INTEGRATED FRAMEWORK OF JAPANESE DRM

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KEY MESSAGE

Japan has developed the DRM framework

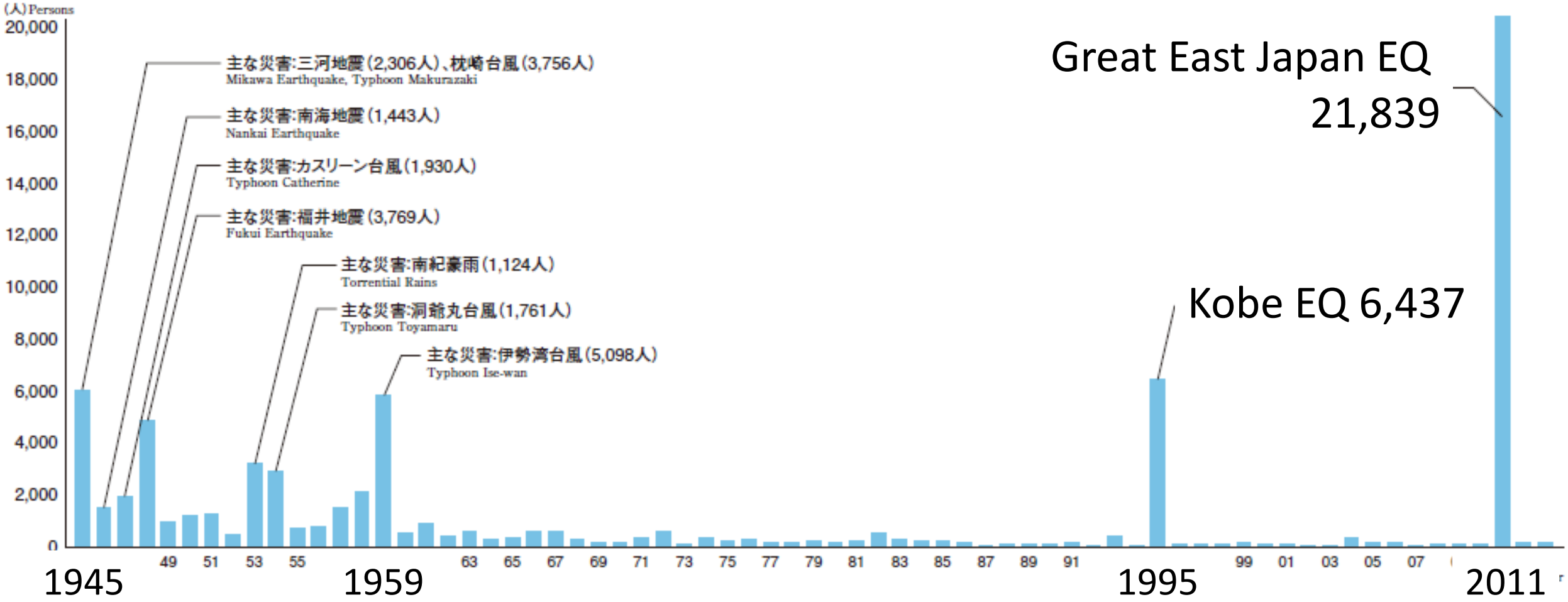
by integrating various sectors and organizations at all levels

through learning from disasters

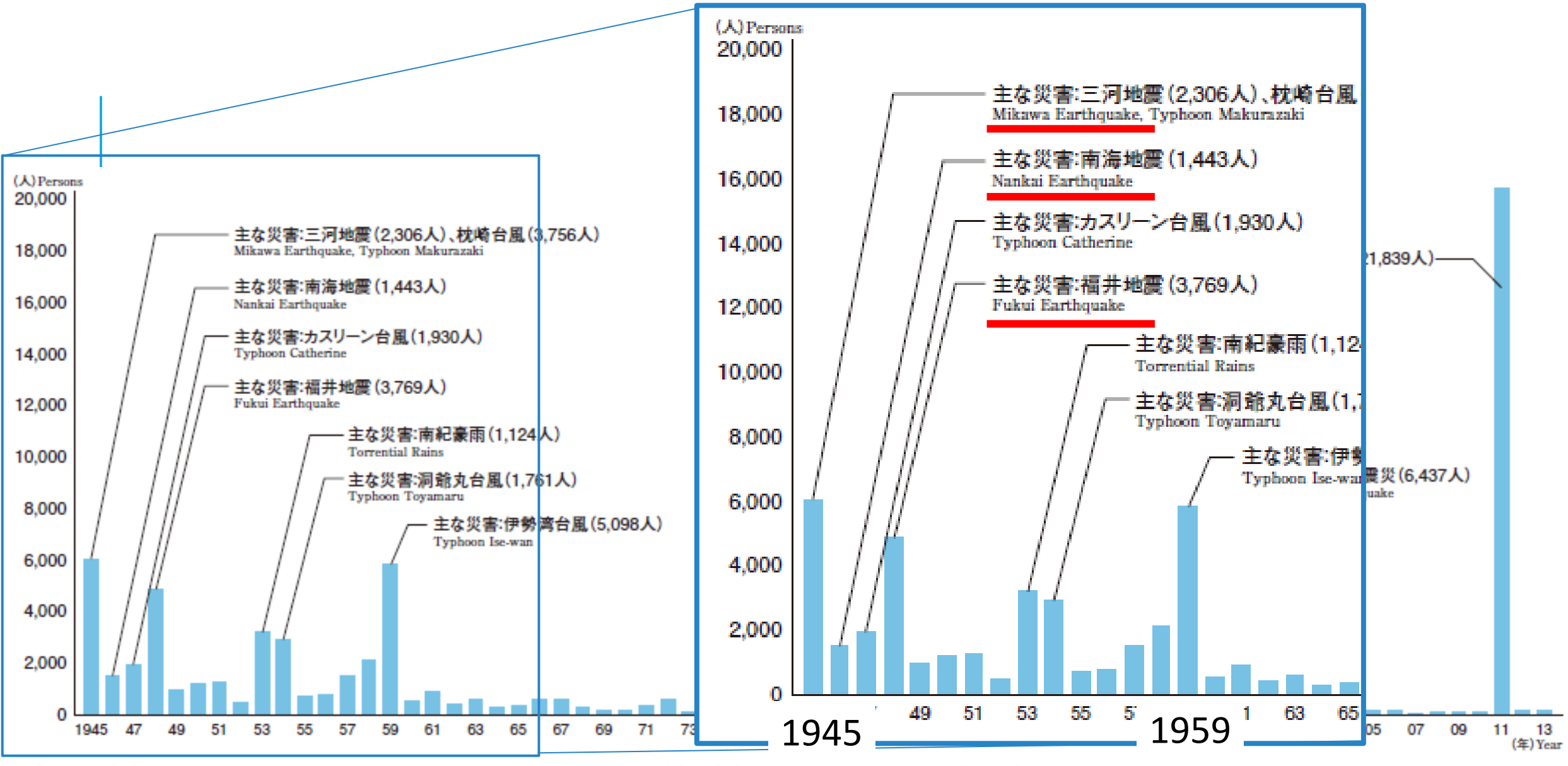
1. Earthquake disasters in Japan
2. Integrated Framework
3. How works? Integrating response at Great East Japan Earthquake and Tsunami
4. Conclusion

I. EARTHQUAKE DISASTERS IN JAPAN

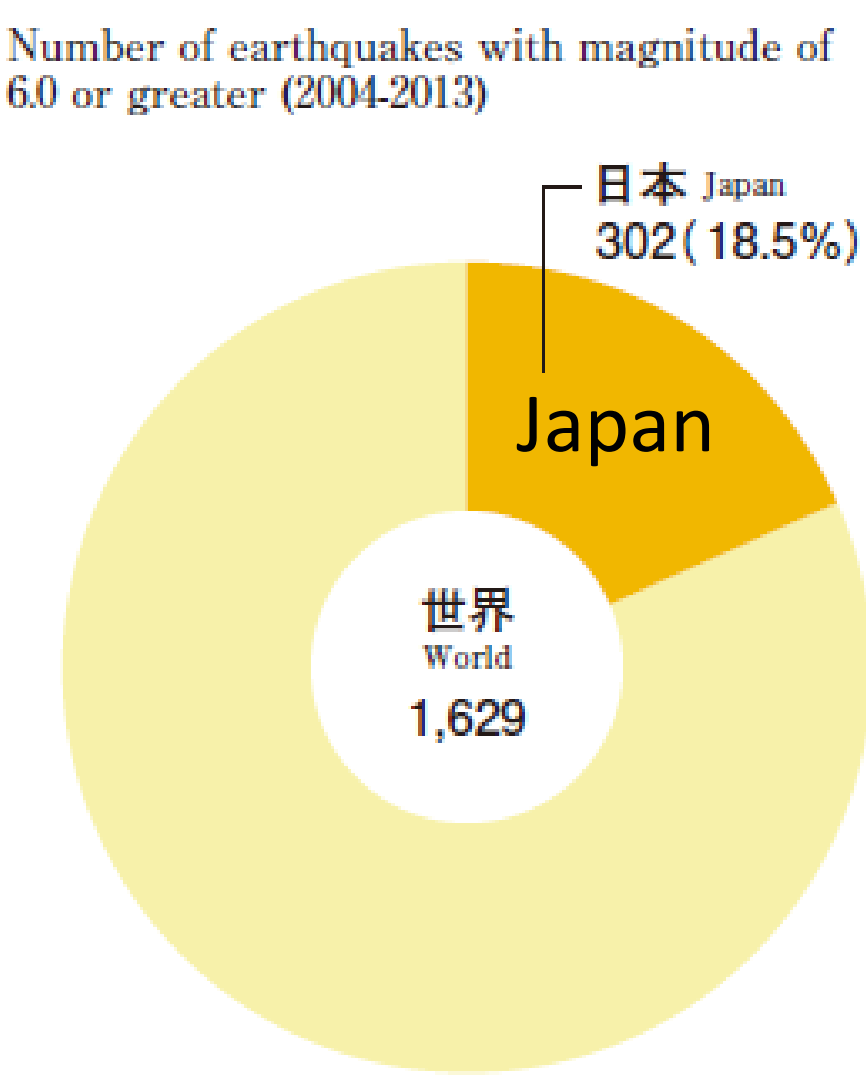
DEATH TOLL BY NATURAL DISASTERS

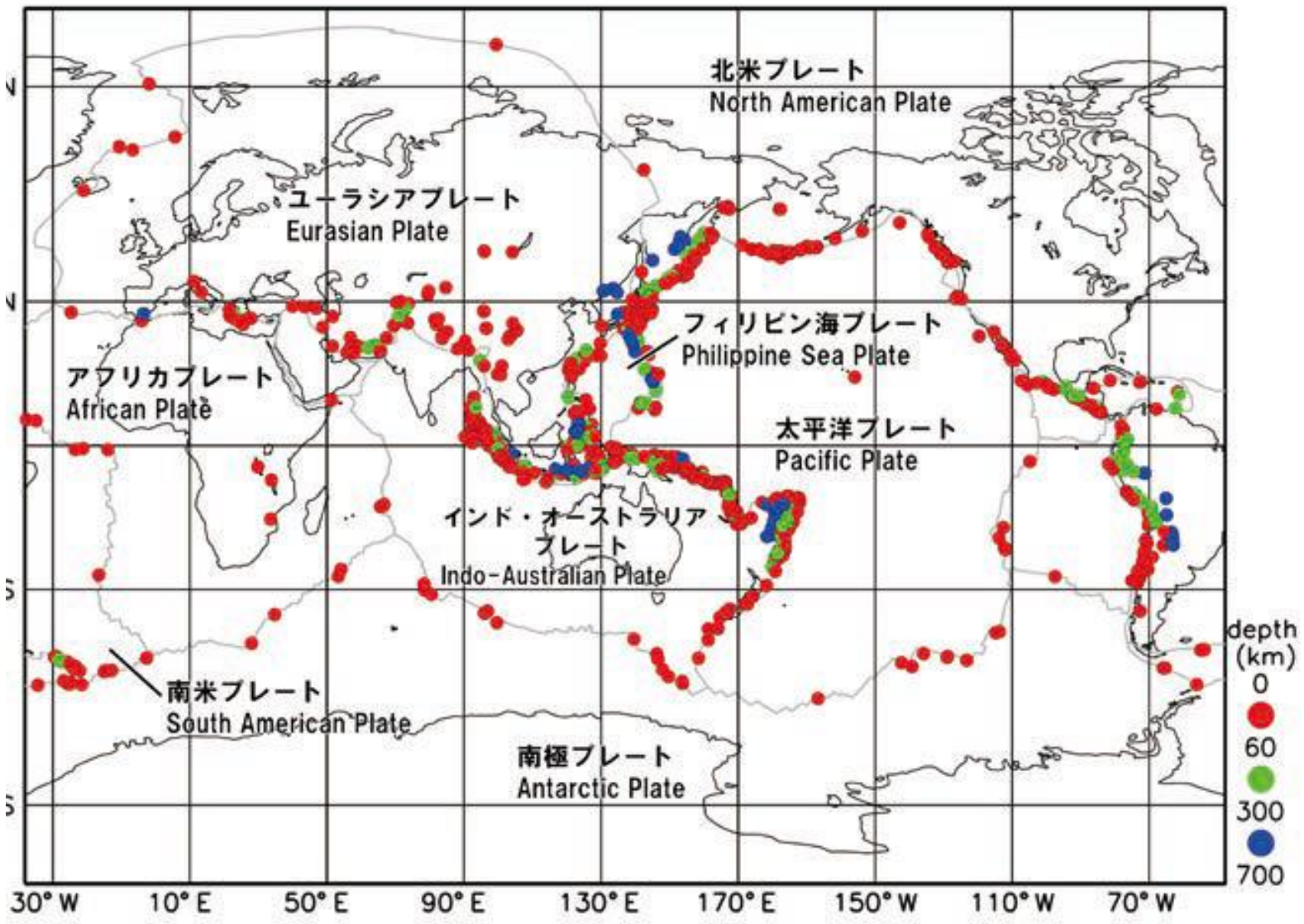


日本の災害対策 [2019/2/22閲覧]
http://www.bousai.go.jp/1info/pdf/saigaipamphlet_je.pdf



日本の災害対策 [2019/2/22閲覧]（一部拡大）
http://www.bousai.go.jp/1info/pdf/saigaipamphlet_je.pdf





20% of Earthquakes happen in Japan

日本の災害対策 [2019/2/22閲覧]
http://www.bousai.go.jp/1info/pdf/saigaipamphlet_je.pdf

EARTHQUAKE DISASTERS

12 times Death >1,000

Fires, Tsunamis, Building

	EQ	Death Toll	M
1891	Nobi	7,273	8.0
1896	Meijisanriku (Tsunami)	**21,959**	8.2
1923	Kanto	**105,385**	7.9
1927	Kitachikugo	2,912	7.3
1933	Syowasanriku(Tsunami)	3,064	8.1
1943	Tottori	1,083	7.2
1944	Tonankai	1,183	7.9
1945	Mikawa	1,961	6.8
1946	Nankai	1,443	8.0
1948	Fukui	3,769	7.1
1995	Kobe	6,437	7.3
2011	Great East JPN (Tsunami)	**22,199**	9.0

過去の地震津波災害 [2019/2/28閲覧]
https://www.data.jma.go.jp/svd/eqev/data/higai/higai-1995.html

※M：Magnitude

MEGA EARTHQUAKE
(A) GREAT KANTO EARTHQUAKE 1923

Death toll: 105,000

Damaged houses: 290,000

Damage cost: 30% of GDP

自然災害情報室[2019/3/7閲覧]https://dil.bosai.go.jp/disaster/1923kantoeq/index.html

(B) KOBE EARTHQUAKE 1995 (HANSHIN-AWAJI)

