Introduction:
Issues for the Second Independent Accident Investigation:
Do not brook the "normal pattern"

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An enormous earthquake of Magnitude 9.0 struck the Pacific Coast of Japan from the Tohoku region to the Kanto region at 14:46 on March 11, 2011, causing a large tsunami. The huge amount of seawater that rushed over the seawall into the premises of the Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant located in the coastal area of Fukushima flooded the underground switchboard and emergency diesel generator. With the collapse of power towers, the transmission line from outside was cut off, the power supply inside was also lost, and a so-called total power outage (station blackout: SBO) took place. The Fukushima Daiichi Nuclear Power Plant lost its reactor cooling function, triggering a severe accident, which corresponded to an Article 15 event in the Act on Special Measures Concerning Nuclear Emergency Preparedness (Nuclear Emergency Act).

Not a single life was lost to direct radiation exposure in this unprecedented crisis thanks to the efforts of Director Masao Yoshida and others who struggled at the site of the Fukushima Daiichi Nuclear Power Plant in danger of their own lives, the people supporting them, and perhaps luck. However, the number of earthquake related deaths in Fukushima Prefecture from the Great East Japan Earthquake and evacuation accompanying the Fukushima Daiichi Nuclear Power Plant accident, was 2,301 (as of March 2020) with a peak of 160,000 residents being forced to evacuate. The consequences of the nuclear accident were extremely far-reaching with many of the evacuated residents forced into difficult circumstances, and as often reported, subjected to unfair bullying and discrimination in the places they evacuated to despite being victims themselves.

A report is not the end of matters

Regarding this accident, not only the Independent Investigation Commission on the Fukushima Nuclear Accident, the predecessor of this research project, but many other investigatory bodies were established, each examining the accident that took place at Fukushima Daiichi Nuclear Power Plant from their own perspective and drawing their own lessons and proposals, including the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations (Government Accident Investigation), the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (NAIIC), the first of its kind in the history of constitutional government, the Investigation Committee on the Nuclear Accident at the Fukushima Dai-ichi NPP by the Atomic Energy Society of Japan (Academic Accident Investigation), and the TEPCO Accident Investigation Committee established by TEPCO itself.

However, as is the case with many accident investigations, it is common in Japan for investigations of such large-scale accidents to be disbanded once their findings are published. They are rarely examined in terms of the extent to which the proposals and lessons are accepted by society, how they transform governments and parties, and whether "preparedness" to prevent similar accidents from happening again has been put in place or not. As a result, when the shock in the immediate aftermath of the accident has not yet worn off, we take the recommendations and lessons of these reports seriously, work on various reforms and changes to prevent the same thing from happening again, putting new laws and systems in place. However, it is highly likely that the memories gradually fade after 10 years, that people forget why the accident happened, how they dealt with it and what lessons they learned from it, and revert to the old habits and ways of thinking from before the accident. The reports published by the accident investigation committees are stowed in a corner of the bookshelf

never to be reopened, nor will we have the opportunity to check if the lessons and recommendations have actually been realized.

The Fukushima Daiichi Nuclear Power Plant Accident was an accident of huge proportions that should not follow this "normal pattern". First of all, not only are there many people who are still unable to return to their hometowns with evacuation orders still in place, but those who for various reasons are building new lives in the places they have evacuated to have also had their lives derailed by the accident. The decommissioning work at the Fukushima Daiichi Nuclear Power Plant is still in its infancy, and there are many places that cannot be accessed because the radiation dose is still high, and the overall picture of the accident remains unclear. In other words, the Fukushima Daiichi Nuclear Power Plant accident is still an ongoing event, and the questions as to why the accident occurred, why it was not possible to avoid it, and why it couldn't be contained earlier are also still ongoing.

