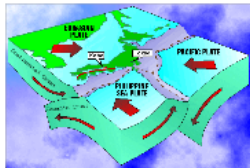


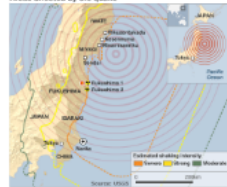
# Social Capital, Sensemaking, and Recovery: Japanese Companies and the 2011 Earthquake

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### Background Information



Areas affected by the quake



- **Date:** Friday March 11th 2011
- **Time:** 14:46 (Japan standard time)
- **Richter Scale:** The earthquake was the biggest ever recorded to have struck Japan, at approximately 9.0
- **Epicenter:** approximately 70 kilometers east of the Oshika Peninsula of Tohoku
- **Focus:** underwater depth of approximately 320m (206m)
- **Fault line:** Japan is located at the meeting point of 3 tectonic plates, The Eurasian, Pacific and Philippines. It is a convergent DESTRUCTIVE boundary, with faults running off the boundary. The reason why the Tohoku Earthquake happened was due to the build up in strain energy as the Pacific plate SUBDUCTED under the Eurasian plate. This strain energy eventually overcame the frictional force holding the plates in place, and was released as earthquake waves.
- **Duration:** 6 minutes

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2011 Japan's Great East Earthquake



### Management Responses

#### Precautions prior to the Earthquake

Japan is home to the most sophisticated earthquake code, based on seismicity studies in Japan. The regular and extensive of strong shaking in earthquakes, which is expected to have caused the quake.

Japan's highly sophisticated and resilient infrastructure was designed to withstand the intensity of the Great East Japan Earthquake, which involved repeated strong shaking and massive tsunamis, and a 6.9 magnitude earthquake.

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#### Management Responses after the Quake

- In order to make up the 30% drop in power supply caused by the shutdown, electricity companies have reactivated old thermal power plants, and businesses and individuals have conserved power. People wore fewer clothes in the summer to reduce the need for air conditioning, and wrapped up warmer in winter.

#### Responses during Earthquake

The earthquake was the most powerful ever recorded in Japan, and the most powerful ever recorded in the world. It caused significant damage to infrastructure and property, and resulted in the deaths of approximately 15,000 people.

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#### Management Responses After the Quake

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### Primary Effects: On People

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- **Death and injury:** an estimated 15,762 dead, 121,134 people were injured and 15,000 were displaced.
- **Evacuation:** approximately 1.5 million people were evacuated from their homes and placed in evacuation centers. These centers provided food, shelter, and emotional support.
- **Homelessness:** approximately 1.5 million people were made homeless.
- **Displacement:** approximately 1.5 million people were displaced from their homes.
- **Loss of property:** approximately 1.5 million people lost their property.
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### Primary effects



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### Secondary Effects

Secondary effects are long term impacts.

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### Secondary Effects: On People

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### Secondary Effects: On the Environment

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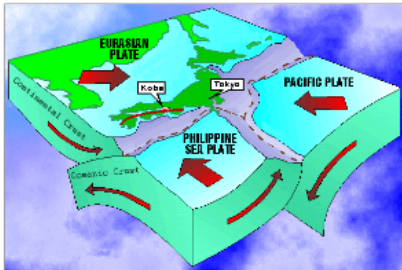
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UKTV Footage of the Japan Earthquake



#### Management Responses

##### Precautions prior to the Earthquake

- Japan has spent >€70million trying to predict earthquakes using lasers to measure earth movements. Despite this large investment, scientists believed Tohoku was not in the danger zone.
- Japan holds earthquake and tsunami drills on 'National Disaster Prevention Day' which occurs on September 1st, the anniversary of the Great Kanto quake which increases awareness among the population and tests that
- Japan is home to the most sophisticated earthquake and tsunami early warning systems. In Tokyo, this system sent warnings of strong shaking to millions during the earthquake, which is supposed to have saved many lives.
- Hundreds of earthquake and tsunami proof shelters have been built and some cities have built tsunami walls and flood gates to stop waves traveling inland.
- Earthquake kits containing bottled water,