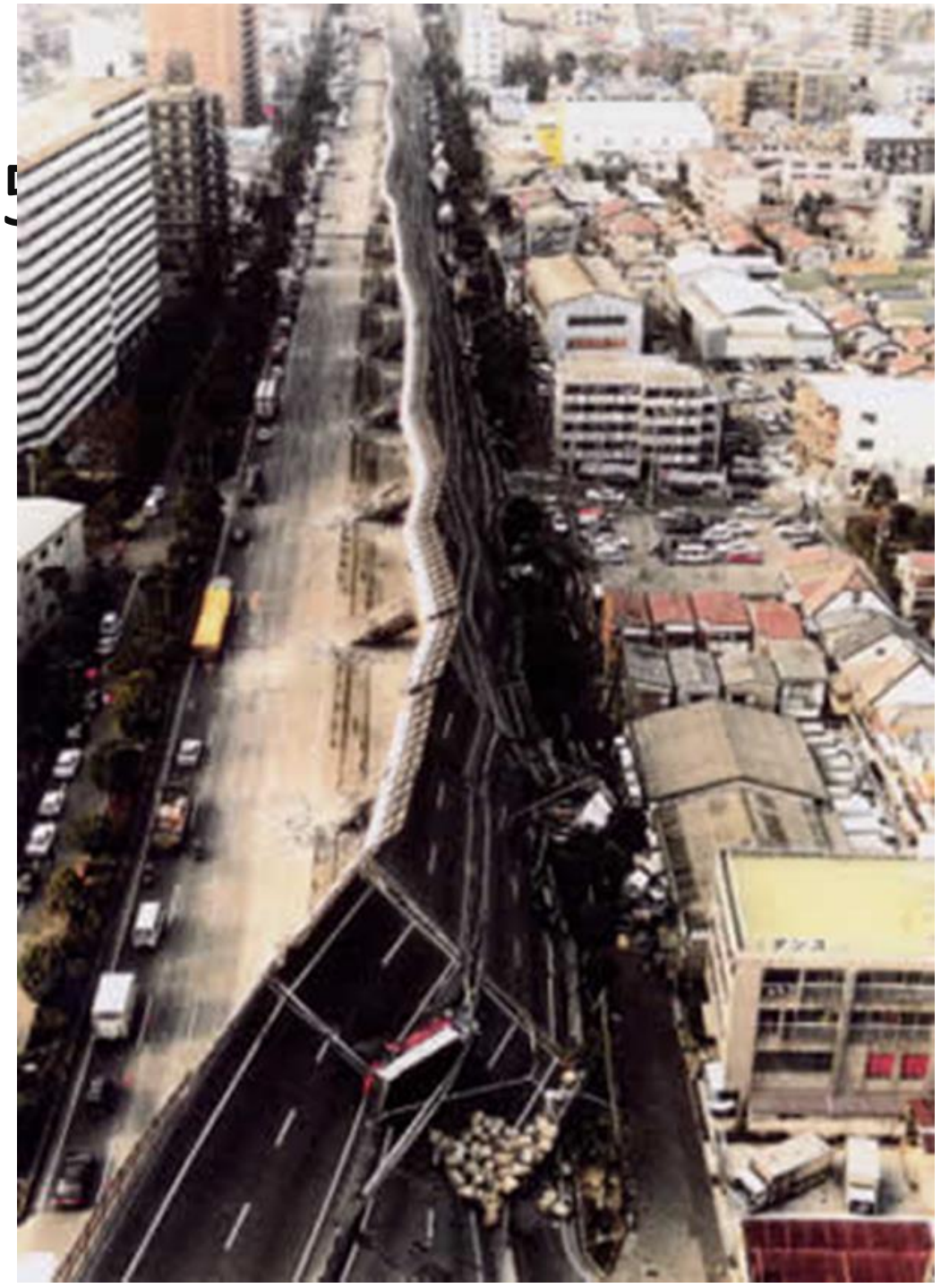
- M 7.3
- Death 6437
- Damage houses

  complete 105,000

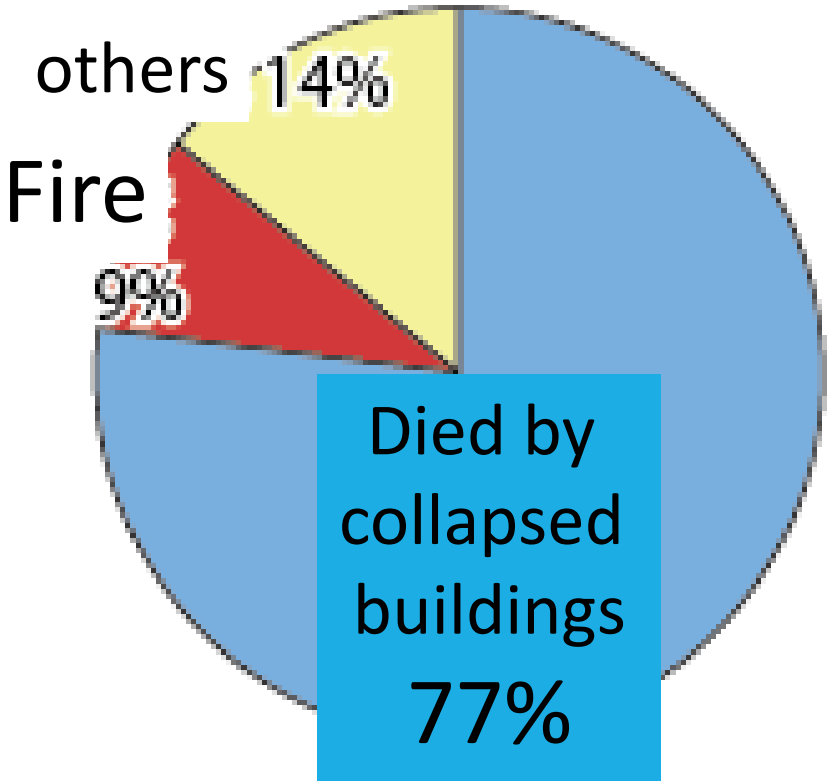
  Partially 144,000
- Damage cost

  9.9 Trillion JPY

  90 billion USD



LESSONS FROM KOBE EARTHQUAKE

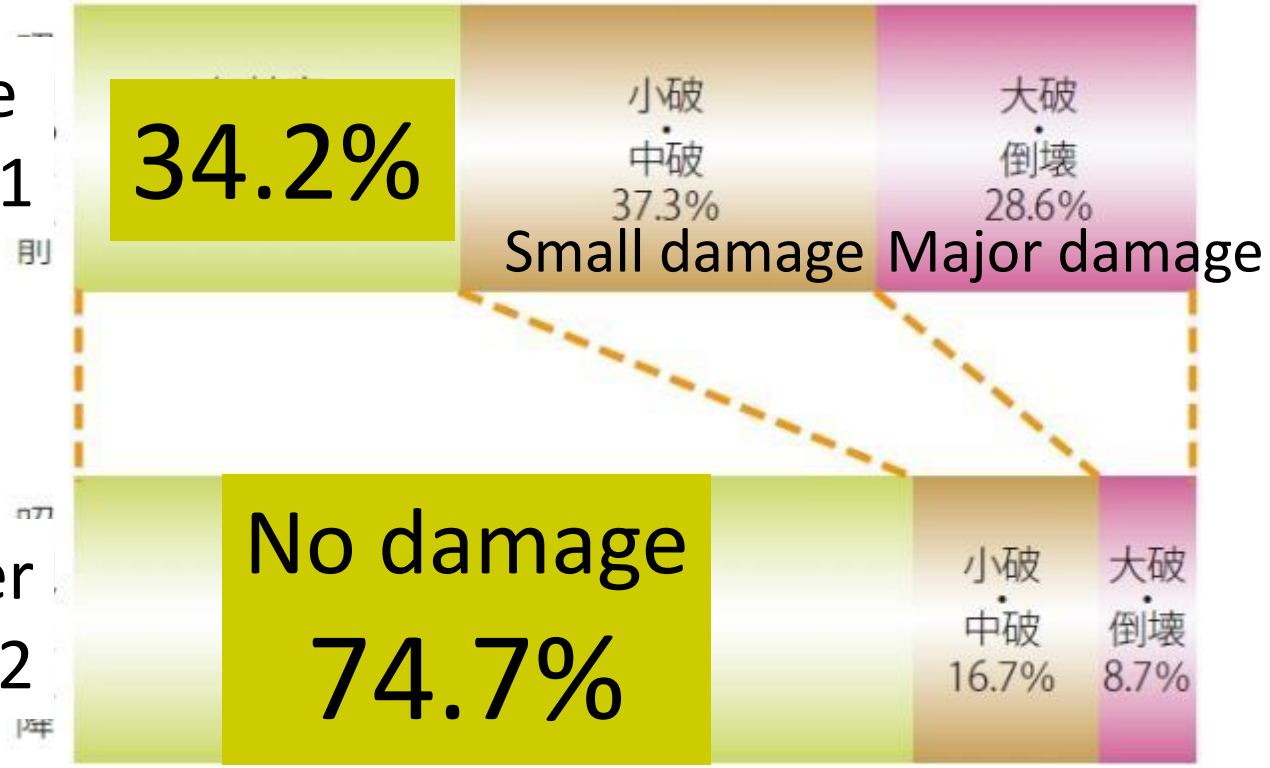


国土交通省における南海トラフ巨大地震・首都直下地震対策[2019/2/28閲覧] http://www.mlit.go.jp/river/bousai/earthquake/capital/

平成26年度 広報誌ぼうさい[2019/2/28閲覧] http://www.bousai.go.jp/kohou/kouhoubousai/h26/78/special_01.html

BUILDING CODE WORKED

Constructed Before 1981



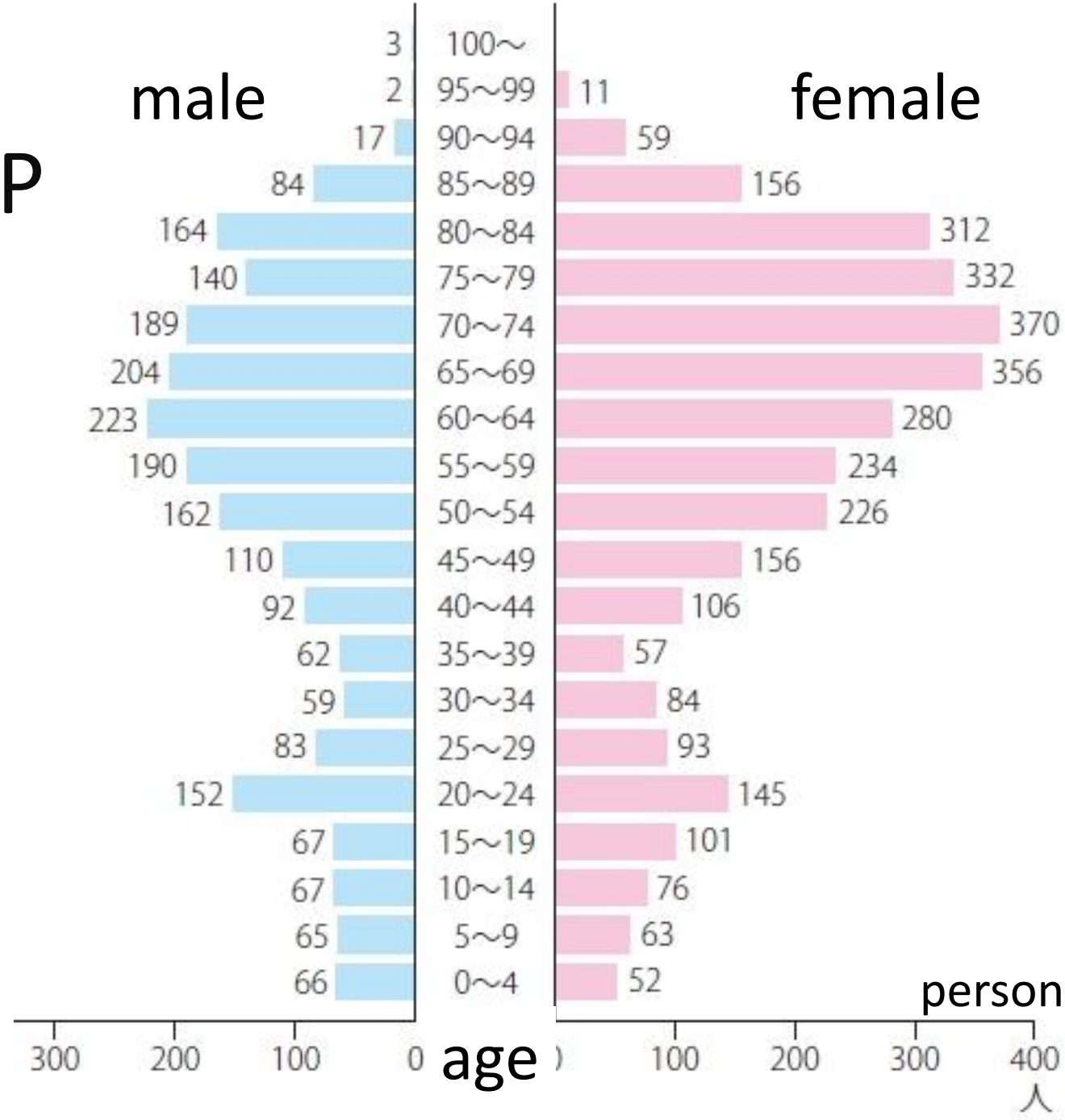
After 1982

New building code enforced in 1981

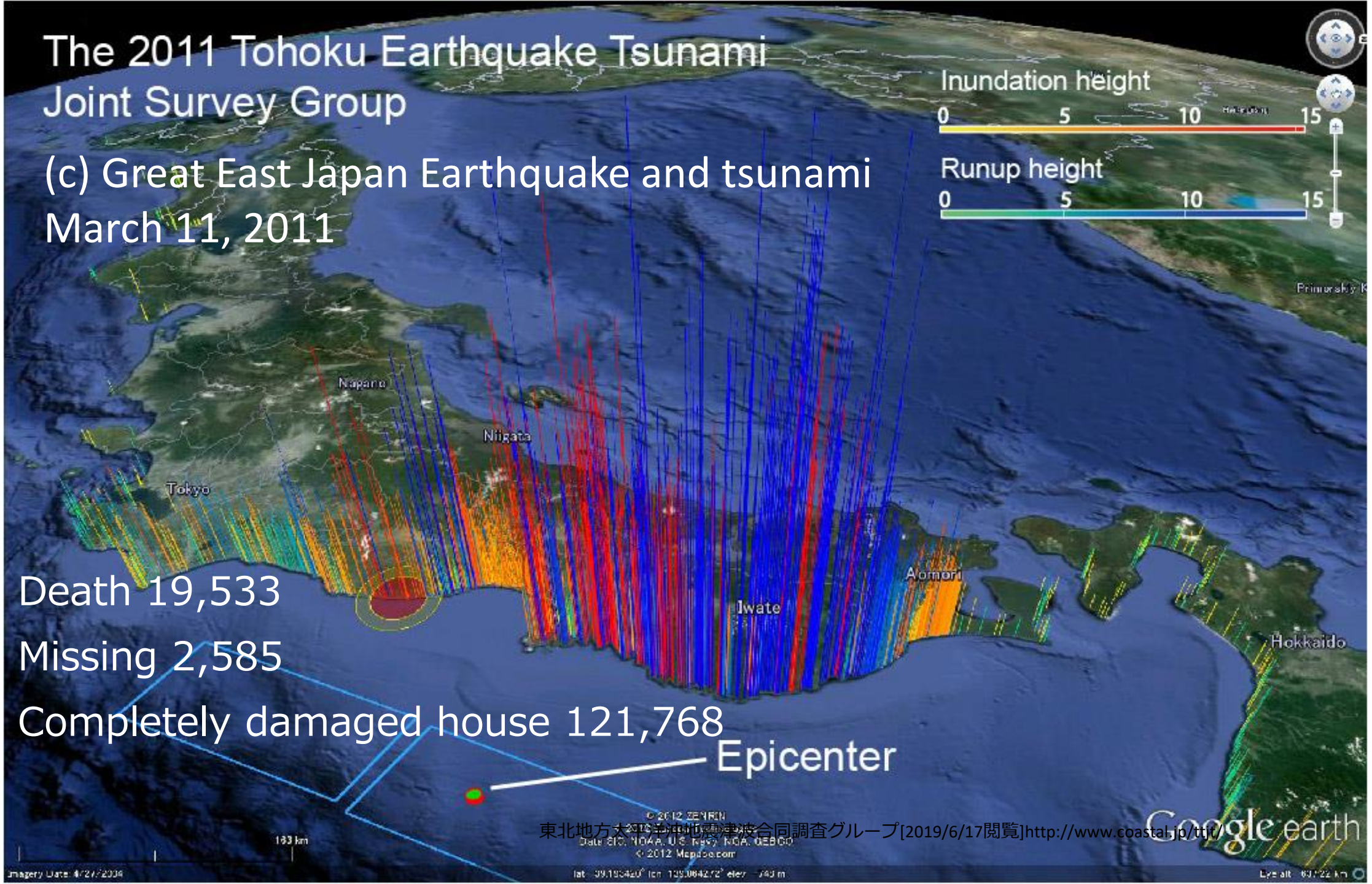
平成22年度 広報誌ぼうさい　31年2月28日閲覧
http://www.bousai.go.jp/kohou/kouhoubousai/h22/03/special_01.html

VULNERABLE GROUP

- Female X1.4
- Elderly > 60years 53%
- 20-24 years



広報誌防災[2019/3/5閲覧]
http://www.bousai.go.jp/kohou/kouhoubousai/index.html



東北地方太平洋沖地震津波合同調査グループ[2019/6/17閲覧]http://www.coastal.jp/ttjt/

Great East Japan Earthquake

- Low probability, high impact
- High level of complexity
- Widespread impact due to globalized supply chains

Japan's DRM system

- Investment in structural and non-structural measures
- Culture of preparedness and learning from past disasters
- Multi-stakeholder involvement
- Legislation, regulation, and enforcement
- High-tech, sophisticated instruments


Risk assessment and communication
Coordination
Protection of vulnerable people
ISSUES

2. DAMAGE ASSESSMENT FOR TOKYO EQ

東京タワー[2019/3/3閲覧]https://ja.wikipedia.org/wiki/%E6%9D%B1%E4%BA%AC%E3%82%BF%E3%83%AF%E3%83%BC#/media/File:Tokyo_Tower_and_around_Skyscrapers.jpg

