Disaster Response by Japanese Fire Service

- Basic Structure & Preparedness based on Past Lessons -

Takashi ENDO

Fire and Disaster Management Agency, Japan

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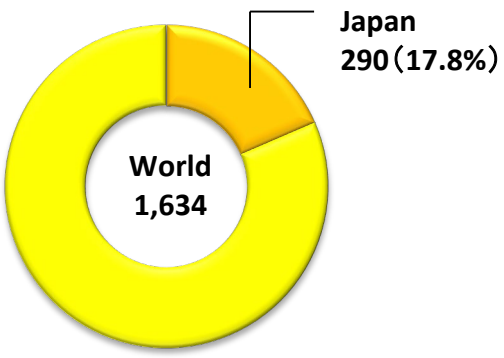
Geographical Character of Japan – linked to disasters

- ✓ **Japan lies on four plates – which fact has made the country frequently face earthquakes and volcano eruptions**
- ✓ **Land area not-so-large as well as mountainous – which gets the rivers steep**
- ✓ **Located in Asian Monsoon area – hit by typhoons and torrential shower**
- ✓ **Areas suitable for residence limited – forcing many people to live close to seaside, river sides and active volcano**

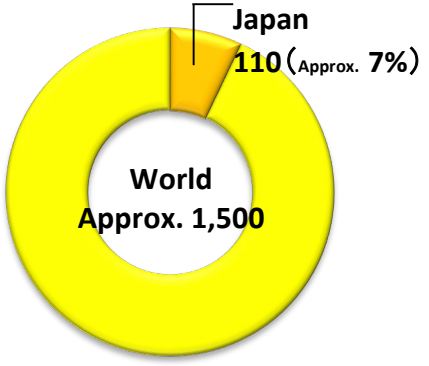
No. of earthquakes of magnitude 6.0 or greater (2006-2015)

Source: JMA and USGS



No. of active volcanoes (2016)

Source: Cabinet Office website



The avoidable conditions mentioned above, leading to accumulated experiences in disaster management.

What to take away in this presentation:

1. Basic structure and arrangement of fire service in Japan – tasked with firefighting, ambulance service and rescue activities, a top-tier country on this planet in disaster experiences.

   *Although Japan has 1/4 % of land over the world, nearly 20% earthquakes at magnitude >= 6.0 occurred in Japan and 7% active volcanos located there.

2. What Japanese fire service organizations have learnt through past large scale disasters and implemented based on the lessons.

1. Basic Arrangement in Fire Service

- Referring to Search and Rescue in Great East Japan Earthquake -

2. Utilizing Lessons Learnt by Disaster Experience

2-1. Step Up National Fire-Service Team

2-2. Enhance Capacity of Volunteers

2-3. Facilitate People to Secure Safeties

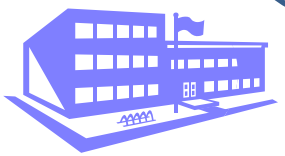
1-1. Institutional Arrangement in Fire Services
- Central Government, Prefectures and Municipalities -

Mission: Firefighting, Ambulance Service and Rescue Activity

Central Government
(Fire and Disaster Management Agency)

- ✓ Designing basic fire fighting measures and policies
- ✓ Providing technical advices, education and training
- ✓ Conducting research

Prefectures



- ✓ Running fire academy to provide fire defense education and training

Municipalities

- ✓ Day to day firefighting operation as well as ambulance service and rescue service in accordance with situation and condition of municipalities on their own initiative

1-2. Institutional Arrangement in Fire Services – with figures

Fire and Disaster Management Agency (FDMA)

- ✓ Designing basic fire fighting measures and policies
- ✓ Providing technical advices, education and training
- ✓ Conducting research
- ✓ Running college and research organization as affiliated organizations
- ✓ Around **170 staff members** in total

Prefectures

- ✓ Running fire service academy for education and training

Municipalities

Regular Firefighting

- ✓ Professional first responder units to provide fire service, rescue activity and ambulance service on site
- ✓ 728 fire service organizations, established by municipalities, and **164,873 firefighters** across the nation
- ✓ 11,701 fire engines, 6,329 ambulance cars and 1,237 rescue cars

Volunteer Firefighting

- ✓ 2,209 volunteer fire corps groups and 843,667 members in the country, with 14,054 fire engines

Annual expense to firefighting in fiscal 2017; approx. 2.1 trillion JPY (3.6% of the total)

* Figures above are as of 1st April, 2018.

