Sharing the Japanese Experience of Disaster Reduction & Capacity Development

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Japan International Cooperation Agency

Ranking of Earthquakes 20-21st Century

Strong Earthquakes

Year	Place	Magnitude
1960	Chile	9.5
1964	Alaska	9.2
2004	Indonesia Sumatra	9.1
2011	East Japan	9.0
1952	Kamchatka	9.0
2010	Chile	8.8
1906	Ecuador	8.8
1965	Alaska Aleutian Islands	8.7
2005	Indonesia Sumatra	8.6
1950	Tibet, Assam	8.6
1957	Alaska Aleutian Islands	8.6

Deadly Earthquakes

Year	Place	Casualties
1976	China Tangshan	242800
1920	China Ningxia	235502
2004	Indonesia Sumatra	227898
2010	Haiti	222500
1948	Turkmenistan	110000
1923	Japan Kanto	105000
2008	China Sichuan	87587
2005	Pakistan, Afghanistan	86000
1908	Italy Sicily	82000
1927	China Gansu	80000
1970	Peru	66794
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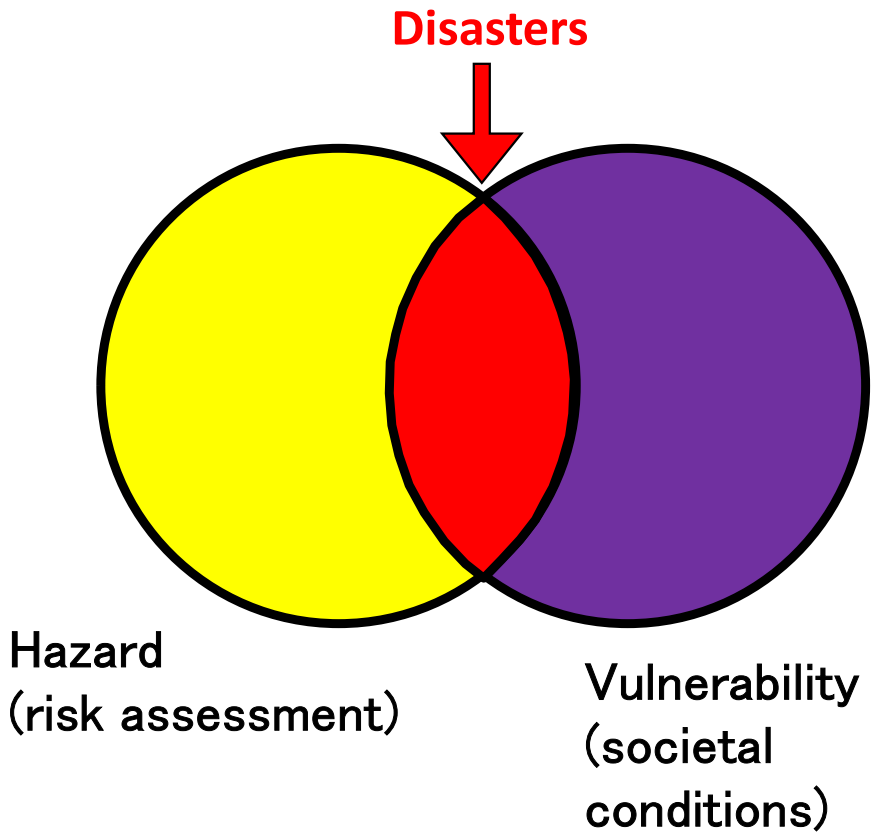
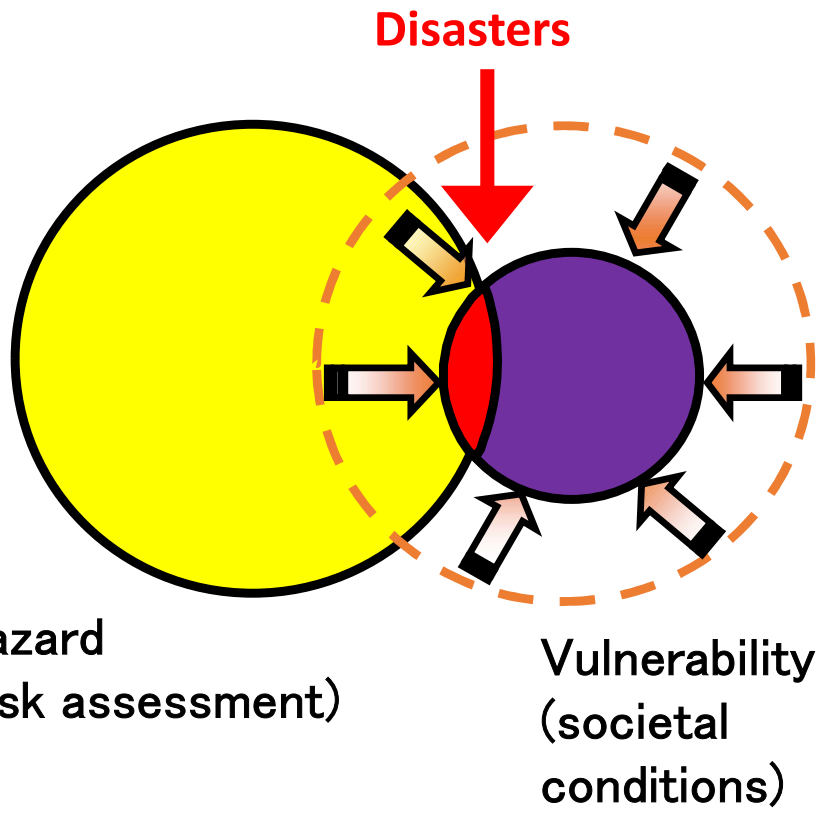
2011	East Japan	18423

Casualty figures of East Japan EQ is from National Police Agency report

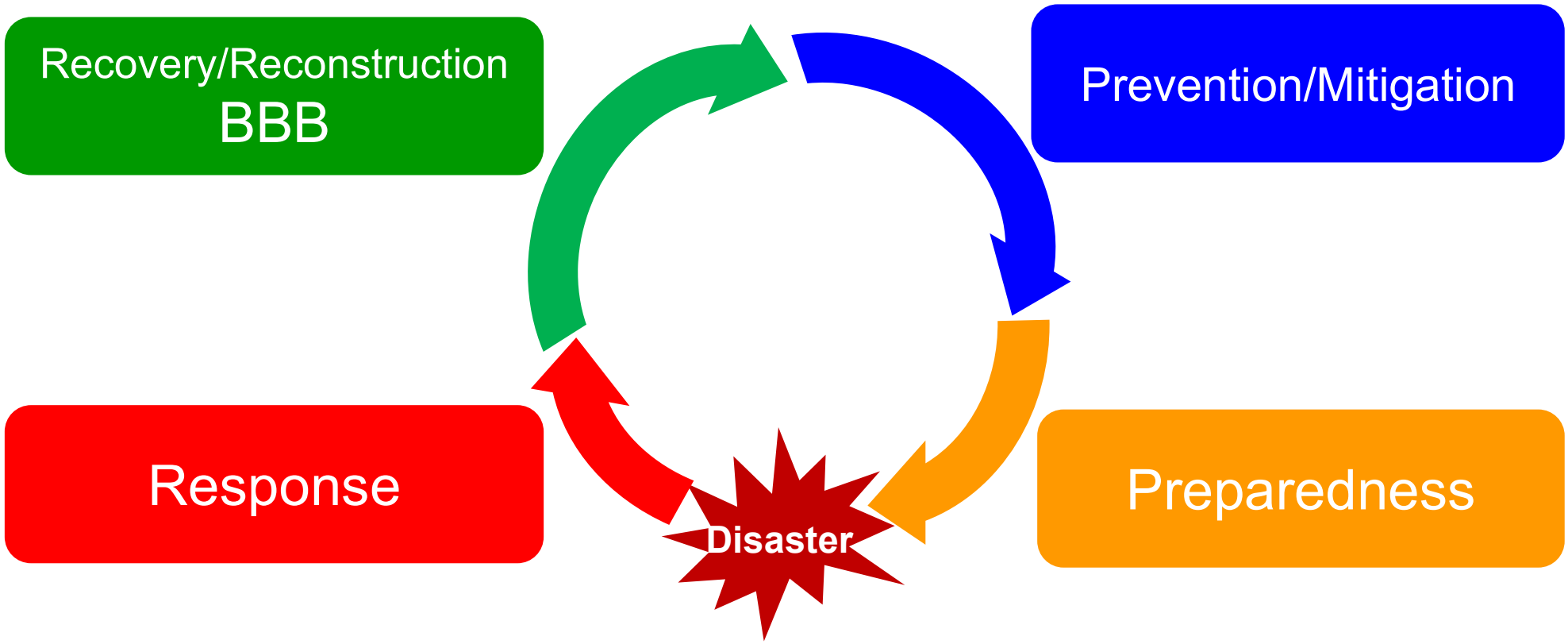
Hazards Confronting Vulnerable Communities Cause Disasters





