences. Disaster is characterized as "a potentially traumatic event that is collectively experienced, has an acute onset, and is time-delimited; disasters may be attributed to natural, technological, or human causes."[27]

In contrast to routine emergencies, when facing disasters, organizations have to: (1) promptly collaborate with numerous and unfamiliar organizations and departments, (2) lose their autonomy and independence of operation, (3) adapt to different performance standards, and (4) work much more closely with private and public sectors, all of which are unusual in everyday emergencies. UNDH[28] defines disaster management as "comprehensive approach and activities" to alleviate the negative influence of disasters. In conclusion, although emergency planning and crisis management are defined differently in various disciplines, the key factors are the temporal dimensions from preparedness to response.[29]

Definitions of crisis. Some scholars have noted that a crisis is a moment when crucial decisions involving opportunities and threats should be made in an extremely short period of time,[30] which is distinct from a disaster.[31] It is argued that sufficient risks may lead to a crisis, which can develop into a disaster if

23 Perry, M. (2007), "Natural disaster management planning: A study of logistics managers responding to the tsunami", International Journal of Physical Distribution & Logistics Management, Vol. 37 No. 5, pp. 409-433.

24 BELOW R., WIRTZ A., GUHA-SAPIR D. (2009), "Disaster Category Classification and Peril Terminology for Operational Purposes", Centre for Research on the Epidemiology of Disasters (CRED), accessed September 20, 2023, https://www.cred.be/node/564.

25 "The International Disaster - Emergency Events Database (EM-DAT)", European Commission, accessed September 20, 2023, https://knowledge4policy.ec.europa.eu/dataset/ds00107_en.

26 Quarantelli, E. L. (2000), "Disaster Planning, Emergency Management and Civil Protection: The Historical Development of Organized Efforts to Plan for and to Respond to Disasters", Disaster Research Center, University of Delaware, Preliminary Paper.

27 McFarlane, A. & Norris, F. (2006), "Definitions and Concepts in Disaster Research", In: Methods for disaster mental health research, pp. 3-19.

28 ONUG/DHA (1992), "Internationally Agreed Glossary of Basic Terms Related to Disaster Management", https://digitallibrary.un.org/record/793886/files/004DFD3E15B69A67C1256C4C006225C2-dha-glossary-1992.pdf.

29 Federici, M. (2016),, "Introduction: A state of Emergency for Crisis Communication", In: Mediating Emergencies and Conflicts, pp. 1-29.

30 Turner, B.A. & Pedgeon, N. (1999), "Man Made Disasters", Risk Management, Vol. 1, No. 1, pp. 73-75.

31 Shaluf, I.M., Ahmadun, F. and Mat Said, A. (2003), "A review of disaster and crisis", Disaster Prevention and Management, Vol. 12 No. 1, pp. 24-32.

circumstances were averted.[32] United Nations High Commissioner for Refugees (UNHCR)[33] describes "a complex emergency" as:

> A humanitarian crisis in a country, region or society where there is a total or considerable breakdown of authority resulting from internal or external conflict, and which requires an international response that goes beyond the mandate or capacity of any single agency and/or the ongoing UN country programme.

Accordingly, characteristics of crises include a large population affected with a significant scale of human suffering, response beyond the capacity of a single agency, thus requiring extensive international aid, difficulties in delivering humanitarian aid, aid workers at high risk, and attacks on aid workers.

Crises are categorized into different types, including community versus non-community crises and conflict versus non-conflict crises. Community crises include natural crises caused by natural disasters, industrial crises caused by socio-technical disasters, and non-industrial crises caused by conflict or non-conflict crises, whereas non-community crises do not affect the functioning of the community, e.g., traffic accidents.[34] Conflict crises are divided into external, e.g., wars, threats, relation breakdown, embargoes, blockades, and terrorism, and internal crises, e.g., political systems, internal conflicts, terrorist attacks, strikes, civil disturbances, sabotage, riots, executive kidnappings, and hostile takeovers. Non-conflict types include economic and social crises.

Another way is to categorize them into various types based on the nature of the crisis. In particular, the emerging concept of "polycrisis" is gradually gaining attention in academia and industry. A global polycrisis "occurs when crises in multiple global systems become causally entangled in ways that significantly degrade humanity's prospects. These interacting crises produce harms greater than the sum of those the crises would produce in isolation, were their host systems not so deeply interconnected."[35] Thus, the typology of crises is as follows: natural and human disasters, crises of community identity, political and economic crises, multi-dimensional crises—"Polycrises."

