Effectiveness of ‘Electrical Safety Management Service’proven by the Great East Japan Earthquake

Seiji Watanabe
Tohoku Electrical Safety Inspection Association

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Information on Electrical Safety Inspection Associations Nationwide and the Tohoku Electrical Safety Inspection Association

■There are 10 Associations in Japan from Hokkaido to Okinawa.

Operation Details (Safety management operations)

- Reviews of electrical facility designs, and inspections during construction and after completion.
- Regular inspections (monthly, annually) and provisional inspections
- Emergency actions during accidents, and recurrence prevention actions
- Stand in as witness to inspections conducted by government agencies
- Guidance and consultation regarding electrical safety

Reference: Number of contract safety management operations

Nationwide contracts	Approx. 389,000
Tohoku contracts	Approx. 54,000 (14% of nationwide)

(As of Mar. 31, 2016)

Subject

Safety services were effectively employed during the Great East Japan Earthquake.

-- Readiness for ensuring continuity of operations --

I. Overview of the earthquake and damage caused
II. Recovery
III. Disaster response actions carried out by the Tohoku Electrical Safety Inspection Association
IV. Readiness for ensuring continuity of operations (for customers)

I-1 Overview of the earthquake and damage caused

- When

  2:46 pm,

  Friday, March 11, 2011

- Where

  Off the Sanriku coast at a depth of 10 km

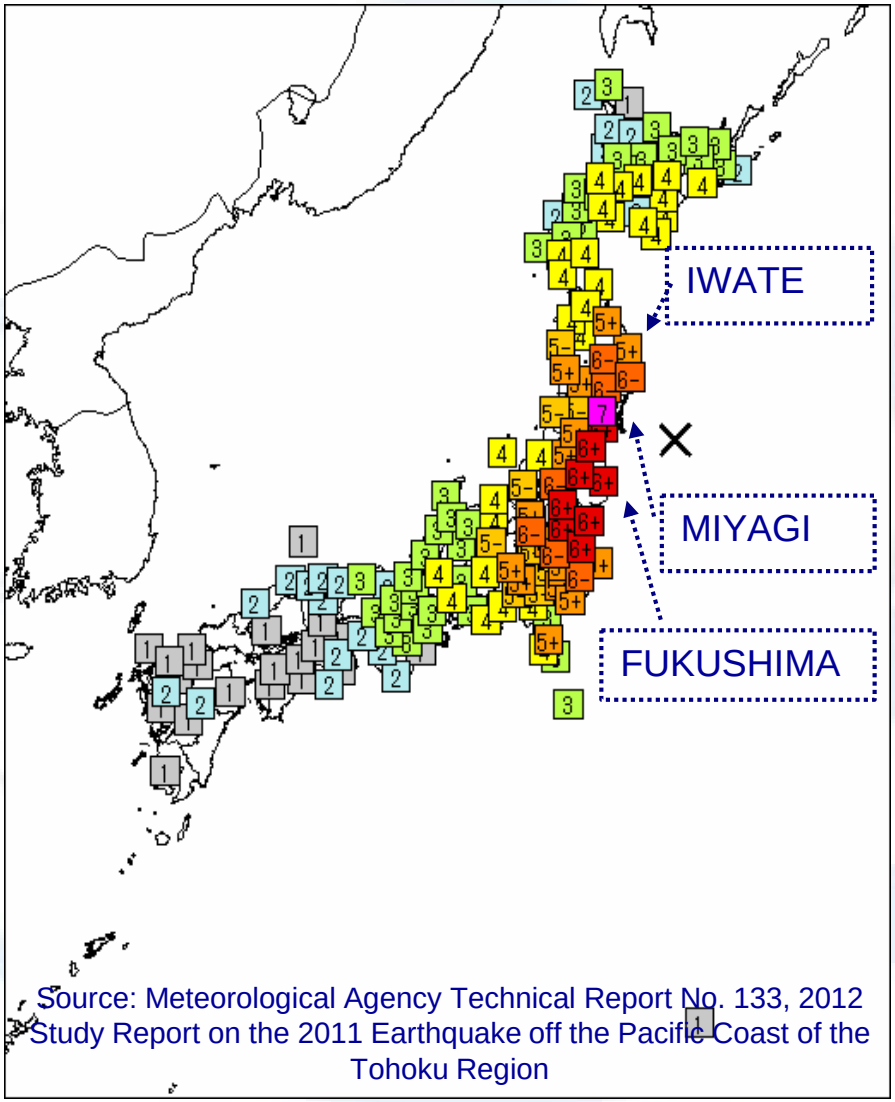
  Magnitude 9.0

- Earthquake intensities recorded in different regions

Intensity 7: MIYAGI

Intensity 6-plus: FUKUSHIMA

Intensity 6-minus: IWATE



Source: Meteorological Agency Technical Report No. 133, 2012
Study Report on the 2011 Earthquake off the Pacific Coast of the Tohoku Region

I-2 Overview of the earthquake and damage caused: Regions with particularly extensive damage.