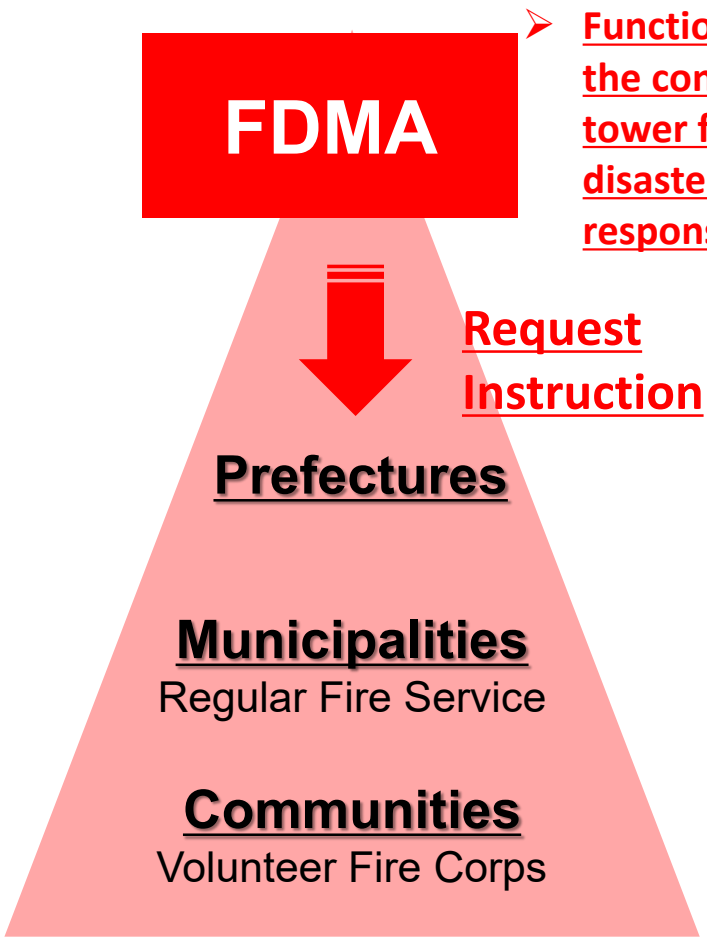
1-3. Structure of Fire and Disaster Management

Basic Structure of Fire and Disaster Management

Municipalities and communities playing the main role in fire service and disaster response

- Designing and drafting umbrella rules on fire service and disaster management
- Providing technical advices, education and training
- Conducting researches etc.

For Large Scale Disasters

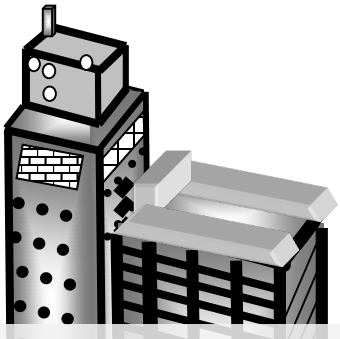


1-4. FDMA Operation in Large-Scale Disasters

Crisis Management Center at Prime Minister's Office

Reporting and sharing of disaster hit area situation

FDMA Disaster Task Force



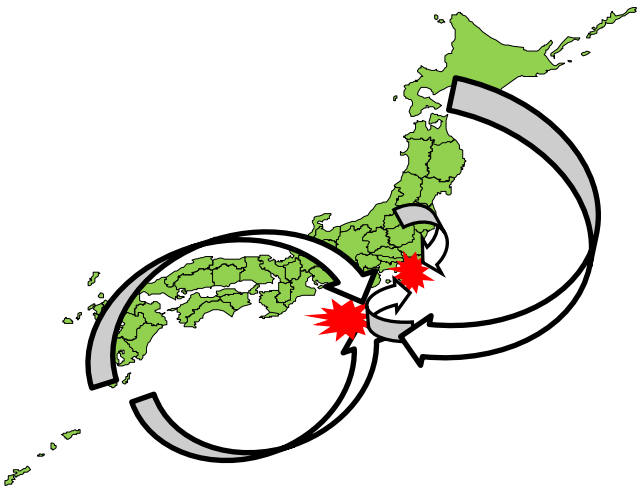
Information collection from disaster hit areas

Coordination for deploy of National Fire-Service Team

Local government office in disaster hit area

1-5. National Fire-Service Team for Disaster Response

The Elite Units that Rush for Rescue from Various Regions across the Country



Great Earthquake, Tsunami, Huge Flood, Powerful Volcano Eruption, Wide-Spread Fires ….

✓ **Request of leader in disaster hit area to FDMA, or**

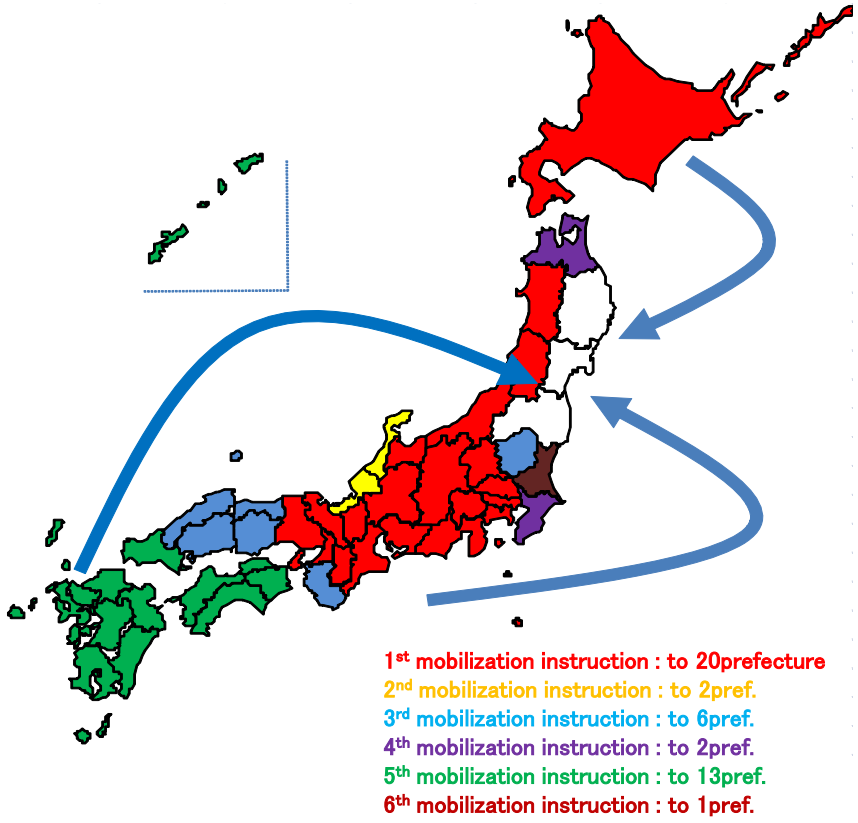
✓ **FDMA commissioner's instruction - even without any request**