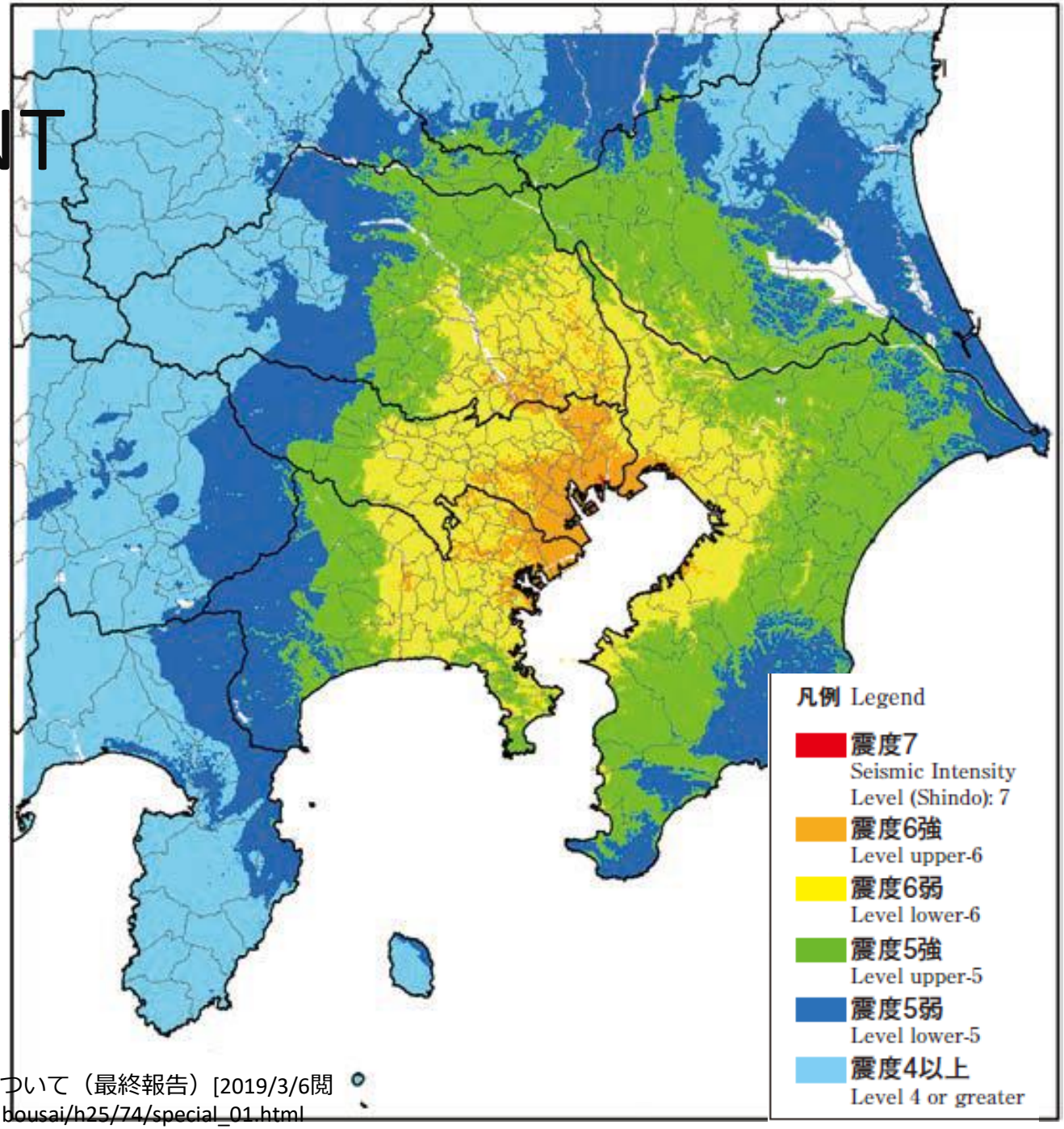
首都直下地震[2019/3/9閲覧]ttps://www.youtube.com/watch?v=Tnxww93PgPc

DAMAGE ASSESSMENT FOR TOKYO EQ

- Magnitude 7
- Death toll: 23,000
- Damage cost :

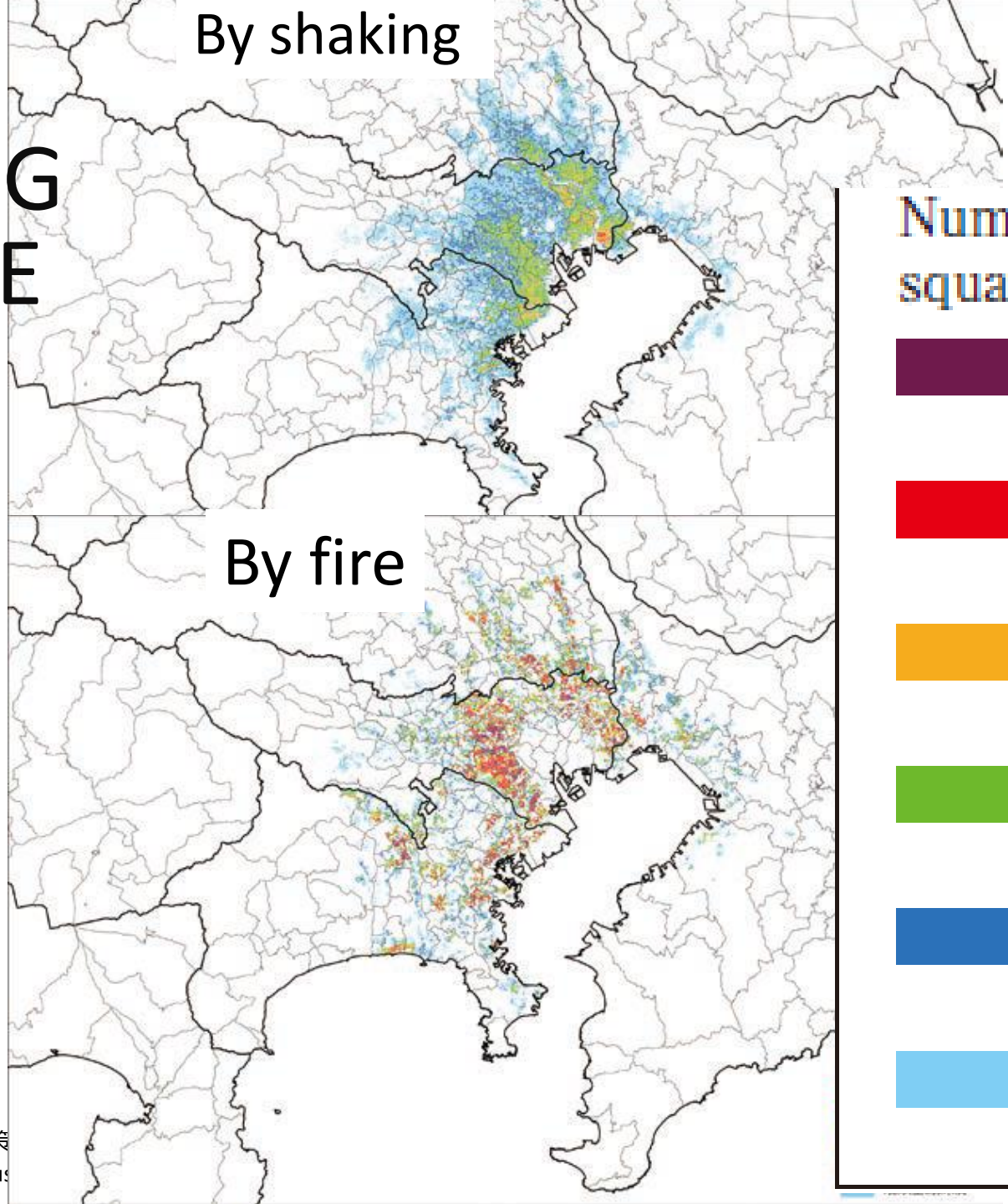
95 Trillion JPY

800 billion USD



特集　首都直下地震の被害想定と対策について（最終報告）[2019/3/6閲覧]-http://www.bousai.go.jp/kohou/kouhoubousai/h25/74/special_01.html

HOUSING DAMAGE

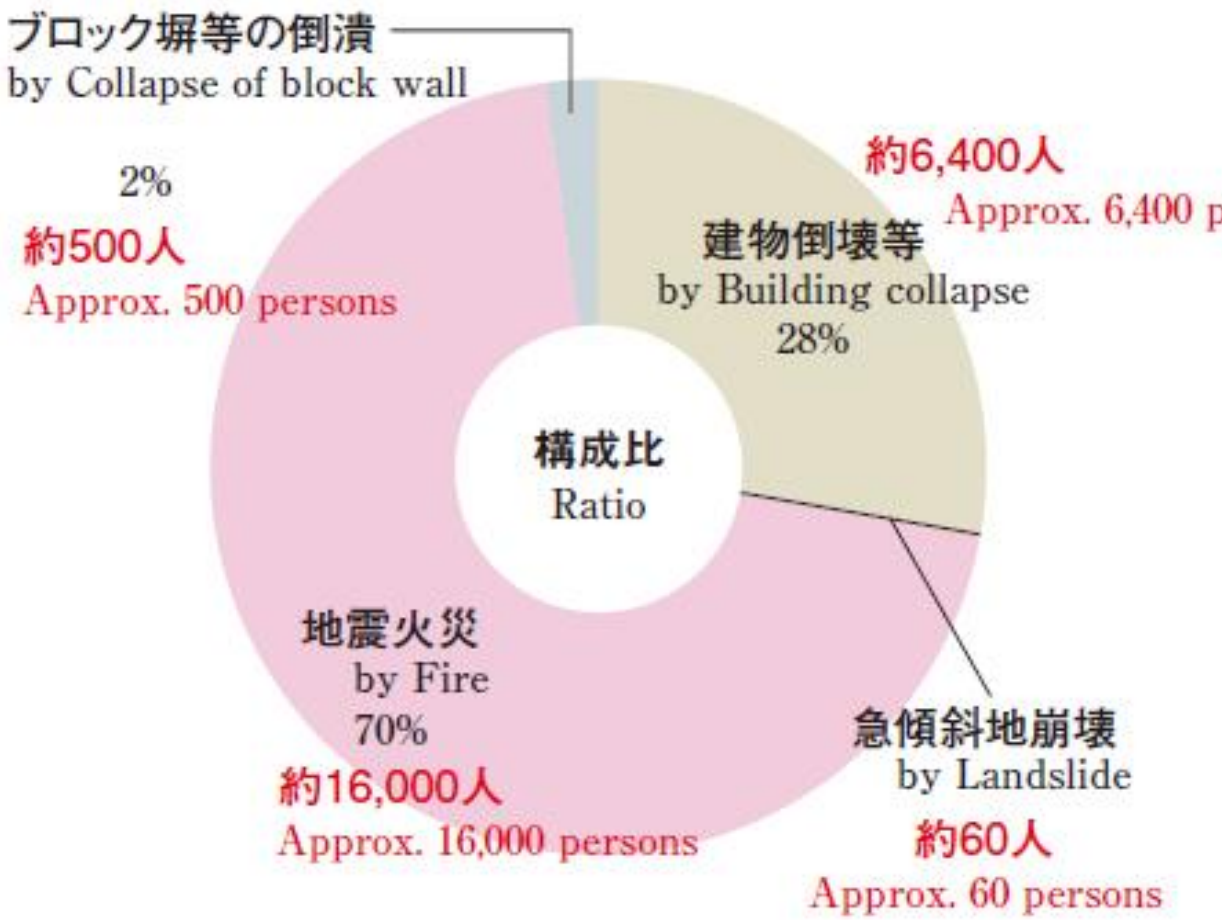


Number in 250 meter square area

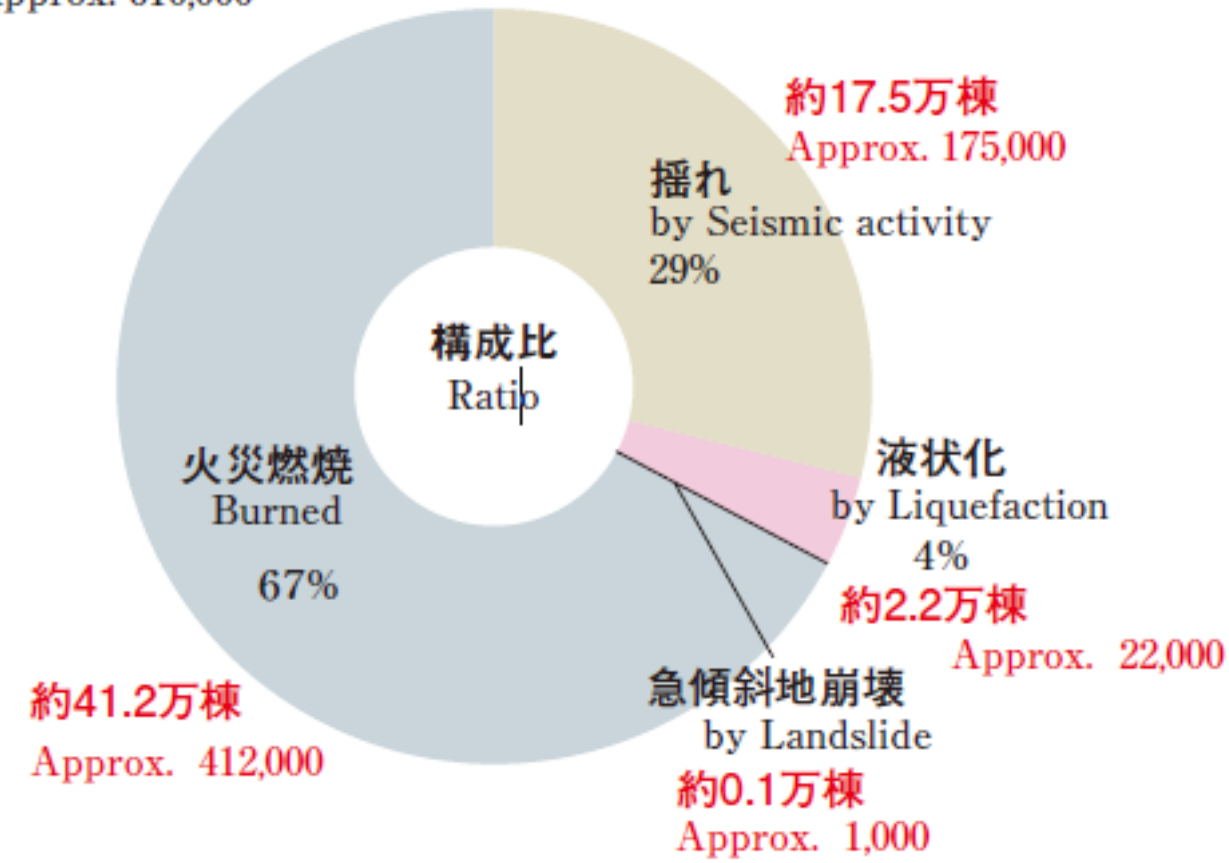
- 100軒以上 Above 100
- 50軒以上100軒未満 50 to 100
- 30軒以上50軒未満 30 to 50
- 10軒以上30軒未満 10 to 30
- 5軒以上10軒未満 5 to 10
- 1軒以上5軒未満 1 to 5

日本の災害対策
http://www.bous

No. of death toll: Approx. 23,000 persons



No. of houses and buildings collapsed or burned
Approx. 610,000



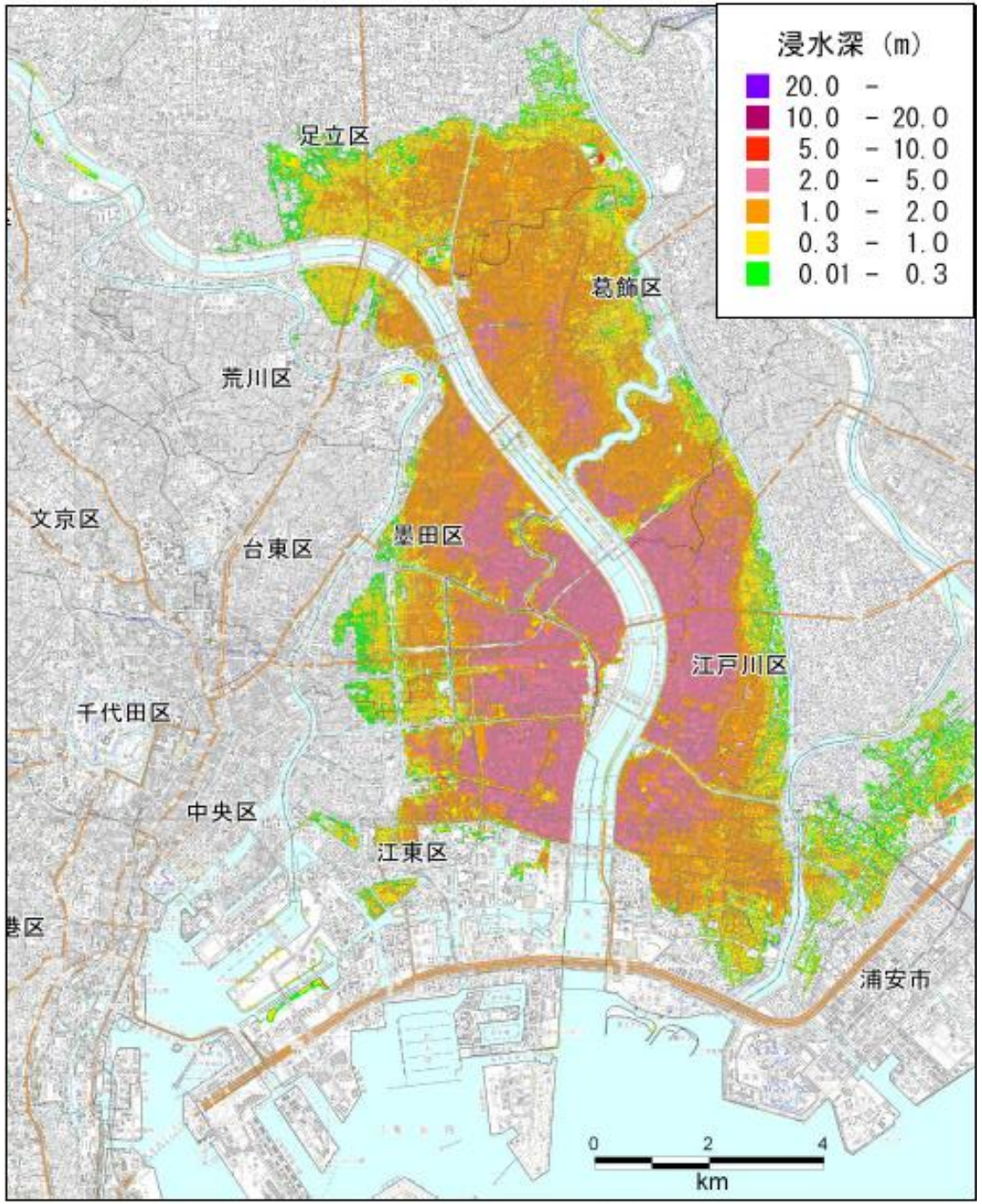
日本の災害対策[2019/3/5閲覧]
http://www.bousai.go.jp/1info/pdf/saigaipamphlet_je.pdf