Less Disasters

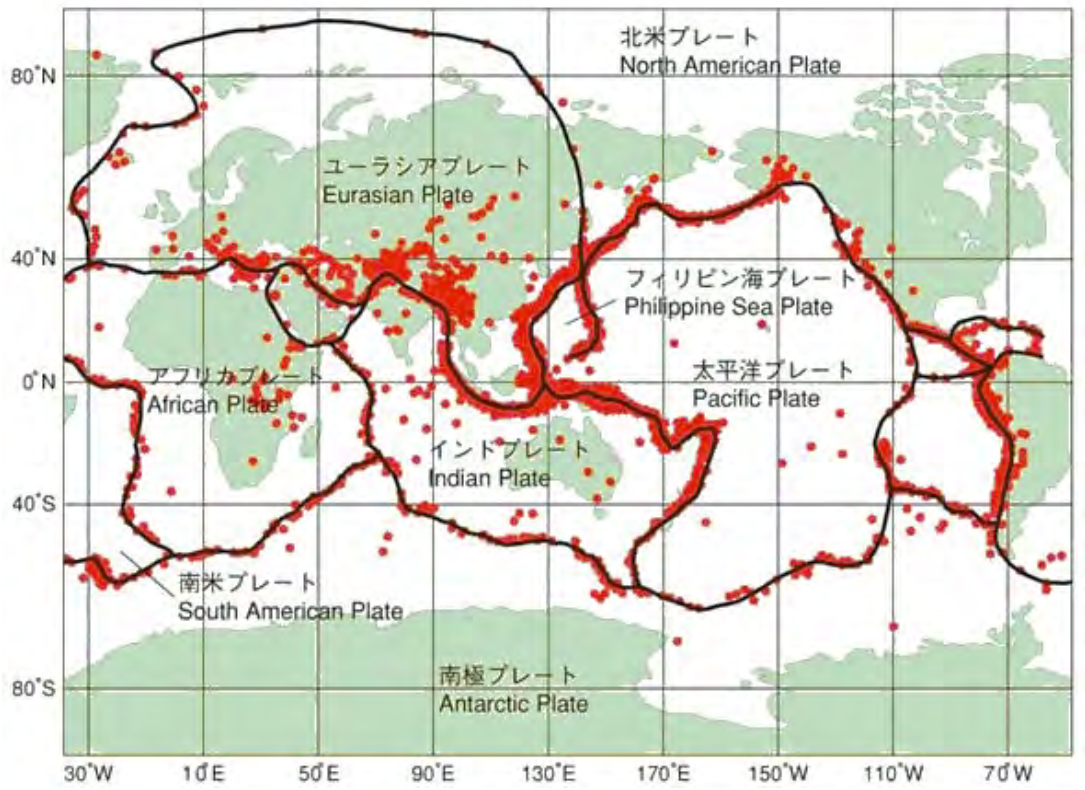
How?

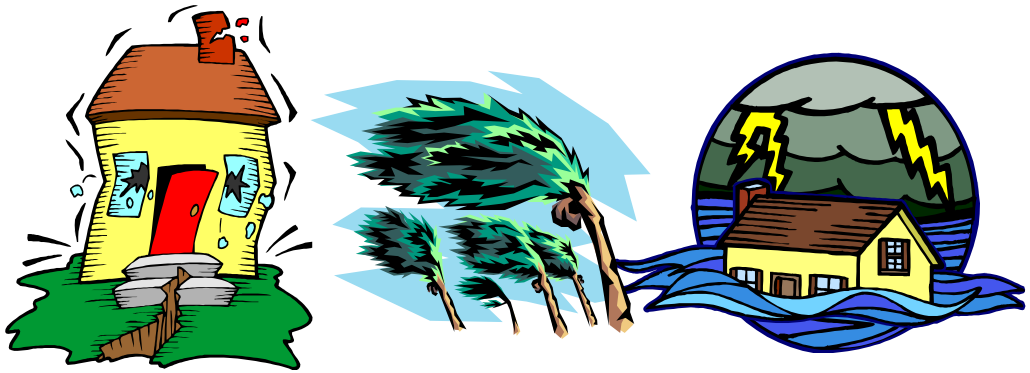


Addressing the Four Phases of Disaster Reduction

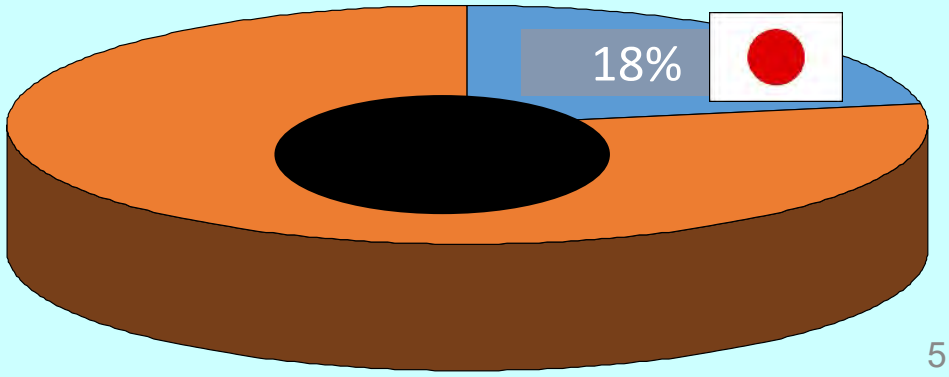
Mother Nature is not Gentle in Japan !

- **Earthquakes**
- **Tsunamis**
- **Volcanic Eruptions**
- **Typhoons**
  (July – October)
- **Heavy Monsoon Rains**
  (May – July)
- **Floods**
- **Landslides**
- **Snow Avalanches**





Number of earthquakes with magnitude of 6.0 or larger (2011-2020) Japan's Unfair Share



Japan's long tradition of coping with natural disasters


日本書紀巻第一上
神代上
古天地未剖陰陽不分渾沌如鶏子

- 416A.D. August, Yamato-Kochi Earthquake

The first written record of Earthquake in Japan within "Nihonshoki" the first official history book of Japan, edited in 8th century.

- 684A.D. November, Hakuho-Nankai Tonankai Earthquake (Estimate Magnitude: 8.2-3) & Tsunami

The first written record of Earthquake Tsunami in Japan within "Nihonshoki".