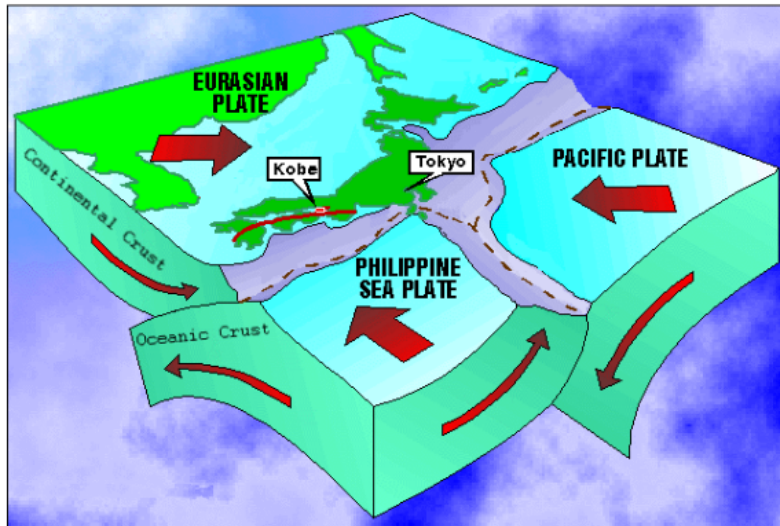
#### Management Responses after the Quake

- In coastal areas, people may work on the seafront but have to live on high ground. The elderly, who often live alone, need to move into regional hubs for better care and services.
- In order to make up the drop in power supply by the shutdown, electric companies have reached old thermal power plants, businesses and individuals have conserved. People wore fewer clothes in the summer to reduce the need for air conditioning wrapped up warmer in

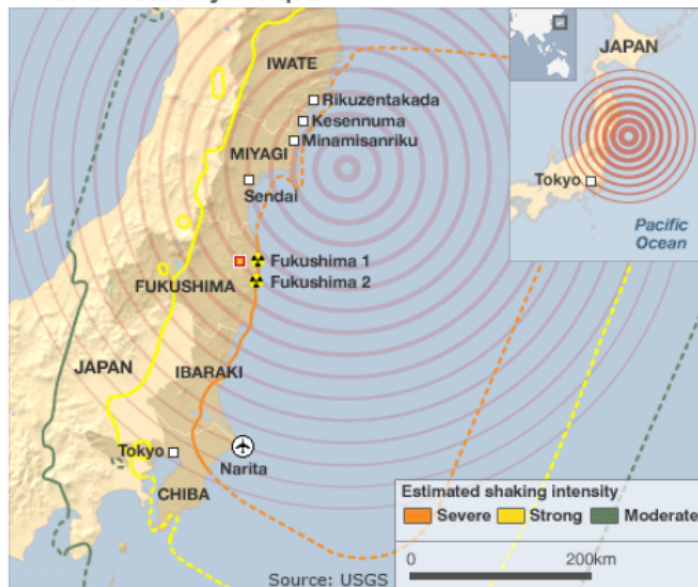
##### Responses during Earthquake

- One priority was to get aircraft in the air to survey the devastation and identify priority areas for emergency aid. Within 20 minutes of the earthquake, 11 military aircraft had responded and identified communities such as hospitals as being completely cut off.
- The JSDF (Japan Self-defence Force) moved in on the ground and within two days all debris had been cleared and emergency goods could be delivered twice a day.
- In 2006 all Shinkansen (bullet) trains were fitted with an early earthquake
- The warning was issued just eight seconds after the first wave of the earthquake was detected and it sent a message to 124 television stations and 52 million phones. Although the tsunami warning which followed the earthquake warning did not reach many coastal residents who had already evacuated, or whose televisions and radios had stopped working due to power outages sparked by the earthquake.
- The Government of Japan declared a state of nuclear emergency due to the threat posed by reactors in the new Fukushima nuclear power plant and 140,000 residents within 20km of the plant evacuated.

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- **Duration:** 6 minutes

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# Primary effects

**Primary effects** are the immediate damage caused by the earthquake, such as collapsing buildings, roads and bridges, which may kill many people.