Example: Regions with particularly extensive damage

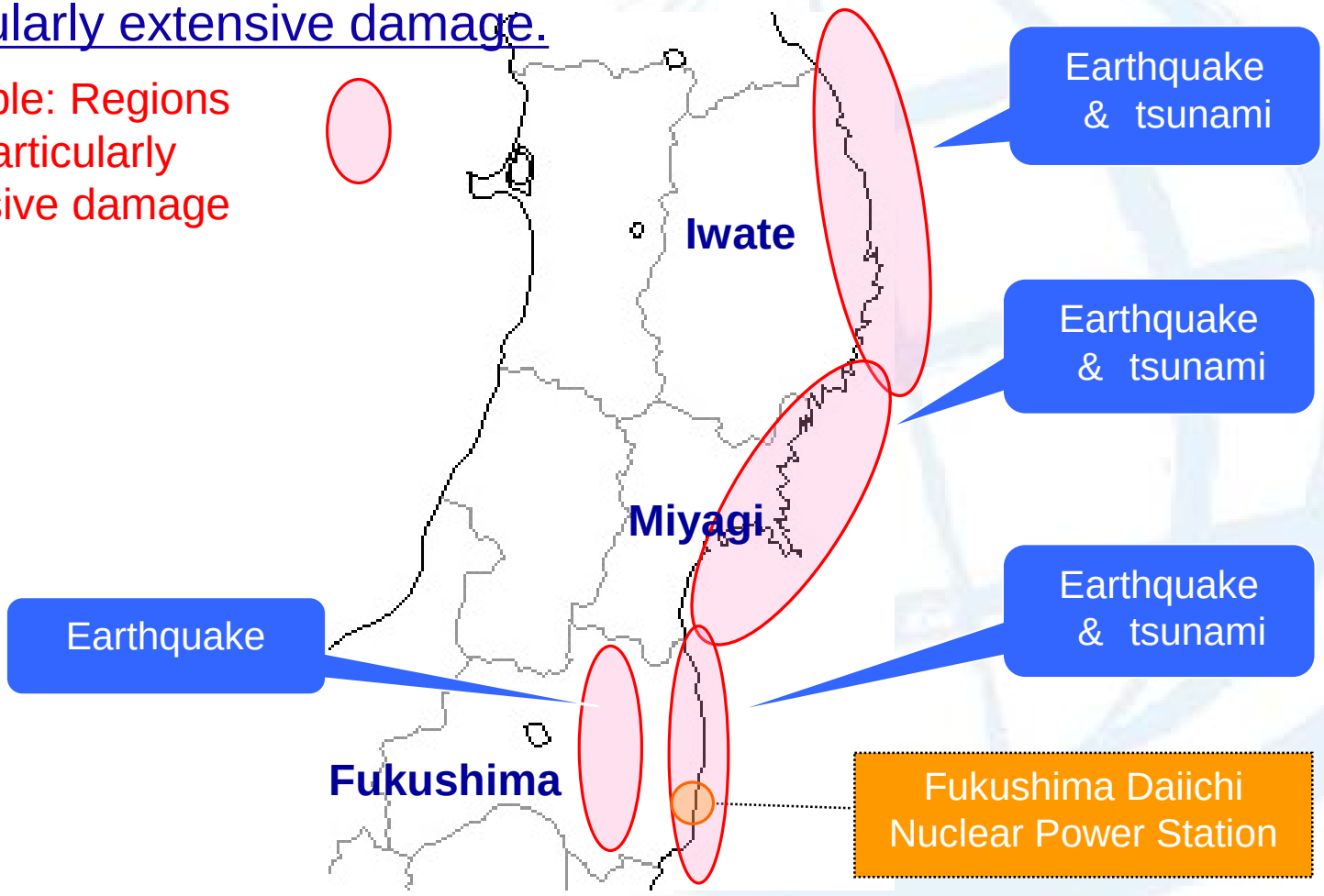
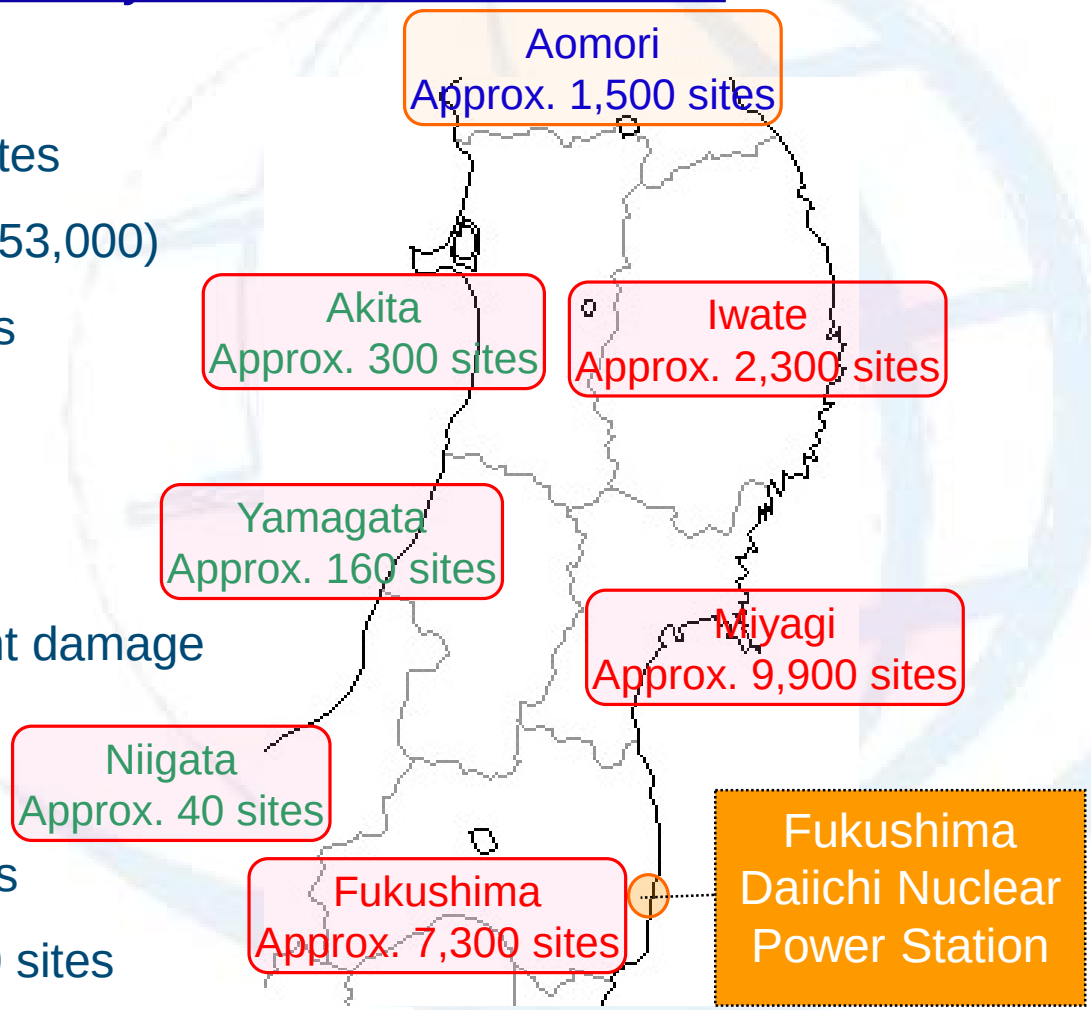