In conclusion, there are no universally standard definitions for disaster, emergency and crisis. The definition depends on the context and the discipline. Disasters, emergencies and crises are independent yet interdependent with each other with similarities and unique characteristics, respectively. The common features of the three terms are their suddenness and the damage caused, though an emergency does not have to be sudden.[36] Although a crisis and a disaster differ in many ways, they share many commonalities compared to an emergency. Some argue that a crisis and a disaster are interrelated events where a crisis is more comprehensive than a disaster while others claim disaster is an umbrella term covering emergency and crisis, pointing out that with negligence or mismanagement, an emergency or a crisis can become a disaster. Despite disputes over the definition and scope of the three terms, all of them require timely response and management. The complex nature of these three scenarios indicates challenges and difficulties in respective actions.

GFCC's definition of "crisis"

In light of GFCC's focus on "crisis", we conducted a literature review on the definition of crisis and combined the major elements of practitioner and academic work on crisis that has developed over the past three decades. Although "crisis" and "disaster" are often used interchangeably and both situations can cause disruption and require a response, the differences between them need to be clarified.

First, a crisis is not a single event; rather, it is a situation over a period of time that can refer to a wide range of events, including natural disasters, financial meltdowns, political upheavals, public health emergencies, social conflicts and other incidents that interrupt normal functioning and threaten the stability of individuals, groups, organizations, or society as a whole. A disaster, on the other hand, is a sudden and catastrophic event that leads to extensive devastation and casualties.

32 Davies, H. and Walters, M. (1998), "Do all crises have to become disasters? Risk and risk mitigation", Property Management, Vol. 16 No. 1, pp. 5-9.

33 "Coordination in Complex Emergencies", United Nations High Commissioner for Refugees (UNHCR), accessed September 20, 2023, https://www.unhcr.org/publications/coordination-complex-emergencies.

34 Quarantelli, E.L. (1988), "Lessons Learned from Research on Disasters", Disaster Research Center, Preliminary Paper.

35 Lawrence, M., Janzwood, S., & Homer-Dixon, T. (2022), "What is a Global Polycrisis? And how is it Different from a Systemic Risk?", Discussion Paper 2022-4, Cascade Institute, https://cascadeinstitute.org/technical-paper/what-is-a-globalpolycrisis/.

36 Al-Dahash, H., Thayaparan, M., & Kulatunga, U. (2016), "Understanding the Terminologies: Disaster, Crisis and Emergency", Proceedings of the 32nd Annual ARCOM Conference, 5-7 September 2016, Manchester, UK, Association of Researchers in Construction Management, Vol. 2, pp. 1191-1200.

"Context" is a characteristic of a crisis, meaning that recognizing a crisis involves observing the phenomenon within a certain context. It is crucial to establish a shared context for crisis awareness, as this provides an opportunity to bring together diverse talents that were difficult to accumulate in the past, what can ultimately lead to innovation. In this process of crisis recognition, we can identify a specific context (while keeping it as simple as possible, considering that overly complex contexts may not be fully comprehensible). Additionally, it would be helpful to explore the capabilities that were mobilized in response to these crises.[37] Examples illustrating effective contexts and how they were handled can be valuable, even if similar situations do not occur in the future.

Regarding consequences, while crises can profoundly affect individuals, communities, or even entire societies, they may not necessarily result in extensive physical harm (e.g., the Global Financial Crisis). On the contrary, disasters, such as earthquakes, cyclones, or floods, usually cause widespread physical damage.

As a crisis can sometimes be more complicated than a disaster, the response to a crisis may involve finding a resolution to a challenging situation, while the response to a disaster primarily focuses on relief and rebuilding efforts which are made immediately after a destructive event occurs. Although both crises and disasters are disruptive in nature, compared to disasters, crises often involve high levels of uncertainty, complexity, and ambiguity, making it difficult to anticipate their consequences or identify the most effective reaction. Specifically, when a polycrisis occurs, the impact and complexity of the overall situation is intensified, and it poses significant challenges in response, management, and recovery.

Therefore, given the complex nature of crisis, we think "crisis" is an umbrella term whose scope is broader than emergencies and disasters.

