Disaster Mitigation Under Complex Contingencies:
Risk Management Outline for a Connected World

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ABSTRACT

Disasters have always been part of human history. Although global safety has increased over the years, it is a question if the positive trend will continue. The most discussed major uncertainty is climate change, temporarily dwarfed by the COVID-19 virus pandemic. There are however many other challenges due to an increasingly connected and complex world. Failure to recognize an approaching danger is as human as the exaggeration by those who get worried too easily. If risk management systems shall handle the new risks, substantial advances in how to identify new risks are needed as well as improvements in the identification of cost-efficient mitigations. The collateral damage caused by mitigative measures can be high. Invasive actions, possibly amplified by social and traditional media, may disrupt supply chains and factories, and whole economies might suffer. A risk management system that can identify types of global risks and evaluate measures on cost-efficiency is needed to see if the cure could become worse than the disease.

KEYWORDS

Behavior Science, Cognitive Bias, Cognitive Dissonance, COVID-19, Decision-Making, Heuristics, Risk Management, System Dynamics

INTRODUCTION

Some of the new hazards that may emerge from a complex and connected world may have the potential to become major risks, in particular when they combine. The size of these risks is unknown and almost impossible to calculate, partly because it is difficult to estimate the probability of their occurrences and dependencies, and partly because the adverse consequences might escalate to unknown levels.

In today´s interconnected and global society, collateral damages caused by early and radical mitigation may cause more harm than the disaster itself. Radical efforts to avoid spread of the recent Corona virus (Covid-19) comprised the isolation of whole communities and even countries, severe travel bans and isolation of large number of people. Supply chains were interrupted which resulted in the shutdown of many factories, not only in China. Oversizing mitigative actions of the scale taken, which is the number one and first advice in contingency management, may not be the best action in

today´s complex world. It may have been correct in the Covid-19 case, but the decision-makers did really not know that.

Will it be possible to conduct reliable and valid verifications of the decision processes afterwards? Probably not, if de-briefs are based on subjective beliefs and impressions. Self-justifications will impede rational and objective considerations. A modern risk and contingency management system would record communication and all decisions made once an emergency was declared and contingency staff set. It will then be possible to evaluate the consequences of the decisions objectively and in hindsight to investigate if the cure had become worse than the disease.

A major shortcoming of present approaches to risk management is that the total risk of a major incident is usually only calculated for particular types of threats and for single, or a limited number of consequences. Risk management systems are usually not designed to capture how risk may escalate in tightly coupled, complex systems. The additional detrimental effects due to complexities might be more related to social and behavioural issues than physical and technical ones. A pertinent question is therefore: Can the mentioned shortcomings of risk management be alleviated by a new, advanced and interactive risk management system based on behavior and cognitive science, using stochastic systems and system dynamics models?

BACKGROUND

There has been a considerable safety improvement over the last centuries. The average life expectancy at birth of the world population in 1770 was slightly below 30 years, rising to 70 years in 2018 (Roser, 2019). The advancement in technology and science has led to increased production of food, new medicines and vaccines, and better treatment and care. Obesity is a larger problem today than starvation, the number of people killed in wars and by diseases are reduced (Pinker, 2011). A comprehensive overview of the total global health situation and positive overall trend can be obtained from the Global Burden of Diseases, Injuries and Risk Factors Study (GBD) (cf. Stanaway et.al., 2018 and Roser & Ritchie 2019).

The prospect for the future, however, is more uncertain as many new risks might emerge (Harari, 2016), some for the very same reasons that brought about the safety gains. Past trend is no guarantee for continued safety improvements. Global warming and pollution, the growing debt bubble, reduced effects of antibiotics, new viruses, artificial intelligence and robots where man is not in the loop, the harvesting of personal data for targeted commercials, the challenge for democracy by the influence on people's voting behavior through use of big data (Rose, 2019), (cyber)wars, overpopulation, pandemics and migrations. The inequality of wealth between the poor and the very rich is growing (Piketty, 2014). Financial capital is increasing much more than production capital. Some of these changes might be benign, others might not. They may interact in ways that are not able to foresee, but it is likely that financial turmoil may occur. Minor conflicts may lead to social unrest due to rapid spread in social media (Jackson, 2017). Belief systems contradicting science may shake the foundation of the welfare state. The rise of victimhood culture (Campbell & Manning, 2018), identity politics and no-platforming initiatives might pose a threat to freedom of speech, and thus the basis for the western version of human rights and democracy (Lukianoff & Haidt, 2018). Some hazards may reinforce each other, e.g. through amplification effects of perceived risk in social settings (Fjaeran & Aven 2019). The future has indeed numerous challenges, and they may come as both negative uncertainties (risks) and positive opportunities.

Black Swans and Unknown Unknowns

Regardless of the amount of efforts put into risk analyses, there might be risks that are unknown at the time of analysis. Some risk causes or hazards may neither be captured by risk analyses nor by previous accident investigations and may thus escape our attention. Large, unknown risks have been given different names, like Black Swans (Taleb, 2010), Grey Rhinos (Wucker, 2016)) and unknown

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