ESTIMATED DAMAGE ON INFRASTRUCTURE

Electricity	50% blackout, > one week in some areas
Telephone	One-day including cell phone
Road	1-2 days closure for main roads Rehabilitation needs > one month for other roads because of debris
Railway	One week closure for metro One month for railway

AREA BELOW SEA LEVEL

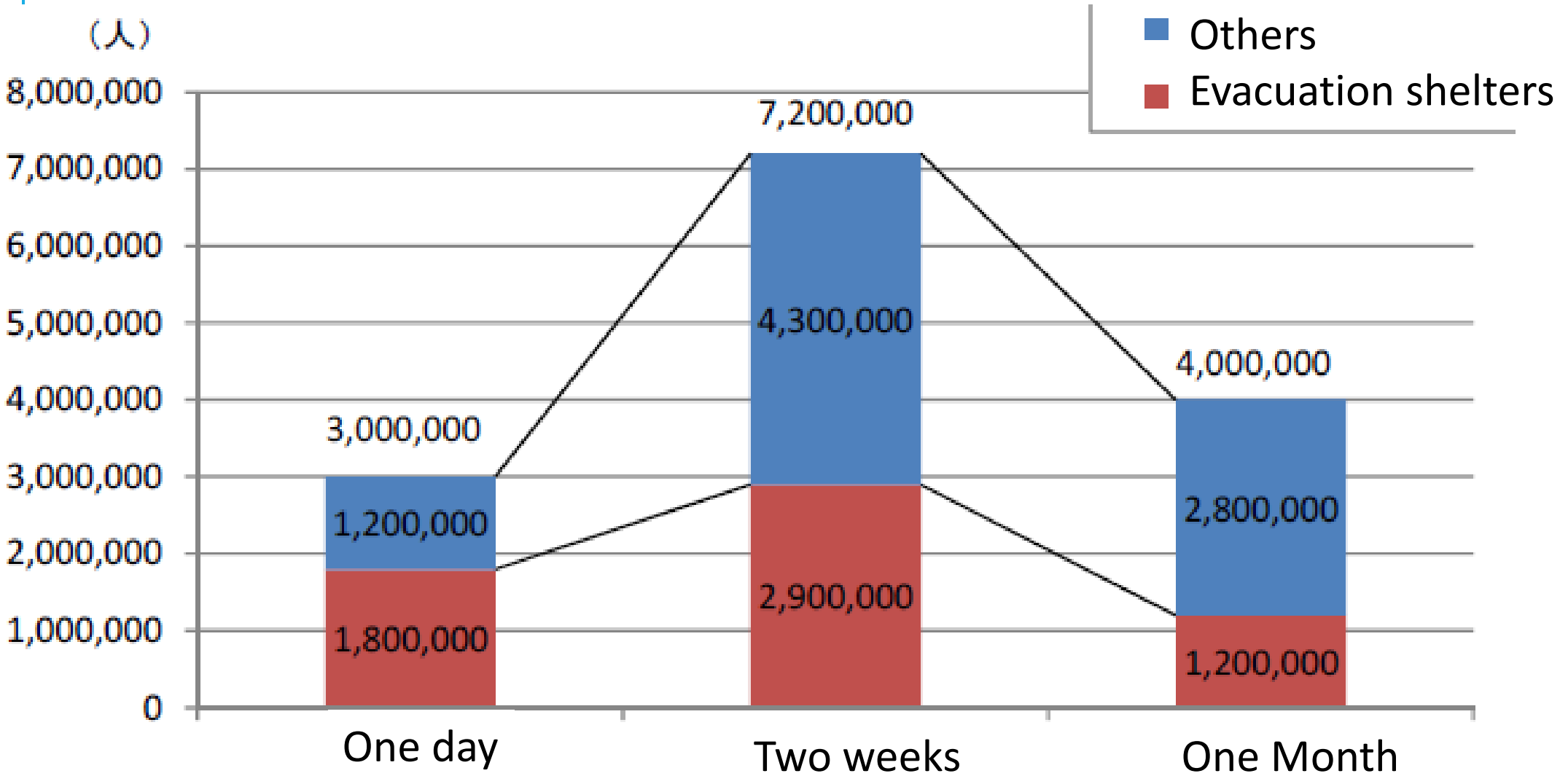
In case of damaging gates and levees



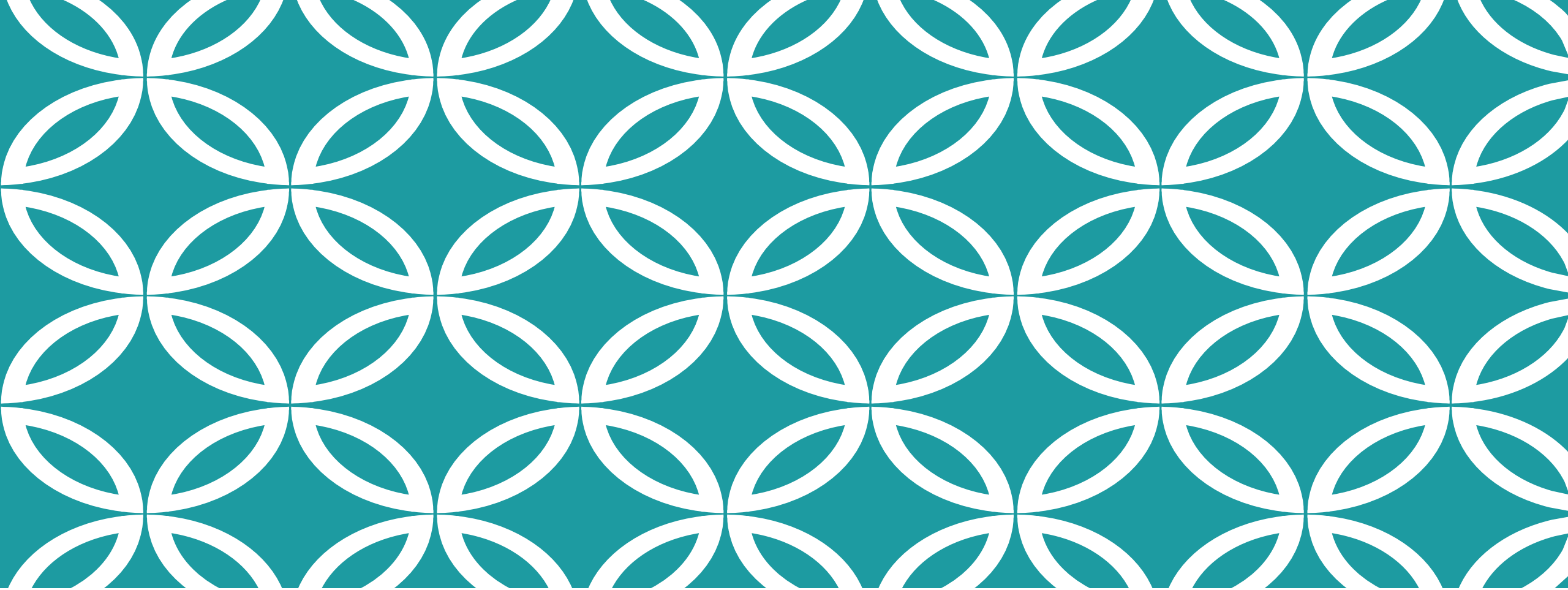
TP＋0.93m（満潮位）

首都直下地震対策検討ワーキンググループ[2019/3/5閲覧]
http://www.bousai.go.jp/jishin/syuto/taisaku_wg/index.html

EVACUEES: 7.2 MILLION



首都直下地震対策検討ワーキンググループ[2019/3/5閲覧]
http://www.bousai.go.jp/jishin/syuto/taisaku_wg/index.html



2. INTEGRATED FRAMEWORK

1. Legislation, strategy

DRM system: Starting from response, evolving to integration

Starting with response

1947 Dis. Relief Act

Strengthening flood management

1949 Flood control Act

From response to Bosai, integrated approach

1961 Dis. Countermeasure Basic (Bosai) Act

Disaster reduction day

1962 Central Dis. Management Council

1963 Basic Dis. Management Plan

64 Nigata EQ

MLIT

1966
EQ insurance

78 Miyagioki EQ

1981
Revised Building Code

1995
EQ Retrofitting Act

95 Kobe EQ

MLIT

1998
NPO act

2001
Cabinet Office
DM Minister

2011 GEJE

MLIT

2011
Urban Development Resilient to Tsunami Act

2. DIVERSE ORGANIZATIONS AND A WIDE RANGE OF SECTORS INVOLVED

Coordinating Body	**Cabinet Office**	
Building Code	Min. of Infrastructure	Local Gov.
Infrastructure		Private Sector
Urban Planning		Local Gov.
Insurance	Min. of Finance	Private
Research	Min. of Science	Academia
Response	Fire Agency, Police Agency Min. of Health & Welfare, Self-Defence Force	Community Local Gov. Mass media Private sector
Monitoring, warning	Met Agency	Local gov.

DISASTER COUNTERMEASURES BASIC ACT

- Enforced in 1962
- Formulates comprehensive and strategic disaster management system

Main Contents;

1. Definition of responsibilities for disaster management
2. Disaster management organizations
3. Disaster management planning system
4. Disaster prevention and preparedness
5. Disaster emergency response
6. Disaster recovery and rehabilitation
7. Financial measures
8. State of disaster emergency

Structure of Basic Disaster Management Plan

Natural Disasters

Earthquakes | Tsunamis | Water Hazards | Volcanoes | Snow Hazards

Accidents Disasters

Maritime Disasters | Aviation Disasters | Railroad Disasters | Road Disasters

Nuclear Disasters | Hazardous Materials D. | Large-scale Fires D. | Forest Fires D.

Presented according to the order of disaster management phases

Prevention/Preparedness → Emergency Response → Disaster Recovery

Stipulated concrete countermeasures by each stakeholder

National Govt. ⟷ Local Govts. ⟷ Residents

National Platform
Governance and Coordination

Organization of Central Disaster Management Council

Prime Minister
Minister of State for Disaster Management

Inquiry ↓ Report ↑ Offer Opinion ↑

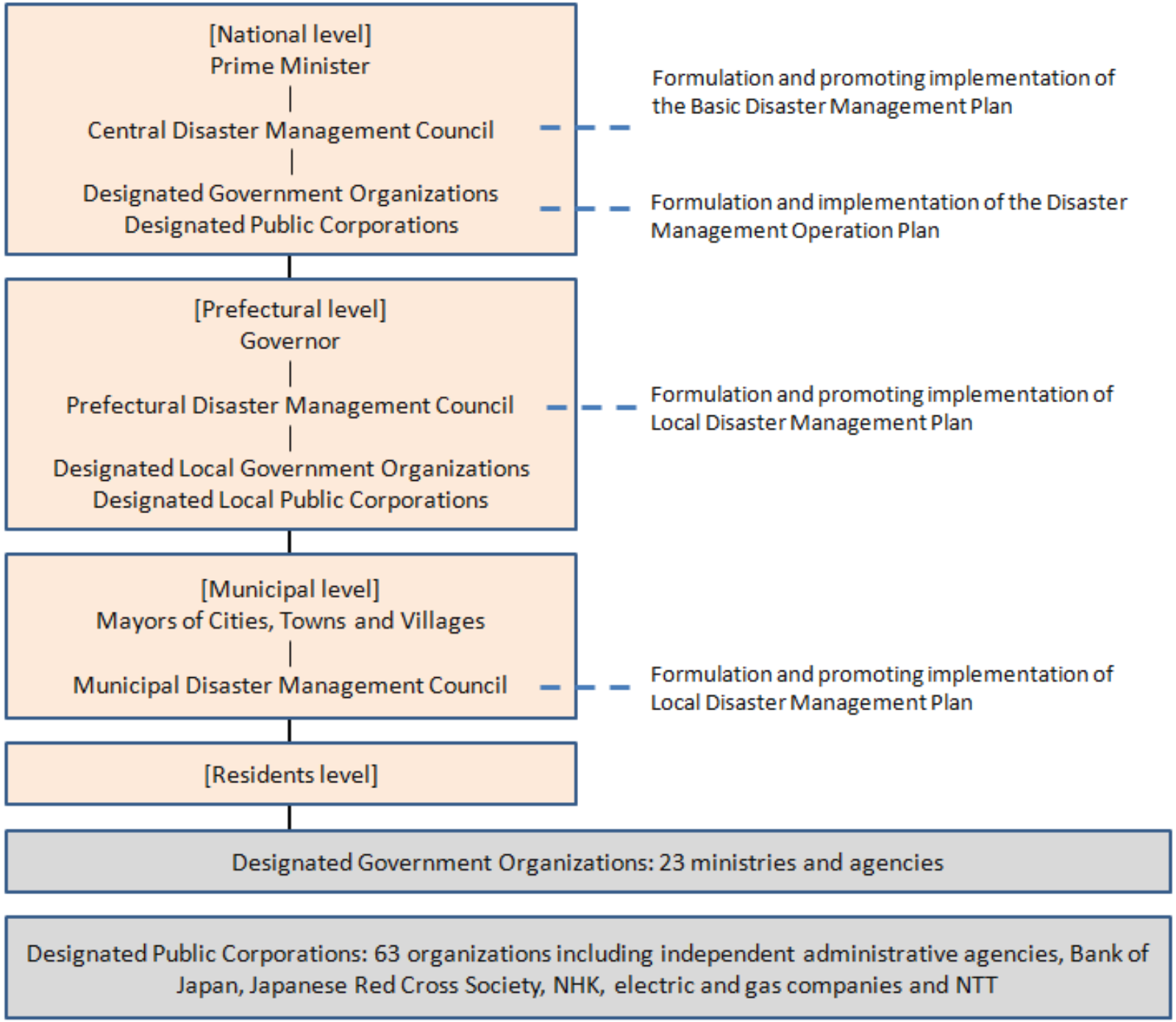
Central Disaster Management Council

Chair	Prime Minister		
Members of the Council	Minister of State for Disaster Management and all Cabinet Ministers	Heads of Designated Public Corporations (4) - Governor of the Bank of Japan - President of the Japanese Red Cross Society - President of NHK - President of NTT	Academic experts (4)

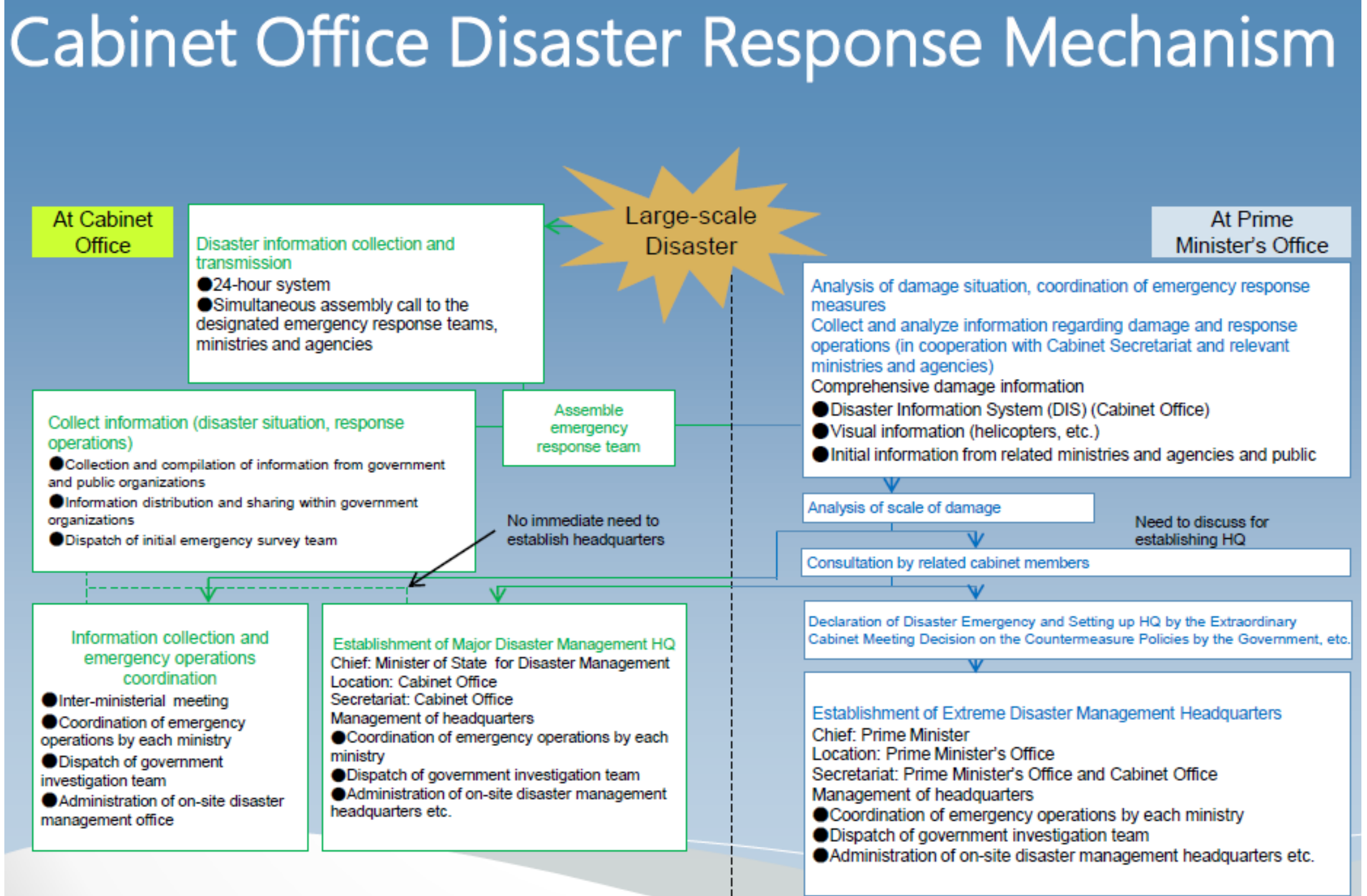
Committees for Technical Investigation
- Nationwide movement for DM
- Tonankai & Nankai Earthquake
- Tokyo Inland Earthquakes

etc.