- Most dreadful things historically in Japan for children

1. Earthquakes, 2. Lightning/Thunder, 3. Fire, 4. father

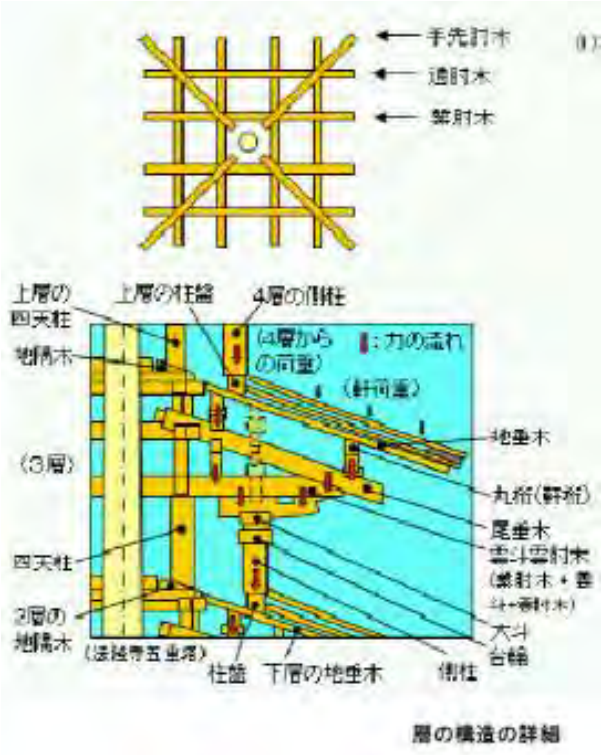
Jishin Kaminari Kaji Oyaji

Not anymore

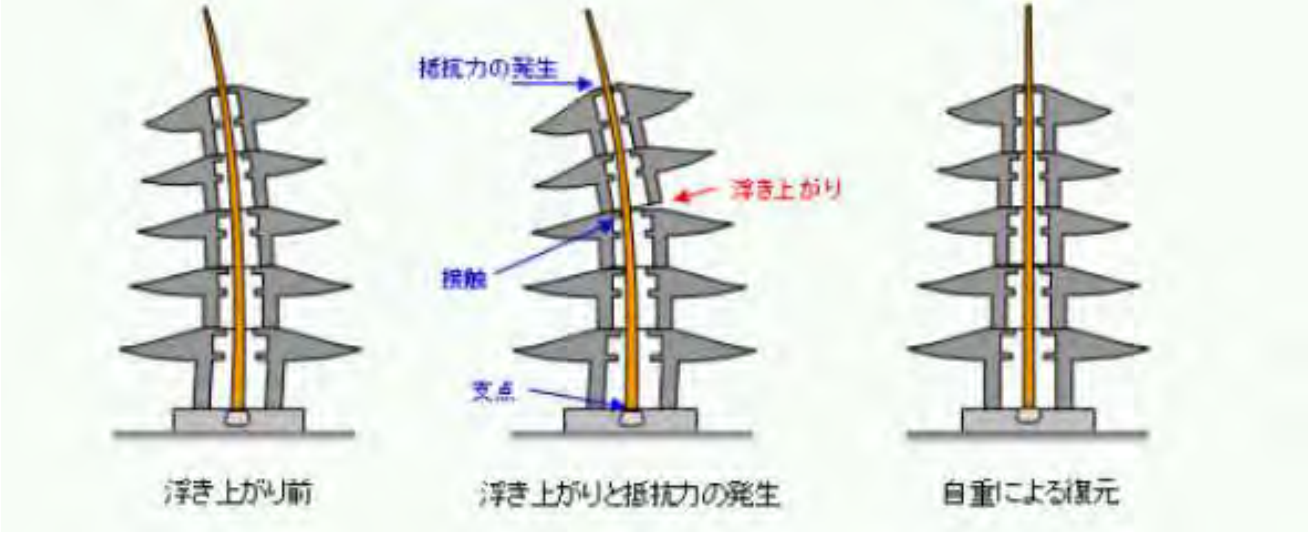
Pagoda of Horyuji Temple built 680A.D.
The Oldest Wooden “High-Rise” Building in Japan withstood numerous Earthquakes over the Centuries

5 layered, 32m high

Combination of semi-flexible timberwork joints and a central wooden pillar disperses and absorbs earthquake shocks



層の構造の詳細

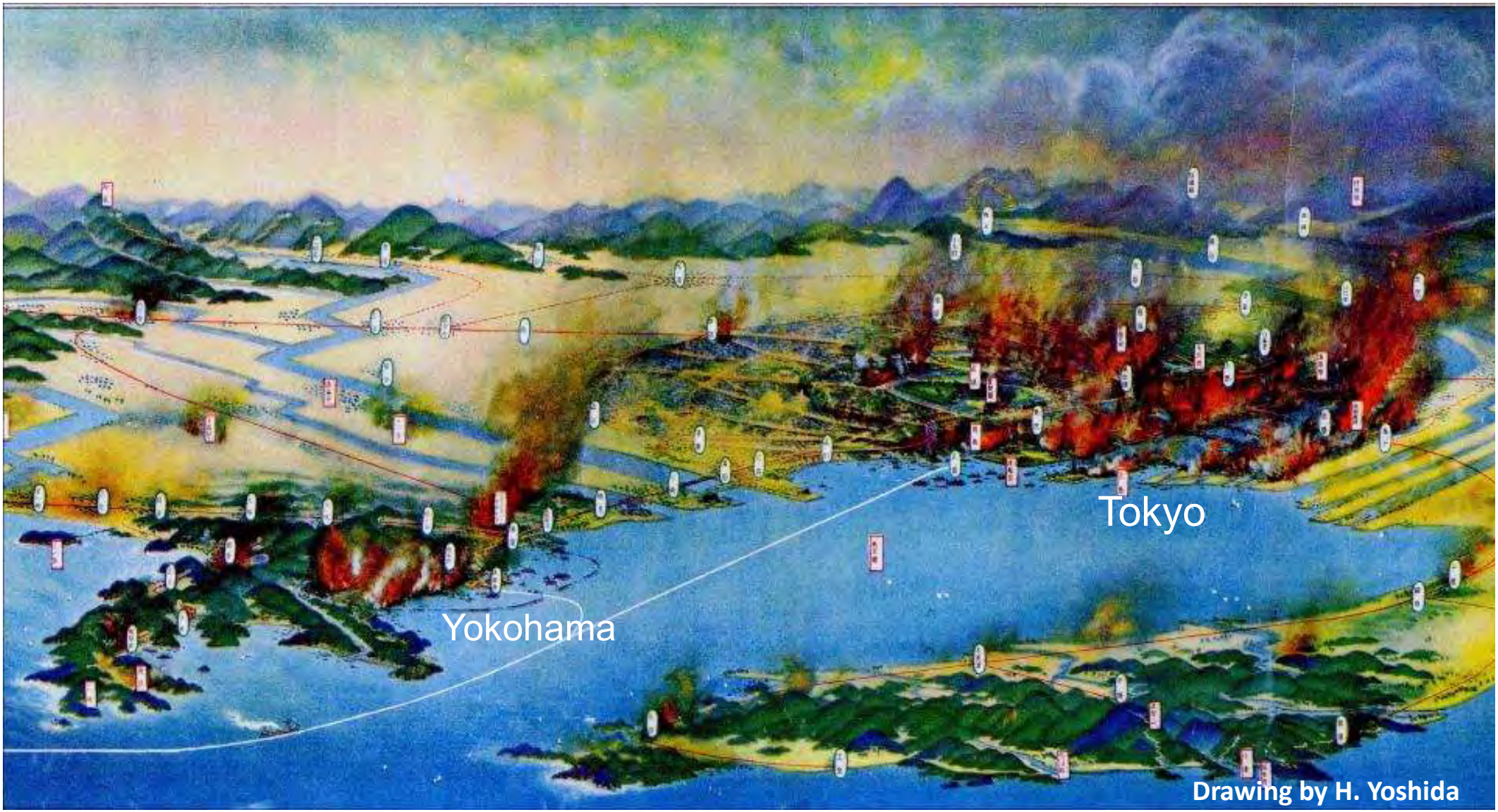


Traditional “UKIYOE” drawing after 1855 October Ansei-Edo Earthquake

Edo (Old name of Tokyo) citizens beating the legendary Catfish Monster which was believed to cause earthquake

1923 Great Kanto Earthquake destroyed Tokyo & Yokohama

M7.9 Sagami Trough Earthquake on 1 Sept. 1923



105,000 Casualties, approx.40% of GDP of Japan lost

The Tokyo Capital Reconstruction Project (1924-1930)

Citizens of Tokyo rose up together, with the motto:
“We do not want to suffer that misery ever again!”

BBB 100 years ago

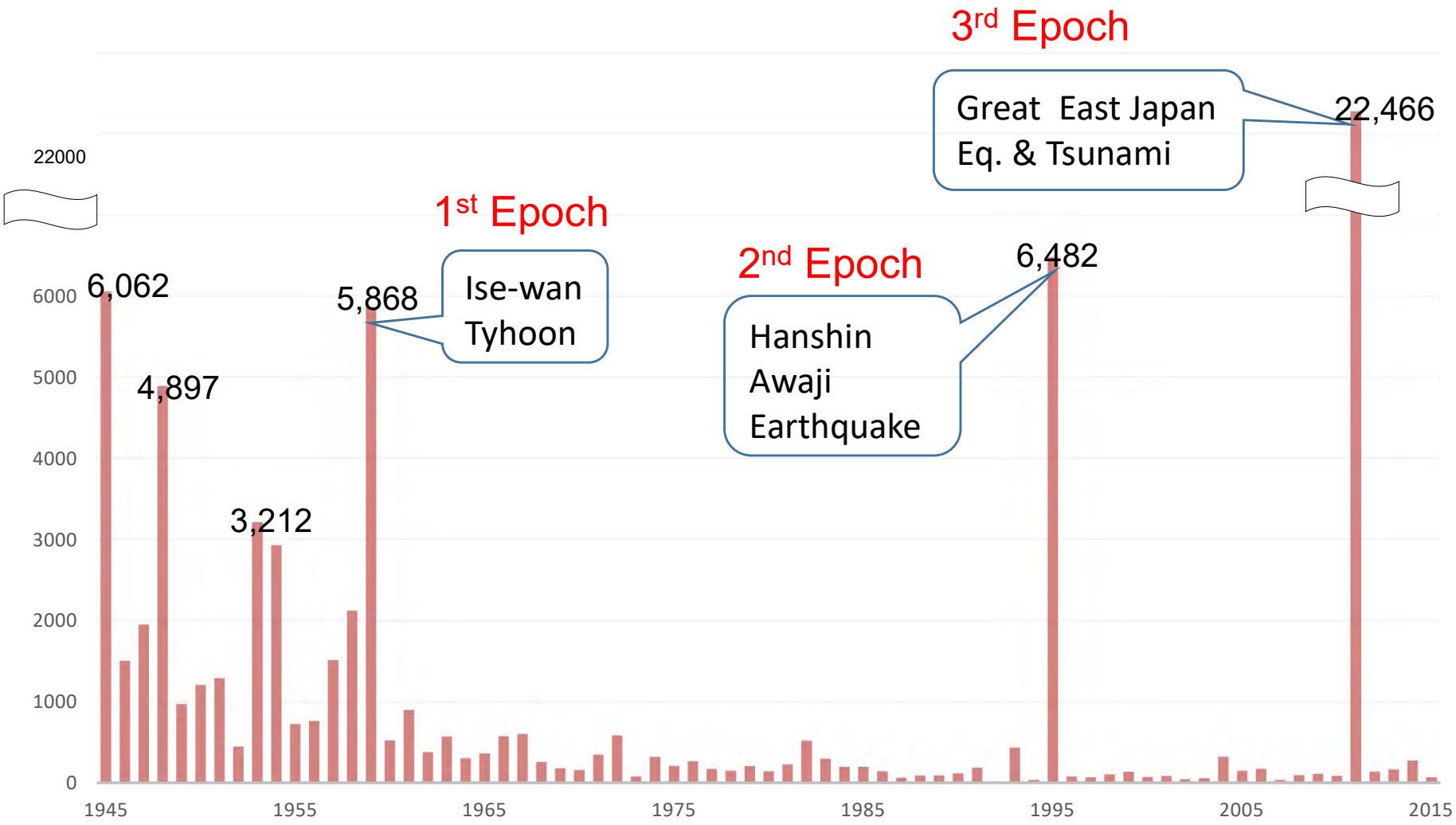
Objective of the project: Create the city as the capital of Japan which the people can be proud of, while ensuring earthquake and fire resilience, prioritizing the public interest under the national consensus.

