Global Systemic Risk: Confronting the Illusion of Control

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Global Systemic Risk

- Global Systemic Risk is a term used to describe fragility in **interconnected** systems that result in **cascades** of failures due to either relatively small shocks at the subsystem level or larger and more malicious disruptions affecting the whole system.
- These risks are not confined to individual domains—such as agriculture, water, transportation, energy, and healthcare—and are impossible to mitigate independently.
- New risks arise endogenously within the global system as a result of its inherent **complexity**, and collective behaviors cannot be reduced to those of the individual parts.
- Each component in such networks connects with countless other components, creating a web of interactions that is **self-organising**, not centrally controlled, and susceptible to **nonlinear** responses to change.
- As the trend toward modernity and globalisation accelerates, the system exhibits greater **unpredictability** and less **resilience**.
- Interconnectedness provides pathways by which shocks propagate and **contagion** spreads across systems with the potential to devastate global populations.
- A non-trivial problem for increasingly complex societal organizations

What We Do

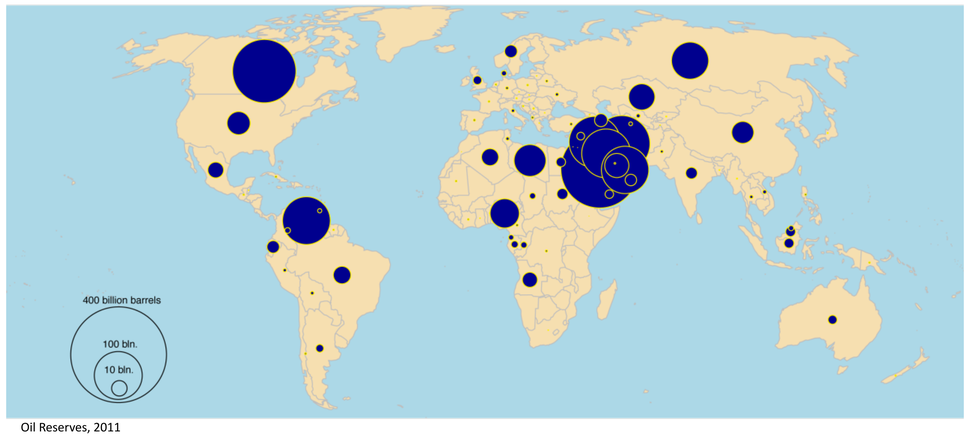
- The Global Systemic Risk research community located at Princeton University coordinates with multiple institutions—including Cambridge University—to develop systemic risk as a multidisciplinary academic field, which produces research with consequential effects on private industry and public policy.
- By uniting risk and uncertainty methodologies from disparate domains, serving as a coordinating hub for a multidisciplinary group of scholars, practitioners, and policymakers, and sharing best practices, we hope to assess systemic risk effectively within and between domains with the ultimate goal of putting forth frameworks to mitigate their consequences.

Motivation

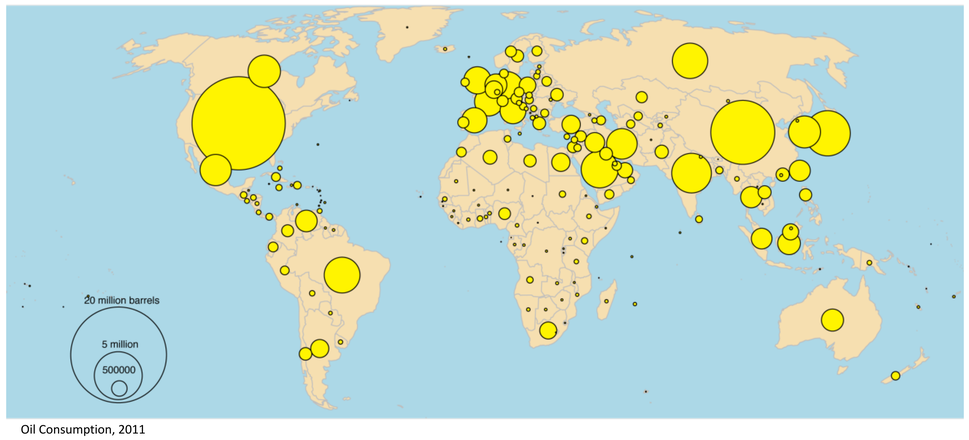
- These interconnected systems support critical domains that form the backbone of our increasingly global and interdependent society.
- Researching potential vulnerabilities of these domains is vital as decision-makers work to steer the complex systems in the face of uncertainty.
- We are looking for collaboration partners (academic & practitioner) from multiple fields.

The Illusion of Control

- Stacy et.al (2000) expanded the original concept of the Illusion of Control into group decision-making with the premise that managers of organisations assume their system will function within their control once the design and the control of its activities are complete.
- Humanity now operates within Large Scales—Socio-Technical Systems are Complex Adaptive Systems
- The capacity for design and control depends significantly on the possibility of making reasonable enough predictions of the internal and external consequences of one design rather than another and of one action rather than another.
- Gabriel (2003) makes the claim that the management—and hence control—of many complex organisations is based on illusory concepts about what planning activities achieve and constitutes a serious misdirection of attention and energy.



Oil Reserves, 2011



Oil Consumption, 2011

Examples of Systemic Collapse

Finance:
2008 Crash – Primarily caused by deregulation in the financial industry. That permitted banks to engage in hedge fund trading with derivatives. Banks then demanded more mortgages to support the profitable sale of these derivatives. Banks believed that these trades had been de-risked due to complex instruments that eventually proved to be flawed. Losses are estimated between US$4-20 trillion.

Infrastructure:
Fukushima Nuclear plant – The earthquake and tsunami that engulfed the nuclear power plant caused damage, but the issue was the failure to correctly develop the most basic safety requirements—such as assessing the probability of damage, preparing for containing collateral damage from such a disaster, and developing evacuation plans for the public in the case of a serious radiation release.

War/Conflict:
World War I (1914-1918) – As global powers sought to secure lasting peace with a complex network of treaties and international agreements, a small shock disrupted the entire system. An assassination in Sarajevo set off a chain of events that could not have been predicted, and which propagated through the tightly coupled political landscape of Europe and the world. Efforts to control and manage the risk of conflict backfired, and a small perturbation led to one of the deadliest conflicts in human history.

Agriculture:
2007-08 spikes in global rice prices – Despite no shortage of rice crop production, prices needlessly tripled in the winter of 2008 as global actors in agricultural trade misinterpreted signals and began acting with incomplete information. A decision to limit exports in India rippled through the tightly coupled and increasingly global food system. Unclear about India's motives, other countries began hoarding rice supplies, which created an unnecessary crisis in the food system.

Epidemiology:
Ebola Outbreak (2014) – The spread of disease is a classic illustration of contagion, but the Ebola outbreak's impact on systems beyond healthcare is an example of how a shock in one domain can cascade unexpectedly into others. Crop yields were promising and infrastructure for aid was well-established, but by stopping work in the fields, and making travel to infected areas suddenly impossible, the sickness also led to famine.

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