Secondly, despite the fact that the Fukushima Daiichi Nuclear Power Plant Accident has caused a major swelling of the post-nuclear and anti-nuclear power movements and the pressure exerted by such social forces, the government has demonstrated its intention to maintain its strategy of using nuclear power in its energy policy, and nine reactors have already been restarted (including the Ikata Nuclear Power Plant Unit 3 that was suspended by the Hiroshima High Court, and Sendai Nuclear Power Plant Unit 1 and 2 are suspended by noncompliance to the new safety regulations). Additionally, six nuclear power plants have been approved by the Nuclear Regulation Authority as conforming to its standards, and are likely to restart after coordination with local governments. If nuclear power plants are to continue to operate in the wake of the Fukushima Daiichi nuclear accident, the question is are the regulations permitting their operation appropriate? Have the operators running the nuclear power plants learnt their lesson properly? How should people using the electricity that is generated face the restart of nuclear power plants? In the process, we need to verify if the lessons learned from the Fukushima Daiichi Nuclear Power Plant accident and the recommendations of several accident investigation committees have been properly taken into consideration and are reflected in the regulation and operation of nuclear power plants, as well as "preparedness" should a similar accident occur.

Thirdly, the Fukushima Daiichi Nuclear Power Plant accident had a major impact on post-war Japan's economic growth and society, as well as the "shape of this country". After World War II, we vowed to be a peaceful nation under the new Japanese Constitution, and separating the development and utilization of science and technology from military purposes and focussing on economic development, Japan enjoyed dramatic economic growth. Against such a backdrop, nuclear power was positioned as a "dream energy" able to meet the rapidly growing demand for electricity, with an ultimate research and development goal of creating a nuclear fuel cycle that made new nuclear fuel out of spent nuclear fuel, something never realized in the world. However, the Fukushima Daiichi nuclear accident fundamentally shook people's faith in the "safety myth" that "nuclear power plants are safe" and brought it painfully home to them that nuclear power plants were an energy source that carried the risk of causing a huge nuclear disaster. The economic development and civilized life we have enjoyed to date thanks to power sources are accompanied by these risks, and we need to consider how we should solve questions such as how to deal with these risks and, if nuclear power generation disappears, other problems that may instead arise such as, for example, the mass emission of greenhouse effect gas from burning fossil fuels to generate electricity.

Follow-up project to the Independent Accident Investigation

In order to break through this "normal pattern"," our research project reviewed the accident, post-accident changes and the lessons learned using the tenth anniversary of the Fukushima Daiichi

Nuclear Power Plant accident as a catalyst. The goal was to analyze and study how much we have learned, how far proposals have been put into practice, and if any given proposal has not been realized, why it has not changed, or is not changing.

In the Independent Accident Investigation, the predecessor of this project, we examined many phenomena based on the initial message from our Chairman Koichi Kitazawa to "understanding the background of this unfortunate accident and thereby learn the lessons to make our country safer." In Part One, the history of the accident was organized chronologically and the cause of the accident was analyzed from a technical point of view based on the public information available at the time. Since the Independent Accident Investigation was unable to secure the cooperation of TEPCO, we were unable to hear from TEPCO's executives and staff, including Director Yoshida who was in charge of the scene of the accident, but we expressed the view that, judging from the publicly available information of the accident, the station blackout (SBO) had made it difficult to cool down the reactor, resulting in a severe accident. Apart from the nuclear accident, we also explained the environmental impact of the spread of radioactive material, the problem of internal exposure through food, and the risks posed by low-dose exposure as well as assessing the extent of the impact of the Fukushima Daiichi accident and sharing a basic understanding of what was required for coping in the aftermath of the accident.

In Part Two, we focused on the response to the nuclear power plant accident, clarifying public information about the process of response by the Kantei (the Prime Minister's Official Residence) and the thoughts of each actor in their decision making through interviews with Prime Minister Naoto Kan, the major cabinet members involved in decision-making, and executive officers who were gathered at the Kantei at the time. Significant problems existed here concerning the relationship between the Kantei and the Nuclear and Industrial Safety Agency (NISA), as well as the mechanism for information sharing between the government and TEPCO. Our analysis focused on the fact that the establishment of an integrated countermeasures headquarters for the government and TEPCO in an extra-legal manner facilitated the flow of information and helped the government to organize the response. We also pointed out that decision-making in the Kantei was overly influenced by Kan's individual play as well as the problems caused by micromanagement on the part of the Kantei (some may have called it "Naoto Kan Risk" which means the management of accident by Prime Minister would increase risk of confusion), suggesting that the nuclear disaster manual at the Kantei be reviewed.