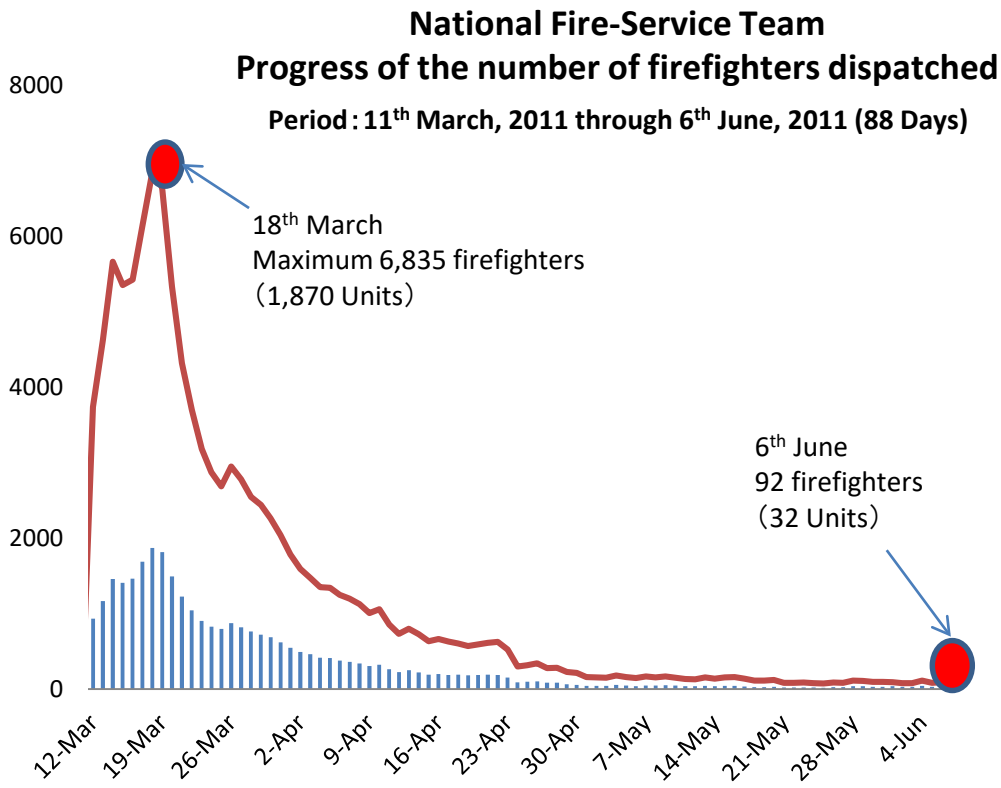
The National Fire-Service Team for Disaster Response is formed with municipality-based fire service responders turning into the members of the national team.

- Established in 1995
- Having been dispatched to disaster hit areas in the event of large scale disasters 39 times ever, such as earthquake, landslide, flood, and volcano eruption that put huge damages on people
- Composed of 5,978 units (Firefighting: 2,372, Rescue: 504, Ambulance: 1,424 Air: 75 and so forth) as of April 2019

