

National Disaster Warning System in Korea



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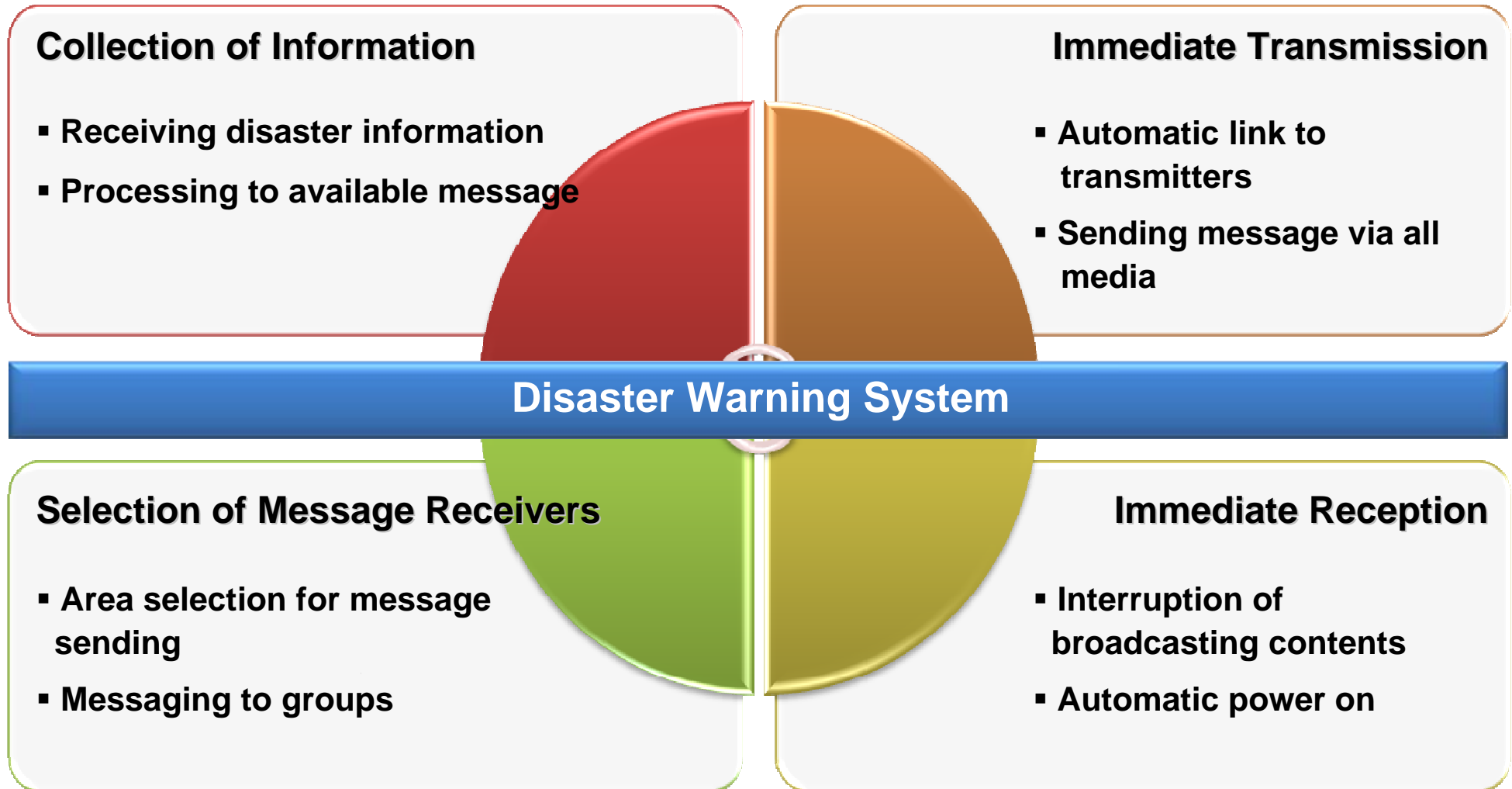
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1. Definition of Disaster Warning System

- **Disasters such as earthquake and flood are increasing due to global warming, El Nino, etc**
- **Immediate alarm and rescue system helps to reduce the disaster damage**
- **Disaster warning system requires immediate transmission of message**
- **Conventional communication system may not be efficient for warning system because of restricted capacity of concurrent transmission**

- ① **For efficient evacuation, warning message should be sent to anyone, anytime, anywhere**
- ② **For efficient rescue, a lot of information needs to be sent**