Details of Tokyo Reconstruction Project

The total cost was about 724.5 million yen (about 4 trillion yen in current value)

From a poster on display at the Fukko Kinenkan (Great Kanto Earthquake Memorial Museum)explaining the details and costs of the Imperial Capital Reconstruction Project in Tokyo.

Statistics on Casualties by Natural Disasters in Japan 1945-2015



1959 Ise-Wan Typhoon was the 1st Epoch-Making Turning Point

Ise-wan Typhoon hit Nagoya, the 3rd largest metropolis on 26 Sep.1959
Lowest pressure 894 hPa ,
Max Wind Speed 75m/s
5098 killed. 4.2% of GDP lost.

Disaster Countermeasures Basic Act 1961 newly legislated

- Response oriented approach to preventive approach
- Individual approach to comprehensive multi-sectoral approach
- Investment for disaster reduction
- National, Prefecture and Municipal Gov'ts were given responsibilities

1 Sept. designated as "Disaster Prevention Day"(Annual Nationwide Event)

Great Success in decreasing Typhoon & Flood Casualties

Investing in Science and Technology for Disaster Reduction

Meteorological Radar

On top of Mt. FUJI 3776m high

10 March 1965,
The first high mountain meteorological radar started observation.

Fukui Earthquake(M.7.1) 1948

3,769 casualties

内閣府防災災害教訓報告書

福井県資料

Wooden houses collapsed
caught fire

Tokachi-oki Earthquake(M7.9) 1968

52 Casualties

Collapsed RC buildings

Miyagi-ken-oki Earthquake(M7.4) 1978

Sendai City Experience

28 Casualties

Crashed concrete block wall

school children crushed to death

Pancake-collapsed building

Evolution of Japan's Anti-Seismic Building Code

1923 The Great Kanto Earthquake (M7.9: Tokyo devastated 105,000 dead)
1924 First Seismic Building Code
1948 Fukui Earthquake (M7.1: 3,769 dead)
1950 Building Standard Law
1968 Tokachi-oki Earthquake (M7.9: 52 dead)
1978 Miyagi-ken-oki Earthquake (M7.4: 28 dead)

1981Revision of Building Standard Law requirements:

- No damage against medium scale (JMA scale 5+) earthquakes,
- To be able to continue use after these medium earthquakes.
- No collapse & safety of people inside against large scale(JMA scale 6+ to 7) earthquakes

1995 Hanshin-Awaji(Kobe) Earthquake (M7.3: 6,347 dead)
1995 Revision of Building Standard (encourage metal reinforcement to wooden beam & pillar joints)
2000 Revision of Building Standard (ground strength check made mandatory & wall ratio increased for wooden houses,)

JMA scale 5+ ⇒ almost equivalent to Mercalli scale VII
JMA scale 6+ to 7 ⇒ almost equivalent to Mercalli scale VIII to IX

1995 Hanshin-Awaji (Kobe) Earthquake (M7.3)

was the 2nd Epoch-Making Turning Point

Fire in a city center

Collapsed houses

Damaged office building

Damaged railway track

Collapsed viaducts of an expressway

6,437 Casualties

Lesson1: Collapse of old houses built before 1981 standard was the main cause of death

5,520 direct deaths (+917 relevant deaths)

total 6,437 victims

83% immediately killed by building collapse

surgeon general's autopsy report

1995 new Act on Seismic Retrofitting of Existing Buildings

Public awareness campaign on housing seismic safety

Public campaign on affixing furniture and room safety

Damage to Kobe City Hall main building

Difficultly in Communication at HYOGO Prefecture Headquarter

Lesson 2:Delay of First Response due to lack of information at the direct hit Kobe city

- Damaged Local Government Headquarter
- Local Government Command initially paralyzed
- Destroyed almost all traffic system
- Telecommunication, even satellite telecommunication system were cut off due to power failure

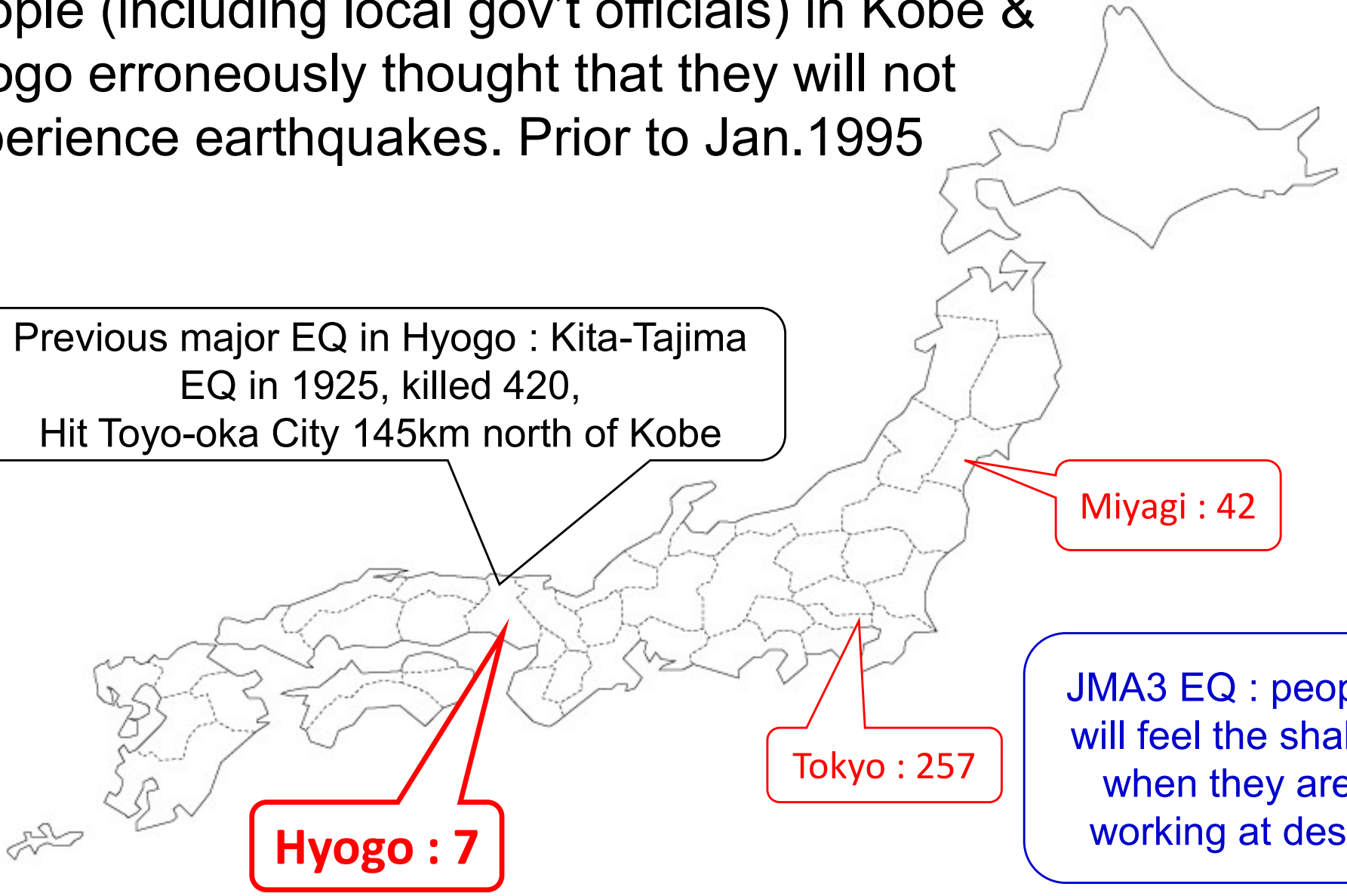
⇒ It took three days to grasp the entire picture of damage