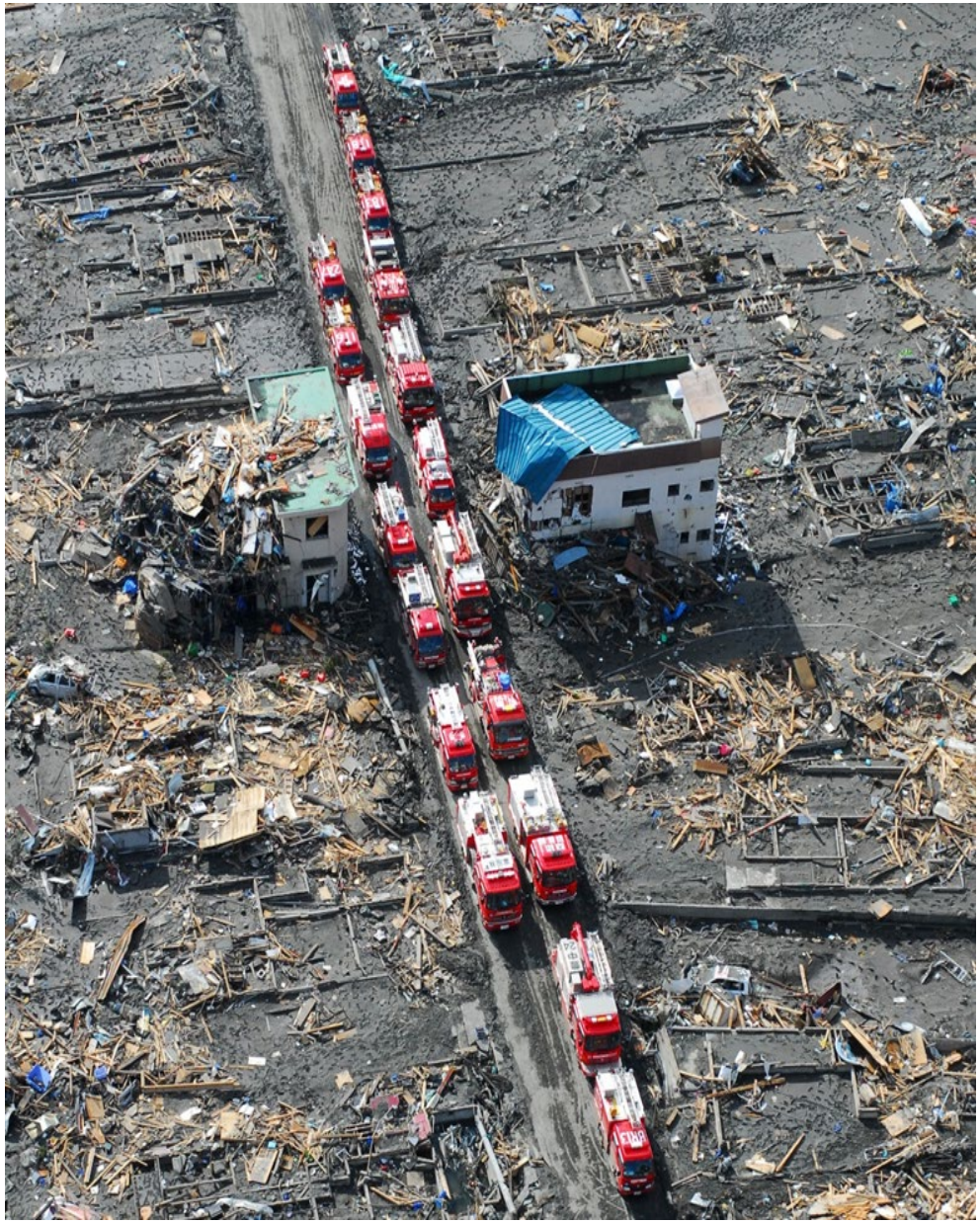
1-6. National Fire-Service Team in Great East Japan Earthquake

- ✓ Just after the Great East Japan Earthquake occurred, the National Fire-Service Team for Disaster Response was formed and dispatched to the three prefectures - Iwate, Miyagi and Fukushima, with an instruction of the FDMA Commissioner.
- ✓ The firefighters mobilized in the great earthquake amounts to about 30,000, accounting of around 20% of all the firefighters in Japan.
- ✓ The ground units made firefighting, rescue and ambulance service while the aviation units carried out rescue, aerial firefighting and information collection, having saved 5,064 people.





1-6. National Fire-Service Team in Great East Japan Earthquake



1-6. National Fire-Service Team in Great East Japan Earthquake

1-7. Damages Caused by Great East Japan Earthquake

(As of March 1st, 2019)

1. Total Damages

Damage to Human	Iwate pref.	Miyagi pref.	Fukushima pref.
Dead： 19,689	5,141	10,565	3,868
Missing： 2,563	1,114	1,221	224
（Dead and Missing in total：22,252）			
Casualty ： 6,233	213	4,148	183

Damage to Buildings	Iwate pref.	Miyagi pref.	Fukushima pref.
Fully destroyed：121,995	19,508	83,004	15,435
Half destroyed： 282,939	6,571	155,130	82,783
Partially destroyed：745,109	19,064	224,202	141,053

Cases of Fire	Iwate pref.	Miyagi pref.	Fukushima pref.
330	33	137	38

2. Damages on Fire Services

Firefighters	Dead/Missing ：27
Damage on Buildings（fully, half or partially destroyed）	Headquarters and Fire Stations：143, Branch Stations：161
Damage on Vehicles etc.	Vehicles：86, Fire boat：2, Helicopter： 1

Volunteer Firefighters	Dead/Missing ：254
Damage on Buildings（out of use）	Depot of volunteer fire corps：463
Damage on Vehicles etc.	Vehicles：255

1-8. Major Natural Disasters since Great East Japan Earthquake

Year & Month	Disasters	Casualties
2011. 8-9	Typhoon #12	98
2014. 8	Huge Scale Landslide in Hiroshima	77
2014. 9	Volcano Eruption at Mt Ontake	63
2016. 4	Kumamoto Earthquake	273
2018. 6-7	2018 Japan Floods	245
2018. 9	Hokkaido Eastern Iburi Earthquake	42

