The Tohoku Disaster: Responding to Japan’s 3/11 Earthquake, Tsunami, and Nuclear Accident

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Relief to Earthquake and Tsunami Victims
Earthquake, Tsunami…. Then Silence

• Disaster headquarters were stood up in Fukushima, Miyagi, and Iwate prefectural capitals within minutes of the earthquake.

• Tsunami warning was quickly passed from Japan Meteorological Agency to prefectures to communities and thence to public by radio and loudspeakers – but first warning forecast only a 3-meter tsunami. Corrected in minutes to forecast a 6-meter tsunami, still under-predicting size of the waves.

• Some people on the coast therefore minimized danger or sought shelter in emergency locations that proved tragically inadequate for the height and force of the actual tsunami.

• Coastal communities initially reported moderate earthquake damage but nearly all went totally silent when the tsunami hit within 30-45 minutes of the earthquake.
Prefectural Actions

- Prefectures dispatched responders – primarily firefighters from communities that sustained limited damage – to coastal regions. At first, relatively few were available.
- Contact made with locally stationed SDF units and requests for more aid sent to national government – to SDF and Fire and Disaster Management Agency, which could initiate emergency dispatch of firefighters from other prefectures.
Prefectural Actions (2)

• Prefectural disaster headquarters had representatives from multiple agencies, presided over by prefectural governor.

• But little or no information to guide response. Considerable emphasis placed on gathering intelligence to make sense of what had happened and what was required next.

• As reinforcements arrived, responders were sent out to discover what needed to be done – and then act – in each affected community.
Reaction in Tokyo

• In the immediate aftermath of the earthquake, the prime minister’s office (the Kantei) formally set up its crisis management apparatus and convened an emergency council of ministers.

• In reality, central coordination of earthquake/tsunami response was very weak, particularly in the first days after the disaster.

• Individual ministries and agencies – including the National Police Agency, MLIT, FDMA, SDF, and the Coast Guard – launched their own efforts, operating mostly independently of each other.

• SDF dispatched senior officers to the prefectural capitals of Fukushima, Miyagi, and Iwate, as did other ministries.

• Coordinating committees of national agency representatives were set up in each prefecture in close physical proximity to the prefecture’s own coordinating apparatus.
Achieving Situational Awareness

• High priority for all: develop “situational awareness” – i.e., knowledge of what had happened and forecast what was likely to happen in the next days.
• Given the destruction and disruption of communications and transport, this proved extremely difficult.
• Sea and air surveillance conducted by SDF and the Coast Guard –with US assistance – was insufficient to give detailed operating picture.
• As in the three hard-hit prefectural capitals, information about conditions in the tsunami-impacted areas had to be assembled piece by piece as word came back from responders who reached individual cities and villages.
Tohoku Regional Bureau of MLIT

• At the initiative of the director-general of the Tohoku Regional Bureau (TRB) in Sendai of the Ministry of Land, Infrastructure, Transport, and Tourism, the Minister in Tokyo authorized proactive offers of whatever assistance local governments might need.

• During early post-earthquake/tsunami days. TRB launched major effort to clear east-west roads leading to the coast (“Operation Comb”) from the north-south highway some distance inland.

• When assistance teams reached coastal communities, they were authorized to provide help as determined at the scene.
In the days and months following the disaster, the Ground, Marine, and Air Self-Defense Force, operating for the first time in a joint task force, provided the bulk of emergency response personnel who provided aid to communities hit by the earthquake/tsunami.

At the peak, starting on 9th day, 107,000 troops, about half the nation’s total, were mobilized for response.

Utilized 59 vessels and 543 aircraft.
SDF had troops stationed in the Tohoku area when the disaster struck, but most had to be mobilized and transported from distant locations – a huge challenge for which existing resources proved inadequate under the harsh time pressures.

On scene, SDF performed a number of response missions:

– Search and rescue: Along with Japan Coast Guard, rescued 19,286 people and recovered 9,505 victims’ bodies.
– Road re-opening and rubble removal
– Massive victim support services: water supply, food, medical assistance, mobile bathing units
Firefighters Dispatched from All Over Japan

- Following pre-determined disaster assistance plans, the Fire and Disaster Management Agency (FDMA) orchestrated the dispatch of Emergency Fire Response Teams from 44 other prefectures to Fukushima, Miyagi, and Iwate for fire suppression, search and rescue, and emergency medical missions.