⇒ The bottom-up reporting system could not function

- Nationwide support system for local & regional emergency
- Appointment of Minister of State for Disaster Management
- High density seismometer network &
- Development of disaster damage estimation system (DIS)

Biggest Lesson: Lack of Earthquake Awareness in Kobe & Hyogo

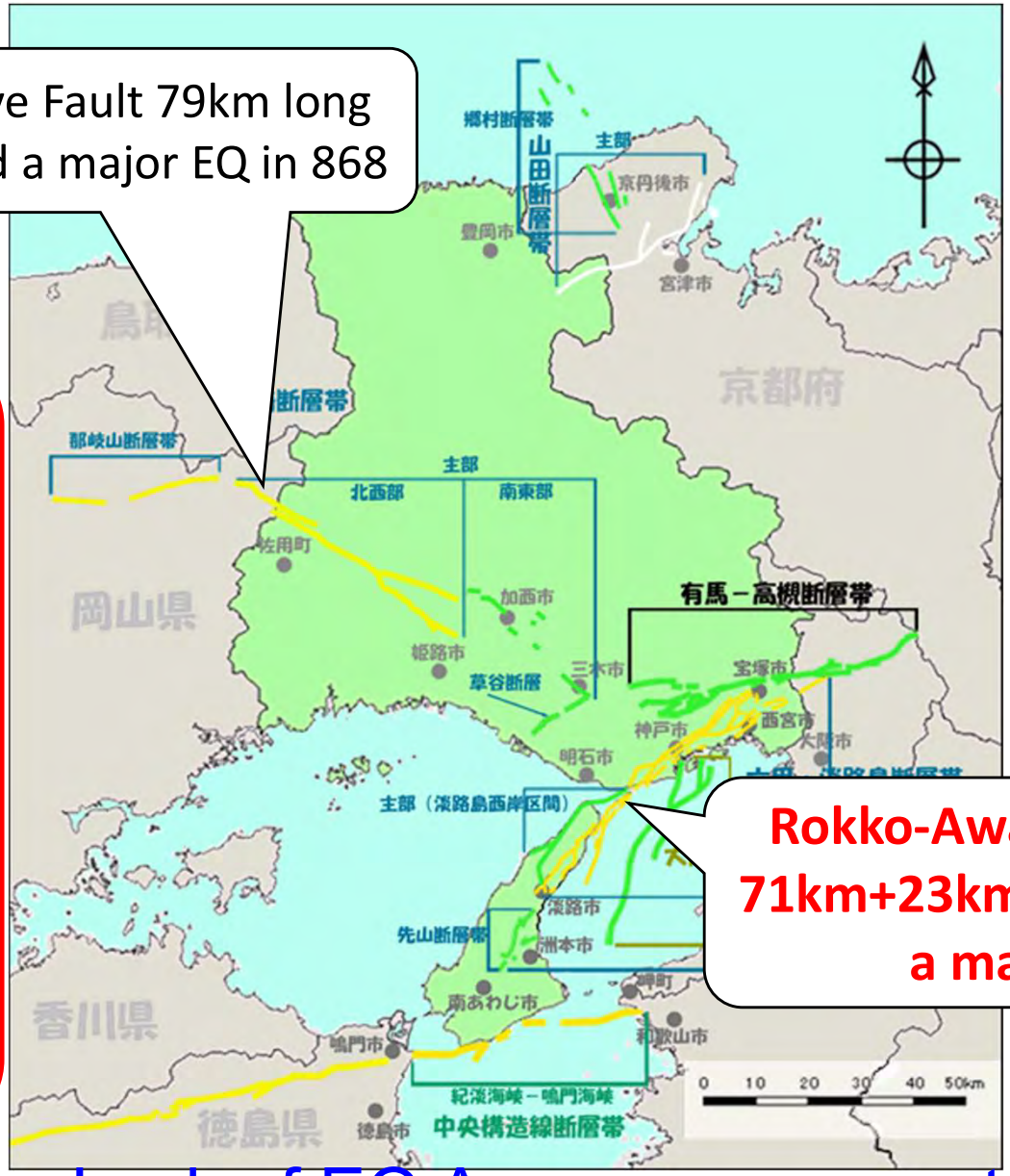
People (including local gov't officials) in Kobe & Hyogo erroneously thought that they will not experience earthquakes. Prior to Jan.1995



Number of EQs greater than JMA3 felt in 1985-1994

Existence of Active Faults in Hyogo were known to only a limited number of scientists

Yamazaki Active Fault 79km long which triggered a major EQ in 868



Risk Communication Gap between Academia & Policy

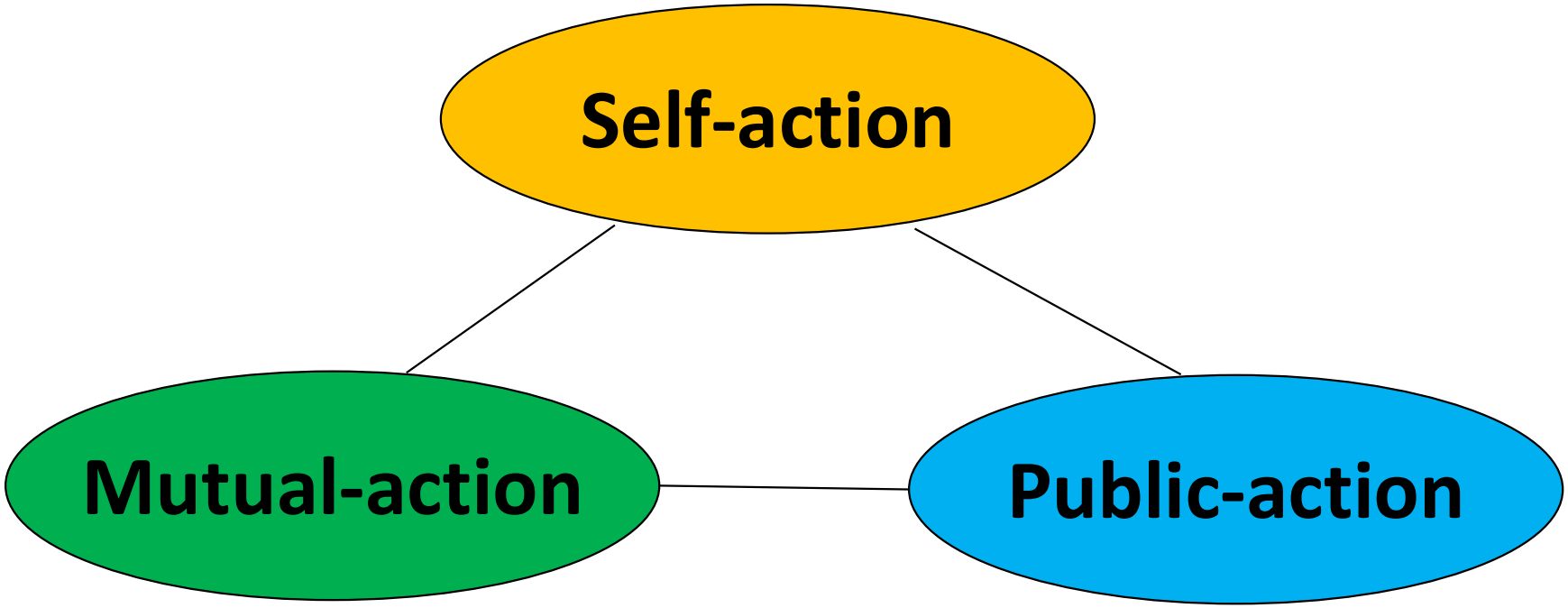
Rokko-Awajishima Active Fault 71km+23km long which triggered a major EQ in 1596

