Perspectives on Complex Risk Governance and Fukushima Accident

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1. Complex Risk Governance and Public Policy Perspective

- Background
  - increasing complexity, uncertainty and ambiguity(Climate change, Pandemic, World-wide financial crisis, Fukushima disaster...)
  - risk versus risk issues among various risks (safety, economic, social, ethical...)
  - the risk governance perspective is the key to overcome this challenge
  - the need for full risk mapping and analysis based on that: OECD reports and IRGC frameworks

- Aims
  - To identify the key factors in achieving resilient society in the face of complex risks
  - To explore a set of policy options and measures to enhance the capacity to govern complex risks
  - To coordinate dialogues and collaborations among experts from academia and practitioners with divergent disciplines and set a platform for societal discussions towards a better risk governance

- Areas of Research Interests
  - The risk governance mechanism and cross-cutting issues in the fields of nuclear energy, natural disaster, HSE risks, financial risk, etc.
    ⇒e.g. Lessons learned from the Great East Japan Quake & Tsunami and the Fukushima nuclear disaster
  - Mapping and visualization of the risk relationships: Develop of holistic framework and indicators
  - Identification of the challenges against risk governance
  - Recommendation for social decision making and management directed towards complex risk governance.
  - Possible Forecast of Japan Risk Landscape

Need for Comprehensive Risk Mapping Ex GLOBAL RISKS REPORTS (2006~2012)

Identifying global risks for the next decade

Criteria: Severityとlikelihood

2006：25 items, 2012：50 items

Making RIM(Risks Interconnection Map)

Global Risks 2012

Red : Centers of Gravity Violet : Critical Connectors

Economic	Environment	Geopolitical	Societal	Technological
Chronic fiscal imbalances	Rising greenhouse gas emissions	Global governance failure	Unsustainable population growth	Critical system failure
Major systemic financial failure	Failure of climate change adaptation	Critical fragile states	Backlash against globalization	Cyber attacks
Severe economic disparity	Land and waterway use mismanagement	Pervasive entrenched corruption	Mismanagement of population aging	Mineral resources supply vulnerability
Extreme volatility in energy and agriculture prices	Mismanaged urbanization	Terrorism	Water supply crisis	Massive incidence of data fraud or theft
Unforeseen negative consequences of regulation	Persistent extreme weather	Failure of diplomatic conflict resolution	Rising religious Fanaticism	Massive digital misinformation