Mt Ontake Volcano Eruption

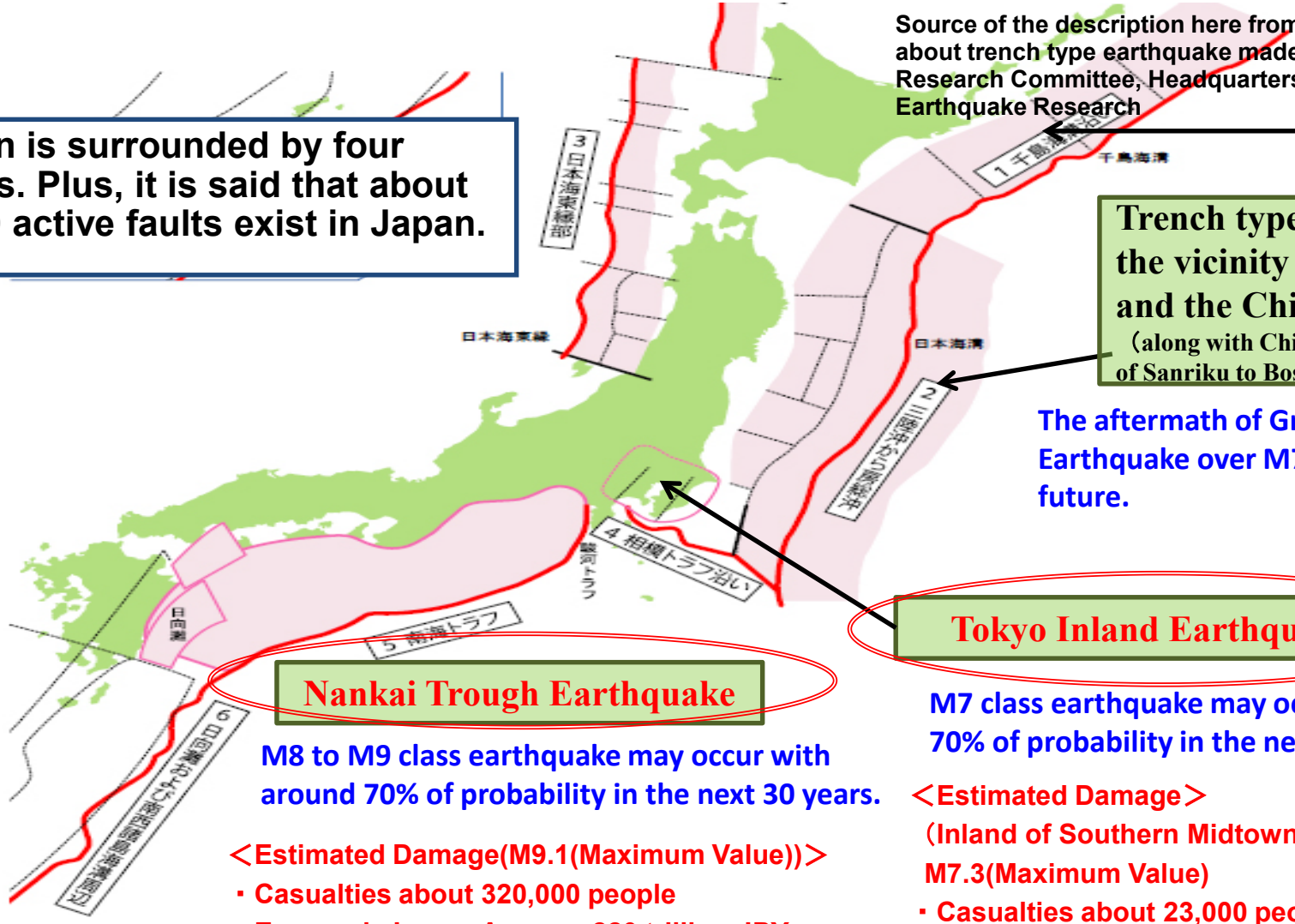
Kumamoto Earthquake

Western Japan Flood

1-9. Large Scale Earthquakes Forecasted to Occur in the Future

Source of the description here from long term research about trench type earthquake made by Earthquake Research Committee, Headquarters for Promotion of Earthquake Research

Japan is surrounded by four plates. Plus, it is said that about 2,000 active faults exist in Japan.



Trench type earthquakes in the vicinity of the Japan and the Chishima Trenches
（along with Chishima Trench, offshore of Sanriku to Boso）

The aftermath of Great East Japan Earthquake over M7 may occur in the future.

Tokyo Inland Earthquake

M7 class earthquake may occur with around 70% of probability in the next 30 years.

＜Estimated Damage＞
（Inland of Southern Midtown Earthquake M7.3(Maximum Value)
・Casualties about 23,000 people (Casualties by fire about 16,000 people）
・Economic Loss : Approx. 95 trillion JPY, equivalent to 0.8 trillion USD (JPY/USD=120 applied)

Nankai Trough Earthquake

M8 to M9 class earthquake may occur with around 70% of probability in the next 30 years.