Based on the literature review and justification presented above, we define "crisis" as: **"A recognized period of increased danger requiring action to limit severe and cascading consequences."**

Below we describe how each element of the definition can be understood with examples. As an example, we use five crises from the last 100 years—the Spanish Flu, the Bhola Cyclone, the Global Energy shortage of the 1970s, the dissolution of the USSR, and deaths of despair.

Table 2. Examples of past crises

LOCATION	EVENT	START	END
Global	Spanish Flu	1918	1920
Bangladesh (East Pakistan)	Bhola Cyclone-Civil War	1970	1971
Global	Global Energy Crisis	1973	1980
Former USSR	Dissolution of USSR	1988	1991
United States	US Deaths of Despair	1998	Ongoing

37 "What can we learn from past crises to help us better innovate in the future?", The Global Federation of Councils of Competitiveness (GFCC), accessed September 20, 2023, https://blog.thegfcc.org/what-can-we-learn-from-past-crises-to-help-us-better-innovate-in-the-future-714ee6a14b18.

Firstly, a crisis is a **"recognized period of increased danger."** A crisis is a social construct with an affected population at its core. It arises when actors or stakeholders acknowledge it and often follows a timeline. For instance, the subprime mortgage crisis became a complete global financial crisis after the Lehman Brothers' collapse. Due to the mishandling of the high-risk period of the mortgage crisis, a series of reactions occurred, leading to more severe consequences. This man-made crisis carries a rising risk that can be traced back to a specific event. This event marks the beginning of the crisis period. Before the event, there is a high risk, but people are not yet facing the negative effects. The impact becomes evident after the initial event.

Secondly, **novelty** is a unique qualifier. If the same thing happens again and you are caught unaware, it's not a crisis; it's negligence. A novel crisis is a situation that has not been experienced before or a previously experienced event with an unprecedented scale/magnitude. This means that individuals and organizations are not prepared to deal with it, and the impacts can be significant. For example, the Spanish Flu pandemic of 1918 was a novel crisis that had a severe impact on individuals and societies worldwide. The virus was highly contagious, and there was no vaccine or treatment available. As a result, the pandemic resulted in the deaths of millions of people worldwide and had a significant impact on economies and societies. The Turkiye-Syria earthquake was a predictable disaster as these areas sit on a major active fault line for which both the Turkish and Syrian governments had changed their building codes for long ago, yet the codes were ignored by officials because of corruption and ignorance; thus, not a crisis. However, this "disaster" might lead to multiple crises: a political one in Turkey and a humanitarian one in both Turkey and Syria.

Thirdly, a crisis entails **consequences**, which must be **systemic**, **transboundary**, and **have high potential for cascading afterwards**.

The healthcare and psychology literature often focus on individual level crises. We are concerned with a systemic crisis that might impact individuals, but its scope is large-scale, i.e. impacting many individuals and organizations at once and in similar ways. A crisis is systemic when it affects the entire system or structure of an organization or society. For example, the 2008 Global Financial Crisis was a systemic crisis that impacted the entire global financial system. The crisis was caused by systemic issues in the financial industry, including subprime lending, securitization, and deregulation. The crisis had significant impacts on economies worldwide, leading to job losses, foreclosures, and economic downturns. Crises impact systems, not just individuals or organizations. The impact of a crisis on many individuals reflects its impacts on the system level, whatever that system may be. Systems can be of various types: financial/economic, cultural/identity, environmental, political, and health related. Systems can also interact, meaning that a crisis in one system can spread to another. The systems impacted among crises that we identified based on our definition (see full Crisis List in Annex) are: **political**, **health**, **financial/economic**, **environmental**, and **social/cultural**.

Table 3: Systems impact by past crises

LOCATION	EVENT	SYSTEM IMPACTED
Global	Spanish Flu	Health
Bangladesh (East Pakistan)	Bhola Cyclone-Civil War	Environmental
Global	Global Energy Crisis	Financial/Economic
Former USSR	Dissolution of USSR	Political
United States	US Deaths of Despair	Social/Cultural