Photo of the aftermath of the earthquake and tsunami 03.11.2011

I-3 Damage sustained by Safety Association customers

- Estimated damages
  - a. Total: Approx. 21,500 sites
  - (b. Contract sites: Approx. 53,000)
  - About 40% of contract sites sustained damage
  - (As of Feb. 28, 2011)

- Prefectures with significant damage estimates
  - Iwate: Approx. 2,300 sites
  - Miyagi: Approx. 9,900 sites
  - Fukushima: Approx. 7,300 sites



II-1 Recovery through support dispatches

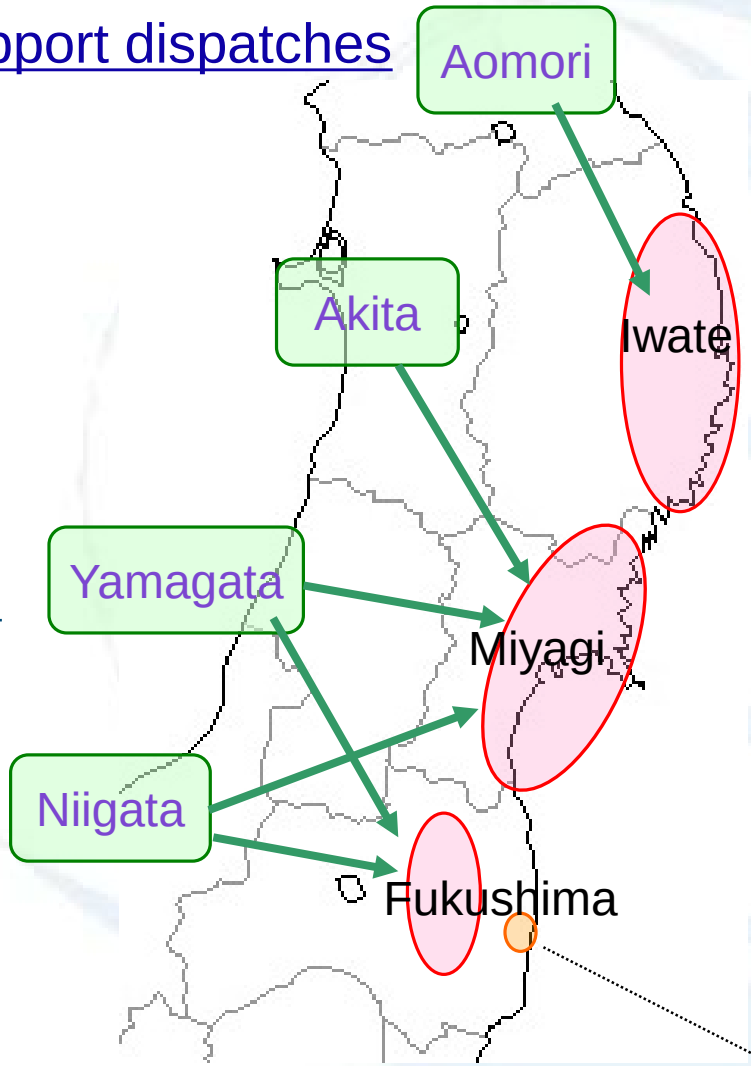
- First dispatch, 20 crews, 40 members: Mar. 14-17
- Second dispatch, 30 crews, 60 members: Mar. 18-21
- ☆Mar. 14-21

First and second dispatches

Total of 200 crews, approx. 400 members

[1] Emergency vehicle registration

[2] Loaded with supplies of food, gasoline, etc.