Furthermore in Part Two, we analyzed the government's dissemination of information from the viewpoint of risk communication, examining the importance of such government information dissemination at times of public unease as well as the performance of government spokesperson for the Fukushima Daiichi Nuclear Power Plant accident, Chief Cabinet Secretary Yukio Edano, TEPCO, and NISA. Additionally, the Independent Accident Investigation not only focussed on Japan, but also analyzed how information was transmitted to the international community and how foreign countries perceived and understood the accident. We also examined what is now referred to as "fake news" by looking at misunderstandings about the risks, intentional hoaxes, and fear-based misconstructions spread via SNS.

Additionally, the Independent Accident Investigation focuses on the response to nuclear disasters in the field, and what role first responders, the Self-Defense Forces, the police, and the fire department play, highlighting problems stemming from the absence of a premise of mutual cooperation, including a lack of mutual communication and problems of command and the command system. In addition, we discussed on SPEEDI, a mechanism for predicting the diffusion of radioactive materials owned by the Ministry of Education, clarifying what SPEEDI could and could not do, concluding it could

not be used as a yardstick for ordering evacuations when the type and volume of emissions were unknown. Furthermore, by investigating the government's evacuation instructions and the response of local governments, we made it clear that the "safety myth" had created an absence of assumptions about possible accidents and a lack of "preparedness", which spurred confusion at the site and created various problems.

Part Three analyzed the historical and structural factors that caused the Fukushima Daiichi Nuclear Power Plant accident. First of all, we showed that acting as the ideological background for nuclear safety, Design Basis Events (DBE) and deterministic safety evaluation lie at the root of safety regulation, the underlying thinking here being that accident assumptions are blueprinted and a safety design then drawn up based on that blueprint. We revealed that because the Fukushima Daiichi Nuclear Power Plant accident far exceeded expectations, an "unexpected" response was required. However, since it was not expected that such an "unexpected" event would occur, "preparedness" for the accident went undone. Our proposal regarding this was to call for the introduction of the concepts of probabilistic risk assessment and defense in depth, as well as accident management (AM) responses.

Also in Part Three, the nature of nuclear safety regulation was historically examined from an administrative stance, discussing the responsibilities of those involved in setting regulations and to what extent tsunami, SBO, severe accidents, compound disasters and so on were envisioned and regulated for. We also analyzed the thinking of the regulatory authorities when designing said regulations, raising the issue of Japan's distinctive safety regulation governance. We pointed out that nuclear power business was not properly regulated and that this distinctiveness stemmed from the anomaly of introducing nuclear technology for peaceful use in Japan, an A-bomb victim, and a bureaucratic dichotomy, on the other hand, of the Science and Technology Agency (MEXT) being in charge of research and development including the "nuclear fuel cycle", and the then Ministry of International Trade and Industry (current Ministry of Economy, Trade and Industry) regulating the commercial operation of nuclear power plants; a dual system of policy decisions between the Nuclear Power Commission and the Nuclear Safety Commission (NSC); a dual system of safety regulation governance by NISA and the NSC; and pointed out the additional structural problem of a dual system between the government pursuing its "national policy/private operation" and the electric power companies created rigid regulations and administrative ambiguity, which meant the power companies were inadequately regulated.

In addition, we examined the ideological problems behind this kind of nuclear safety regulatory governance, and in particular, how the so-called "safety myth" was created and maintained. Here, we clarified what kind of discourse was used in the nuclear power promoting community known as the"nuclear village", which is composed of stakeholders such as the government, academia, businesses, manufacturers and the media. We also clarified how nuclear power plants were accepted by local governments and how residents were persuaded. Furthermore, we discussed how anti-nuclear power movements outside the central "nuclear power village" that promoted nuclear power generation and the "nuclear power village" of local governments that accepted plants, were deployed and often used litigation tactics, but that nuclear safety was switched into an issue of legal compliance by their resultant reliance on the judiciary, which placed decisions in the hands of judges who were not nuclear experts.