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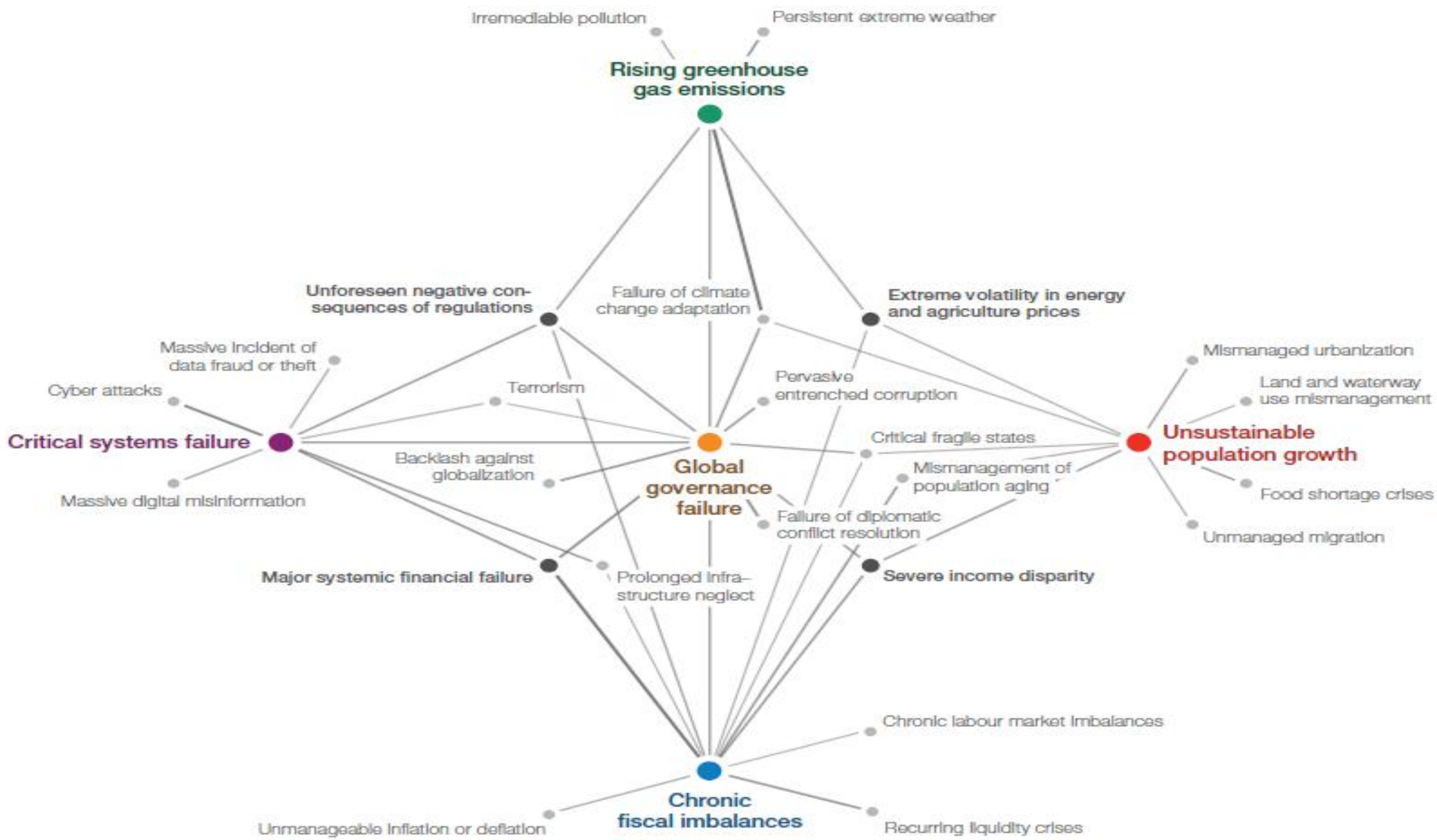
Economic	Environment	Geopolitical	Societal	Technological
Chronic labor market imbalances	Irremediable pollution	Diffusion of weapons of mass destruction	Food shortage	Unintended Consequences of climate changes mitigation
Unmanageable inflation or deflation	Unprecedented geophysical destruction	Entrenched organized crime	Unmanaged migration	Unintended consequences of climate change mitigation
Recurring liquidity crises	Antibiotic-resistant bacteria	Unilateral resource nationalization	Rising rates of chronic diseases	Failure of intellectual property regime
Hard landing of an emerging economy	Species overexploitation	Widespread illicit trade	Vulnerability of pandemics	Proliferation of orbital debris
Prolonged infrastructure neglect	Vulnerability to geomagnetic storms	Militarization of space	Ineffective drug policies	Unintended consequences of nanotechnology

Global risks Map 2012



Source: World Economic Forum

Key Issues of Complex Risk Governance

- "Natech" - Interaction between natural disaster and technological accidents
- Risk trade offs - a measure taken to cope with certain kind of risks can sometimes increase other kinds of risks
- For example, the measure to control health risk posed by nuclear radiation must be balanced with other social economic risks resulting from evacuation policy in affected area

cf. Other risk tradeoff such as energy policy – supply and safety

2. Lessons of Fukushima Accident "Failure" of Interdisciplinary Communication

Delay of Tsunami Regulation

- In September 2006, the Nuclear Safety Commission in Japan (NSC) revised the Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities in accordance with the results of the 5 years study
- The Revised Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities - the tsunami is treated as one of the "accompanying phenomena" of earthquakes despite some subcommittee members' claim that the tsunami required particular attention in its revision process

Incremental Change

- As to the tsunami issues, Japan has responded in incremental ways
- The Tsunami Evaluation Subcommittee of the Japan Society of Civil Engineers (JSCE) published "Tsunami Assessment Method for Nuclear Power Plants in Japan" in February 2002
- The basic concept : To evaluate the design water level based on the evaluations of historical tsunamis which can be identified in historical records and on some calculations with parameter variation.

