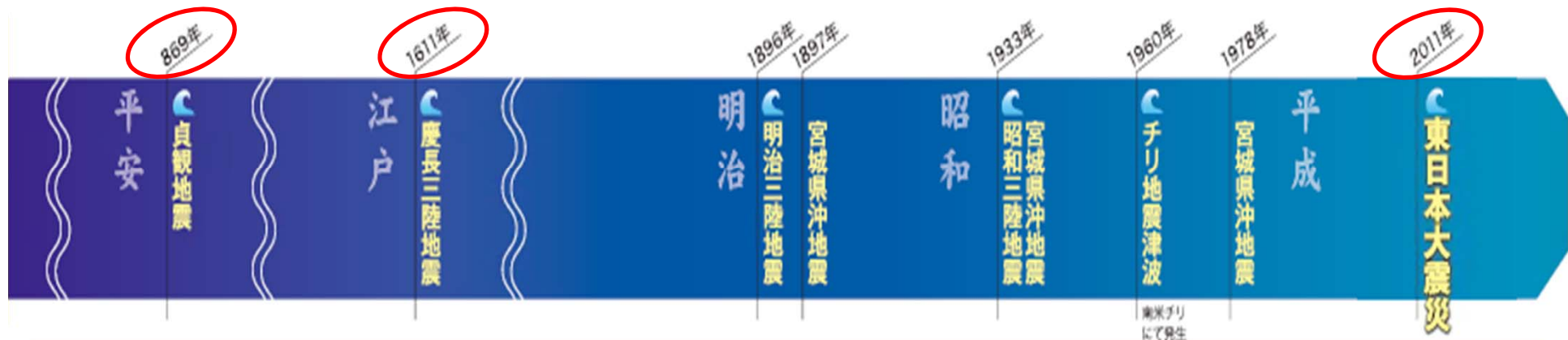
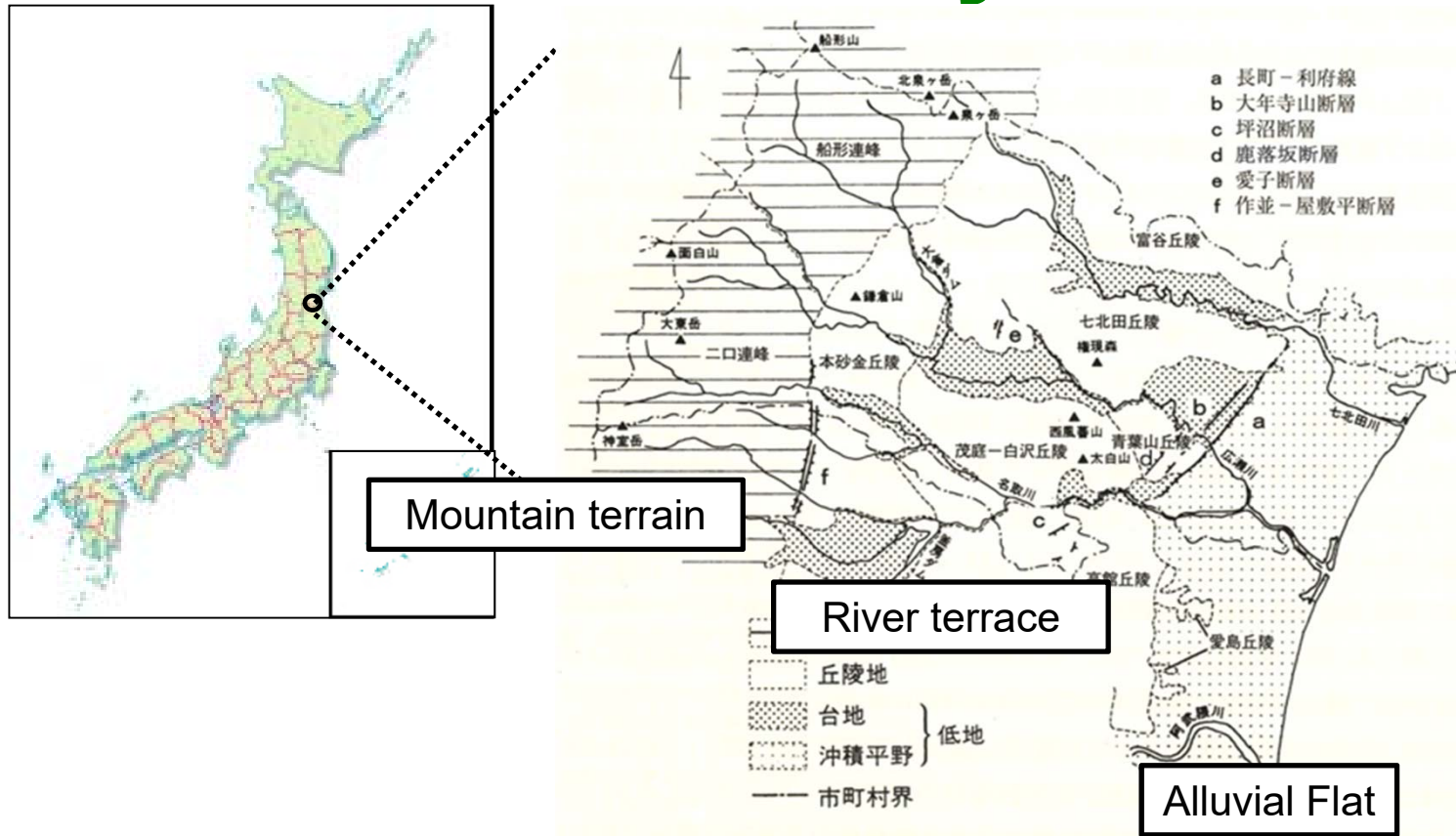