In Part Four, we analyzed the global context, which was not a direct cause of the Fukushima Daiichi Nuclear Power Plant accident, but is important in considering post-accident actions. We examined the distinctive nature of Japan's nuclear regulation in the context of international organizations such as the IAEA and other countries, noting that Japan had long ignored experts in other countries when

they pointed out issues of safety regulation. Furthermore, US-Japan relations played an important part in dealing with the nuclear accident, and as the United States took various measures from the perspective of protecting its own people, we looked at Japanese domestic responses to the communication gap between Japan and the United States and the measures taken by the United States, highlighting issues involved in accepting international support.

Based on these discussions, the Independent Accident Investigation outlined the various "proximate, intermediate and remote causes" behind the Fukushima Daiichi Nuclear Power Plant accident, concluding that fragmented optimizations in Japanese regulations created the loss of a global optimal solution. We argued that what lay at the root of the Fukushima Daiichi nuclear accident was that nuclear safety had lost what should be its ultimate goal of "continuous efforts to enhance safety" due to the use of a design ideology of ignoring the "unexpected" based on design assumption events and the absence of an idea of improving safety with the emphasis on hardware regulatory compliance stemming from judicial responses; the "safety myth" that was created by the interdependence of central and local governments in the "nuclear power village"; and the response of a government and Kantei unprepared for an "unexpected" event; all of which were partial optimizations and could not be deemed to be an overall solution. Our message was that the lesson Japan should learn was to increase its "resilience" towards crises. Crises such as natural disasters and the explosive spread of infectious diseases always occur. We proposed engaging in crisis management by building capabilities and systems to prepare for crises not only by government, but also businesses, first responders, local governments, and the public, and improving leadership to anticipate a variety of "unexpected" events so that even if there was a crisis, we would be able to recover from it.

While upholding the spirit and problem awareness of our predecessor, the Independent Accident Investigation, this second project will consider how society has changed, how the Japanese government has changed, how TEPCO has changed, and how these lessons and recommendations have been taken on board during the past ten years.

Subjects and themes to be examined

Based on the investigation analysis in the Independent Accident Investigation, this project deals with the following themes and looks back over the past 10 years (project member in charge given in parentheses).

- Nuclear safety regulations (Akihide Kugo): NISA was dismantled as a "special agency" of the Agency for Natural Resources and Energy, an external agency of the Ministry of Economy, Trade and Industry, which has to date been responsible for safety regulations after the Fukushima Daiichi nuclear accident, and merged into the Nuclear Regulatory Agency, an external agency of the Ministry of the Environment, this being a "one-way ticket" and not an agency secondment. In addition, the Nuclear Safety Commission whose task was to double-check nuclear safety was abolished, and a highly independent Nuclear Regulatory Commission, a so-called Article 3 commission, was newly established. This new nuclear safety regulation mechanism is to establish and implement safety regulations that are considered to be the "most stringent in the world", but it faces the challenge of whether it will be able to overcome the "safety myth" that was the cause of the Fukushima Daiichi nuclear accident. In this project, we will tackle issues regarding the nature of nuclear safety regulations, to what extent we have learned the lessons from the accident in the past 10 years, and whether a new "safety culture" has been created.

- TEPCO and its governance (Toshihiro Okuyama): TEPCO, the direct party involved in the Fukushima Daiichi Nuclear Power Plant accident, had overwhelming political power under the

regional monopoly and general cost method, and according to the Parliamentary Accident Report, it was an entity capable of creating "Regulatory Capture" and influencing the regulatory authorities. Under the "national policy/private operation" framework, it had an organizational structure comparable to a huge bureaucratic organization, and due to the technical characteristics of the nuclear sector, was characterized by an extremely closed and poorly ventilated corporate culture. Did the Fukushima Daiichi Nuclear Power Station change the nature of TEPCO? The Fukushima Nuclear Power Accident Summary and Nuclear Safety Reform Plan (commonly known as the Anekawa Plan), which was announced as a reform plan for the nuclear power division from inside TEPCO, advocated bold organizational reform and awareness reform, but did such attempts change TEPCO? Deregulation of the power industry is creating a competitive environment, but is it affecting TEPCO's corporate culture? Furthermore, will TEPCO, which ultimately bears the costs involved in dealing with the Fukushima Daiichi Nuclear Power Plant accident and compensation, evolve into a company that can withstand the payment?