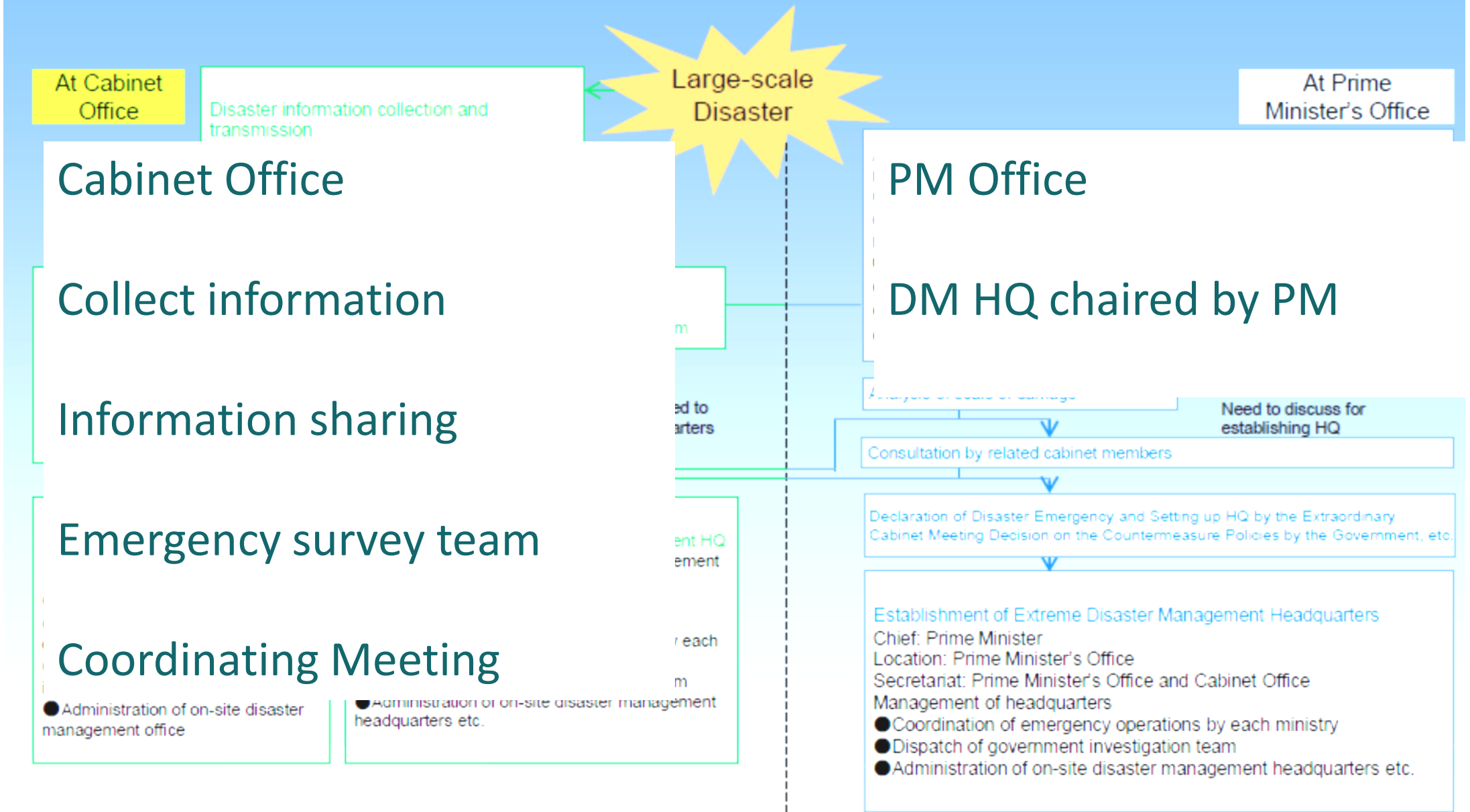
Secretary Organization	
Chair	Parliamentary Secretary of the Cabinet Office
Adviser	Deputy Chief Cabinet Secretary for Crisis Management
Vice-Chair	Director-General for Disaster Management, Cabinet Office Deputy Manager of Fire and Disaster Management Agency
Secretary	Relevant director-generals of each ministry and agency


[National level]
Prime Minister
Central Disaster Management Council
Designated Government Organizations
Designated Public Corporations
Formulation and promoting implementation of the Basic Disaster Management Plan
Formulation and implementation of the Disaster Management Operation Plan
[Prefectural level]
Governor
Prefectural Disaster Management Council
Designated Local Government Organizations
Designated Local Public Corporations
Formulation and promoting implementation of Local Disaster Management Plan
[Municipal level]
Mayors of Cities, Towns and Villages
Municipal Disaster Management Council
Formulation and promoting implementation of Local Disaster Management Plan
[Residents level]
Designated Government Organizations: 23 ministries and agencies
Designated Public Corporations: 63 organizations including independent administrative agencies, Bank of Japan, Japanese Red Cross Society, NHK, electric and gas companies and NTT

Cabinet Office Disaster Response Mechanism



Cabinet Office Disaster Response Mechanism



Cabinet Office

Collect information

Information sharing

Emergency survey team

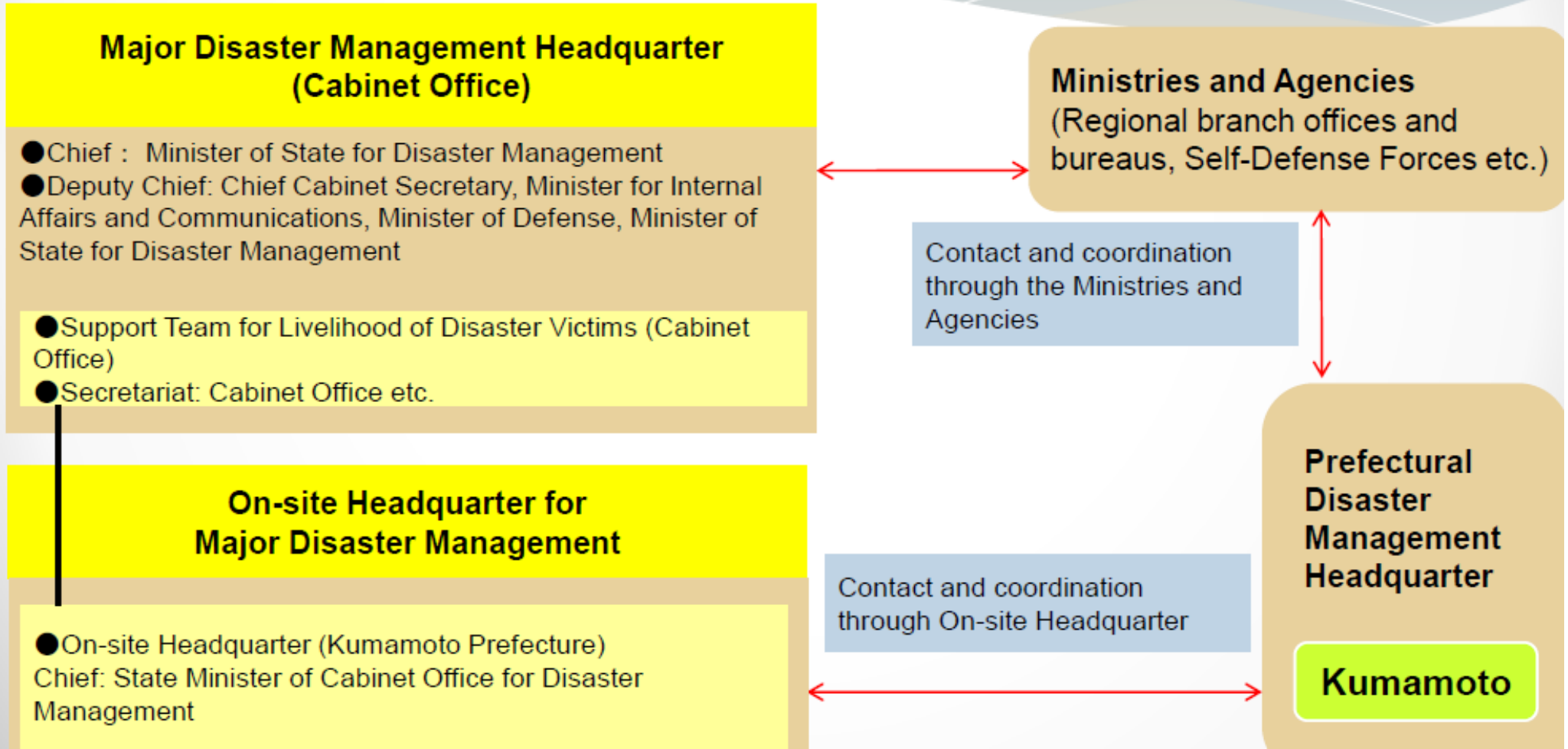
Coordinating Meeting

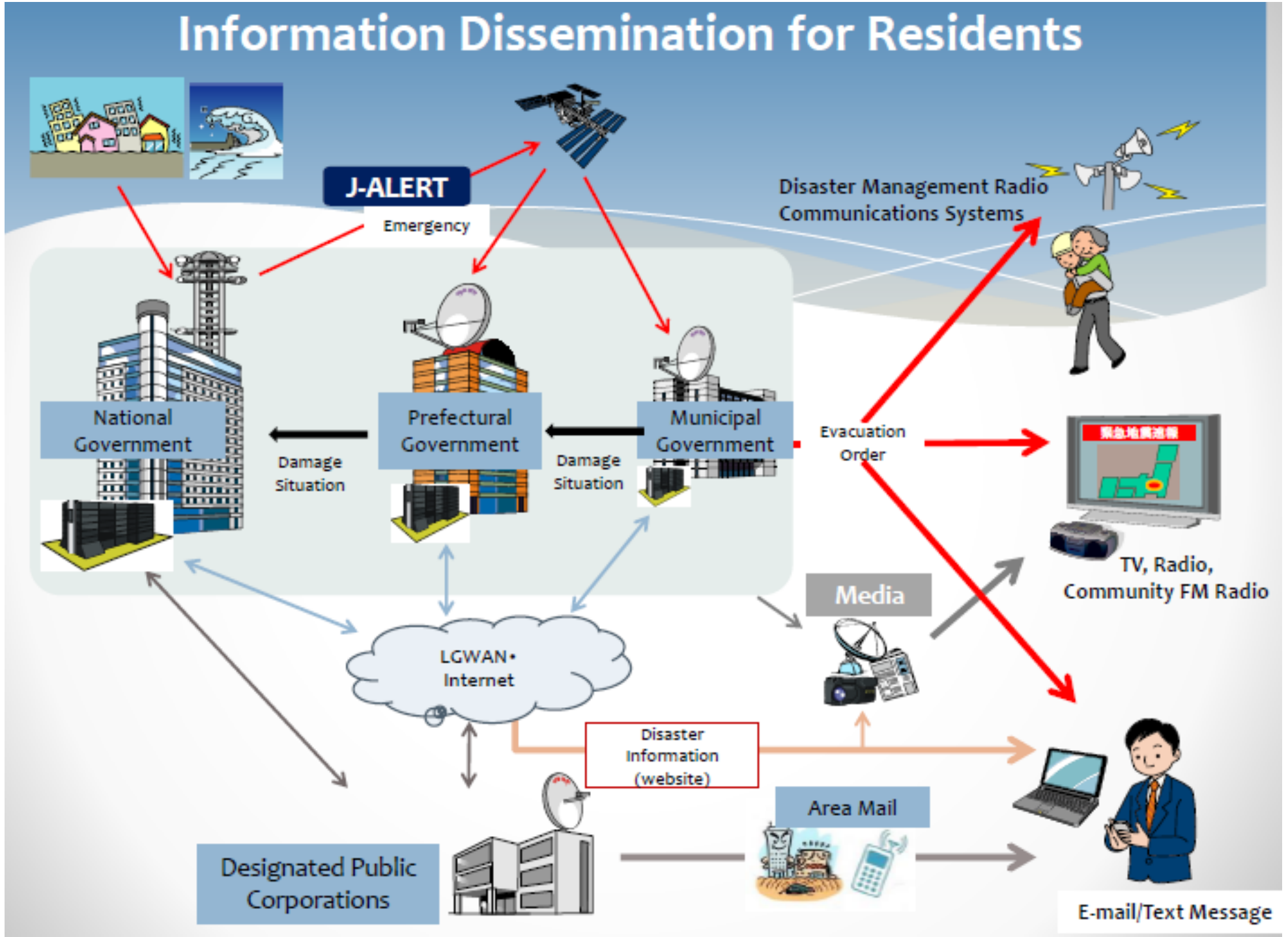
PM Office

DM HQ chaired by PM

Coordination System between National Government and Local Government (in the case of the Kumamoto Earthquake)

Communication and coordination system between Major Disaster Management Headquarter and Local Government (prefecture)




Information Dissemination for Residents
J-ALERT
Emergency
Disaster Management Radio Communications Systems
National Government
Prefectural Government
Municipal Government
Damage Situation
Damage Situation
Evacuation Order
TV, Radio, Community FM Radio
Media
LGWAN・Internet
Disaster Information (website)
Area Mail
Designated Public Corporations
E-mail/Text Message