Consequences of crises must be **transboundary**. Boundaries can be real such as physical divisions like rivers and mountains or imagined like political borders or religious identities. Crisis is transboundary when crosses these borders and it impacts individuals and organizations. For example, the COVID-19 pandemic is a transboundary crisis that has impacted the entire world. The pandemic has led to significant impacts on individuals, organizations, and societies worldwide, including widespread illness and death, economic disruptions, and changes in social norms. The OECD has previously used a more limited definition of "transboundary": "rapid onset event with severely disruptive consequences covering at least two continents."[38] This definition leaves out several boundaries that are within continents that are still relevant. For instance, the Indian Ocean Tsunami of 2004 had massive transboundary consequences crossing several national and ethnic boundaries yet was limited in impact to one continent (Asia). For the transboundary level impacted among crises that we identified based on our definition (see full Major Crisis List in Annex), we focused on geographic boundaries for ease of use only, while understanding that our definition encompasses more than these. The boundaries listed are: **national**, **regional**, and **global**.

Table 4: Transboundary levels in past crises

TRANSBOUNDARY LEVEL	LOCATION	EVENT
Global	Global	Spanish Flu
National	Bangladesh (East Pakistan)	Bhola Cyclone—Civil War
Global	Global	Global Energy Crisis
Regional	Former USSR	Dissolution of USSR
National	United States	U.S. Deaths of Despair

Cascading consequences are when an unaddressed portion of a crisis leads to other severe consequences. For example, during the 2011 Great East Japan Earthquake, the Government of Japan mapped severe cascading consequences after the earthquake and the tsunami involving high material damage to nuclear power plants, then power shortages, followed by negative perceptions about Japanese products overseas and the plummet in foreign tourist numbers.[39]

There is a high potential in crises for cascading consequences that are also severe, and, in some cases, can cause further crises. This is why crisis management and response have been a major focus of policymakers. Climate change is an example of the potential of serious cascading consequences that lead to more crises. While we know that the climate will change in severe ways, there are enormous uncertainties about where, when, and to what extent the climate will shift, with a high potential for severe cascading consequences if left unaddressed. The broad predictability (i.e., that there will in fact be climatic shifts) does not limit the depth of uncertainty.

Responses

In our analysis, we found that crises can spark a variety of responses. Some make the crisis worse, usually by triggering cascading consequences. Others cut off the worst consequences of the crisis and allow for better preparedness for future crises. These response types can also lead to greater innovation, or cause organizations and whole societies to be stuck in crisis or worse.

Responses consistently fall into five categories: ignoring, reactive, proactive, collaborative, and divisive. Some crises may have multiple types of responses by different actors. For instance, one set of actors may use proactive and collaborative responses, while others may ignore, and still others may use reactive responses. While there is no one-size-fits-all approach, proactive, collaborative, and cooperative responses tend to be more effective than reactive or divisive responses in limiting cascading consequences. Investing in research, contingency planning, and resilience-building can help to prevent crises from (re-)occurring or mitigate the size of their consequences. Similarly, working together across boundaries can help to achieve a more effective response and less dire outcomes.

Ignoring

One response to crises is to ignore them. This approach is often driven by a lack of awareness or understanding of the crisis, by a belief that it will not affect a particular individual or community, or by an underlying unwillingness to do what is necessary to address the crisis, usually because it would be perceived of as undermining the authority of the actor addressing the crisis. However, ignoring crises is rarely a viable option. Ignoring a crisis often makes its consequences worse and increases the likelihood of cascading consequences and the creation of newer, larger crises.

38 OECD (2011), "Future Global Shocks: Improving Risk Governance", OECD Reviews of Risk Management Policies, www.oecd.org/governance/48329024.pdf.

39 OECD (2013), "OECD Risk Management: Strategic Crisis Management", OECD Working Papers on Public Governance, No. 23, https://dx.doi.org/10.1787/5k41rbd1lzr7-en.

Proactive

A proactive response to crises involves acting before the crisis occurs or reaches a critical level. This approach can include measures such as investing in research and development, developing contingency plans, and building resilience in vulnerable communities. Proactive responses can help to prevent crises from occurring or mitigate their impact when they do occur. For example, investing in renewable energy sources can help to reduce the impact of climate change, while investing in public health infrastructure can help to prevent pandemics. Developing and implementing early warning systems and evacuation plans for areas prone to natural disasters, such as earthquakes, can save lives and reduce property damage. Investing in renewable energy sources, such as solar and wind, to reduce reliance on fossil fuels can help prevent the worst impacts of climate change.