Increasing knowledge

- However, Japanese nuclear community couldn’t catch up accurately with the rapid progress in understanding tsunami
- In August 2002, the Earthquake Research Committee of the Headquarters for Earthquake Research Promotion, led mainly by scientific researchers, pointed out the possibility of earthquakes centered in plate boundary ocean areas which can be stronger than historical ones
- New simulation methods combined with sedimentological studies（堆積学的研究）brought some new findings on the Jyogan earthquake（貞観津波） which was mentioned in reliable historical records.
- Some tsunami experts estimated possible tsunami heights in Fukushima coastal area which can be higher than its earlier predictions.

"Limited" Introduction of Severe Accident Management

- Behind other countries, Japan also introduced the severe accident (accident beyond design basis) management in 1992
- Accident management measures were been basically regarded as voluntary efforts by operators, not legal requirements
- It was decided in keeping with the intention of operators that the PSA (probability safety assessment), which provides the basis of accident management, limited its subject to internal events, and excluded external events including earthquakes
- It is said that there had been operator's considerations from the viewpoint of public acceptance in siting areas
- Difference between engineering thinking based on Probability and security expert thinking based on scenarios

3. Human Resource development
Ensuring Integrative Capabilities

- Formal independence is not enough – need for capacity
- After the JCO (nuclear fuel production company) critical accident in 1999 and the reorganization of government ministries since the Hashimoto administration reform in 2001, the NISA had been reinforced and the JNES (Japan Nuclear Safety Energy Organization) was established under the NISA (Nuclear and industrial Safety Organization)
- These regulatory agencies have been conducting mid-career recruitment from manufacturers for acquiring technical expertise
- The NSC also has strengthened its Secretariat's functions after the JCO accident.
- Integrating safety, security and possibly safeguard might be good step forward, but not enough

Problem of Capabilities

- The mid-career staffs from manufacturers were certainly experts of parts of nuclear technology, but they could not always succeed in regulating in a comprehensive way, nor could they get the skills as regulatory professionals enough to deal with operators.
- There is also a problem with the adequacy of distribution of regulatory resources, that is, whether it is truly effective or not to establish two sets of regulatory bodies, the NISA and the JNES which are primarily in charge of safety regulation and the NSC which conduct "double-checks"

Structural Base of Independent Expertise

- In the case of the United States, the Navy, which has lots of nuclear submarines, has played an important role as an excellent source of nuclear professionals
- Many nuclear experts from the Navy have been employed by the NRC and the Secretariat of the Institute of Nuclear Power Operations (INPO)
- In Japan, it can be said that Science and Technology Agency (STA) and some research institutes under the former STA such as the former Japan Atomic Energy Research Institute (JAEA) had played a role somewhat similar to the U.S. Navy
- However, their roles have been decreased

4. Roles of Residents and Local Governments

- Historical development of nuclear safety agreement
- Historical importance of informal relationship between local governments and utilities – NISA was behind utilities and experts
- Future role of local government – monitoring, forum setting (following the model of CLI in France) or official consultation

  cf. Interests of some governors in CLI
- Official relationship between regulatory agency and local governments becoming important
- Nothing done so far in the regulatory reform even though there were some statements in the Diet when NRC was established

5. Difficulties of Complex Risk Governance

- Institutional infrastructure for the Identification of the whole picture of the risks in question and transparent decision making mechanism is of critical importance- but dilemma - integration or making sure diversity?

  Cf. Issue of role of Prime Minister in crisis management
- Scenario analysis (based on security thinking) can be a help←→Reliance on PRA (probability risk assessment) as a filter in Severe Accident management based on engineering thinking
- But scenario in what scope? – ex. Poison gas from chemical plant killing operators of nuclear plant ?