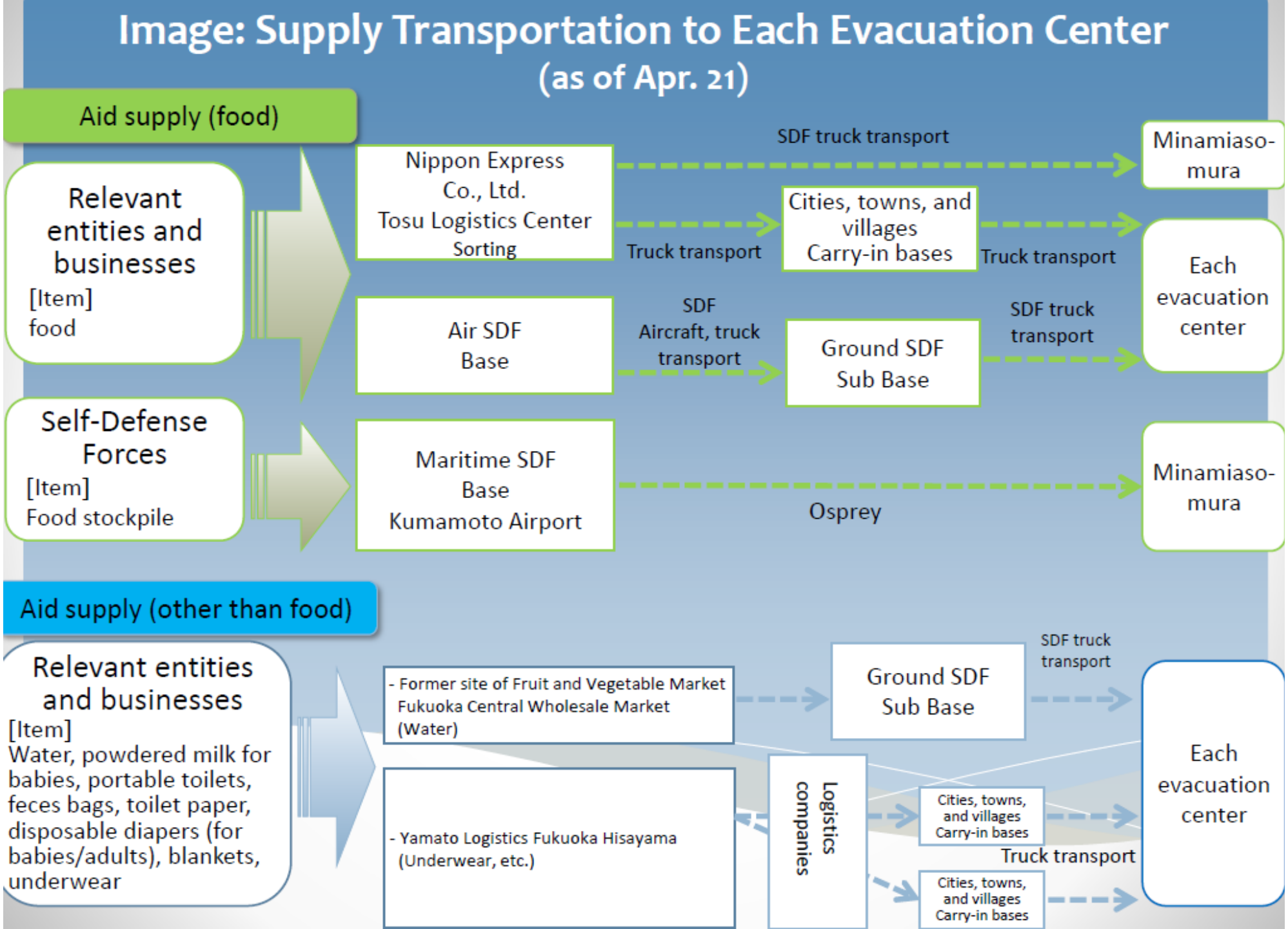
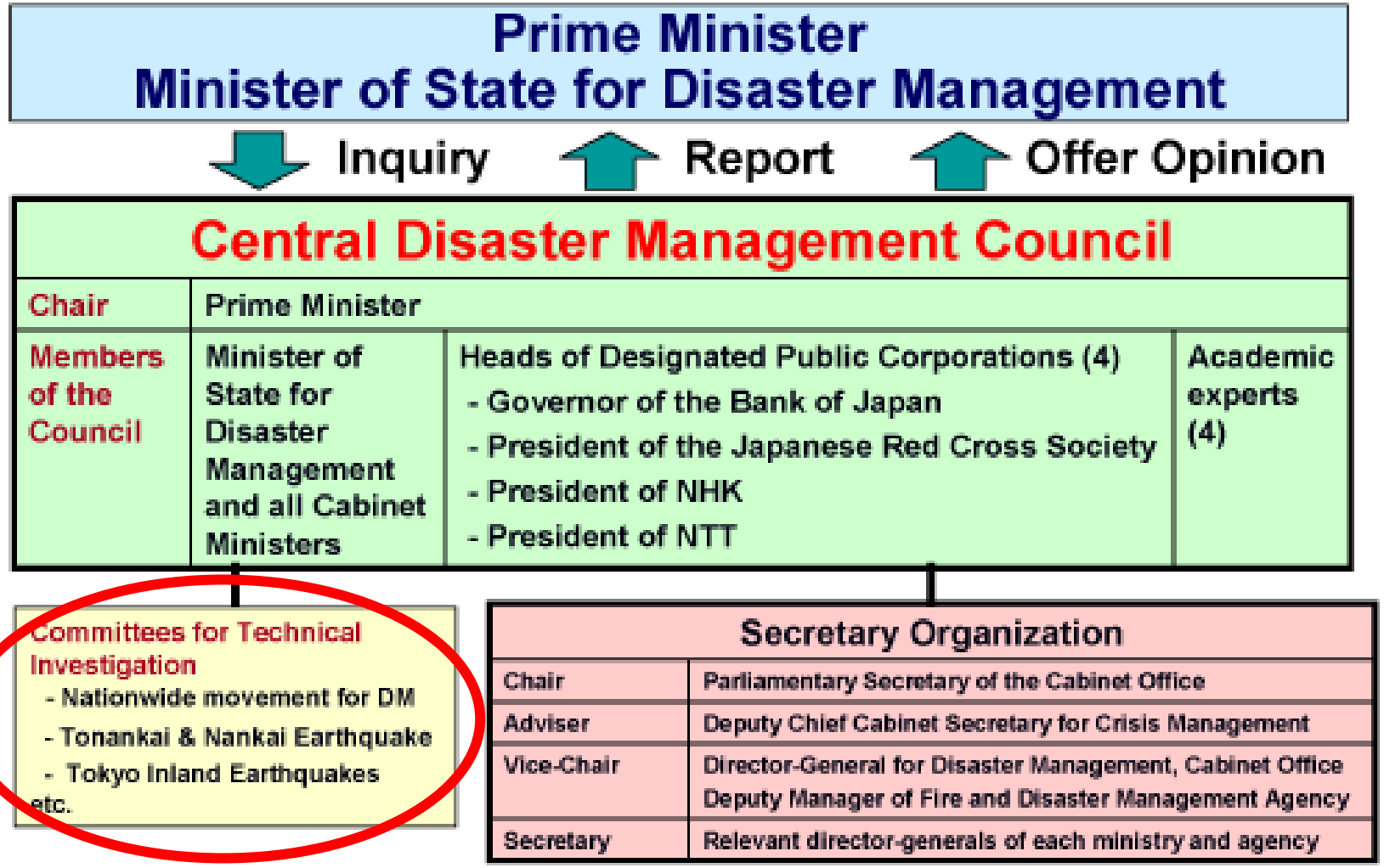


Image: Supply Transportation to Each Evacuation Center
(as of Apr. 21)
Aid supply (food)
Relevant entities and businesses
[Item]
food
Self-Defense Forces
[Item]
Food stockpile
Nippon Express Co., Ltd. Tosu Logistics Center
Sorting
Air SDF Base
Maritime SDF Base
Kumamoto Airport
SDF truck transport
Truck transport
SDF Aircraft, truck transport
Cities, towns, and villages Carry-in bases
Ground SDF Sub Base
Truck transport
SDF truck transport
Minamiaso-mura
Each evacuation center
Osprey
Minamiaso-mura
Aid supply (other than food)
Relevant entities and businesses
[Item]
Water, powdered milk for babies, portable toilets, feces bags, toilet paper, disposable diapers (for babies/adults), blankets, underwear
- Former site of Fruit and Vegetable Market Fukuoka Central Wholesale Market (Water)
- Yamato Logistics Fukuoka Hisayama (Underwear, etc.)
Logistics companies
Ground SDF Sub Base
SDF truck transport
Cities, towns, and villages Carry-in bases
Truck transport
Cities, towns, and villages Carry-in bases
Each evacuation center

3. UNIQUENESS OF JAPANESE SYSTEM
EVIDENCE/ SCIENCE BASED POLICY FORMULATION



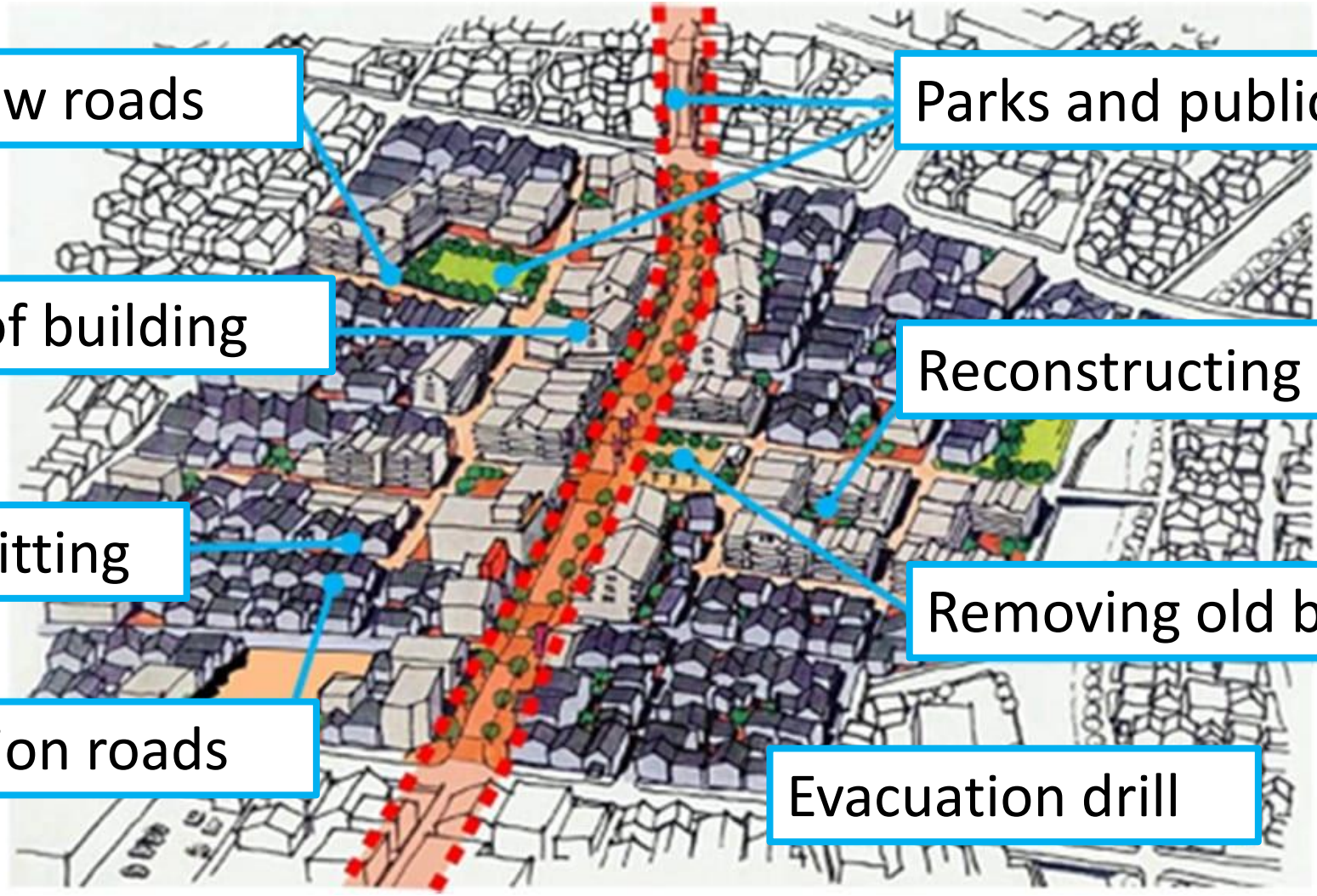
EX. STRATEGY FOR LARGE-SCALE EARTHQUAKE DRM/DRR 2014 CENTRAL DISASTER MANAGEMENT COUNCIL

Mitigation	Retrofitting, Tsunami, Fire, Landslides, Crucial Infrastructure, Long-term Shaking, Liquefaction, Risk Communication, DRM education, Volunteers, Comprehensive DRM, Research,
Response	HQ at disaster area, Nuclear Accident, Search & Rescue, Medical response, Fire, Logistics, Emergency supply, Evacuation shelter, Infrastructure rehabilitation, Health, Debris, Information, Law & order, Support
Managing confusion	Transportation, BCM,
Responding local needs	Under ground, Flooding, Oil finery, Traffic congestion, Isolated community, Cultural heritage, Snow,
Cascading effects	
Recovery	
Monitoring	

MINISTRY OF INFRASTRUCTURE: ACTION PLAN

I. Protecting human lives	Human lives	Safer residence
		DRM education
		Plane, ships & drills
	Safe space	Retrofitting
		Road transport
	Evacuation	Evacuation, Logistics
II. Continuing National Capital Function	Cascading effects	floods, landslides, tsunamis
	Capital function	Transportation
III. Recovery	Special teams	
	Reconstruction	

I. PROTECTING HUMAN LIVES
I-1 HUMAN LIVES



PARK WITH DM FACILITIES

- disaster Management base
- Preventing fire spread
- Water storage tanks, etc.
- Improving living environment

木造住宅密集地域整備事業[2019/3/8閲覧]http://www.toshiseibi.metro.tokyo.jp/bosai/pdf/mokuzou_01.pdf

JOINT RECONSTRUCTION OF OLD HOUSES

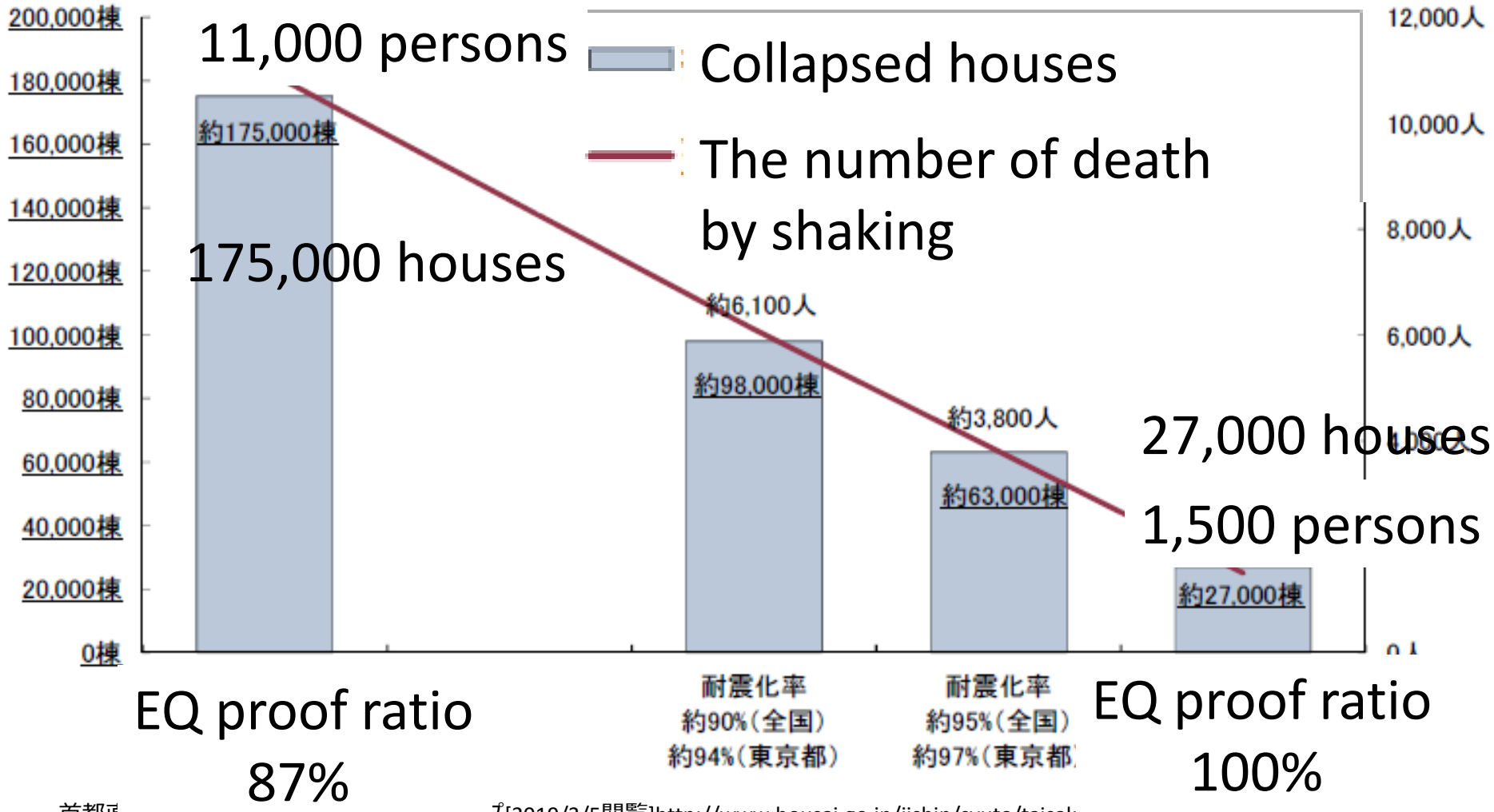
Financial support for removal and construction

Fire proof

Improving housing conditions

木造住宅密集地域整備事業[2019/3/8閲覧]http://www.toshiseibi.metro.tokyo.jp/bosai/pdf/mokuzou_01.pdf