Iwate
First dispatch, 2 crews, 4 members

Miyagi
First dispatch, 12 crews, 24 members

Second dispatch, 18 crews, 36 members

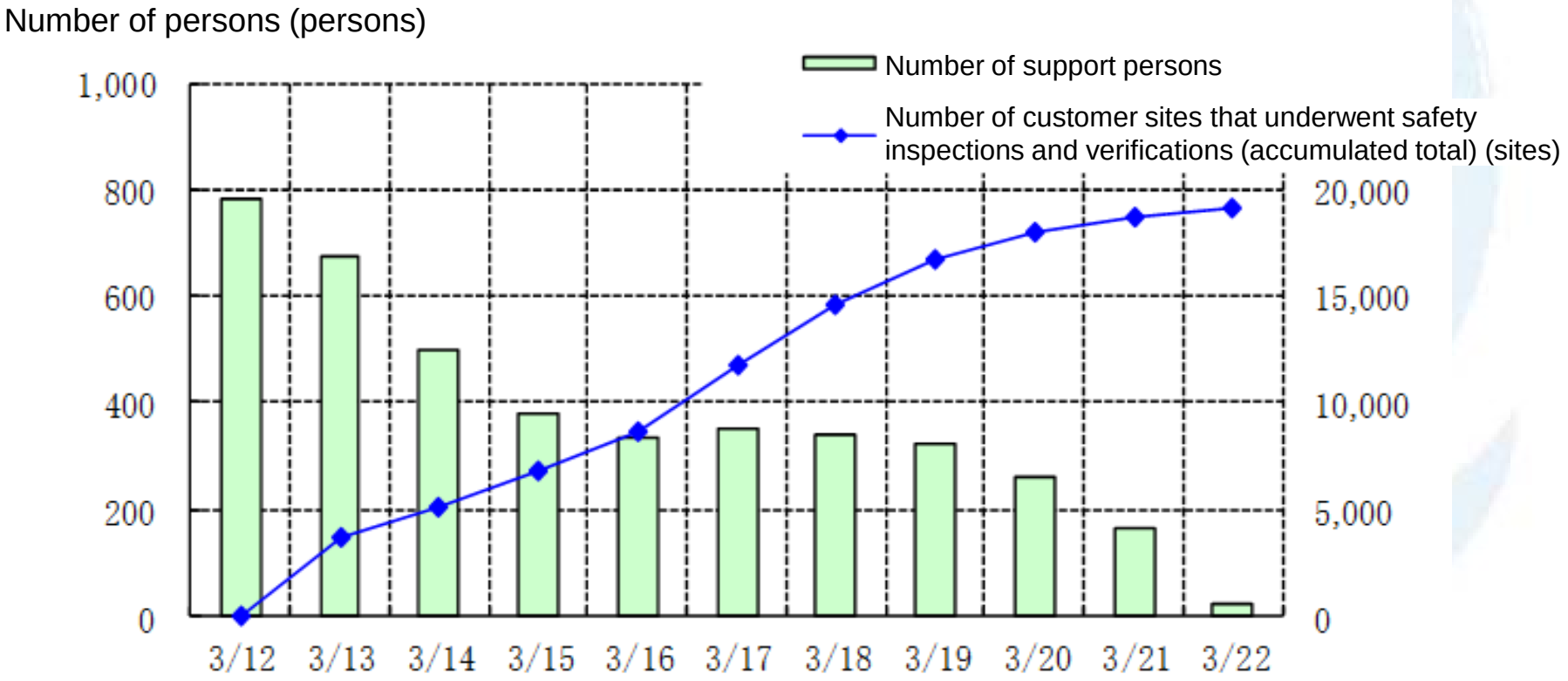
Fukushima
First dispatch, 6 crews, 12 members

Second dispatch, 12 crews, 24 members

II-2 Recovery status of contract business sites that operate electrical facilities for private use

Mar. 22, approx. 21,500 sites ⇒ **Recovery was complete by this time**, except for approx. 2,600 customers sites where inspections could not be performed.

* Sites where inspections could not be performed included customers who sustained damage to their facilities, were not accessible due to roads being cut off, or were located in no-entry zones that were cordoned off due to the nuclear power plant accident.