＜Estimated Damage(M9.1(Maximum Value))＞
・Casualties about 320,000 people
・Economic Loss : Approx. 220 trillion JPY, equivalent to 1.8 trillion USD (JPY/USD=120 applied)

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2-1. Step Up National Fire-Service Team

2-2. Enhance Capacity of Volunteers

2-3. Facilitate People to Secure Safeties

2-1-1. Stepping Up National Fire-Service Team through Experience of Great East Japan Earthquake

1. Need to strengthen the logistic and back-up teams so that the national Fire Service Team can keep on their activities in a long period and also in wider areas

   ➡ Introducing Operation Base Vehicle and Large Air Tent

Operation Base Vehicle

Large Air Tent

2. Need to make sure of alternative ways that the rescue teams can arrive at disaster hit areas swiftly even in the case that the roads are blocked due to damages caused by disaster

   ➡ Increasing the helicopter bases across the nation so that the rescue teams can dash to disaster hit areas with helicopters, no matter how the road conditions are

75 helicopters on active, for firefighting and disaster response throughout Japan

Rescue activity base with rescue tools storage and oil depot

2-1-1. Stepping Up National Fire-Service Team through Experience of Great East Japan Earthquake

3. Need to enable the rescue teams to keep the high mobility in the flood, the tsunami-hit and the rubble area

   ➡ Introducing Small Amphibious Buggy and Tsunami/Large-Scale Water Disaster Countermeasure Vehicle

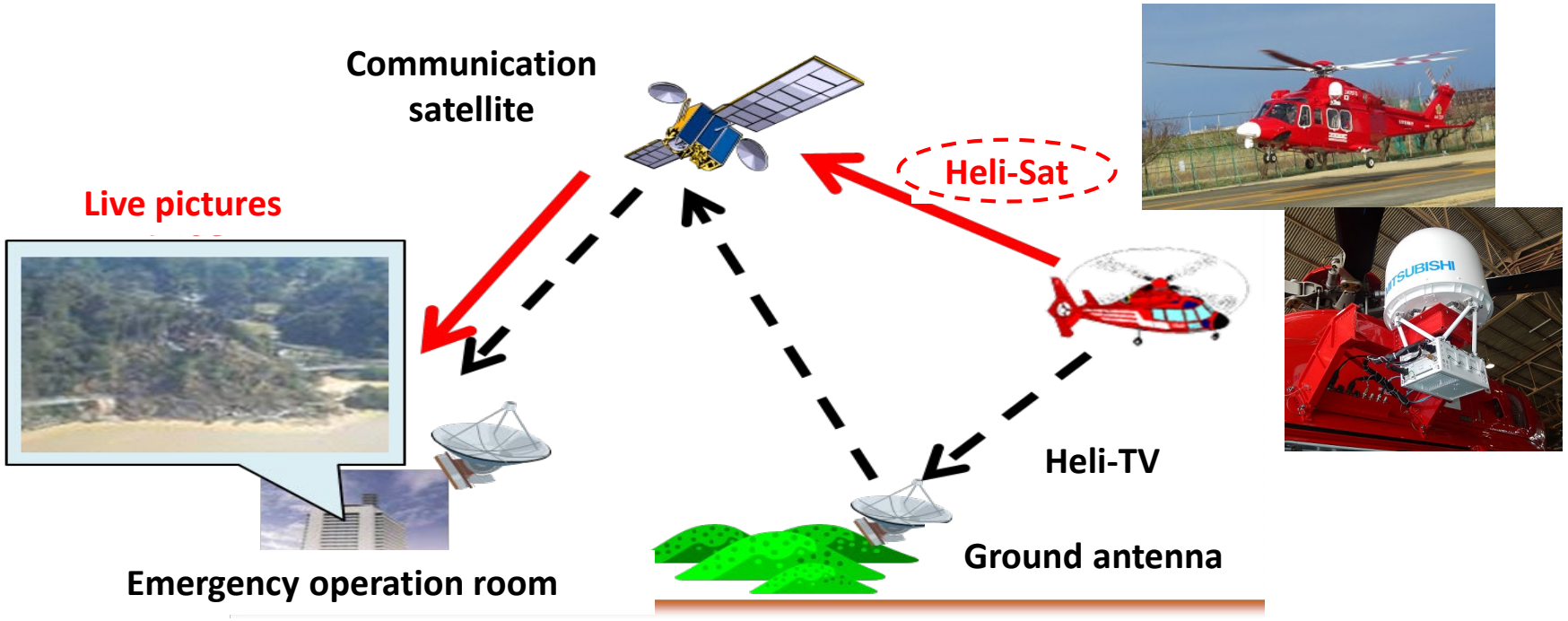
Small Amphibious Buggy

Tsunami/Large-Scale Water Disaster Countermeasure Vehicle

Specializing in the search and rescue at flood areas, loading boat, buggy, life jacket and dry suit

2-1-1. Stepping Up National Fire-Service Team through Experience of Great East Japan Earthquake

4. Need to enhance the arrangement to gather and share information on disaster damages ➡ Installation of Heli-Sat system



Advantageous Aspects of Heli Sat, Compared to Heli TV – a conventional system

- Able to directly transmit images to disaster management institutions - no need to use ground antenna which is fragile to disasters such as earthquake and landslide, as well as to cut the cost to build ground antennas
- Possible to receive radio waves free from constraints of terrain