http://www5d.biglobe.ne.jp/~kabataf/katudansou/hyougo/hyougo.htm

Lack of EQ Awareness meant
Lack of Preventive Measures & Preparedness

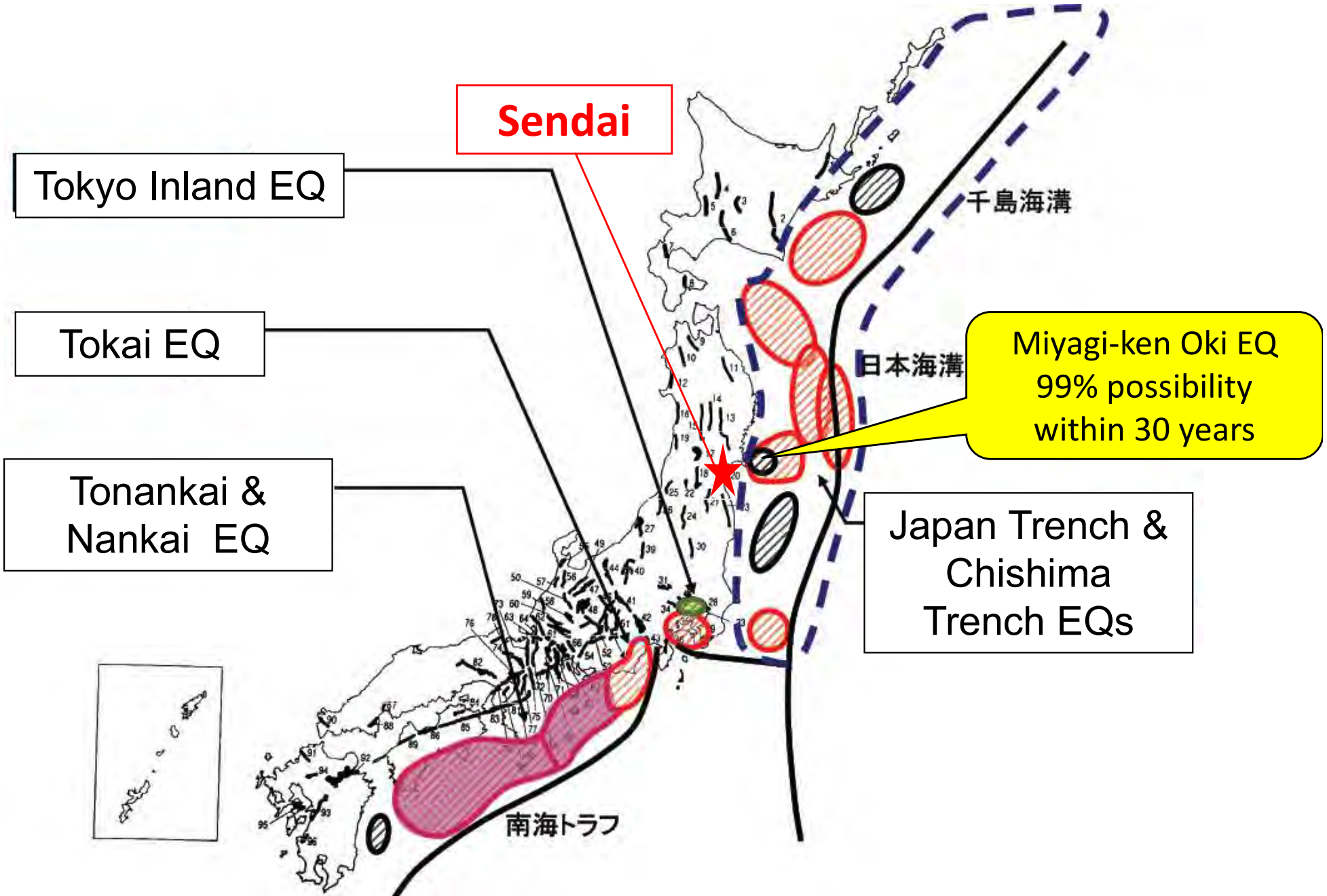
Paradigm shift after 1995 Hanshin-Awaji (Kobe) Earthquake

Call for a Nation-Wide Movement for Disaster Reduction Actions



Self-help action by individuals, families and companies
Mutual-help action at neighborhoods and local communities
Public-action by governments

Recognized Possibilities of large-scale M8 earthquakes and tsunamis in Japan (pre-2011)



M9 Earthquake & Tsunami Came ! 2011

The 3rd Epoch-Making Turning Point

写真出典仙台市復興五年記録誌

Tohoku was prepared for a Miyagi-ken Oki EQ of M7.6-M8.2,
but what came was M9 EQ & Tsunami

Energy of M9 earthquake is 32 times stronger than M8 earthquake

Enormous Destruction by the Tsunami !

Tsunami Warning → Run!
Disaster Education Tested!

Junior high school students helping elementary school children to run to high grounds in Kamaishi City.

撮影:高村幸男

Massive Evacuation !

Emergency Sirens for Tsunami Warning

Elementary School on hilltop

Signs of Tsunami Evacuation Building

Approx. 500,000 people in the Tsunami inundated area. Majority escaped.

But 20,000 did not make it!

Mortality rate of Tsunami Inundated area
Indian Ocean Tsunami: 40%
Great East Japan EQ&Tsunami: 4%

Photos by ADRC

Seismic Retrofit of Schools

Seismic retrofit of schools based on
Sendai City Earthquake Resilience Policy April 2008

Progress of school seismic retrofitting : 99.6% done by April 2010

M9 Earthquake Came ! 11 March 2011

No structural damage to Sendai schools.
Not a single child killed in Sendai school.

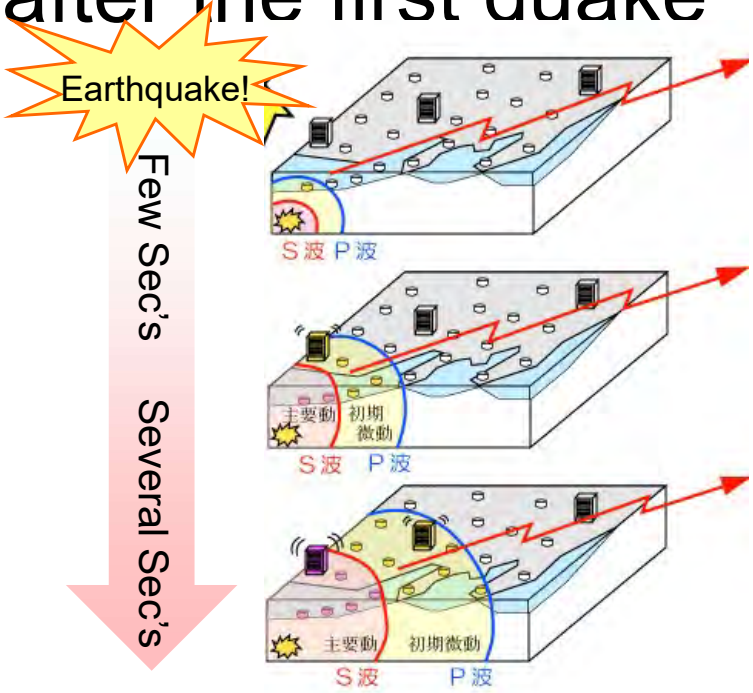
Seismic Retrofit of Fire Stations

Seismic Retrofit of Sendai City Fire Stations based on
Nov. 1999 “Sendai City Building Assets Seismic Safety Target”
April 2008 “Sendai City Earthquake Resilience Policy”

M9 Earthquake Came ! 11 March 2011

None of the Fire Stations structurally damaged by earthquake.
Functioned as Emergency Operation base.