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# Primary Effects: On People



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- **Death and Injury** – an estimated 20,352 died , 5314 people were injured and 130,927 were displaced
- **Nuclear crisis** – Although the Fukushima nuclear plant was protected with a 5m tsunami barrier, a 9m high wave came ashore and flooded the plants generators and electrical wiring. People lost energy immediately and this took some time to restore
- **Power supplies** – Around 4.4m households in north east Japan were left without electricity. Power blackouts were experienced for around three months in many areas.
- **Defenses ineffective** – Japan had spent billions building anti-tsunami defenses at heights of 12m. However, the tsunami just washed over them, making them totally ineffective. The flood waters in some cases moved six miles inland, destroying anything in its path e.g. houses, roads etc



# Primary Effects: On the Environment

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- **Fore and aftershocks** – the earthquake was preceded by a number of fore shocks (one measuring 7.2 on the 7th of March), and 100s of aftershocks. Three aftershocks measuring more than a magnitude 6 took place on the same day and another three measuring more than magnitude 7. Some scientists estimate that over 800 earthquakes of magnitude 4.5 or more have been recorded since the main quake. Each quake was caused by plate movement, which created further tears and fissures in the ground, and damage across Japan.
- **Tsunami** – was triggered by the earthquake and came about 30 mins after the quake struck, and reached heights of up to 40m. It devastated entire towns such as Otsuchi, and resulted in the loss of 1000s of lives. Waves also traveled to the east. Tsunami warnings were issued right across the Pacific Ocean and were felt in Alaska and Chile (over 11000 miles away but measures 2m tsunami waves. Flooding causes huge amounts of damage. Pollution carried in the water settled far inland and sources of clean drinking water were affected in some cases for up to a year.
- **Land Subsidence** – some coastal areas in Japan experienced land subsidence as the earthquake dropped the beach fronts in some places by more than 50cm, making these areas more susceptible to flooding.

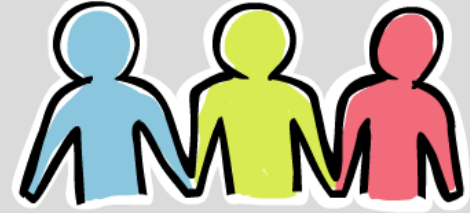
# Secondary Effects

Secondary effects are long term impacts.

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# Secondary Effects: On People



- Economy: World bank estimated cost of US\$235 billion. Thought to have been the most expensive natural disaster ever.

Tsunami: The massive surge destroyed three-story buildings where people had gathered for safety. Most of the 18,000 deaths were caused by drowning.

The tsunami caused a cooling system failure at the Fukushima Daiichi Nuclear Power Plant, which resulted in a level 7 nuclear meltdown and release of radioactive materials. The local area was evacuated and a 12 mile exclusion zone was put in place affecting 200,000 residents.

Radioactive waters and leaks contaminated local areas leading to food contamination e.g. in fish and beef.

- Transport: Huge disruptions including sections of the Tohoku Expressway were damaged, Sendai airport was hit by the tsunami wave, four trains were derailed and over 1,100 sections of rail line needed to be repaired.
- Rebuilding: Teenagers and young adults have been involved in a panel helping rebuild devastated areas in Japan.
- Safety concerns rose over damage to nuclear safety. Protests took place in Tokyo on 27th March 2011 and were taken off line until June 2012.



# Secondary Effects: On the Environment

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- Landmass Movement: The quake moved parts of NE Japan 2.4m closer to N.America, making parts of the Japanese landmass wider.
  - Coastline Movement: A 250m mile stretch of coastline dropped by 0.6m, allowing the tsunami to travel further inland.
  - Plate Movement: Estimated that the Pacific plate has slipped west by between 20-40m.
  - Seabed Movement: The seabed near the epicentre shifted by 24m and the seabed off the coast of the Miyagi province has moved by 3m.
  - Earth Axis Shift: The power of the earthquake shifted the earth's axis by between 10-25cm, shortening the day by 1.8 microseconds.
- Liquefaction: Occured in Tokyo in areas of rebuild land. Around 30 homes were destroyed and 1,046 buildings were damaged by this process alone.
  - Aftershocks: Japan has experienced over 900 aftershocks since this devastating earthquake, some as big as magnitude 7.
  - Antarctica: Seismic waves from the earthquake were reported to have caused giant slabs of ice to fall from the Sulzberger Ice Shelf.