2-1-1. Stepping Up National Fire-Service Team through Experience of Great East Japan Earthquake

5. Need to create a special unit dedicated to firefighting at petro complex

➡ Forming new fire response team, “Dragon Hyper Command Unit”

Water Cannon Vehicle

Mega Volume Pumper

- Dedicated to extraordinary disaster response activities at energy and industrial infrastructures
- Can discharge the larger volume of water to farther and higher point for longer time than ordinary fire engine

2-1-2. Collaboration among Disaster Response Forces - in National Fire-Service Team Disaster Exercise

On-site Emergency Command Post

(jointly operated by Fire Service, Police, Self Defense Force, DMAT (medical team), Coast Guard etc)

Joint Rescue Activity

Rescue teams both of fire service and police are jointly in operation.

Medical Treatment immediately after rescue

The rescue teams save people, followed by DMAT medical treatment on site.

Joint Search and Rescue Activities

Fire Service Organizations and Japan Coast Guard jointly search and rescue castaways.

SDF clearing roads for firefighting

SDF clears stuff on roads to enable firefighters to rush to disaster hit areas.

Coordination

Firefighting by Fire Service Organization and Industrial Firefighters

Disaster Management Headquarter at local governments

Coordination and Support

Disaster Management Headquarter at the central governments

Transportation of firefighters by SDF Carrier

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2-2-1. Significance of Volunteers in Disaster Management

（as of April 1, 2018）

Regular Fire Services
(732 Fire Defense Headquarters)
about 165,000 personnel

Volunteer Fire Services
(2,209 groups)
about 844,000 members

Voluntary Disaster Preventing Groups
(164,195 groups)
about 44 millions

NPOs
Community Volunteers
Corporations

2-2-2. Volunteer Fire Corps

Volunteer Fire Corps:

1. **Close to Community**
   Have known their own community and its situation better than professionals

2. **Robust Mobilization**
   Composed of five times more members than professionals

3. **Rapid Response**
   Can start firefighting/rescue even before professionals attend the incident scene because of undergoing high level training

Searching for victims in landslide disaster
(Hiroshima-City)

Supporting firefighter's rescue activity with power shovel
(Oshima-Cho)

2-2-3. Significance of Volunteer Fire Corps Proved

- **A village which was stricken by a 15m high tsunami in Great East Japan Earthquake didn't see any casualty.**

  Volunteer Fire Corps not only instructed people to dash to high hills but also closed the roads toward lower places so that people couldn't go down before the tsunami warning is lifted. This tactful idea and action were thanks to their regular disaster drill.

- **Even with a magnitude-6.7 earthquake in mid-night winter 2014, all of the residents in a village survived.**

  An original map for emergency operation where the location of people in need for evacuation was plotted – quite useful to save and guide the people to evacuation instantly.

These good practices proved the significance of the volunteer fire corps in disaster management.

FDMA has taken measures to encourage people to join the volunteer fire corps and enhance their capabilities through providing training and equipment.

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2-3-1. New Phase - Facilitate People to Secure Their Safety

✓ **Climate change and global warning, causing unprecedented natural disasters**

✓ **Aging population and globalization in society**

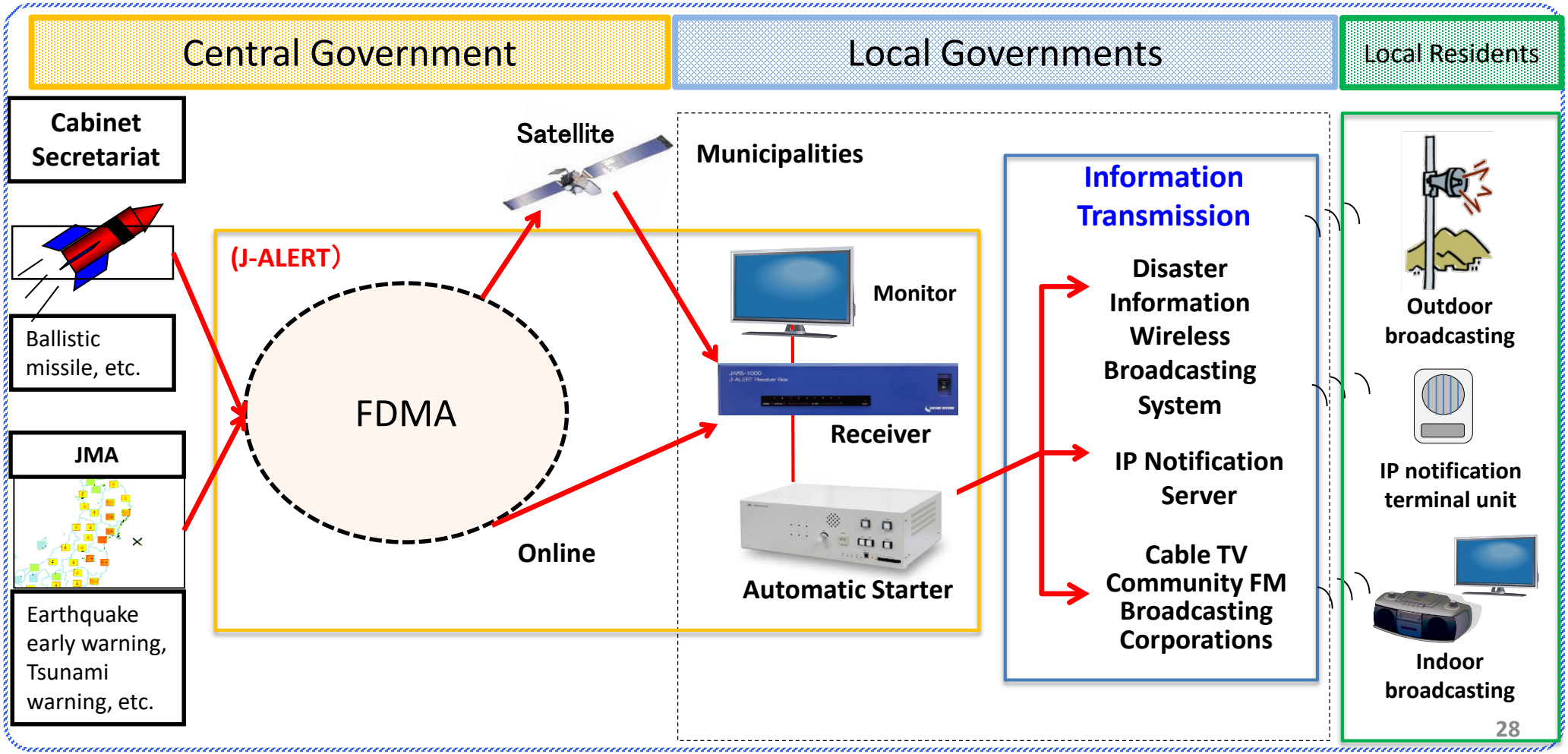
◆ **Demand for professional emergency response ballooning**