REDUCING DEATH BY RETROFITTING HOUSES FROM 11,000 TO 1,500 PERSONS



首都直 プ[2019/3/5閲覧]http://www.bousai.go.jp/jishin/syuto/taisaku_wg/index.html

I. PROTECTING HUMAN LIVES
I-2 SAFE SPACE

Retrofitting bridges

I. PROTECTING HUMAN LIVES
I-3 EVACUATION, RELIEF GOODS TRANSPORT

Disaster Management Jetty

Nihonbashi River
Source : Prof.Yuji MIURA,

II. CONTINUING NATIONAL CAPITAL FUNCTION
II-1 **CASCADING EFFECTS**

Landslide protection

II. CONTINUING NATIONAL CAPITAL FUNCTION
II-2 **CAPITAL FUNCTION**

Retrofitting

Airport

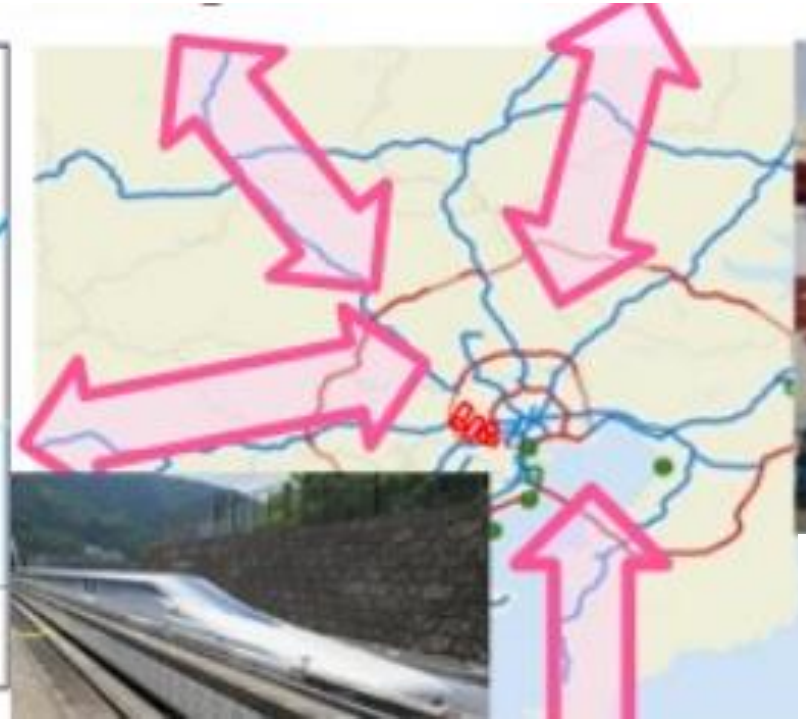
III. RECOVERY
III-1 **SPECIAL TEAMS**

Engineer’s team

- Damage assessment
- Planning rehabilitation
- Preventing cascading disasters

III. RECOVERY
III-2 RECONSTRUCTION

Recovery planning: Transport covering Highway, Railway, Port

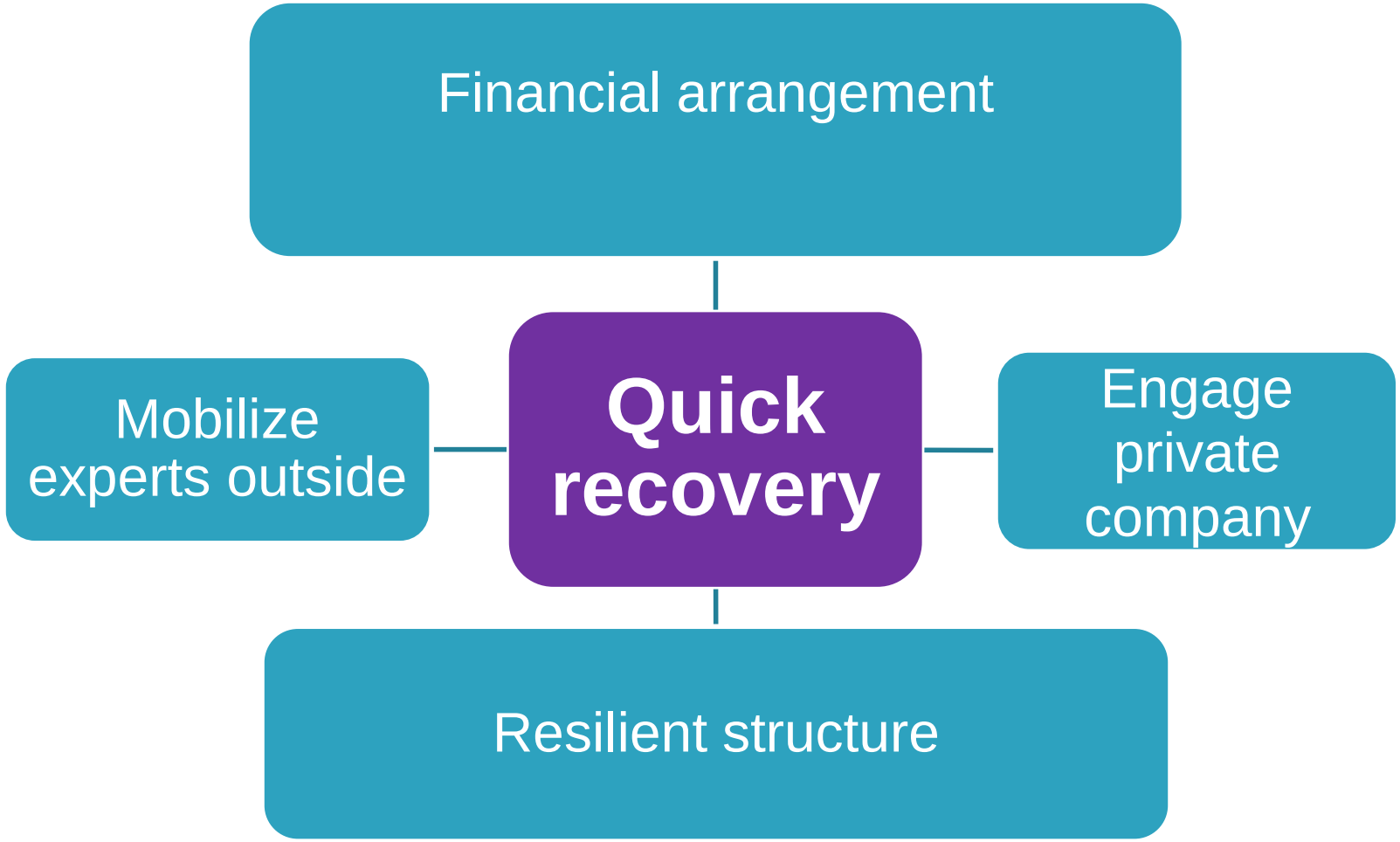


3. INTEGRATING RESPONSE AT GREAT EAST JAPAN EARTHQUAKE AND TSUNAMI

Coordination

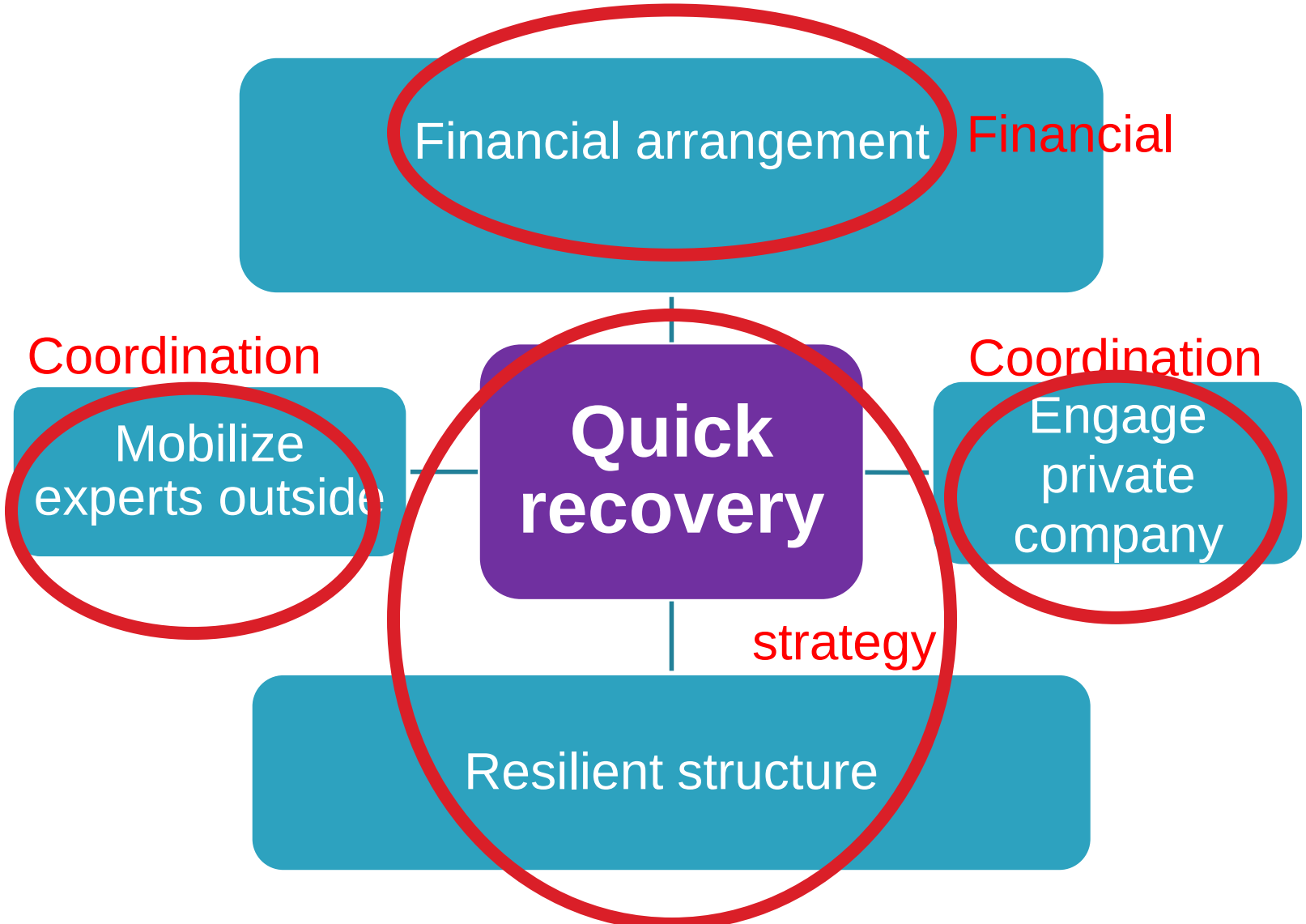
Lessons from the Great East Japan Earthquake

How did Governance work?

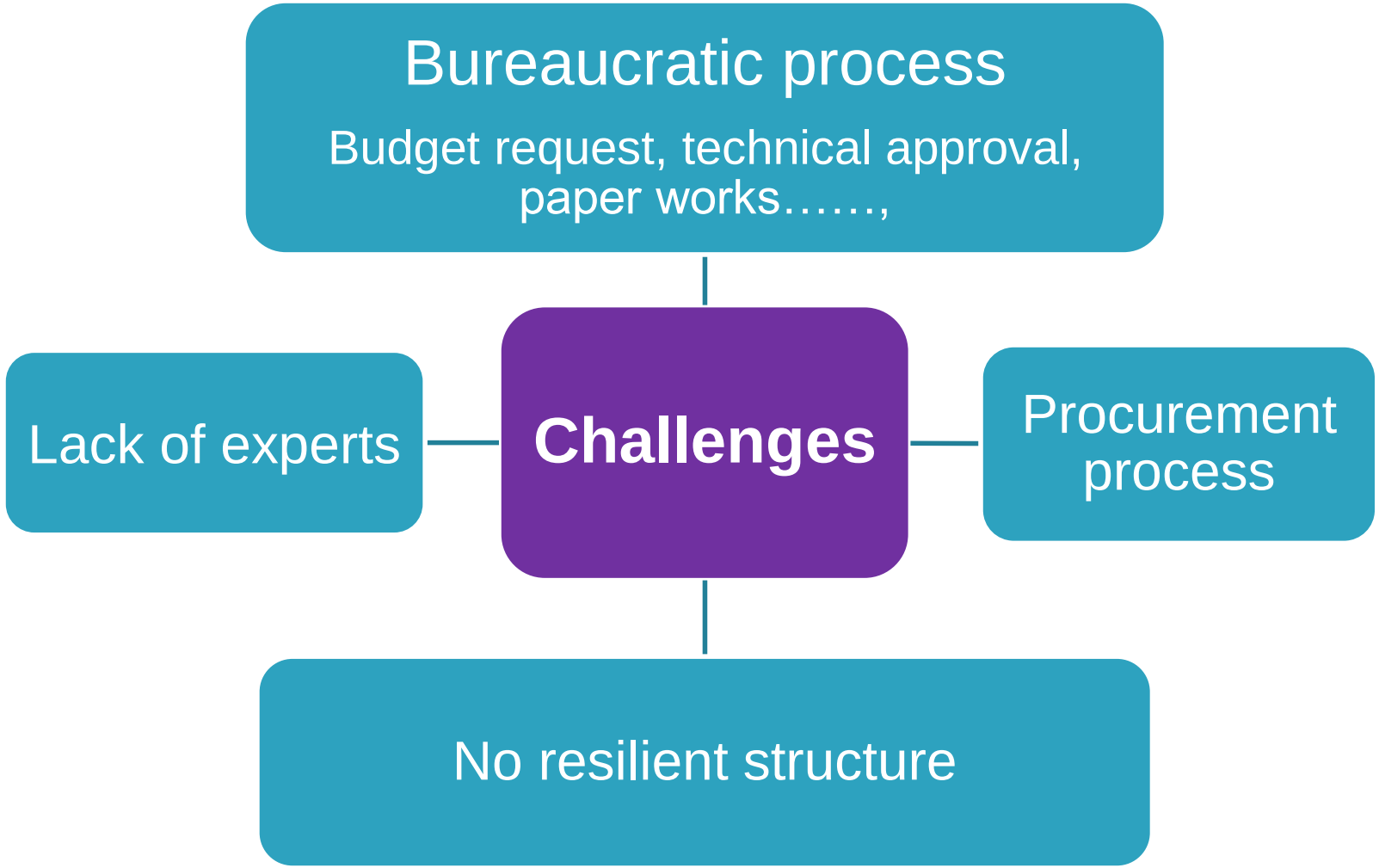


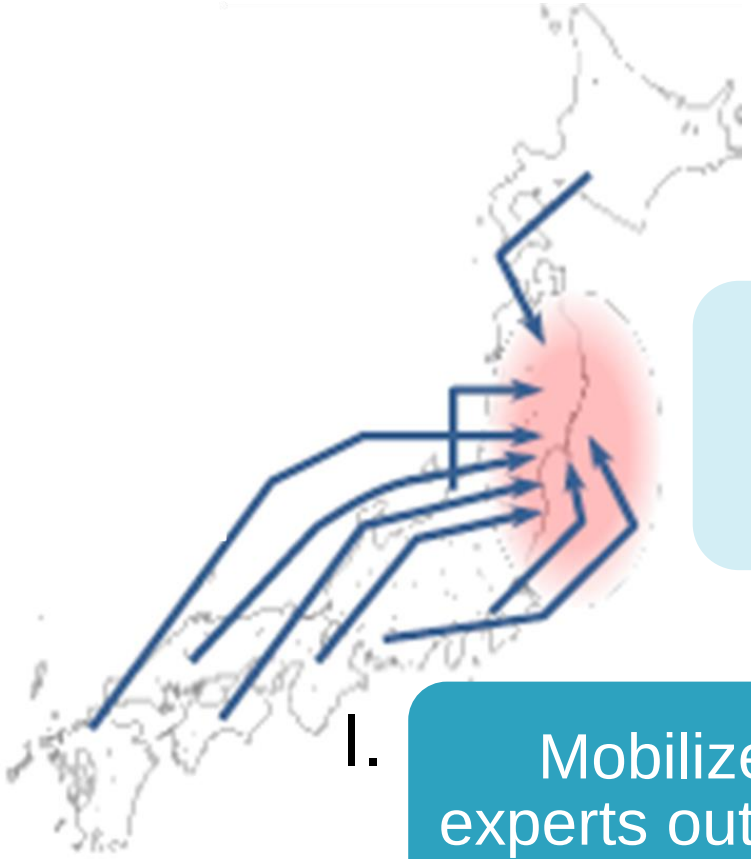
Ishiwatari, M. (2014). Institution and governance related learning from the East Japan Earthquake and Tsunami. In Disaster recovery (pp. 77-88). Springer Japan.

Lessons from the Great East Japan Earthquake & 3 Gaps



Issues in developing countries





I.

Financial arrangement

Mobilize experts outside

Quick recovery

Engage private company

Resilient structure

a. National level

TEC-FORCE: technical emergency control force

Ministry of Land, Infrastructure, Transport and Tourism

Emergency team of engineers & infrastructure specialists of national government

- 18,115 person x day from March 11, 2011
- To 97 municipalities in 13 prefecture

b. Local level

Local municipalities support disaster areas

Many prefecture & municipality governments outside Tohoku

sent officials

Some 79,000 officials

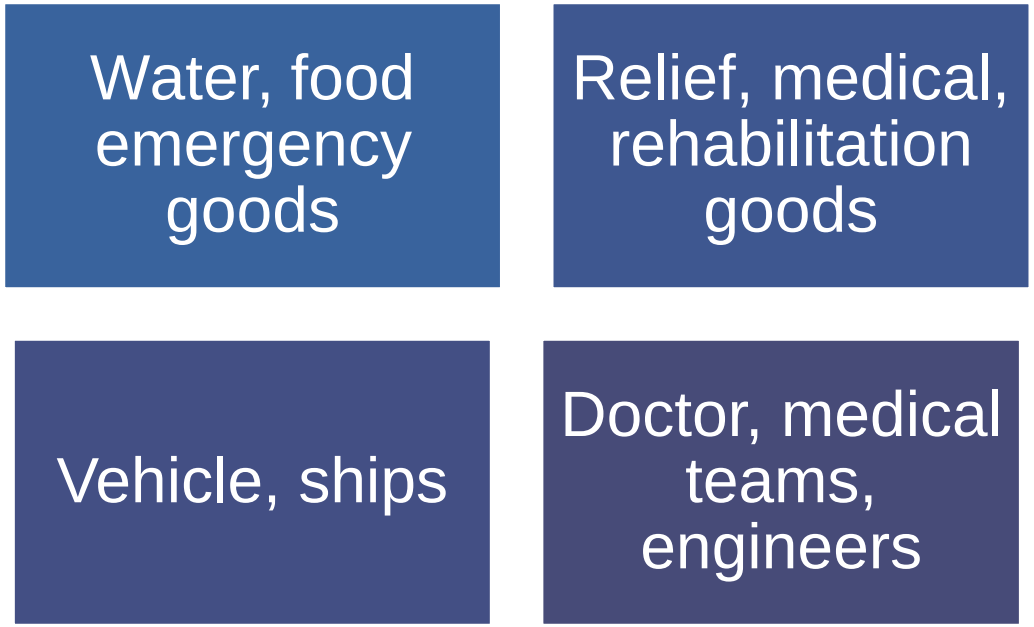
Civil engineers, urban planners, public health specialists, statisticians, etc.

opportunity

to gain experience in dealing with post-disaster situations.