Reactive

Another possible response to crises is to respond reactively. This means waiting until the crisis has reached a critical level before acting. While this approach may be necessary in some cases, such as responding to a sudden natural disaster, it can also be risky. Waiting too long to respond to a crisis can lead to greater costs and longer recovery times. Additionally, reactive responses may not address the root causes of the crisis, leaving it vulnerable to recurring. Ignoring the threat of climate change and its consequences, such as rising sea levels, extreme weather events, and loss of biodiversity, can result in irreparable damage to the environment and the economy. Waiting until a major hurricane has made landfall before initiating evacuation plans can put people's lives at risk and lead to greater property damage.

Collaborative

Another possible response to crises is to collaborate and cooperate across boundaries. Crises often require a coordinated response, as they can affect multiple countries or regions. Even if a crisis occurs within only one nation, the ability of leaders to collaborate with those outside the nation who might be able to help can be critical to a proper response. Collaborative responses can include sharing resources, expertise, and information, as well as working together to develop and implement effective solutions. Examples of collaborative responses to global crises include the United Nations Framework Convention on Climate Change and the Global Health Security Agenda. The Paris Agreement, which was signed by 195 countries in 2015, aims to limit global warming to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C. This agreement is an example of collaborative efforts to address the global climate crisis. During the COVID-19 pandemic, countries have collaborated to share information and resources, such as medical supplies and vaccines, to control the spread of the virus and protect people's health.

Divisive

Finally, crises can also lead to conflicts and tensions, particularly when resources are scarce or when different countries or communities have different priorities. In such cases, a divisive response may emerge, which can exacerbate the crisis and hinder efforts to address it. Divisive responses can include hoarding resources, blaming others for the crisis, or refusing to cooperate with others. During the COVID-19 pandemic, some countries have engaged in a divisive response by hoarding medical supplies, blaming other countries for the spread of the virus, or refusing to cooperate with international efforts to develop and distribute vaccines. In the face of climate change, some countries have engaged in a divisive response by prioritizing their own economic interests over global efforts to reduce greenhouse gas emissions and mitigate the impacts of climate change.

Conclusion

As we continue to navigate the COVID-19 pandemic and other potential crises in the future, the lessons learned from past crises can be invaluable. How can we learn those lessons without being trapped by the decisions of the past?

One way is to use the GFCC definition of "crisis" to provide a flexible framework of recognition (i.e., "this is a crisis") and comparison (i.e., "this is how our crisis is similar and different from some other crisis"). To drive innovation during and after a crisis, leaders can foster a culture of experimentation and risk-taking within their organizations before crisis. They should encourage their teams to think creatively and explore new ideas. With these new ideas in place when a crisis hits, organizations and societies may have options for innovation that they wouldn't have had otherwise. Crisis then becomes an opportunity to reward those who generate breakthroughs. Additionally, they should look for opportunities to collaborate with other organizations and industries to share knowledge and resources.

Another way is to prioritize communication and transparency during a crisis, especially in the social recognition of crisis and the response to it. Clear and timely communication can help to alleviate uncertainty and anxiety, while also ensuring that stakeholders are informed of any necessary changes or adaptations and providing opportunities for collaboration, a key response tool.

In conclusion, while crises can be challenging and disruptive, they also present opportunities for innovation, growth, and collaboration. By adopting a flexible framework of crisis recognition and comparison, fostering a culture of experimentation and risk-taking, prioritizing communication and transparency, and collaborating with other organizations and industries, leaders can help their organizations navigate crises more effectively and emerge stronger on the other side.

By understanding the importance of innovation in times of adversity and taking proactive steps to drive it, organizations can emerge stronger and better equipped to face the challenges of the future.

About the Driving Innovation in Times of Crisis Initiative

The DITC is a multidisciplinary, multi-stakeholder, global initiative to advance the understanding of crisis and harness its potential to generate innovation and promote prosperity. The project started in 2022 with funding and support from our member Japan Science and Technology Agency (JST).

Since then, we have engaged in relevant discussions, unveiling historical moments when innovation flourished in the face of adversity to gather lessons and review solutions. We invite you to check our report documenting all discussions held in 2022.

In 2023, we onboarded two researchers working in organizations within our network: John Katsos, Ph.D. candidate at Queens University Belfast, and Ailun Gu, a postdoctoral research fellow at the University of Auckland.

They were responsible for collecting, comparing, and synthesizing existing crisis definitions, performing a literature review of crisis typologies and epistemologies, and mapping out relevant examples of crises.