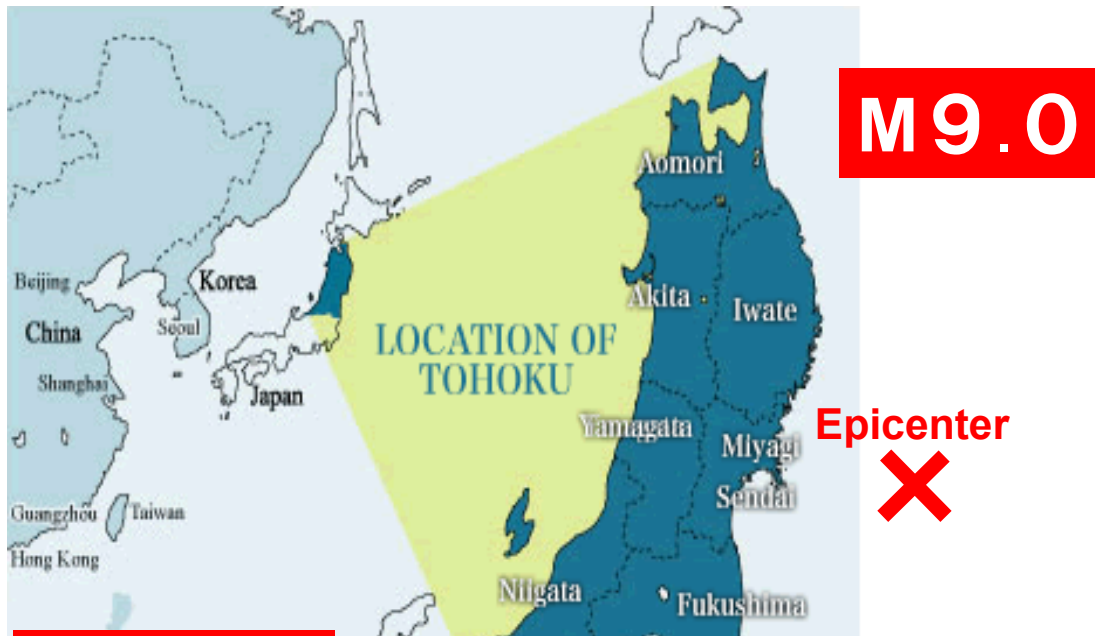
Focus Area 3: Seismic Risk communication for Preparedness

Crisis Management Department
Disaster Prevention Planning Section

SENDAI City Overview



Overview of damage caused by the Great East Japan Earthquake



Miyako city, Iwate
(Source: Fire and Disaster Management Agency, Ministry of Internal Affairs and Communications)

Damage overview

Deaths Completely destroyed

Sources: National Police Agency (Deaths and building damage as of March 10, 2016)
Reconstruction Agency (Earthquake disaster-associated deaths as of Sep. 30, 2015)

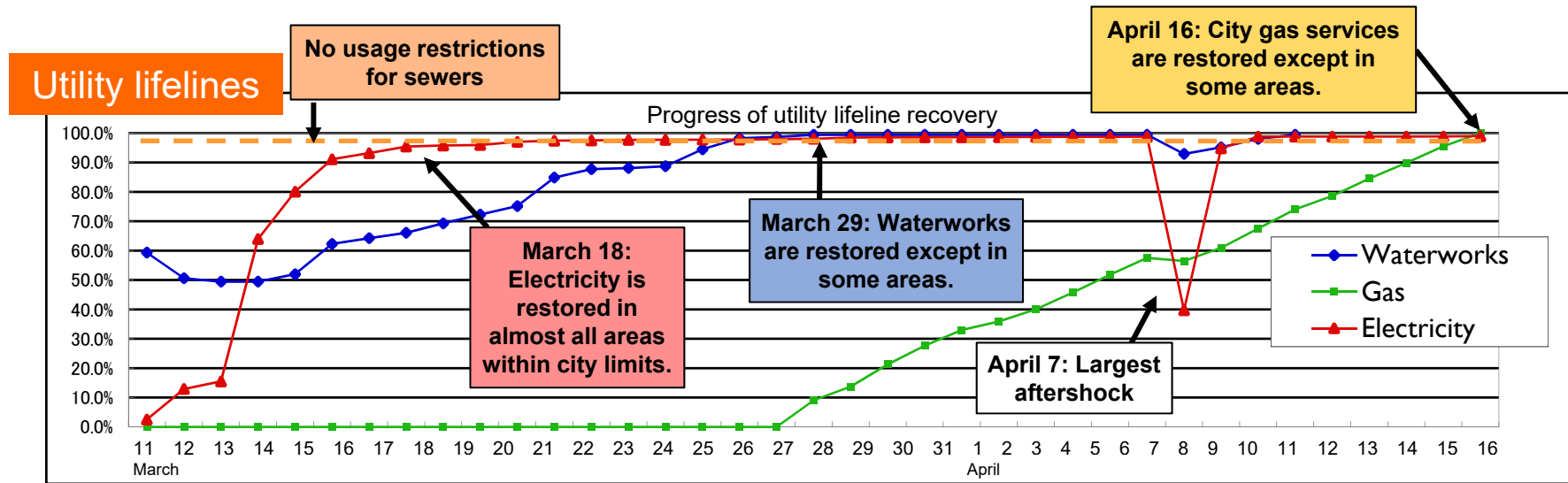
Iwate		5,128		19,597
Miyagi		10,459		82,999
Fukushima		3,592		15,171
Aomori		3		308
Yamagata		4		

Nationwide 19,301 121,805

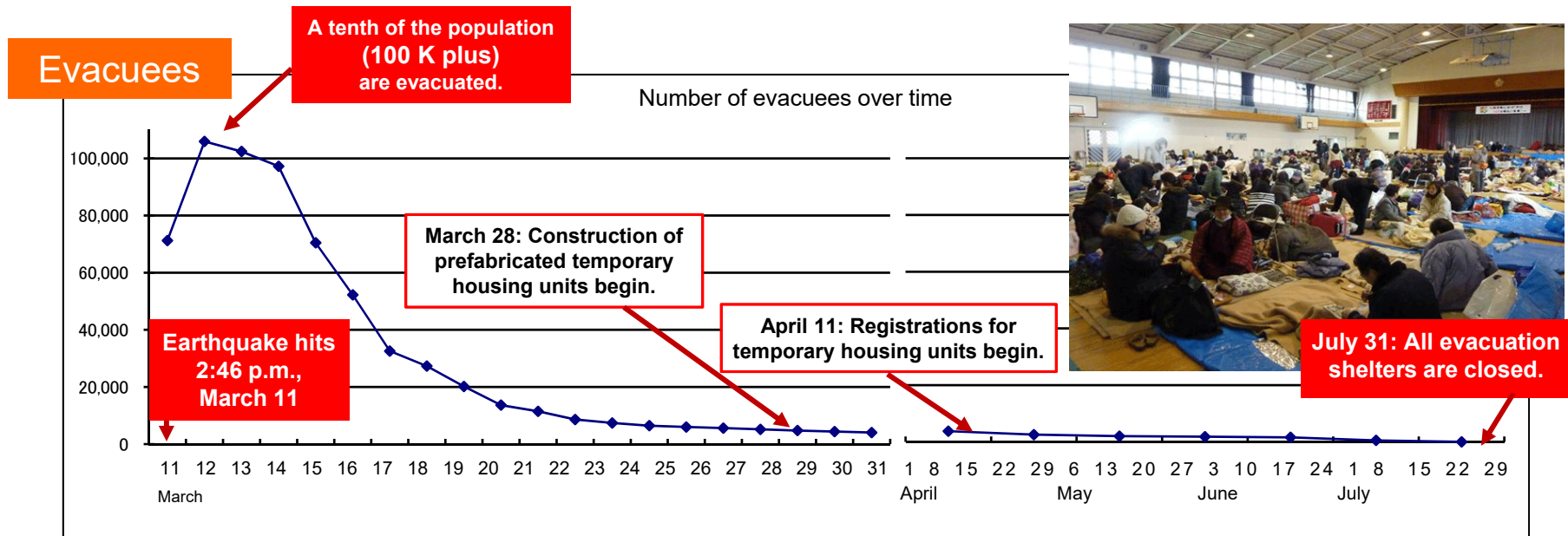


Sendai city's Minami-Gamo Wastewater Treatment Plant

Utility lifelines were shut down and a tenth of the population were forced to live in evacuation shelters.