Pre-Agreement on disaster relief between local municipality governments

- Area



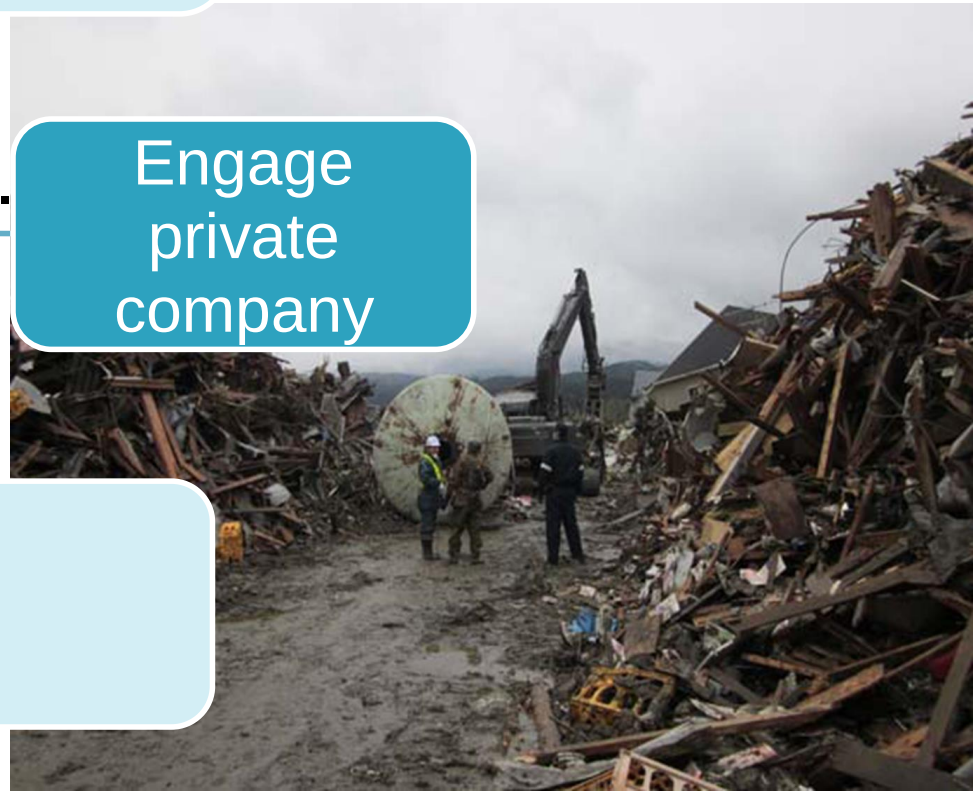
- Cost: usually covered by affected municipality (refunded by the central government)

Financial arrangement

Mobilize experts outside

Quick recovery

II. Engage private company



Resilient structure

Engage local companies on the day of disaster

Skip ordinary procurement process

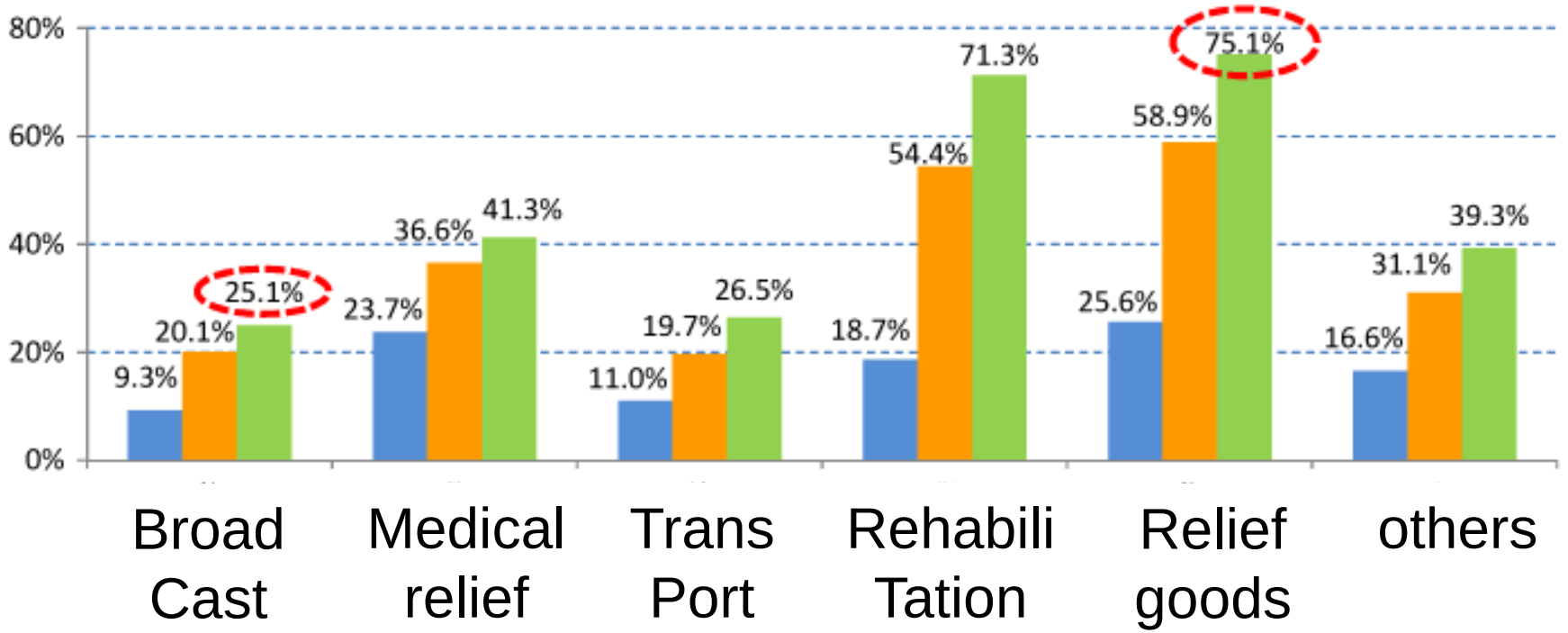
- Start works on March 11, 2011
- Without contract, verbal instruction or simple paper
- Payments are settled later based on quantities of works
- Construction, consultant, survey companies

Pre-agreement

- Simple and covering principle clauses
- guaranteeing payment,
- requiring private companies cooperation
- Renewing annually

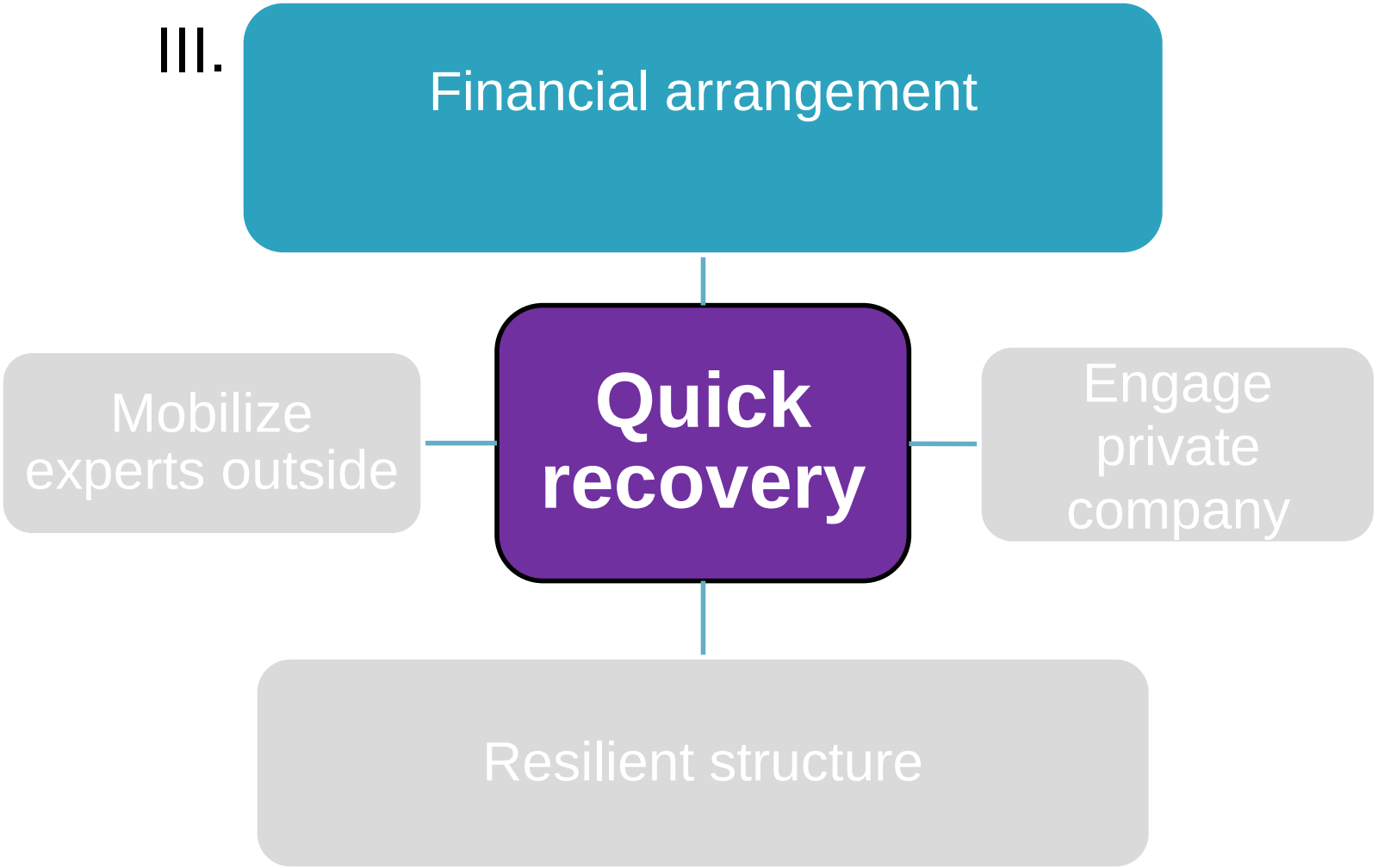
Areas of pre-agreement with private companies

図表 1-0-20 企業等と協定を締結している市区町村の割合



出典：消防庁「消防防災・震災対策現況調査」をもとに内閣府作成

III.


Financial arrangement
Mobilize experts outside
Quick recovery
Engage private company
Resilient structure

Start recovery works without worrying about budgets

Needs central government financial support

Local government cannot cover huge costs

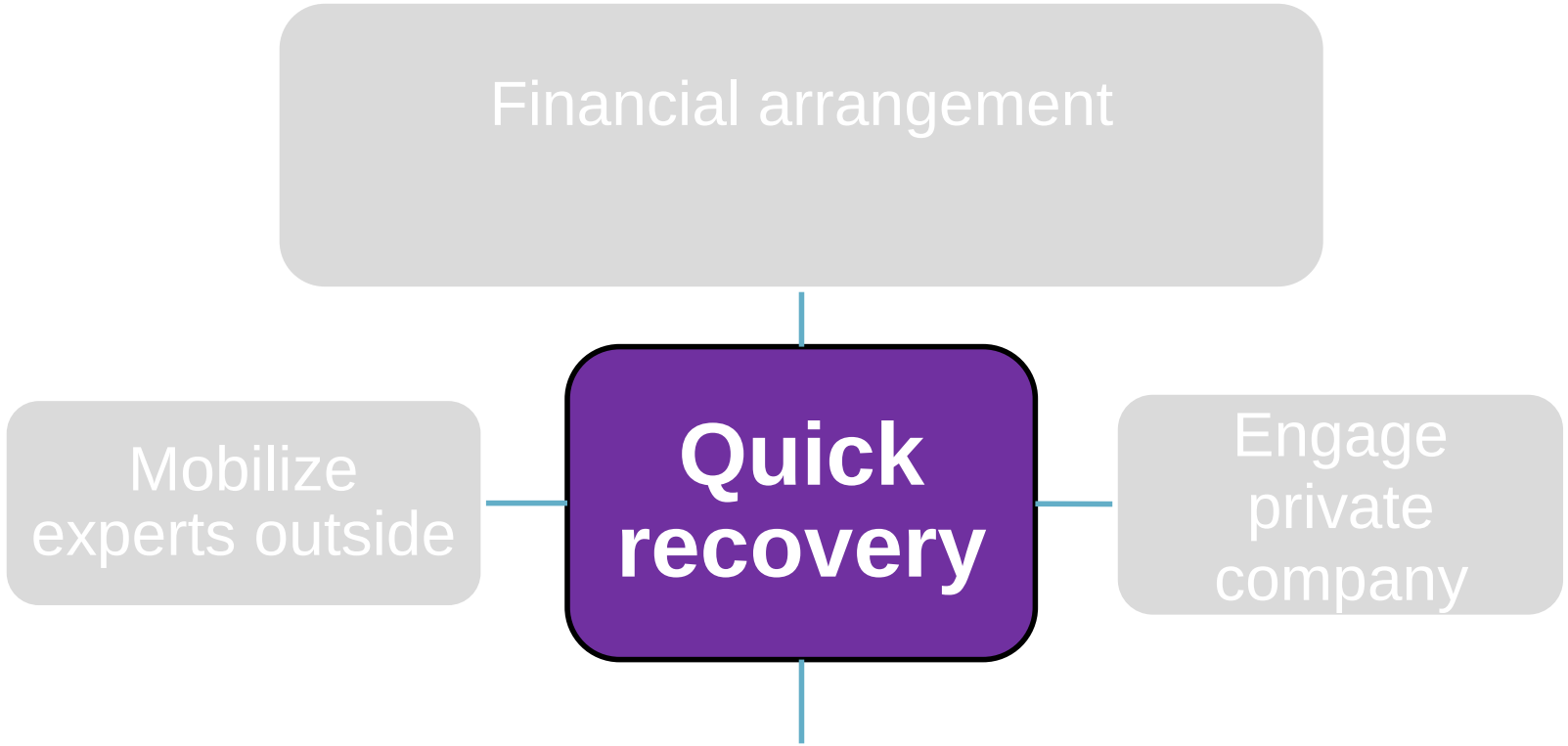
Cover various facilities: river, coast, roads, ports, sewerage & parks

Assess costs & secure budgets immediately after disasters

Start works promptly on the day of disasters

Subsidy is provided retroactively

Staff of finance ministry & technical line ministry jointly examine projects


Financial arrangement
Mobilize experts outside
Quick recovery
Engage private company
Resilient structure

IV.

Resilient structures reduce recovery efforts

	Kobe	GEJE
Highway	550 days	7 days
Bullet train (Shinkansen)	82 days	49 days

lessons from Kobe Earthquake 1995

Reinforcement of structures

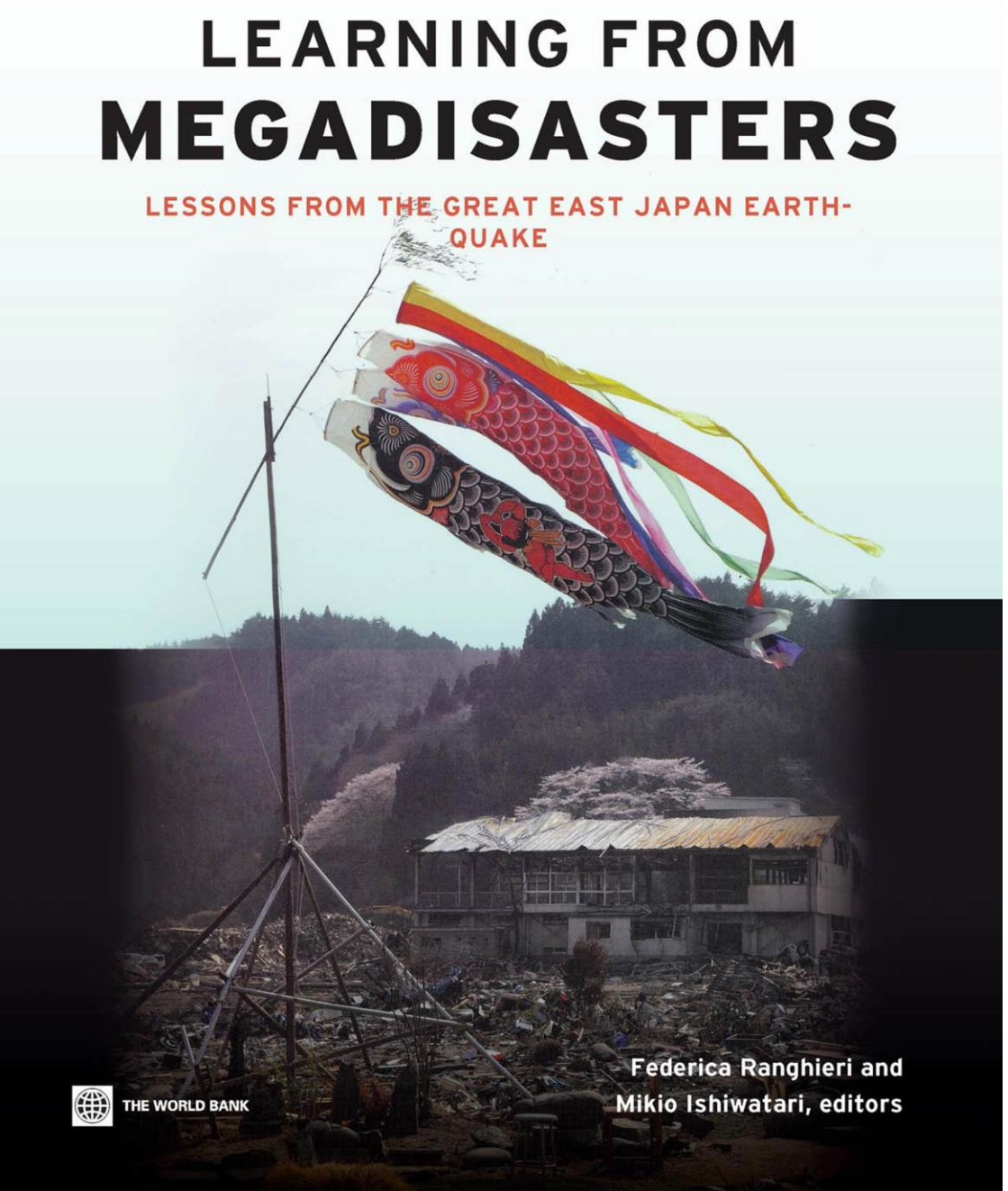
- 17,000 piers of bullet train rails
- 490 bridges

4. CONCLUSION

Japan has developed DRM framework

by integrating various sectors and organizations at all levels

through learning from disasters



THANK YOU

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