They based their work on extensive academic research and a series of interviews with our members and fellows, which resulted in the publication of a white paper on crisis definitions and frameworks and three case studies, uncovering the 9/11 terrorist attacks, the COVID-19 pandemic, and the ongoing armed conflict in Ukraine. The latter was written by Denys Ilnytskyy, an academic from Kyiv National Economic University, which will be published shortly.

We thank JST for their continuous support, and we look forward to continuing our work to help individuals, businesses, and organizations develop new structures and capabilities to drive prosperity and innovation in times of crisis.

We firmly believe that while a crisis can threaten competitiveness, it also poses numerous opportunities. We want to provide a framework for stakeholders to navigate turbulence, limiting competitiveness losses while enhancing their potential to develop creative solutions and prosper.

For more information, visit our webpage:
https://www.thegfcc.org/driving-innovation-in-times-of-crisis

If you want to join us for the journey, please contact:
Dr. Roberto Alvarez, Executive Director, ralvarez@thegfcc.org

Annex—The List: Major Crises over the last hundred years

The list of major crises was created to isolate historical crises, categorize them, and then discover instances and exemplars that might help define and comprehend how businesses and communities pushed innovation through those crises as lessons for others. This list is the first attempt at separating and classifying crises.

This original list has two major sources:

- Initially, GFCC members involved in the initial phases of the Driving Innovation in Times of Crisis project put together a list of relevant crises;
- Then, as academic publications were compiled, crises databases were identified. Some of these included massive datasets, such as the Duke/USC Political Crisis database, which had thousands of entries since World War I's end. Some, such as the OECD crisis framework, only contained a few.

These databases were analyzed. Some of them had adopted amazing granularity such as the Duke/USC database that had over a thousand smaller conflicts that were all directly related to World War II. These smaller events were integrated into the bigger crises that we feel our definition of crisis encompasses.

These crises were, then, categorized based on the primary system touched by the crisis—health, environment, politics/society, and financial/economic—the locations, start and finish dates, severe consequences, and cascading consequences (where relevant), and responses and predominant response types.

Here is a brief guide on how to read the list of major crisis:

- **Transboundary Level:** This is the level at which the crisis was recognized. National, Regional, or Global. We have not considered sub-national crises.
- **Location:** This is where the crisis was located. Where the impact was over multiple countries in multiple regions, "Global" is listed. Otherwise, the specific region or country is noted.
- **Event:** The name provided for each crisis is the one commonly used. We have tried to rephrase crisis names when the word "crisis" is generally associated with it unless it cannot be understood without the word (e.g., "Healthcare crisis", "Global Energy Crisis").
- **Start and End:** The start and end dates of the crisis. Where the crisis is still going on, "ongoing" is listed as the end date.
- **System Impacted:** As noted in the white paper, crises can impact multiple systems. For the purposes of this list, we have noted the primary system impacted for ease of comparison across crisis cases. These are Health, Environmental, Financial/ Economic, Political, and Social/ Cultural.
- **Severe Consequences:** The severe consequences of the crisis are listed here.
- **Cascading Consequences:** When unaddressed or insufficiently addressed, the severe consequences of a crisis can lead to other, cascading consequences (described in more detail in the white paper). Where applicable, these are listed.
- **Response(s) and Predominant Response Type:** The response(s) and their predominant type are then listed.

TRANSBOUNDARY LEVEL	LOCATION	EVENT	START	END	SYSTEM IMPACTED
Global	Global	Spanish Flu	1918	1920	Health
National	China	1931 China Floods	1931	1931	Environmental
Global	Global	Great Depression	1929	1939	Financial/ Economic
Global	Global	World War II	1939	1945	Political
Global	Global	Second Arab–Israeli war ("Suez Crisis")	1956	1956	Political
Global	Global	Asian Flu	1957	1958	Health
National	Japan	Typhoon Vera	1959	1959	Environmental
National	Bangladesh (East Pakistan)	Bhola Cyclone-Civil War	1970	1971	Environmental
Global	Global	Global Energy Crisis	1973	1980	Financial/ Economic
Regional	Former USSR	Dissolution of USSR	1988	1991	Political