- Risk Communication (Naoya Sekiya): In a nuclear accident, fear of damage from invisible radiation dominates people's minds. Everyone is concerned about how much risk an accident will cause and how much their life will be threatened. In the Fukushima Daiichi Nuclear Power Plant accident, Chief Cabinet Secretary Edano fronted the government and disseminated government information, but in the confusion at the time of the disaster, while his message "There is no immediate effect" was accurate, it failed to eradicate people's anxiety. The communication of information from TEPCO and NISA also attracted attention to the question of wording such as "core fusion", which fanned people's anxiety and distrust. Social networks (SNS) have developed in the field of risk communication in the last 10 years, and communication methods have changed significantly from those of 2011. In addition, the question of rumors experienced when the Fukushima Daiichi Nuclear Power Plant accident was yet to be under control is still an ongoing one. We will discuss the desirable nature of risk communication in these circumstances of modern times, and how the lessons learned from the Fukushima Daiichi Nuclear Power Plant Accident are being utilized for information dissemination by the government and TEPCO.

- Crisis management in the Kantei (Yasuaki Chijiwa): It is safe to say that the most well read part of the report was the section on crisis management at the Kantei, the core theme of the Independent Accident Investigation. Crisis management at the Kantei has been institutionally strengthened by the reorganization of the then Security and Crisis Management Office into the Situation Response and Crisis Management Office as well as by the addition of the National Security Secretariat (NSS). However, it is necessary to re-examine the human resources who drive the system, and to what extent the top management and executives who should assume leadership in crisis management are fully aware of "preparedness". At the time of the Fukushima Daiichi Nuclear Power Plant accident, it was a Democratic Party government, and it is now an LDP administration and a long-term one at that, so there are circumstantial differences including the experience gained in crisis management during various natural disasters and an improved ability to respond to situations. However, after excluding the peculiarities of such individual administrations, we will examine whether it is capable as a framework for and a system of crisis management when a nuclear disaster occurs - often involving crisis management in a complex crisis.

- Logistics (Yuki Kobayashi): It is no exaggeration to say that logistics make or break dealing with a situation in a nuclear disaster. The Fukushima Daiichi Nuclear Power Plant accident lacked physical "preparedness" for a nuclear disaster, and it is undeniable that the accident would have been much worse without physical equipment securing power on site, pump cars for water supply, and the high-pressure concrete pump car called the Giraffe that was miraculously effective in

cooling spent fuel pools. Such logistical aspects have been emphasized even in post-accident nuclear safety regulations, and thorough physical "preparedness" for power supply vehicles and fire engines is now a requirement for restarting nuclear power plants. Are these regulations appropriate after all? Will these logistics work properly in the event of a compound disaster? Furthermore, even if such hardware is in place, how well can it be operated? Have the lessons from the accident perhaps led to excessive "preparedness"? If only because of their visibility, physical logistics give a sense of security, but it is meaningless if they become merely a decoration to provide that sense of security. Here we will also discuss the pros and cons of a "Japanese version of FEMA" that was debated following the accident.

- First Responders (Koichi Isobe): A theme that was dealt with in the Independent Accident Report but hardly examined in other accident reports is the role of first responders such as the Self-Defense Forces, police, and fire fighters. Although the SDF, police, and fire fighters are not necessarily primary responders in a nuclear disaster, the sight of the Ground Self-Defense helicopter dropping seawater into Unit 3's spent fuel pool at the Fukushima Daiichi Nuclear Power Plant accident was widely reported, and regardless of its impact, the fact that the Self-Defense Forces were responding to a nuclear disaster provided people with a sense of security and courage to the parties actually dealing with the accident. The fire department also played an important role in injecting water into the reactor, and the police played a role in maintaining social order in various situations, including the evacuation of residents. However, the issue was that no assumption was made as to what role these first responders would play in a nuclear disaster, and there was no way of dealing with it, either institutionally or in terms of mission. In addition, when these organizations, which normally have separate tasks, cooperate and deal with a single operation, a heavy load is placed on communication and coordination between the organizations. What lessons have been learned from the various problems experienced in the Fukushima Daiichi Nuclear Power Plant accident, and what kind of actions are now being taken? Further, when a nuclear disaster is in an extreme state, it is excessively difficult for a private business operator to order its employees to risk their lives to deal with the accident. At such a time, is it then up to SDF officers, who pledge to "to face events without regard to risk, to strive to the utmost of my abilities to complete the assigned tasks"?