➢ **People need to do self-preparedness to secure their safety – evacuation.**

➢ **Plus, the central/local governments required to assist people in proper and timely evacuation.**

2-3-2. Overview of “J-ALERT”

The national early warning system “J-ALERT” can instantly transmit emergency information, such as ballistic missile and earthquake early warning, both via a satellite and online from the central government to local governments. The information the local governments receive is automatically delivered to local residents through various devices like outdoor/indoor broadcasting systems.



2-3-3. Diversification of Disaster Warning Channel

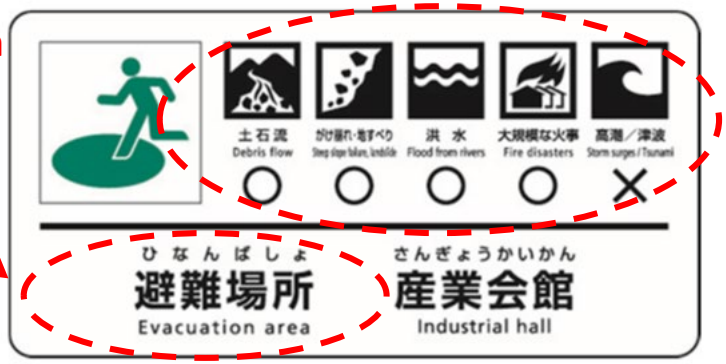
- Prompt disaster warning to people significant to save their lives from disasters
- One-type method to transmit the disaster warnings not sufficient
  - ✓ Loud speakers – the most familiar way of early warning transmission, but fragile to earthquake and tsunami
  - ✓ Warning voices outside buildings difficult to listen to amid heavy rain
  - ✓ Not everyone with mobile phones – especially the elder
- Diversification of disaster information channel necessary to promote

2-3-4. Designation of Evacuation Place by Disaster Type

- **Evacuation area not necessarily perfect for every kind of disaster.**
- **Municipalities required to designate areas as the evacuation places <u>according to the type of disaster</u>**

Evacuation Area Sign

To clarify that here is an evacuation area which is designated by local authority



To make it clear which type of disaster the evacuation place is suitable to
*In this case, not suitable for evacuation in Tsunami

Tsunami	Flood	Debris Flow	Landslide	Fires
津波・高潮	洪水・内水氾濫	土石流	崖崩れ・地滑り	大規模な火事
				

The pictures to show the type of disasters are standardized across the nation so that people can easily recognize the meanings wherever they are.

2-3-5. Proper Issuance of Evacuation Order

- **Municipal mayor responsible for issuing evacuation order**
- **In some cases, the evacuation order too late to protect people from disasters**

- **The government created a guideline regarding evacuation order for municipalities.**

✓ Advice regarding the timing to issue the evacuation order – what disaster warning should be used to trigger issuance of the evacuation order

✓ Recommended to issue the evacuation order when finding necessary – rather than holding back due to too cautious about people's complaint "NOTHING HAPPENED!"

✓ Clarifying which agent/authority the municipalities better ask for an advice in consideration of evacuation order
- situation by situation

- ✓ No way to control the earth, the natural world or the climate
- ✓ Preparedness is the only measure to minimize the damage
- ✓ Learning the lesson gets the preparedness robust

Thank you very much for listening.

Shota: the mascot of FDMA