Note: For electricity, the progress of restoration for all of Miyagi prefecture is shown.



Disaster Measures Before the Earthquake and Their Effects

〔 Estimates on: Earthquake off Miyagi Pref. in 1978 (about 38 year cycle, M8.0), Nagamachi-Rifu Earthquake (M7.5) *Highly unlikely 〕

〔 After GEJ Earthquake 〕

Water Facilities	Reinforced pipes	... 84.5% (AS OF MARCH 31, 2010)	Multiple water origins	Blocked service areas	➔	RECOVERED IN 18 DAYS (AND FULLY IN 1 MONTH).
Gas Facilities	Reinforced pipes	... 80.9% (AS OF MARCH 31, 2010)	Dual supply lines	Blocked pipe networks	➔	RECOVERED IN ABOUT 1 MONTH
School Facilities	Reinforced buildings	... 99.6% (AS OF APRIL 1, 2010)			➔	NO STUDENTS DIED IN SCHOOL
Sewage System	Reinforced pipes	... (AS OF MARCH 31, 2010)	Network of naturally flowing water		➔	NO OVERFLOW IN CITY NO USE RESTRICTION AFTER THE QUAKE
Disaster Waste	Separation, disposal system and estimation of the amount, list of candidate storage sites				➔	SELF-CONTAINED MODEL Recycling rate: 72% Disposal completed in 33 months (50-thou.-t burnable from Ishinomaki included).
POLICY SET IN 21 DAYS LED TO EARLY START.						
“Mutual Help”	Voluntary org. for disaster prevention	... 97.7% (AS OF APRIL 1, 2010)			➔	REGIONAL POWER FUNCTIONED IN MANAGEMENT OF EVACUATION CENTERS, PATROLS, AND GREETINGS.
Others: stockpiles, supply system of goods established, and disaster prevention awareness campaigns and drills conducted for citizens.						



Basic concepts for tsunami protection measures

Multiple protection

■ Reduce tsunami disasters by increasing the height of prefectural roads

Reduce disasters with multiple protections including, **redeveloping coastal dykes, replanting disaster prevention forests, and raising of prefectural roads**