SEVERE CONSEQUENCES	CASCADING CONSEQUENCES	RESPONSE(S)	PREDOMINANT RESPONSE TYPE
50 million deaths (3% of global population), 500 million infected (one-third of global population)	Overall life expectancy declined by more than 10 years in industrialized nations	Social distancing, quarantines, and masking become standard global tools to limit the spread; during WW1, many nations limited reporting on the flu for fear of morale loss	Ignoring
400,000+ deaths	Cholera outbreak leads to millions more deaths	Japanese invasion of Manchuria; crippling of the Kuomintang government; inspiration for Three Gorges Dam project	Reactive
Mass unemployment in most developed economies	Contributing cause of World War 2	Novel securities, banking, and business regulations	Reactive
Over 73 million people killed, including over 50 million civilians		Bretton Woods and formation of the UN; US military industrial complex	Collaborative
3,000+ dead, 4,000+ wounded; temporary closure of international trade	End of UK and French global superpower status; 1967 Arab-Israeli war; Egyptian control over Suez canal	US-USSR push for ceasefire and negotiation; nuclear brinkmanship used as a tool of diplomacy	Reactive
1 million+ deaths		Development of the flu vaccine that limits future flu seasons (but does not make much impact on the Asian Flu).	Collaborative
5,000+ dead	Nagoya epidemic; food shortages; devastation of Japanese pearl industry	Basic Act on Disaster Management	Reactive
300,000+ deaths; millions displaced; billions in economic damage	Breakup of East and West Pakistan after the Bangladesh genocide and the Bangladeshi Liberation War	Slow response to cyclone triggers election win of Awami league	Divisive
300% increase in price of oil; end of post-WW2 global economic boom concentrated in the US; removal of Israeli troops from Suez Canal	1970s global energy crisis; UK coal miners' strike; Japanese and French nuclear power investments; collapse of South Vietnamese government	Start of the move away from oil as primary energy source; underpinnings of OPEC decline; oil source diversification	Reactive
Formation of 15 new countries; end of the Cold War; Bolovezha Accords	3.4 million premature deaths; collapse of Cuban, North Korean, and Aghan economies	"Washington Consensus"; EU accession of the Baltics	Collaborative

TRANSBOUNDARY LEVEL	LOCATION	EVENT	START	END	SYSTEM IMPACTED
National	Rwanda	Genocide	1994	1994	Political
Regional	Latin America	Latin American "Lost Decade"	1982	1995	Financial/ Economic
Global	Global	HIV/AIDS	1981	1995	Health
Regional	ASEAN	Asian Contagion ("Asian Financial Crisis")	1997	1997	Financial/ Economic
Regional	Former Yugoslavia	Breakup of Yugoslavia	1991	2001	Political
National	United States	September 11 Terrorist Attacks	2001	2001	Political
Regional	West Africa Sub-Saharan	Liberian Civil War	1999	2003	Political
Global	Global	SARS outbreak	2003	2004	Health
Regional	Indian Ocean countries	Indian Ocean Tsunami	2004	2004	Environmental
National	United States	Hurricane Katrina	2005	2005	Environmental
Global	Global	Great Recession	2008	2011	Financial/ Economic

SEVERE CONSEQUENCES	CASCADING CONSEQUENCES	RESPONSE(S)	PREDOMINANT RESPONSE TYPE
750,000+ civilians killed; end of the Rwandan Civil War	First Congo War leading to 200,000+ deaths; Second Congo War leading to 5.4 million deaths	Hybrid regime in Rwanda; major international development assistance for the region centered around Rwanda	Divisive
Hyperinflation; mass emigration and unemployment	Sovereign debt crises; political upheavals	Heavier reliance on IMF; Argentine defaults	Reactive
Tens of millions of deaths; forty million people contracted and still alive	Severe life expectancy contraction in sub-Saharan Africa	Development of viral treatments that mitigate impact of disease; public health campaigns to limit spread of all STDs	Collaborative
Massive GDP decline; millions thrown into poverty		Stronger ASEAN economic cooperation	Collaborative
Formation of 7 new countries	Yugoslav Wars; 130,000+ dead; 4 million+ displaced; millions of illegal guns in Europe	Croatia and Slovenia join the EU; NATO invasion of Serbia	Divisive
3,000+ dead	Wars in Afghanistan and Iraq; creation of ISIS	New security and intelligence apparatus globally	Reactive
250,000+ killed, millions displaced	Civil wars in neighboring countries		Ignoring
700+ dead		WHO coordinated response and first major change to its rules since 1969; international health crisis response management system built	Collaborative
Over 200,000 people killed across 14 countries; 1.7 million people displaced; billions of dollars in damage		Peace agreement in Aceh; new Tsunami warning systems in Southeast Asia	Collaborative
1800+ deaths; 1 million+ people internally displaced; pillions in infrastructure and property damage; tens of billions of dollars in economic losses	Breached levees led to large amounts of environmental damage; housing shortage continues today	Slow, inadequate response led to more deaths and damage than would have occurred otherwise.	Reactive
Recession; bank failures; stock market crash; global housing price crash	European Sovereign Debt Crisis; American healthcare crisis		Collaborative