- These plans, modified when appropriate, specified where specific firefighting units would go and pre-assigned command responsibilities to big-city fire departments that had the skills for managing large-scale disaster response.

- At peak, more than 30,000 fire service personnel operated in the disaster-affected prefectures.

- Required managing massive logistical obstacles to move people, vehicles, and equipment to the scene from so many locations.
US Support through Operation Tomodachi

- US forces, dispatched from Okinawa and locations outside of Japan, provided logistical support and advice to SDF and other responders, particularly firefighters from non-Tohoku prefectures.
- Operation Tomodachi = Friend(s)
- At peak, 16,000 US personnel, 15 vessels, and 140 aircraft were active
- No disaster assistance plans had been developed beforehand. US/Japan collaboration was an improvised operation, adapted from defense plans.
Operation Tomodachi (2)

- This support permitted more rapid mobilization of responders in Tohoku than would otherwise have proved possible given shortages of transport capabilities.

- Coordination between SDF and US forces was deemed effective by both sides, aided by joint exercise experiences and personal relationships, despite the then bumpy international relationship.
“Team in Charge of Assisting the Lives of Disaster Victims”

• The inability of prefectural governments to support localities, given the scope and scale of the disaster, eventually led to a much larger direct support operation than the national government had ever before provided in a disaster.

• The PM, recognizing that the informal coordination efforts going on in the Kantei were insufficient, formally established the “Team in Charge of Assisting the Lives of Disaster Victims” on March 20 to collect better information and coordinate relief efforts and delivery of goods.

• Team based in Tokyo but sent representatives to prefectural capitals.

• Held daily meetings of division directors of key ministries and agencies, with several leading members of the Diet, to determine needs and effectively coordinate individual agencies’ field operations.
Summary: Relief for the Disaster Area

- In the wake of the earthquake/tsunami, the affected communities were disoriented and disaster-struck, cut off from their prefectures and the nation – their governments largely incapacitated or overwhelmed in the first days.

- Prefectural governments acted promptly to set up disaster coordinating structures, but they lacked information, sufficient personnel, and resources to handle the exigencies of the emergency.

- At the national level, initial coordination efforts in the PM’s office were hampered by poor situational awareness, distraction by the nuclear accident, and overshadowed by individual ministries’ independent actions.

- Only in the 2nd week was this national coordination strengthened with improvisation of daily meetings of division directors.

- Aid at the local level was primarily the result of community self-help and the outside emergency responders independently reacting to conditions at the scene.
Responding to the Nuclear Accident at Fukushima Daiichi

TEPCO’s Initial Response

• Post-disaster investigative reports have found that the pre-disaster relationship between Tokyo Electric Power Co. (TEPCO, the plant operator) and the regulators in METI and the Nuclear Safety and Industrial Safety Commission (NISA), was too close and permissive.

• Senior TEPCO officials, absent from the office on the day of the emergency, were not in a position to make quick decisions.

• In the immediate aftermath, TEPCO was uncertain, in denial, unable to provide technical assistance to on-site managers, internally conflicted between the plant management and headquarters, and wary of disclosing information in order to protect its own interests.

• TEPCO’s plan for a nuclear emergency proved unworkable:
  – Assumed ability to monitor the reactors
  – Did not allow for extended period of electric power loss

• Confusion in the chain of command and communications with government, particularly with NISA and the Off-Site Center.
Initial Response

- The Nuclear Safety and Industrial Agency in METI was overwhelmed and ineffective in fulfilling its crisis role.
- But government was highly dependent on the knowledge and expertise of TEPCO in regard to the plant. (Similar to the US in dealing with BP oil spill in 2010.)
- The PM/Kantei created an oversight and coordination structure parallel to that for the relief to local areas hit by the tsunami.
PM’s Activist Role

- PM Kan made a personal trip to the plant site on 2\textsuperscript{nd} day of crisis, an action widely criticized for distracting those at the scene from dealing with the accident.
- PM Kan also sidestepped the advisory and support structure in the Kantei and, as the crisis at Fukushima Daiichi continued, relied more and more on a cadre of personal advisers.