Evacuation

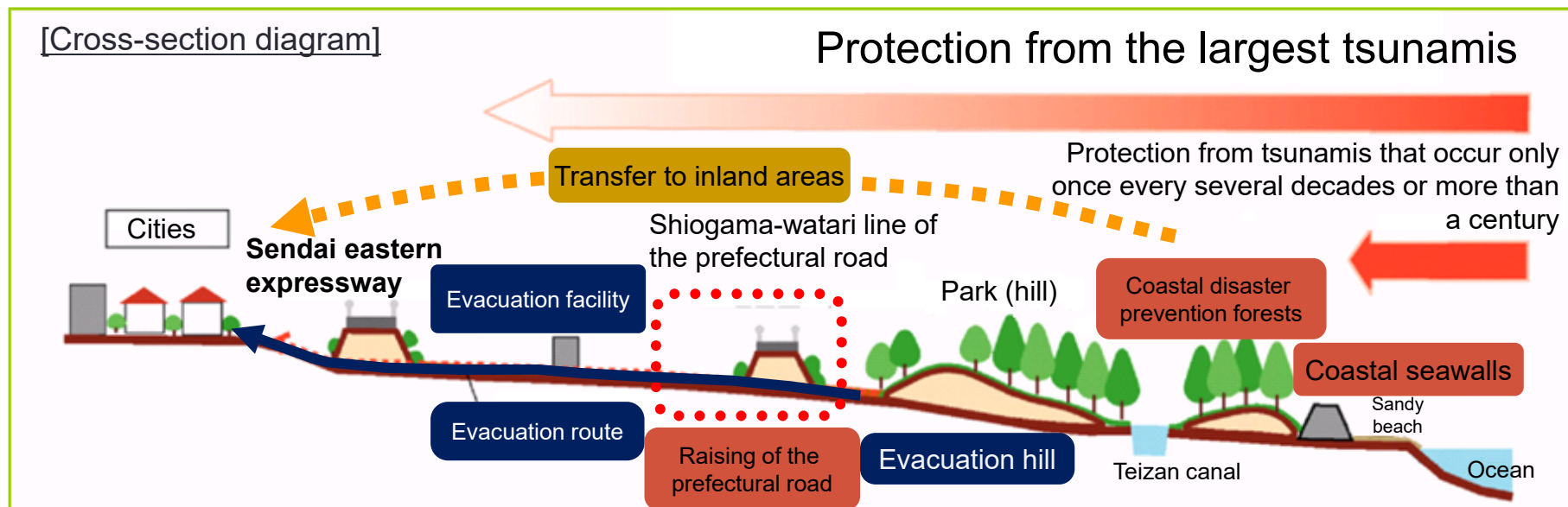
◆ Secure evacuation facilities

Focus on evacuation by improving hills, facilities and routes for evacuation

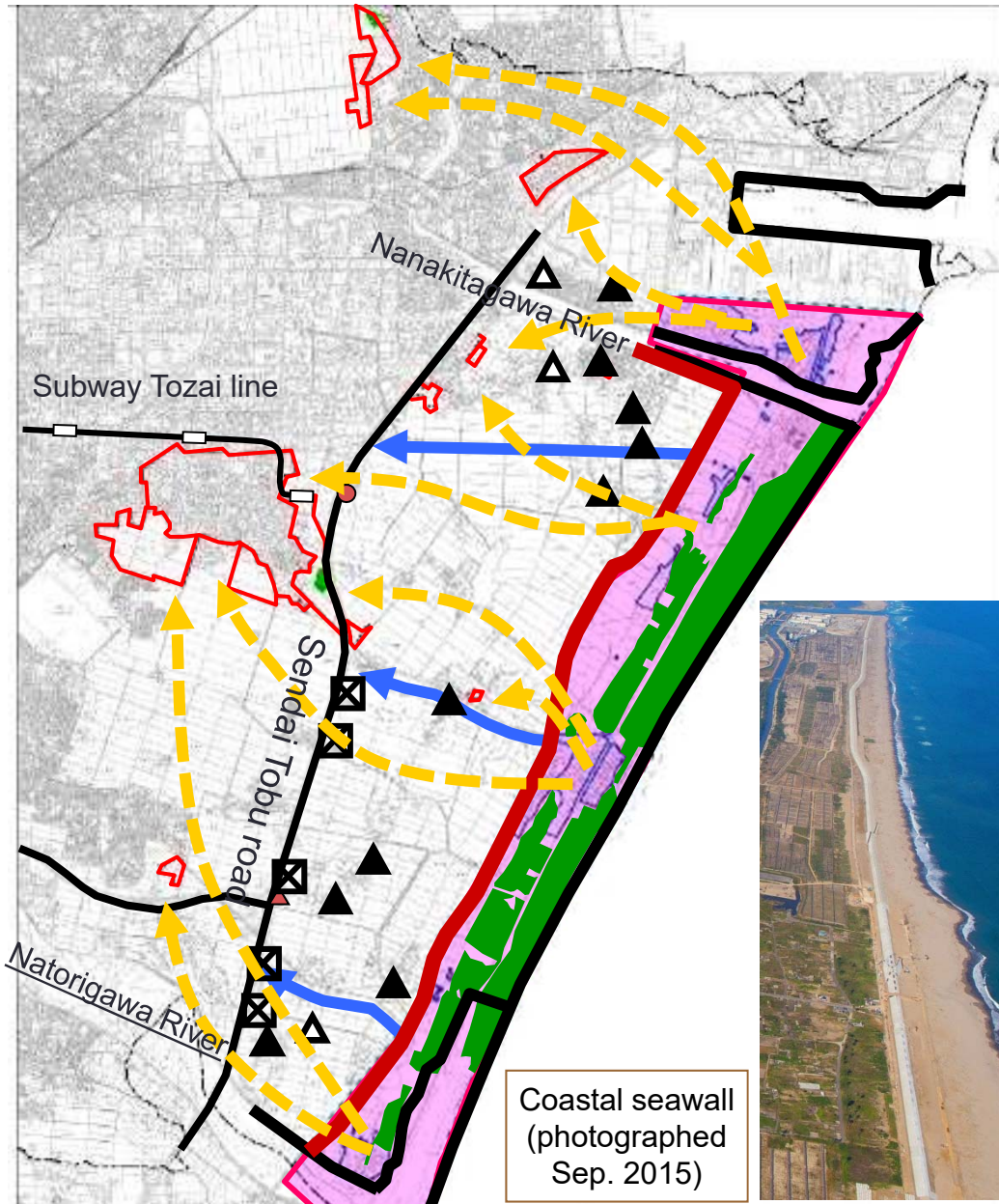
Transfer

■ Transfer to safe inland areas

Comprehensive disaster protection measures by **transferring to safe inland areas in groups**



Tsunami disaster preparedness countermeasures



Multi-faceted protection

- Rebuilding of coastal seawalls, river levees, etc.
- Regeneration of the coastal disaster prevention forest (areas planned)
- Raising of the prefectural road



Actual-sized mockup of raised prefectural road

Evacuation

- Building evacuation roads
- Building tsunami evacuation facilities
- Existing tsunami evacuation facilities (schools)
- Evacuation staircase on the Tobu road (installed by NEXCO)



Tsunami evacuation tower at Nakano 5-chome

Relocation



Group relocation for disaster prevention
13 districts
733 residential plots

- Disaster hazard areas (relocate inland)
- Inland relocation destinations
- Movements of group relocation for disaster prevention