TRANSBOUNDARY LEVEL	LOCATION	EVENT	START	END	SYSTEM IMPACTED
Regional	Gulf Coast countries	Deepwater Horizon Disaster	2010	2011	Environmental
National	Japan	Fukushima	2011	2011	Environmental
National	United States	Superstorm Sandy	2011	2011	Environmental
National	United States	Healthcare crisis	2009	2012	Health
Regional	European Union	EU Sovereign Debt	2013	2015	Financial/ Economic
Regional	West and Central Sub-Saharan Africa	Ebola outbreak	2014	2016	Health
Global	Global	COVID-19 Outbreak	2020	2022	Health
Regional	Levant/Turkey/EU	Syrian Civil War	2011	Ongoing	Political
National	Ukraine	Maidan Revolution	2014	Ongoing	Political

SEVERE CONSEQUENCES	CASCADING CONSEQUENCES	RESPONSE(S)	PREDOMINANT RESPONSE TYPE
11 people dead, 17 injured; $23 billion lost in tourism and fishing over a three-year period; 80,000+ birds killed; over 5 trillion fish eggs destroyed; over 4 billion harvestable oysters killed	Health impacts of pollution on humans, animals, and ecosystem; $65 billion in total charges to BP	Criminal prosecutions and civil suits against BP; Dissolution of US government MMS	Reactive
Thousands evacuated; millions exposed to nuclear radiation		Investments in non-nuclear power	Proactive
200+ deaths; over $70 billion in damages		Government assistance program created to compensate flood victims; government flood insurance program fundamentally altered as insurance companies profit from it	Reactive
Millions uninsured; highest medical costs in the OECD; thousands of excess deaths		ACA (Obamacare); creation of Public Health Fund that helped information sharing during Covid-19 pandemic	Proactive
Austerity measures; massive GDP declines; government changes		Creation of the ESM; IMF bailouts; restructuring of government financing in the PIGS;	Divisive
11,000+ deaths		Criticisms of slow response underpin WHO reforms that help in responding to Covid-19 pandemic	Collaborative
6 million+ deaths; widespread travel and economic shutdown	Inflationary cycle; chip shortages	Increased global health coordination; increased protectionism for local industries and investments to redevelop industries that had been globalized	Collaborative
500,000+ deaths; 4 million+ refugees; Sanctions against Syrian government	Syria/Turkey earthquake death toll	EU-Turkey Migration Agreement	Reactive
Russian invasion of Crimea; Russian financing of separatist movements in Donetsk and Luhansk; MH17 disaster; thousands dead; hundreds of thousands internally displaced	Tens of thousands dead in increased invasion; Russian economic crisis	Russian invasion; more widespread NATO involvement; sanctions	Ignoring

TRANSBOUNDARY LEVEL	LOCATION	EVENT	START	END	SYSTEM IMPACTED
National	United States	US Deaths of Despair	1998	Ongoing	Social/Cultural
Global	Global	Climate Change	Early 1800s	Ongoing	Environmental

SEVERE CONSEQUENCES	CASCADING CONSEQUENCES	RESPONSE(S)	PREDOMINANT RESPONSE TYPE
100,000+ excess deaths		Increased funding for drug interdiction and mental health; lack of unified government response	Ignoring
Rising global and ocean temperatures; shrinking ice sheets and glaciers; rising sea levels	Increase in extreme weather events	COP system	Collaborative

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GFCC
Global Federation of Competitiveness Councils

Global Federation of Competitiveness Councils
900 17th Street, NW, Suite 700
Washington, DC 20006
USA
T +1 202 969 3382
www.thegfcc.org
info@thegfcc.org