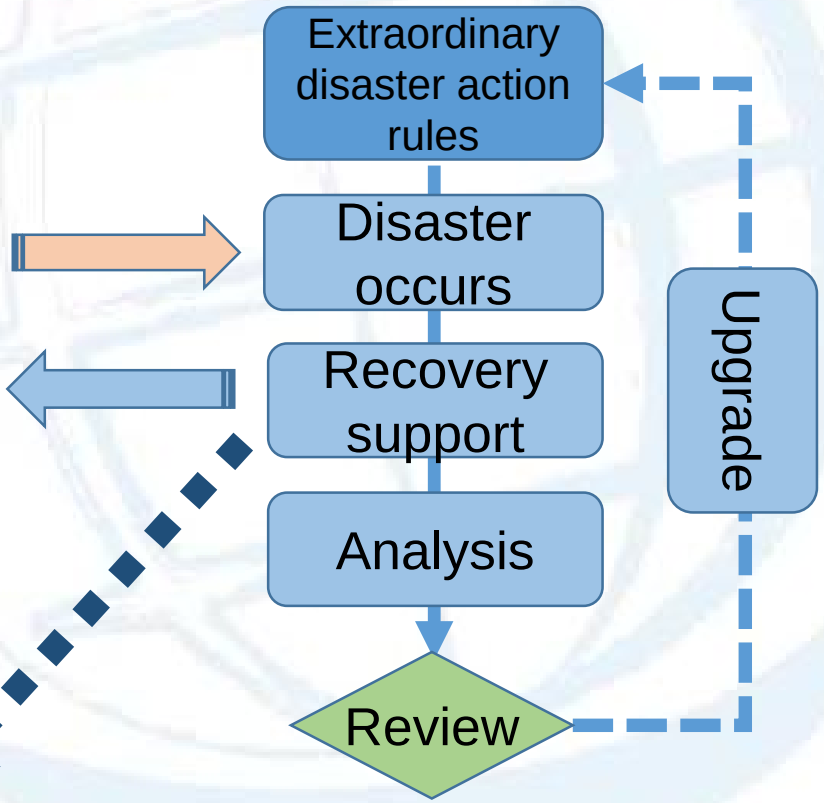
II-3 Photo of a safety inspection, and verification/recovery operation

III Disaster response actions carried out by the Tohoku Electrical Safety Inspection Association

1 Establish rules

Disaster occurs

- xx Earthquake
- xx Typhoon
- Oct. 2004 - Niigata Prefecture Chuetsu Earthquake Intensity 7
- Jul. 2007 - Niigata Prefecture Chuetsu Earthquake Intensity 6-plus
- Jun. 2008 - Iwate–Miyagi Nairiku earthquake Intensity 6-plus
- Jul. 2008 - North Iwate coast earthquake Intensity 6-minus
- Mar. 2011 - Great East Japan Earthquake Intensity 7



III Disaster response actions carried out by the Tohoku Electrical Safety Inspection Association

1-1 "Initial response services setup" -- Examples of upgrades and improvements made --

■Rule stipulating that, in the event of an earthquake of intensity 6-minus or greater, all members are to arrive at the office "automatically" without waiting for instructions.

⇒Based on past experience that earthquakes with intensities above 6 will cause significant damage to facilities. (Quickly establish emergency services setup)

■Implementation of safety verification system (after the Great East Japan Earthquake)
Safety of employees comes first.

⇒Program automatically sends emails to employees.
Information is tallied automatically based on standardized text replies.
(Quickly ascertain safety)