Transmit tsunami information to local residents

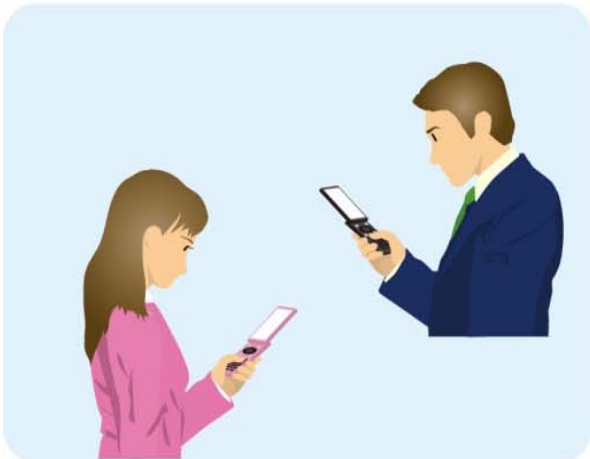
● Information on TV and radio



● Tsunami information communication system



● Fire helicopters



- E-mail
- Websites
- Twitter
- Emergency alert e-mail



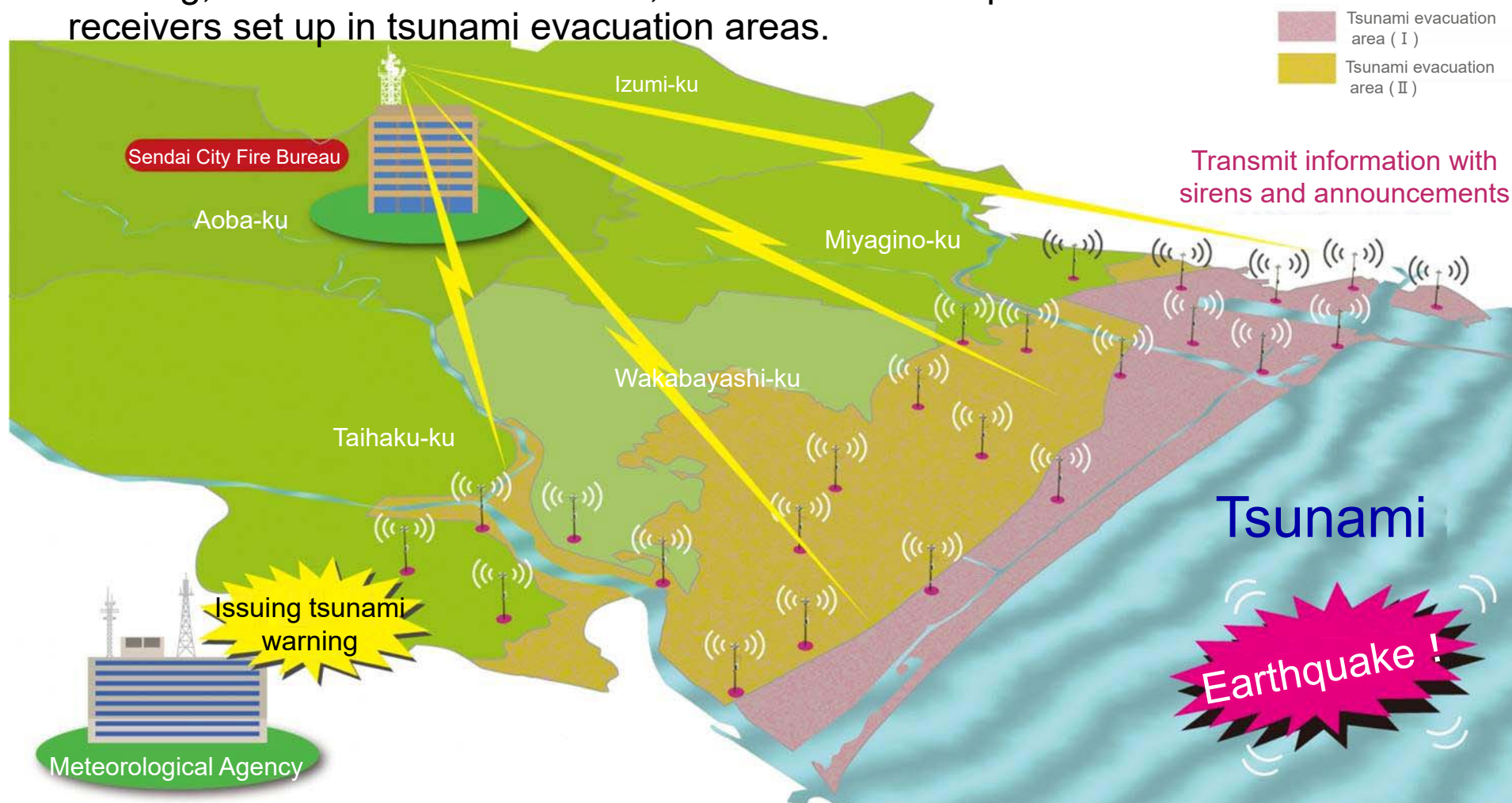
● Fire (fire brigade) engines/vehicles



● Ward office publicity cars

Tsunami information communication system

- ◆ The master station of the disaster prevention administration radio system (fixed type) was established at the Sendai City Fire Bureau, which operates around the clock.
- ◆ When the meteorological agency issues a tsunami warning, by utilizing radio promptly and simultaneously, with sirens and announcements, transmit a tsunami warning, or evacuation information, from outdoor loudspeakers and house to house receivers set up in tsunami evacuation areas.



Before the earthquake



Height: 1.5 meters
Battery: Approximately 48 hours

Diameter of the pole:
Approximately 21.6 cm

Foundation:
60 cm × 60 cm

Aseismatic strength:
Intensity upper 6



After the earthquake

Height: 8 meters
Battery: Approximately 72 hours

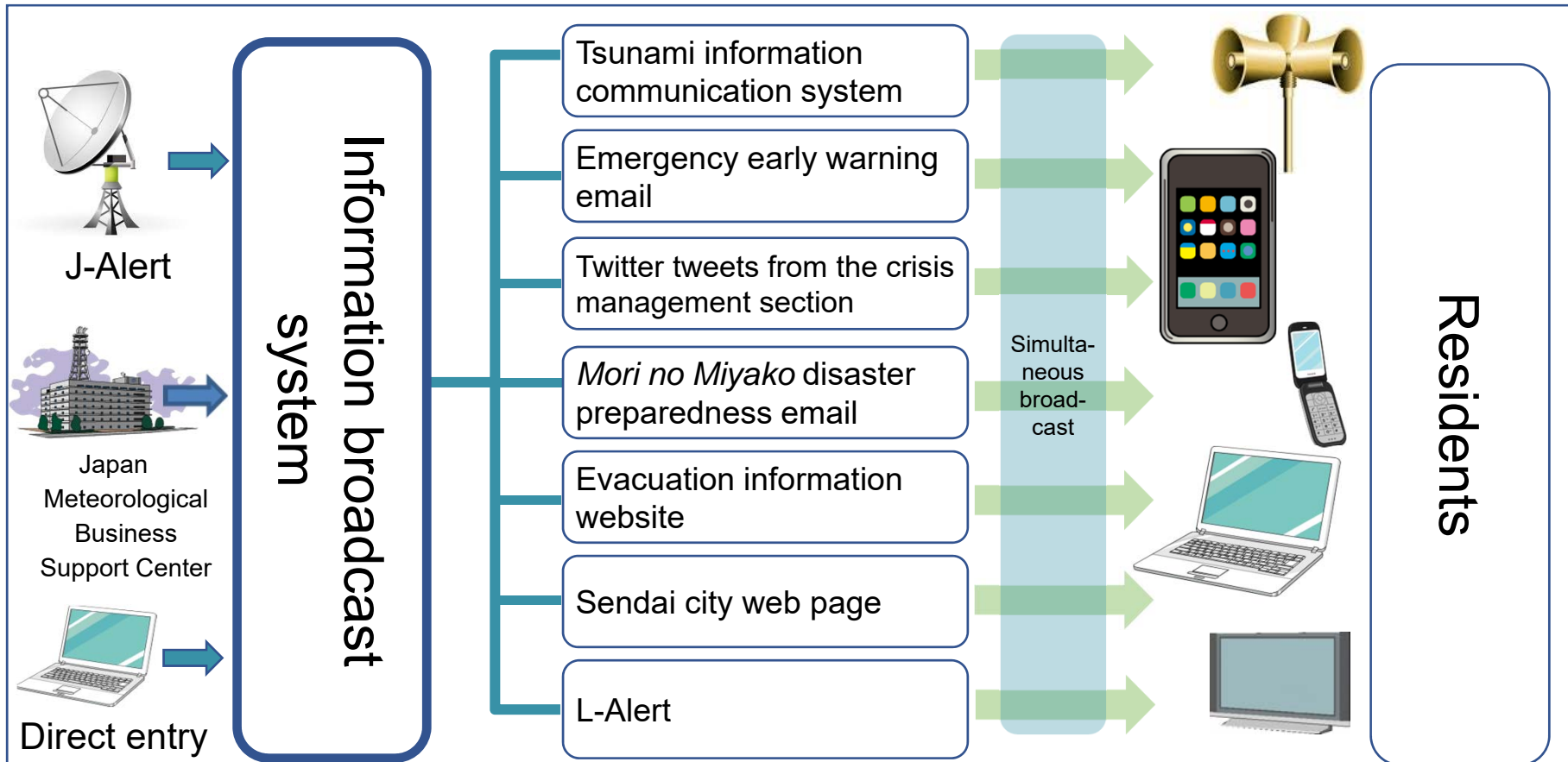
Diameter of the pole:
Approximately 31.9 cm

Foundation:
90 cm × 90 cm

Aseismatic strength:
Intensity 7



Better information dissemination to residents during disasters



- A disaster information broadcast system was built, Information broadcasting tools are centrally controlled to enable the quick, accurate broadcasting of information.

References

Tsunami evacuation facility (outline of a Tsunami Evacuation Tower)

○ Outline of the facility

- Building construction: steel frame (two stories) ▪ Total area: 398 m² ▪ Capacity: 300
- Height from the ground: 6.6 meters (indoor evacuation space), 9.9 meters (roof floor evacuation space)
- Measures for tsunami: To counter liquefaction and the tsunami's power, drive a pile down 26.4 meters. Unshakable structure resistant to collisions from flotsam.