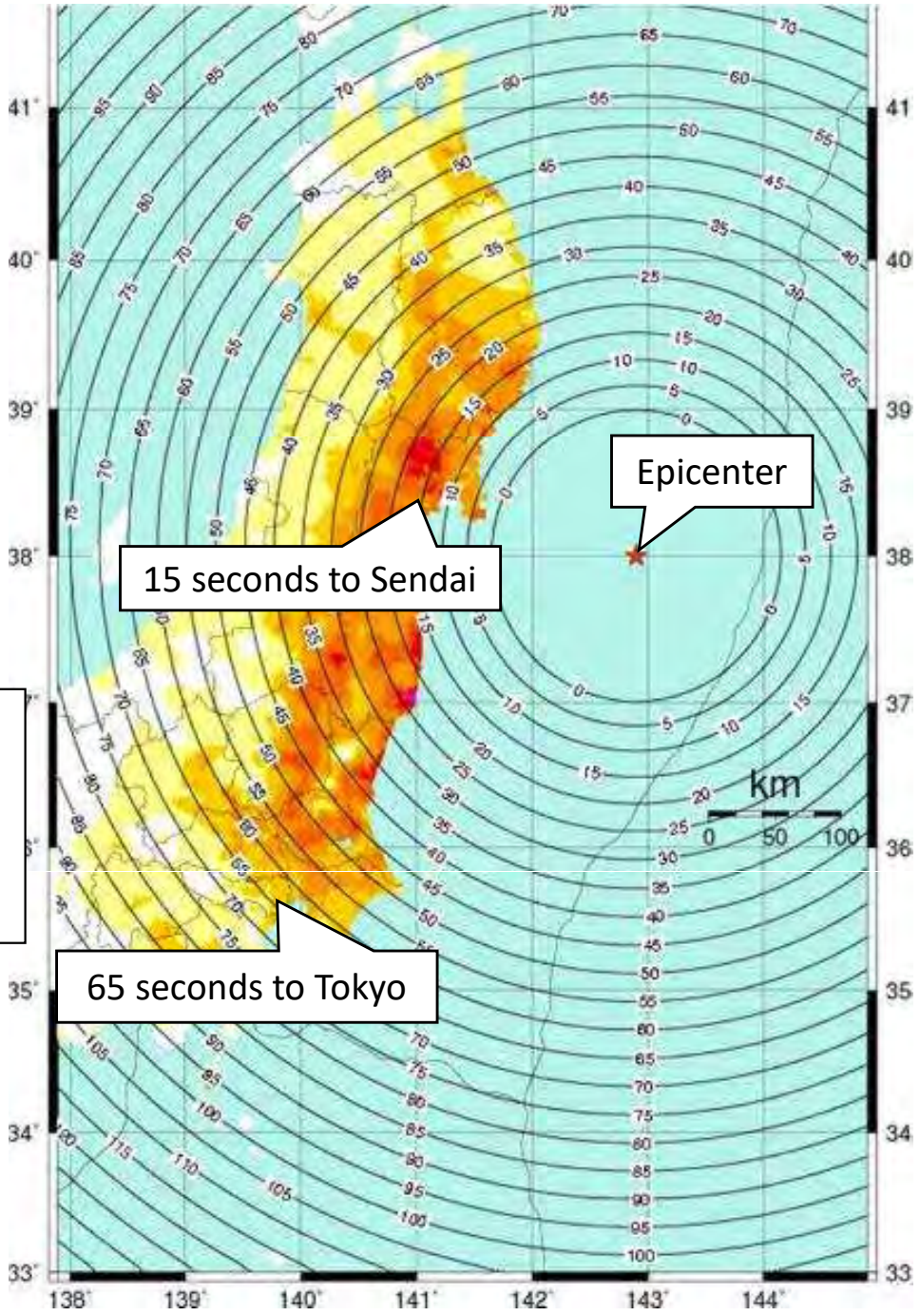
Real-time Earthquake Early Warning issued 8.6 seconds after the first quake



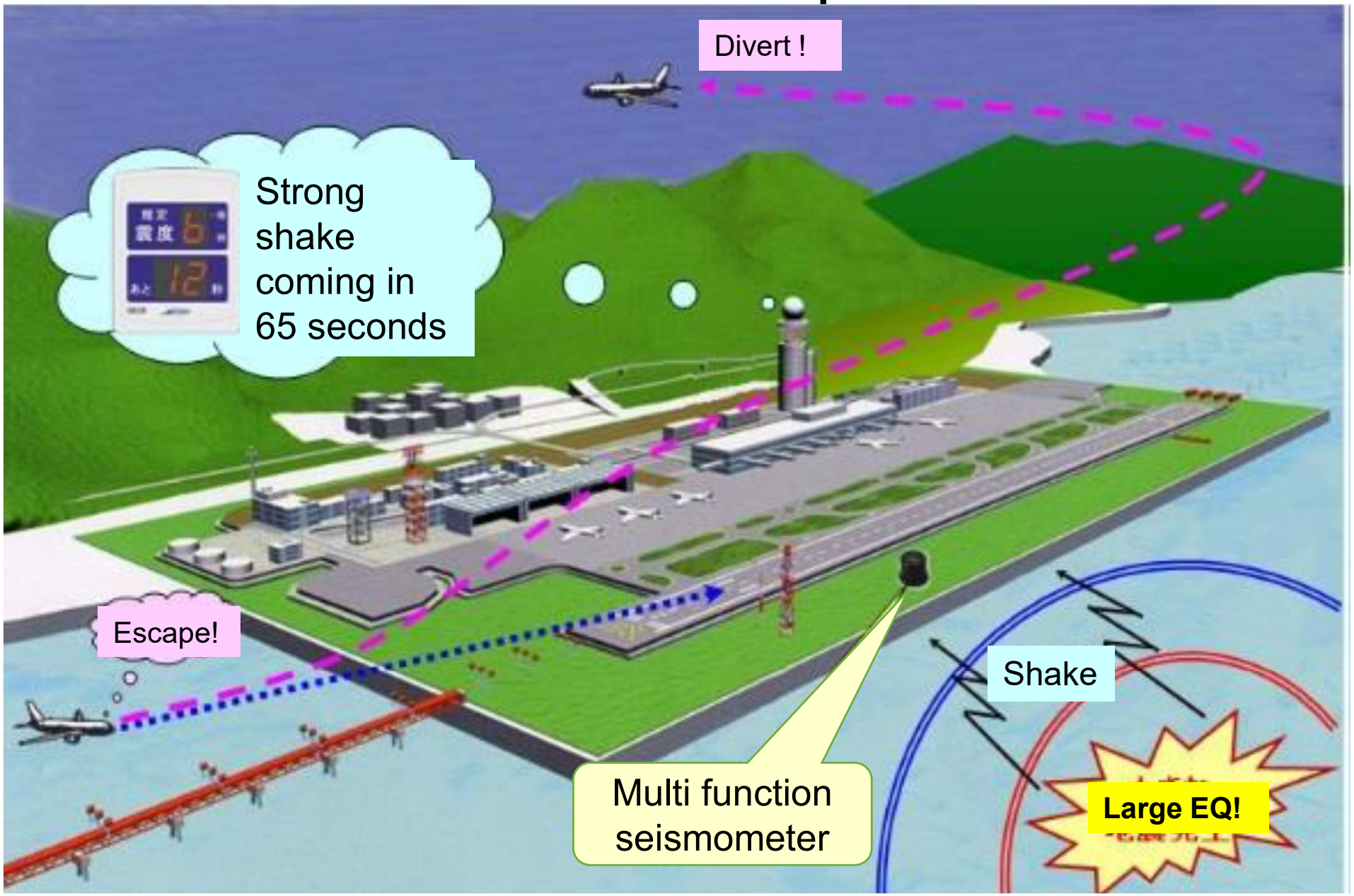
Primary Pressure wave travels much faster than the Secondary Shake wave

Japan Met Agency issues EEW and is aired on TV, Radio and cell phones

Protect yourself before the main shake comes!



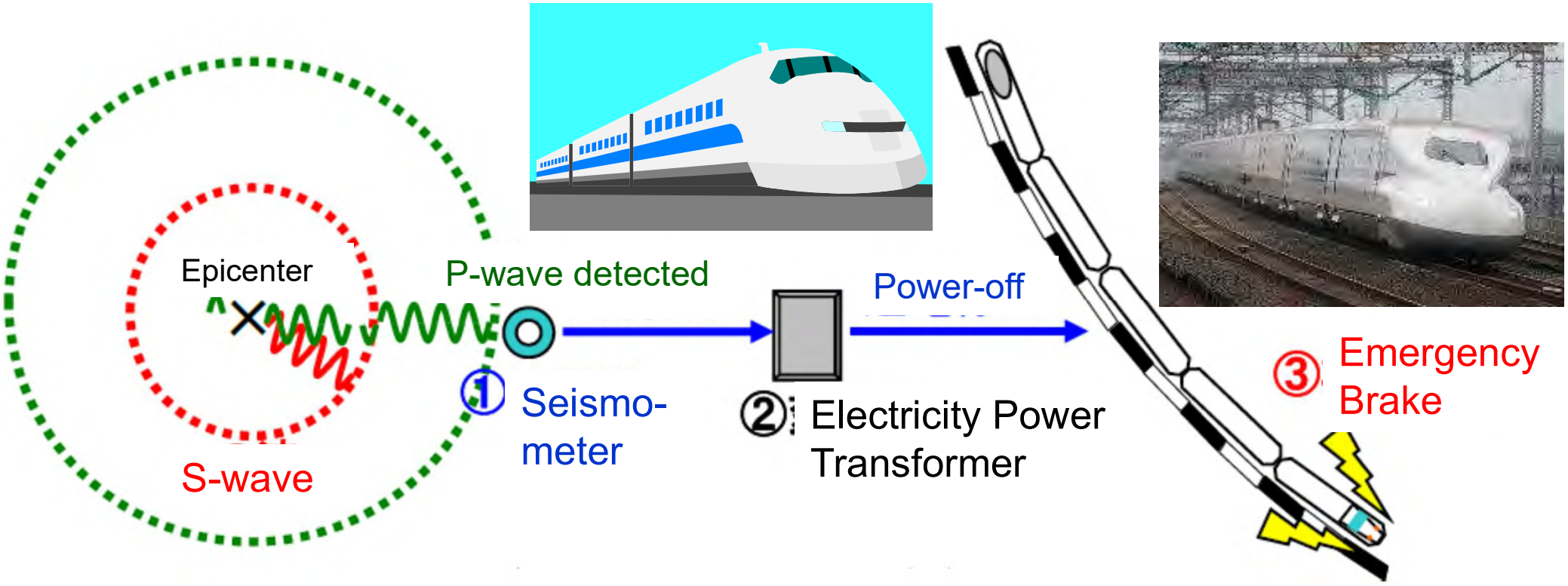
Realtime EEW for Airport Control



On 11 March 2011, Tokyo Haneda, the busiest airport in Japan, many planes were about to land. Upon receipt of EEW, the air control tower immediately commanded planes to escape and divert.