- Prime Minister Kan quickly became distrustful of METI and TEPCO’s response and took an increasingly significant role in strategy and sometimes operational direction of the response.
On-Site Nuclear Accident Response

• Many Fukushima Daiichi plant personnel remained at the site to try to get reactors under control.

• SDF sent 500 troops which helped with evacuation, operated decontamination stations, and, unsuccessfully, tried to spray water on the exposed spent fuel rods.
Ultimately, the Tokyo Fire Department sent a team equipped with very specialized equipment which, in a very dangerous operation, was able to spray sea water on the reactor and greatly assist in bringing the situation under some degree of control.
Evacuation from the Radiation Zone

- Evacuation and protection of population surrounding the plant proved inadequate, with information about radiation levels apparently concealed by TEPCO and the government. Area of evacuation was eventually expanded to 30 km.
Enhancing Emergency Management in Japan
Perceived Shortcomings of Response Capabilities & Strategies

• In Japan, as for many other landscape-scale disasters, there has been deep dissatisfaction with response:
  – Too slow
  – Too many independent responders
  – Weak coordination of operations
  – Insufficient “surge capacity” to get resources where needed
  – Potentially important private-sector and NGO resources under-utilized
  – Tensions among and between political and professional leaders
Enhancing Response?

• The usual answer: Strengthen *centralized command and control.*
  – The perceived “military model”
  – The “super-agency” approach

• This was the direction of reform following the Hanshin-Awaji earthquake in 1995.
Centralized Command in a Landscape-Scale Disaster?

• What conditions need to exist to make centralized command and control feasible and effective?
  – Robust situational awareness at both the periphery and the center
  – Effective communication flows: up, down, and horizontally
  – Appropriate planning and decision making at the center to guide implementers in the field
  – Responsive implementers who acknowledge authority at the center and follow tactical directives
  – Timely feedback from the field to facilitate ongoing central decision making
The Reality of a Typical Landscape-Scale Disaster?

- Substantial situational novelties that do not conform to plans
- Highly variable impacts diffused throughout a very large geographic area or multiple areas
- Disrupted or disabled communications
- A high degree of confusion about what is happening, resulting in poor situational awareness
The Reality of a Typical Landscape-Scale Disaster? (cont.)

• Bottom-up response that begins locally and escalates to involve higher levels of government
• Given highly variable conditions, decisions are exceedingly complex and must be customized by location
• Authority over response resources is fragmented, non-hierarchical, divided by:
  – Agency
  – Jurisdiction
  – Level of government
  – Sector: public, private for-profit and non-profit.
An Alternative Paradigm

• Landscape-scale disasters are inherently decentralized.

• Thus an alternative paradigm – decentralized, intelligent adaptation – based on the idea of “self-organizing systems,” may hold more promise as a way of building improved response capabilities for landscape-scale disasters.
What is the Choice?

• If a landscape-scale disaster is inevitably a decentralized event, the choice is not how to make a **centralized** response work.
• Instead, we have two actual choices:
  – A decentralized response that works well, or
  – A decentralized response the works **poorly**.
• And two questions:
  – **How do we make a decentralized response effective?**
  – **Is there a role for the “center,” and, if so, what is it?**
Role of the Center in Decentralized Operations?

- Building local capacity in advance and establishing structure for operations
- Establishing overall goals and priorities
- Providing aggregated (big picture) information
- COORDINATION
  - Resource procurement and allocation ("supply chain manager")
- Monitoring progress and revising objectives
- **NOT directing operational activity**
Central and Local Levels in Effective Decentralized Disaster Response

Prior to Disaster

Central Level

Local Level

Prior to Disaster

Values

Capacity
• Local Knowledge
• Education/Training
• Exercising
• Experience
• Resources

Operating Framework
• Division of labor
• “Rules of the road”
• Coordination methods

During Disaster

Central Level

Local Level

During Disaster

Goals/Priorities

“Big Picture”

Supply-Chain Management

Expertise & Specialized Resources

Inter-Area Coordination

Monitoring/Feedback

Trust in Local Capabilities & Decisions

Local Capacity & Situational Awareness

Decentralized Decisions & Action

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Thank you!

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