○ Specifications of a Tsunami Evacuation Tower



Countermeasures for nighttime power outages

To enable evacuations in the event of a nighttime power outage, a solar power generation pole is set on the roof floor, illuminating the steps, slope and the roof floor. In addition, a cassette gas generator and LED floodlight are stored.



Measures for evacuees in wheelchairs

Construct slopes for evacuees in wheelchairs to use.



Secure outside communication

The disaster prevention administration radio system is set to communicate with the disaster countermeasures office in Sendai city and others during evacuations.



Measures for cold weather or strong winds

Construct an evacuation space that is surrounded by outer walls and store blankets and cassette gas stoves.



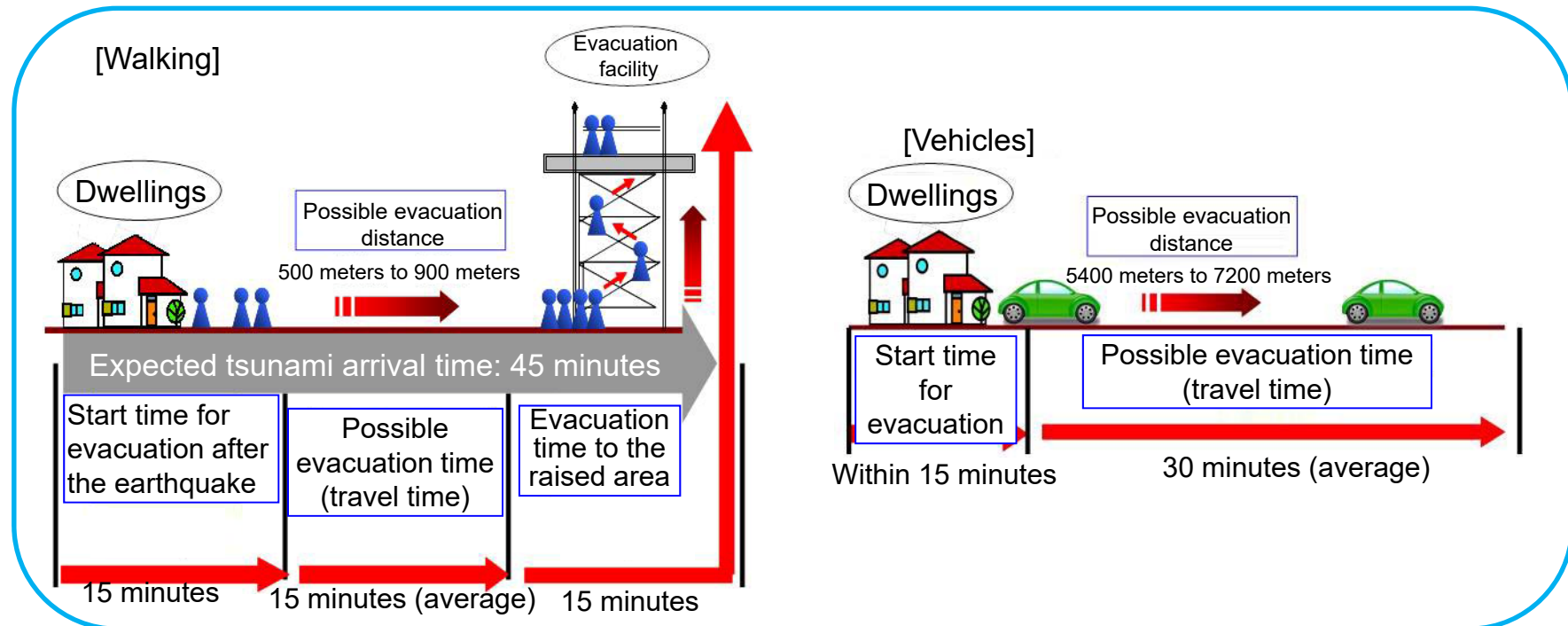
Improve tsunami evacuation facilities (concepts for evacuation)

The review committee consisting of persons with relevant knowledge and experience, and local residents was established in FY 2012.

Based on the evacuation simulations, study evacuation times, evacuation methods, evacuation facilities and evacuation roads

“Protect Yourself”

- 1) Start evacuations within 15 minutes and complete evacuations within 45 minutes (expected tsunami arrival time is approximately 45 minutes)
- 2) In principle, evacuate on foot (limit evacuations by vehicles)



Facilities at the tsunami information communication system

■ Console in the master station



■ Disaster prevention administration radio system in the master station



■ Manual control panel in the master station



■ Outdoor loudspeaker



■ House to house receivers



According to the type of warnings such as a tsunami warning, this equipment can broadcast sirens, announcements, and text data (transmit characters) simultaneously.

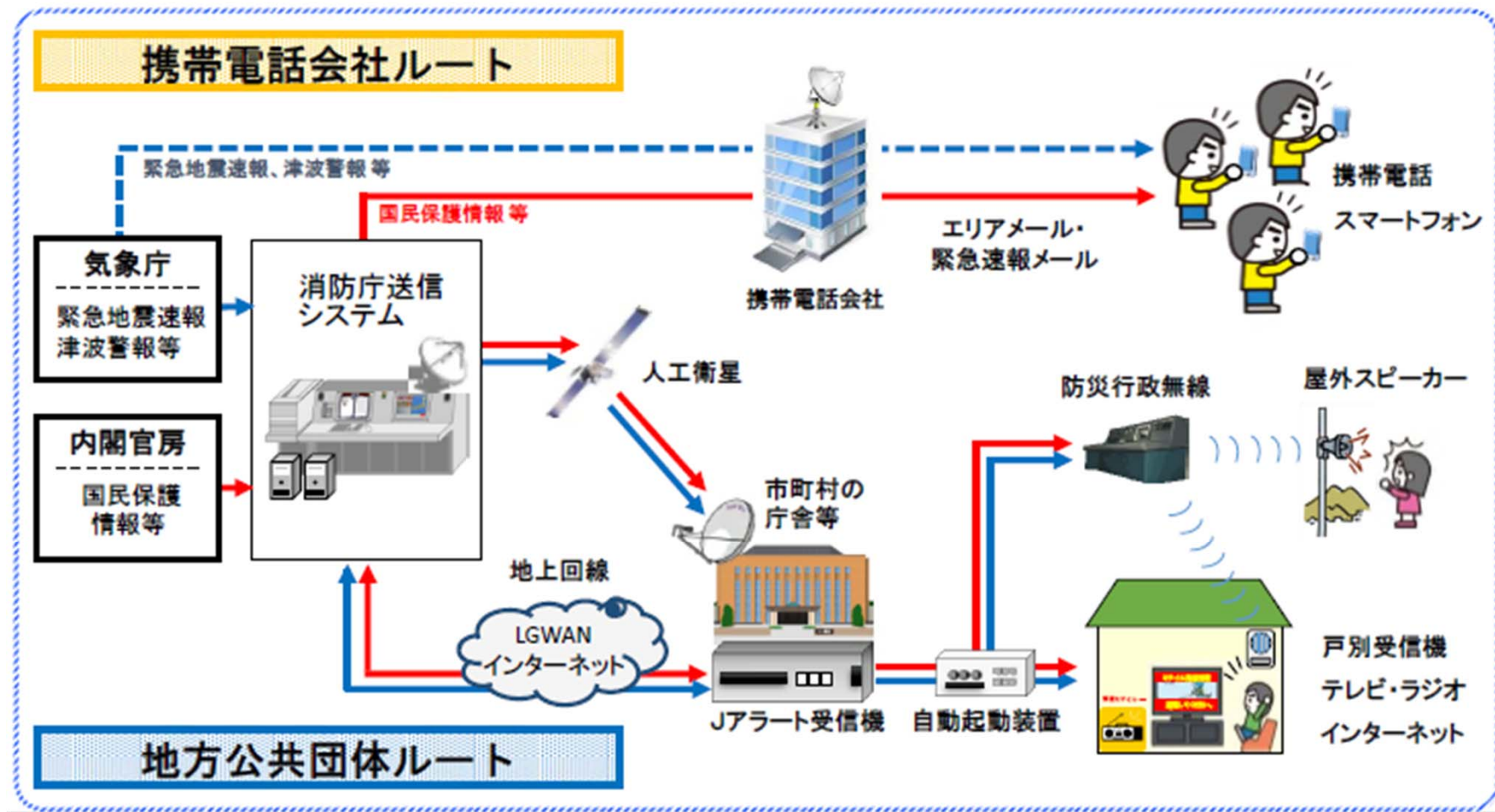
Maintenance record of outdoor loudspeakers Commencement of operations (April, 2004)