Tohoku Shinkansen (Bullet Train) immediately stopped by primary-wave sensors located along the coastline.

No derailment, No fatalities, No injuries.



27 Shinkansen were in service between Tokyo and Shin-Aomori.
2 Shinkansen were running at maximum speed 270km/h near Sendai.
P-wave detected, electricity immediately cut off, 9-12 seconds before the first S-wave.
Emergency brake. Maximum S-wave reached 70 seconds after the first detection, Shinkansen was already slowed down below 100km/h. Safe Stop!

The Japanese Experience:

- Constant "Kaizen"(improvement) for DR
- Constant enlargement of participation
- Constant expansion of scope of DR

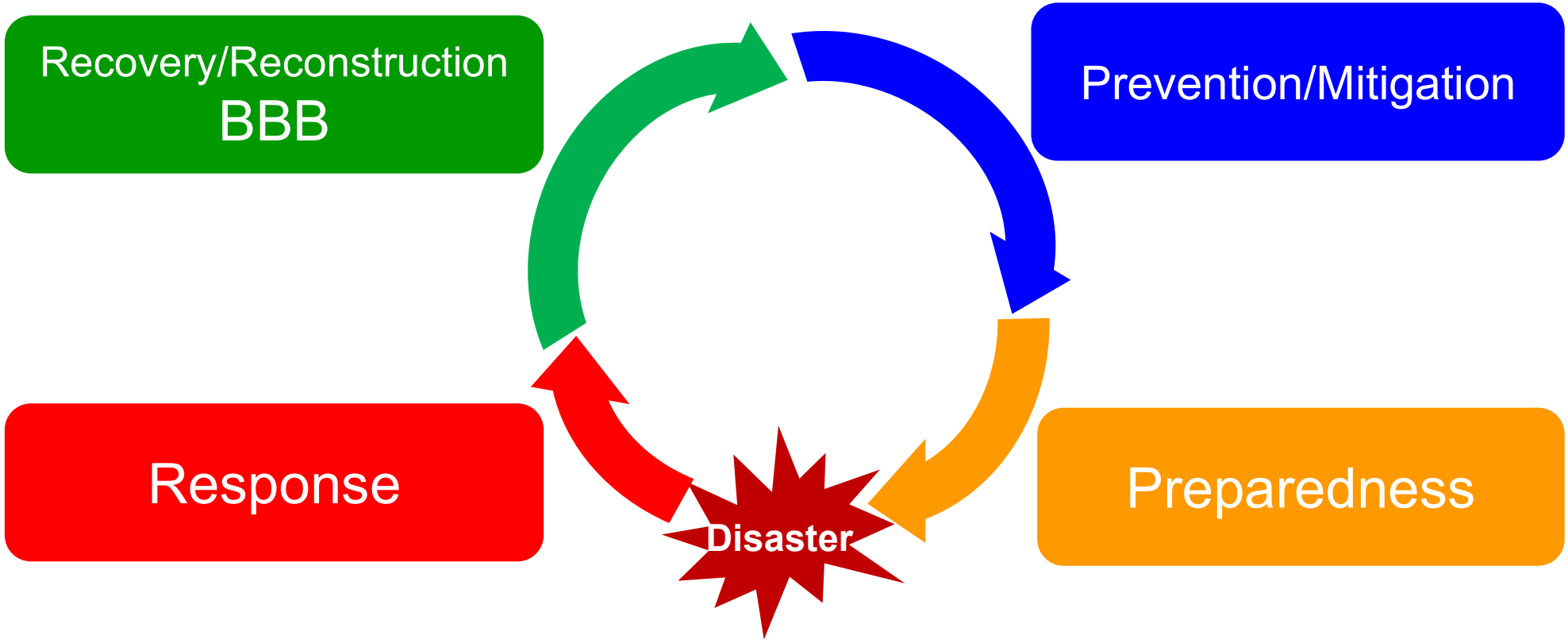
- Based on every bitter lessons learnt
- Applying all the scientific & technical knowledge
- By always trying to raise awareness of numerous stakeholders

Japan  Hosted

1994 1st WCNDR: Yokohama Strategy for a Safer World 1994
2005 2nd WCDR: Hyogo Framework for Action 2005-2015 (HFA)
2015 3rd WCDRR: Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR)

UN World Conference on Disaster Risk Reduction
2015 Sendai Japan

Sharing the Japanese Experience of Addressing the Disaster Reduction Cycle



Reflecting the Lessons Learnt through Bitter Experiences





17 Dec, 2024 Vanuatu hit by Earthquake

Magnitude 7.4 Earthquake Strikes Off the Coast of the Capital City of Port Vila

Several buildings in the city collapsed

Numerous landslides occurred

14 dead, 200 injured

17 Dec, 2024 Vanuatu hit by Earthquake

JICA provided emergency relief supplies and support for disaster medical information management.

Provision of Emergency Relief Items

3 Jan. 2025

Handing Portable Water Purifying Equipment

17 Dec, 2024 Vanuatu hit by Earthquake

"Rapid Assessment Mission for Post-Disaster Reconstruction Assistance" 5 Jan. to 31 Jan.

JICA mobilized "Disaster Standby Expert Team" on January 5, 2025 to confirm the damage situation, identify recovery and reconstruction needs based on Build Back Better, and to collaborate with other development partners.

Landslide that occurred near the international terminal wharf developed with Japanese grant aid.

The survey team on a small boat heading for the Port Vila Harbor Wharf (expanded in 2008 with grant aid), where the access road was impassable due to a landslide.

None of the wharves built with Japanese assistance had structural problems

17 Dec, 2024 Vanuatu hit by Earthquake

"Rapid Assessment Mission for Post-Disaster Reconstruction Assistance" 5 Jan. to 31 Jan.

Airport terminal building built with Japanese aid functions without problems

Airports and ports are the lifeline for SIDs!

Reliability of Japanese Aid!

Vanuatu Earthquake Recovery Seminar January 23, 2025

Held jointly with the Ministry of Infrastructure and Public Works of Vanuatu. Aimed at sharing Japan's earthquake recovery experience and to encourage Build Back Better in Vanuatu. About 90 participants, including development partners from Australia, NZ and other countries attended. In the seminar, Satoru Nishikawa shared his experiences and lessons learned from Japan's earthquake recovery. The survey team reported on the initial findings, leading to lively discussions.

JICA conducts 'Build Back Better' seminar on earthquake recovery and reconstruction

Access passes for CBD restricted amid demolition efforts

JICA's Capacity Development Programs for Disaster Reduction




27 Courses held in 2025 in Japan, Duration 1 to 12 months

- Overall Capacity: Sustainability & Resilience, Africa, Central Asia, SIDs, Latin America
- Response Capacity: Fire Management, Search & Rescue, Maritime Search & Rescue
- Technical Capacity by Disaster Type: Flood & Storm, Landslide, Volcano, Earthquake
- Advanced Engineering Capacity: Seismic Safety, Hydrology, Dam Safety, Sabo
- Cross Cutting Capacity: Mental Health, Gender & Diversity

Country Specific Tailor-made Capacity Development Programs

Third Country Capacity Development Programs jointly organized by host country

- with Mexico for meso-American Countries
- with Turkey for Afghanistan
- with Chile for South American Countries & more

Assisting ASEAN Capacity Development Courses

Applying Japanese Capacity Development Methodology for Disaster Reduction

Evacuation Drills at communities with checking Safe Routes

"Town Watching" for identifying disaster risks at community level and proposing solutions.

Walk around the town with map in your hand. Find something!!!

Applying Japanese Capacity Development Methodology for Disaster Reduction

Interview the locals of their past experiences of disasters & recognition.

"Town Watching" for identifying disaster risks at community level and proposing solutions.

Walk around the town with map in your hand. Find something!!!

Applying Japanese Capacity Development Methodology for Disaster Reduction

Local Signboard warning of debris flow

Walk around to identify the traces of past disasters.

Applying Japanese Capacity Development Methodology for Disaster Reduction

Group discussions among the participants lead to findings.

Emergency Exercise with Locals' Participation
Checking Vulnerabilities at Community Level using Hazard Maps for "Self-Help" and "Mutual-Help"

Applying Japanese Capacity Development Methodology for Disaster Reduction

Group discussions among the participants lead to findings.

This methodology “Town Watching” can be easily applied at different countries at their local communities for identifying the risks and proposing solutions by the locals.

How can we better share the lessons learnt ?

November 2013

March 2011

September 2005

Thank you for your attention!