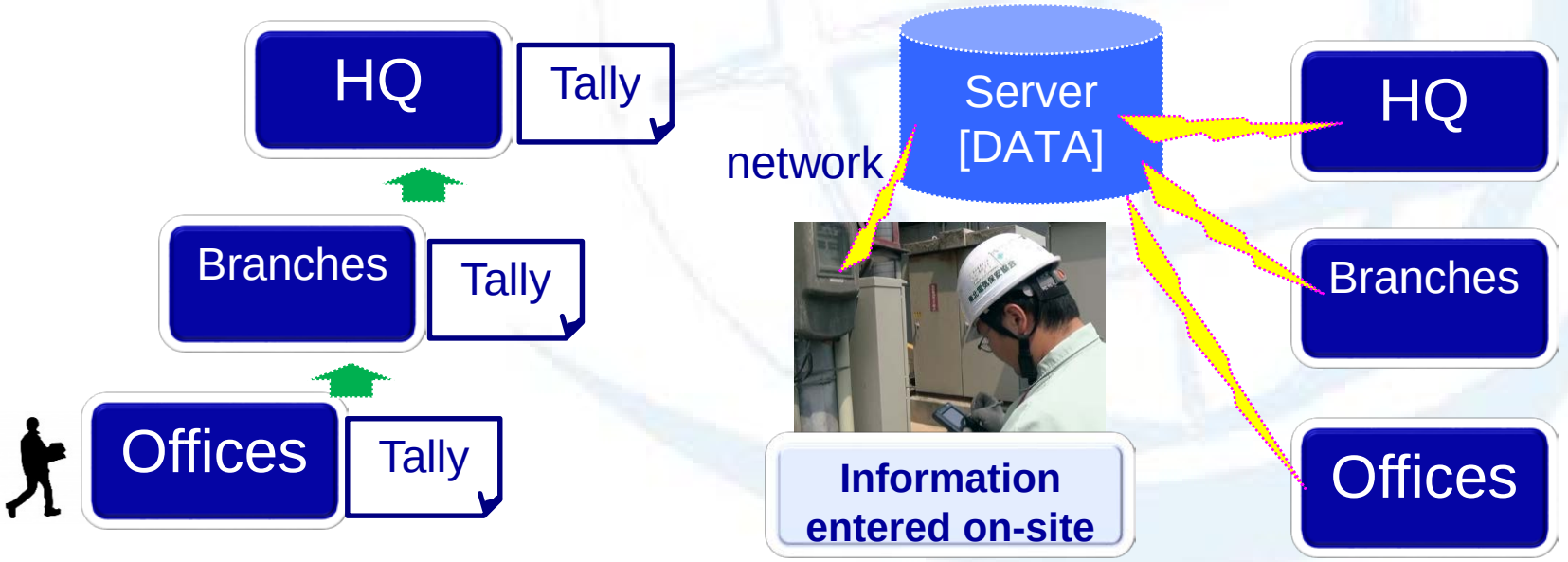
III-1-2 "Information gathering and progress management" -- Examples of upgrades and improvements made --

- Systemization of tallying operations (Expedite progress management and support setup)

Inspectors tally and report after they return to the office ⇒ Manual tallying

⇒

Inspectors enter information on-site on a mobile terminal ⇒ Automatic tallying



III-1-3 "Recovery operations" -- Examples of upgrades and improvements made --

■Verify total number of customers estimated to have sustained damage.

[Focus on verification and recovery operations]

⇒Recovery operations were being carried out based on information provided by customers and power companies. No incoming communication available from unmanned facilities and sites that were on holiday. As a result, power outages went undetected, delaying recovery operations.

[Conduct verification and recovery + safety inspections]

⇒Visit all customer sites that are estimated to have sustained damage, and carry out "safety inspections" which includes inspections of electrical facilities.
* Recovery operations were completed in shorter amounts of time, improving the level of quality for customers.

III Disaster response actions carried out by the Tohoku Electrical Safety Inspection Association

2 Preparing supplies and equipment

■Organizing the services setup chart, etc.
・Set up a disaster response HQ. Create a services setup chart showing PICs and descriptions of operations.
・Create an emergency communication schematic, etc. for extraordinary disasters.

■Preparing supplies and equipment when a disaster occurs
・Secure items including drinking water, emergency food, lights (including spare batteries), maps, stoves, mobile generators, and fuel, etc.

■Organizing telecommunication lines
・Implement satellite mobile phones which are then issued to all branches (after the Great East Japan Earthquake)
・Upgrade the simple communication radios (to units with higher output)

III Disaster response actions carried out by the Tohoku Electrical Safety Inspection Association

3 Ongoing training

Conduct extraordinary disaster training and other forms of training.

Conduct once a year
Based on a scenario of working in an earthquake stricken area
(Earthquake intensity 6-plus, etc.)