FY	Maintenance (units)	In operation (units)
2003	36	36
2005	11	47
2007	2	49
2009	1	50
2010	(Shut down of 38 units due to the Great East Japan Earthquake)	
2011	16	28
2012	40	68
2013	2	70
2014	6	76
2015	3	79

What is a “J-ALERT”?

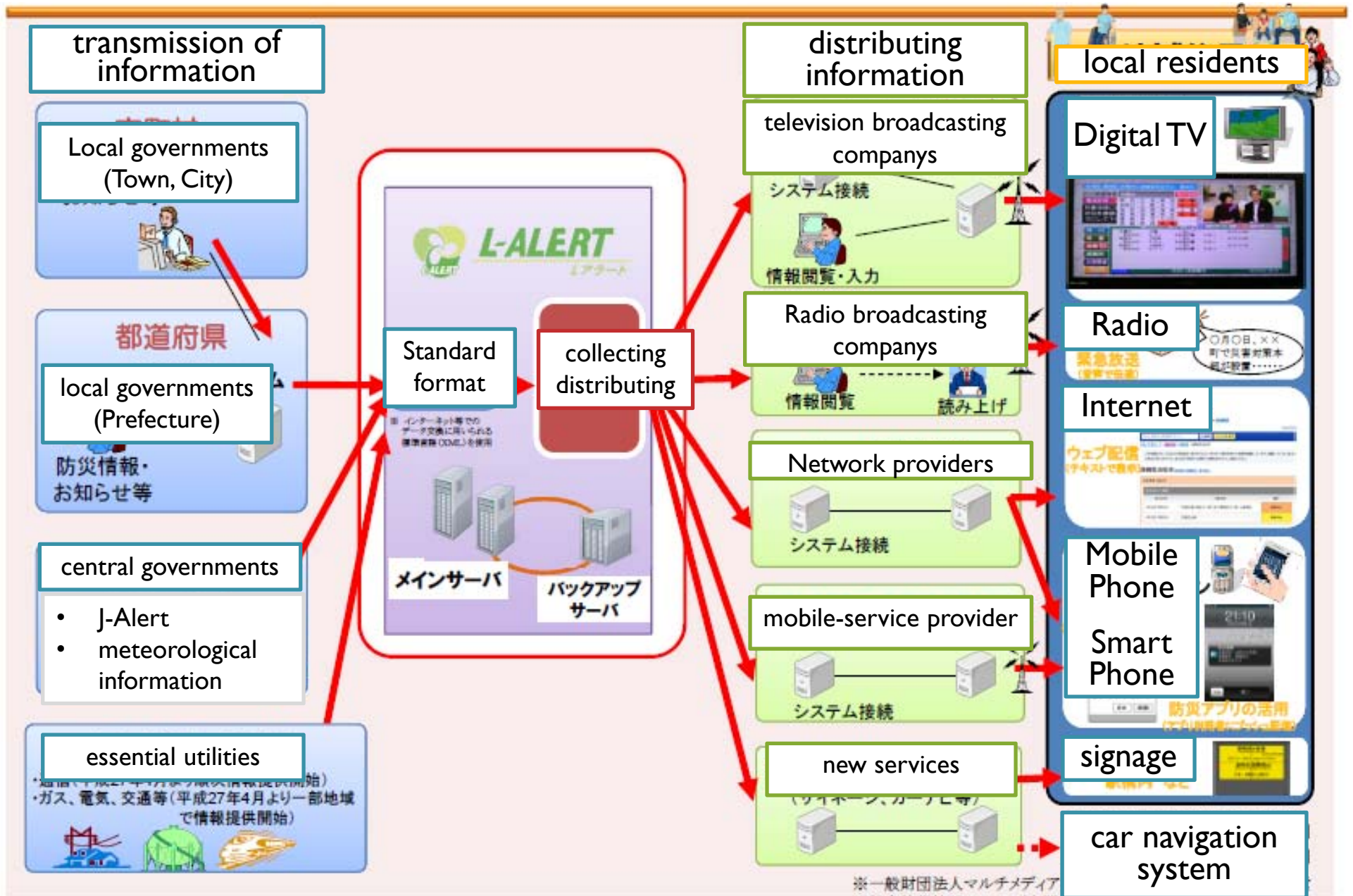
excerpt from
Fire and Disaster Management Agency

The National early warning system (J-ALERT) is a system that transmits high-priority emergency information, such as emergency earthquake information, tsunami information or even missile launch information, as soon as possible to the public.