- Rebuilding (Hiroshi Kainuma): An issue not touched upon in the Independent Accident Investigation was the question of rebuilding. In the Fukushima Daiichi accident, the evacuation area expanded from 5km to 10km then 20km, and 160,000 people were forced to evacuate their homes. Ten years later, the places where the evacuation order has been lifted have expanded, but there are still some places designated as evacuation areas. Additionally, people who have evacuated cannot immediately return to their homes, and the rebuilding of entire cities and infrastructure for daily life are major issues. What should we do about long-term rebuilding as part of the problem of a nuclear accident? Although it is hard to provide a clear answer to this topic, "preparedness" for a nuclear accident should also encompass "preparedness" for the evacuation of people and rebuilding. Although nuclear safety regulations now require the submission of resident evacuation plans, it is hard to say they are fully prepared for rebuilding. It will be the mission of this project to provide some direction in discussing this issue as well.

Investigatory goals

This concludes the summary and recommendations of the report on the Private Accident report. However, the investigatory goals of this project are not limited to the proposals of Independent Accident Investigation. The Government Accident Report, the Parliamentary Accident Report, and the Academic Accident Report also make meaningful recommendations, which we have included in our deliberations. It is not, however, the intention of this project to cover all of the lessons and

recommendations dealt with by these accident investigations, or to verify and re-verify them one by one. In this report, we will continue to examine the main themes to be investigated, such as nuclear safety regulations and TEPCO's governance, based on the recommendations presented by past accident reports.

To close, I have posted the reference material that summarizes the recommendations presented by each accident report according to this project's research topics.

Reference Material

Proposals from the Private, Government, Parliamentary and Academic Accident Investigations

The proposals announced by the Private, Government, Parliamentary and Atomic Energy Society of Japan Accident Investigations have been organized into themes for each chapter, the issues to be examined in each chapter also being listed. Even those issues not explicitly proposed as "recommendations" but hinted at in any of the accident reports are included.

Chapter 1 Safety Regulations

- Accident management (AM) regulatory requirements and institutional considerations (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.266).
- Establishment of an effective nuclear safety regulatory body independent of the administration promoting nuclear power (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.388).
- Overcoming the 2-3 year transfer problem: Developing professional human resources whose life work is safety regulation (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.388).
- Formation of a Critical Expert Group on safety regulation governance (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.321).
- Revision of assumptions in nuclear disaster countermeasure manuals, etc. (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.100).
- Parliamentary monitoring of regulatory authorities (The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012, p.2).
- Requirements for a new regulatory body (The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012, p.3)
- Review of nuclear regulations (The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012, p.6)
- Countermeasure proposals with a view to compound disasters (Cabinet Office, Government of Japan, 2012, p.433).
- Proposal for a switch in risk awareness (Cabinet Office, Government of Japan, 2012, p.433).
- Recommendations regarding the construction of accident prevention measures (Cabinet Office, Government of Japan, 2012, p.434).
- Proposal regarding the need for comprehensive risk assessment (Cabinet Office, Government of Japan, 2012, Report p.435).
- Proposals for severe accident countermeasures (Cabinet Office, Government of Japan, 2012, p.435).
- Recommendations for better monitoring operations (Cabinet Office, Government of Japan, 2012, p.436).
- Proposals for meeting international standards including the IAEA (Cabinet Office, Government of

Japan, 2012, p.439).
- Proposal regarding the ideal state of a nuclear safety regulatory body (Cabinet Office, Government of Japan, 2012, pp.439–441).
- Recommendations for rebuilding a safety culture (Cabinet Office, Government of Japan, 2012, p.441).
- Setting quantitative safety goals and efforts for social sharing and dialogue (Atomic Energy Society of Japan, 2014, p.358).
- Establishment of basic, systematic safety principles that go beyond individual technical development (Atomic Energy Society of Japan, 2014, p.359).
- Development of a "regulatory book" of ideas for defense in depth/Strengthening measures against external events/Strengthening measures from past accidents (Atomic Energy Society of Japan, 2014, pp.360–362).
- The approach of safety regulatory agencies (Atomic Energy Society of Japan, 2014, p.367).