Overall training → Establishing services setup, information communication, and inspection consolidation

Individual training→ Safety verification, and inspection of emergency supplies and equipment

IV Readiness for ensuring continuity of operations (for customers)

▼Operations have stopped due to power outage caused by the disaster! (Difficult to carry on operations)

→ How can we avoid or mitigate these situations?

■Preventive safety is critical! (Continuity of operations)

- Upgrade to electrical facilities that are more robust against disasters. * Some examples shown below.
- Update old facilities (whose materials have undergone changes or degradation from aging)

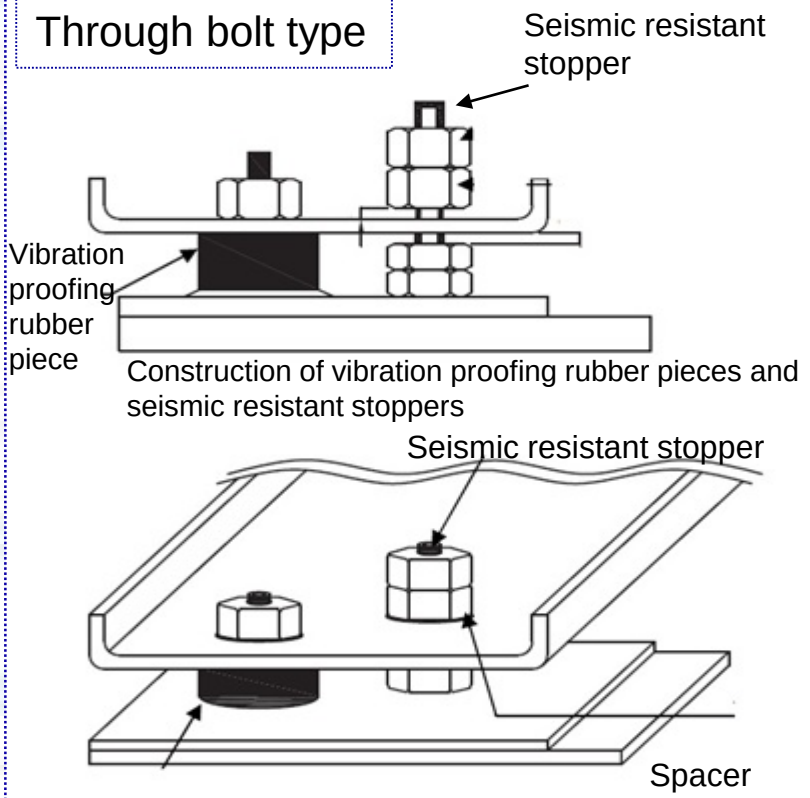
And other concerns.

IV-■Preventive safety　Install electrical facilities that are more robust against disasters

Examples of earthquake countermeasures (seismic resistance)

Electrical facilities including transformers and power capacitors, etc.
⇒ Measures to prevent them from moving, tipping over, and falling, etc.
・Choosing the appropriate anchor bolts, and installing the equipment onto solid foundations.
・Retightening of existing anchor bolts

Through bolt type



IV-■ Preventive safety　Install electrical facilities that are more robust against disasters

Examples of earthquake countermeasures (seismic resistance)

High and low voltage lines in cubicles

⇒Measures to prevent line breakage caused by vibration

- Appropriate amount of slack on the lead lines
- Outgoing lines made of flexible conductors

Create slack on the wiring

Use flexible conductors

summary

Items	Points
1 Quickly establish emergency services setup	・Automatic office arrival rule (Intensity 6-minus or greater) ・Install an extraordinary disaster countermeasures HQ * Verify safety and secure means of communication
2 Establish a support services setup	・Set up a database for quickly ascertaining the state of damage ・Organize a self-sustaining support services setup, as well as prepare supplies and equipment (Prepare equipment and food, etc. to load on to vehicles)
3 Clearly establish recovery tasks	・Verifications and recovery through individual support ・Conduct safety inspections for all presumed customers
4 Establish rules and carry out ongoing training	・Upgrade rules in light of disaster response, and prepare supplies and equipment ・Conduct precise training based on rules (ongoing)
5 Preventive safety (for customers)	・Upgrade electrical facilities to those that are robust against disasters ・Update old facilities

THANK YOU

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