What is a "L-ALERT"?

excerpt from
Ministry of Internal Affairs and communications

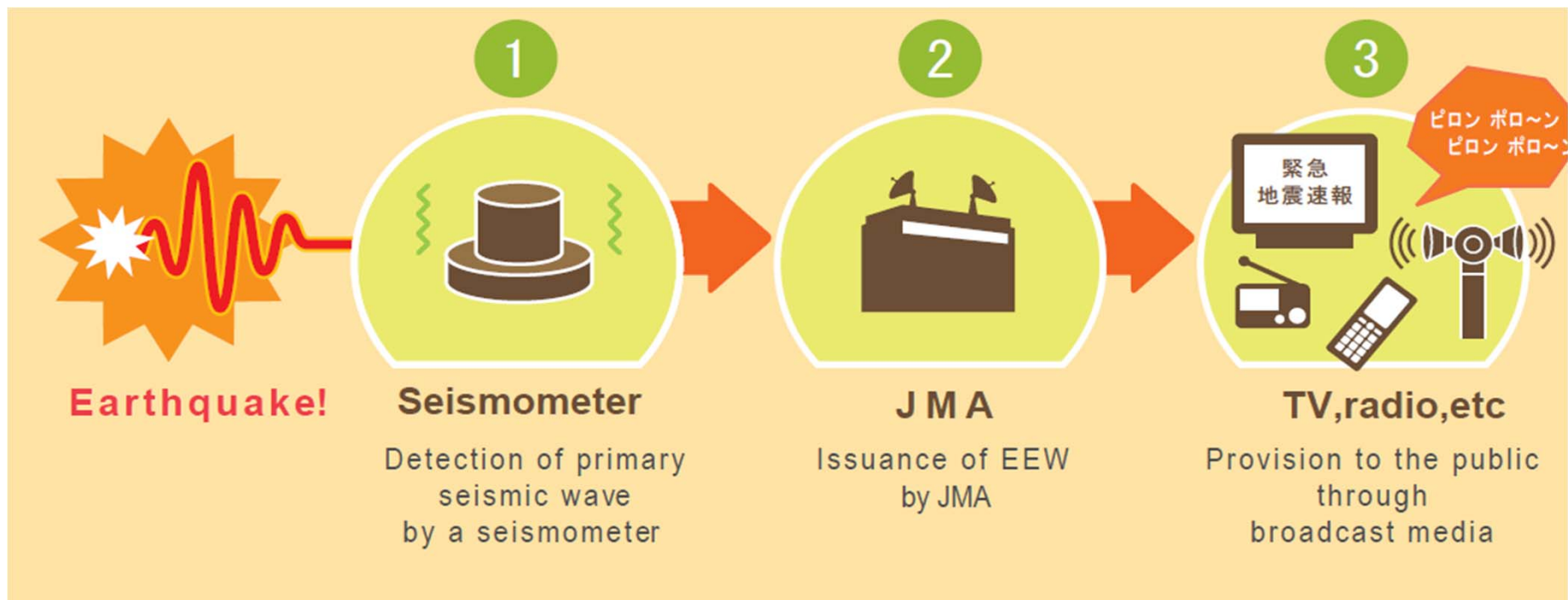


※一般財団法人マルチメディア
※総合防災情報システム(内閣府)とも接続予定

What is an “Earthquake Early Warning”?

The Earthquake Early Warning system provides advance announcement of the estimated seismic intensities and expected arrival time of principal motion. These estimations are based on prompt analysis of the focus and magnitude of the earthquake using wave form data observed by seismographs near the epicenter.

The Earthquake Early Warning is aimed at mitigating earthquake-related damage by allowing countermeasures such as promptly slowing down trains, controlling elevators to avoid danger and enabling people to quickly protect themselves in various environments such as factories, offices, houses and near cliffs.

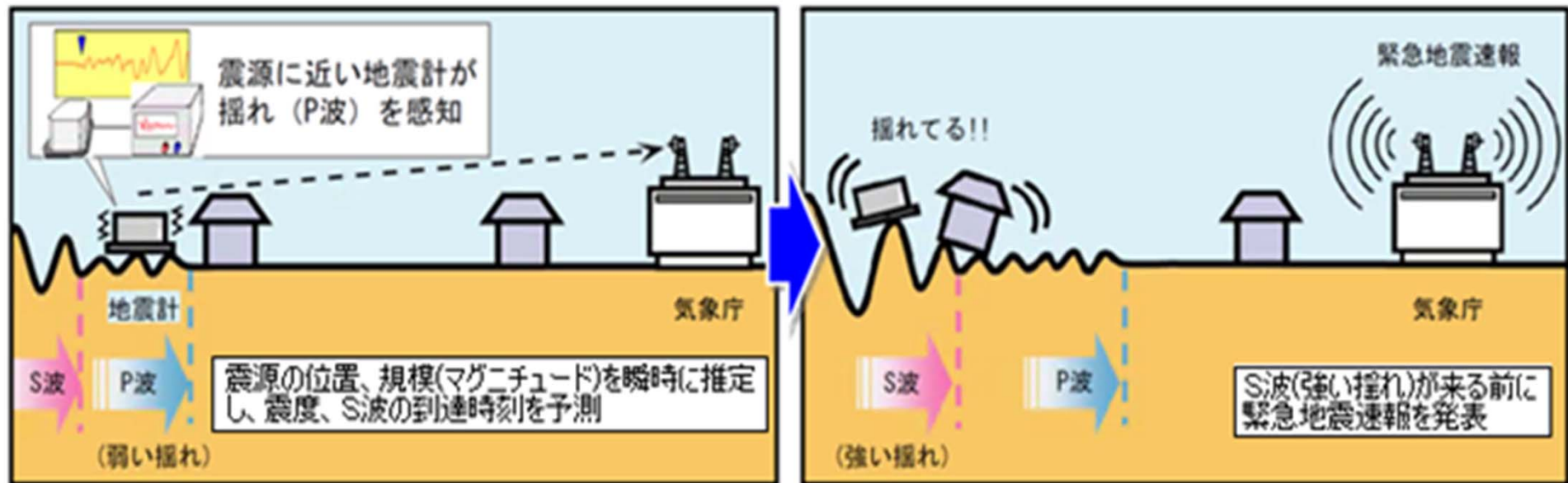


excerpt from Japan Meteorological Agency

What is an “Earthquake Early Warning”

Please note that the period between the Earthquake Early Warning and the arrival of strong tremors is very short, i.e. a matter of seconds (or between several seconds and a few tens of seconds). As a result, areas that are close to the focus of the earthquake may not receive the Earthquake Early Warning transmission before strong tremors hit.

Please also note that there are limits to the accuracy of the Earthquake Early Warning, such as the estimated seismic intensity. This is because the system is necessarily dependent on very short-term data.



速度

P波 : 秒速約7km

S波 : 秒速約4km

Examples of Response to an Earthquake Early Warning

At Home

- Protect your head and shelter under a table
- Don't rush outside
- Don't worry about turning off the gas in the kitchen



When Driving

- Don't slow down suddenly
- Turn on your hazard lights to alert other drivers, then slow down smoothly
- If you are still moving when you feel the earthquake, pull safely over to the left and stop



In Public Buildings

- Follow the attendant's instructions
- Don't rush to the exit



Outdoors

- Look out for collapsing concrete-block walls
- Be careful of falling signs and broken glass



On Buses or Trains

- Hold on tight to a strap or a handrail



In Elevators

- Stop the elevator at the nearest floor and get off immediately