Chapter 2 TEPCO and Its Governance
- Lack of an appropriate relationship between regulators and operators: the need for mutual understanding and respect between the two parties (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, pp.289–290).
- Ambiguities of responsibility brought about by "privately administered national policy"/ Business responsibility for reviewing safety regulation governance (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, pp.320–321).
- The limits of responsibility of the operators of privately administered policy–The irreplaceable role of the state (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.388).
- Monitoring electric power companies (The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012, pp.2–3).
- Proposals regarding the nature of TEPCO (Cabinet Office, Government of Japan, 2012, p.441).

Chapter 3 Risk Communication
- Consensus building in the ambiguity of scientific knowledge ・ Cross-border scientific communication (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.66).
- Social media and risk communication during a nuclear crisis (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.145).
- Recommendations regarding public relations and risk communication (Cabinet Office, Government of Japan, 2012, p.436).
- Proposal for incorporating new knowledge into disaster prevention plans (Cabinet Office, Government of Japan, 2012, p.434).
- Recommendations on how to evacuate residents (Cabinet Office, Government of Japan, 2012, pp.437–438).
- Recommendations regarding public understanding of radiation (Cabinet Office, Government of Japan, 2012, p.438).

Chapter 4 Crisis management in the Prime Minister's Office
- Lessons related to micro management in the Prime Minister's Office in dealing with the nuclear accident (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.98).
- Lessons on various issues in the crisis management of complex disasters by the Prime Minister's

Office (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.119).
- Institutional understanding of Prime Minister's Office staff capable of responding to nuclear disasters/education, training and systems that support advice to politicians (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.101).
- Review of the government's crisis management system (The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012, p.2).
- Proposal for rebuilding crisis management systems in the event of a disaster (Cabinet Office, Government of Japan, 2012, p.435).
- Proposal regarding the nature of the Nuclear Emergency Response Headquarters (Cabinet Office, Government of Japan, 2012, pp.435–436).

Chapter 5 The Logistics of Responding to a Nuclear Emergency
- Recommendations for various reviews of the off-site center system (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, pp.168–169).
- Necessity of a FEMA-like nuclear disaster response unit as the last stand (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.388).
- Proposals for an off-site center (Cabinet Office, Government of Japan, p.436).
- Emergency preparedness and strengthening response measures (Atomic Energy Society of Japan, 2014, p.363).

Chapter 6 First Responders
- Lessons and recommendations regarding each first responder's command system in the event of a large-scale disaster (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.168).
- Issues concerning the on-site response of first responders in the event of a nuclear disaster (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.168).
- Necessity of a FEMA-like nuclear disaster response unit organization as the last stand (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.388).
- Suggestion for a whole-of-alliance approach in coordinating allies during crisis management (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.380).
- Maintenance of a common base for cooperation between first responders (Atomic Energy Society of Japan, 2014, p.363).

Chapter 7 Rebuilding
- Necessity of follow-up survey for monitoring and managing the effects of radiation exposure on residents in the medium to long term (Independent Investigation Commission on the Fukushima Daiichi Nuclear Accident, 2012, p.67).
- Government response to disaster victims (The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012, p.2).
- Proposal for SPEEDI system (Academic Accident Report p.363)
- Radiation monitoring and long-term dose evaluation (Atomic Energy Society of Japan, 2014, p.370).
- Legal regulations and guidelines for decontamination (Atomic Energy Society of Japan, 2014, p.370).
- Setting a decontamination target area (Atomic Energy Society of Japan, 2014, p.370).
- Decontamination and decontamination technology (Atomic Energy Society of Japan, 2014, p.370).

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The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission. (2012). *Tōkyō denryoku fukushima genshiryoku hatsudensho jiko chōsa iin kaihōkokusho* [The official report of the Fukushima Nuclear Accident Independent Investigation Commission] (Digest version). Report. Tokyo: Diet. (In Japanese.)