1. Definition of Disaster Warning System

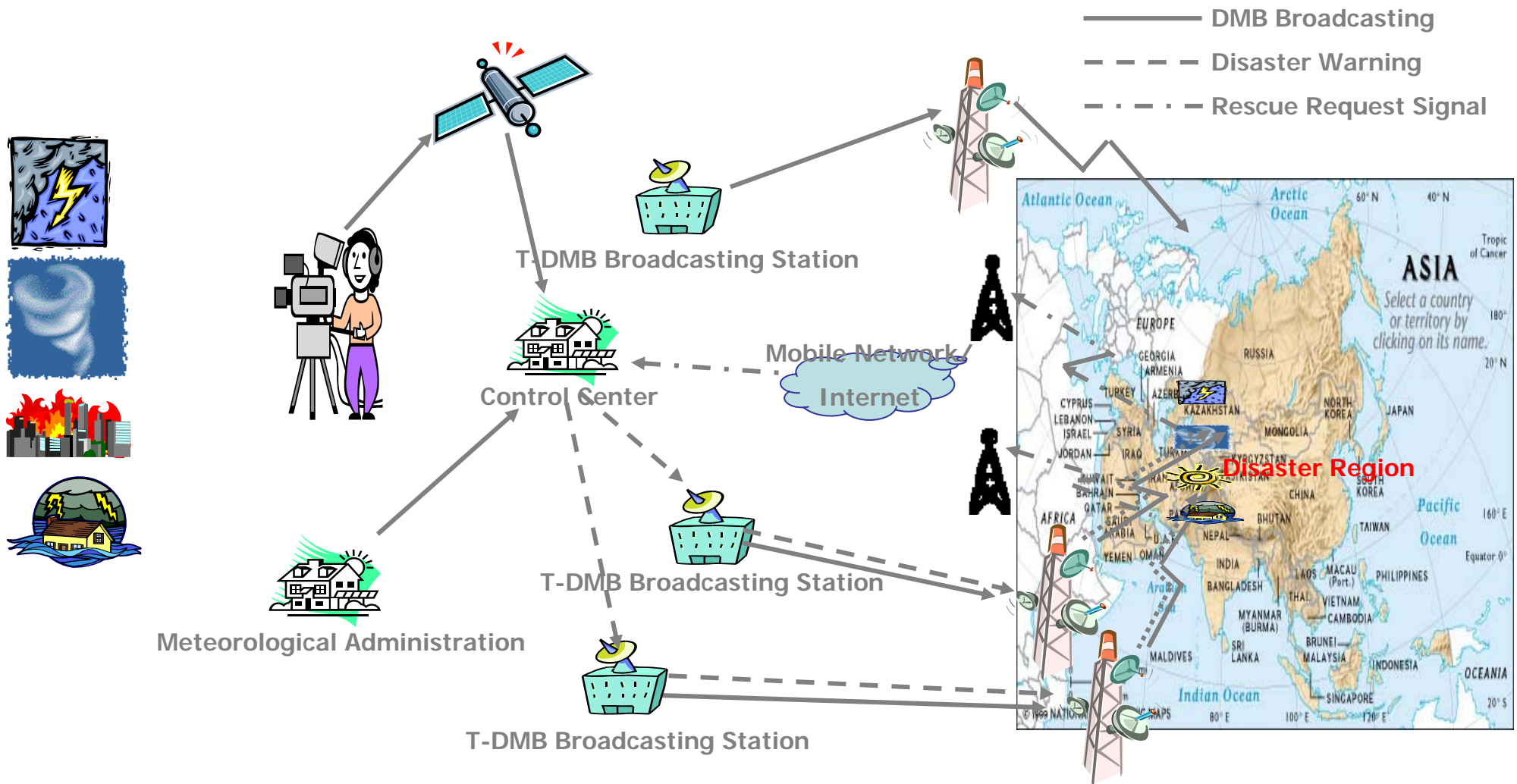


1. Definition of Disaster Warning System

■ Early Warning System

- **Effective Early Warning System need earthquake forecast and tsunami warning as well as emergency action plan, disaster response activities such as issuing disaster warning alarm, residents shelter, emergency recover of facilities, emergency aid of victims and resident training, etc.**
- **The system include precaution such as construction of prevention facilities, training/education to officials in charge, investigation of disaster cause and evaluation of risk as well as post-activities such as recover of facilities, emergency aid.**

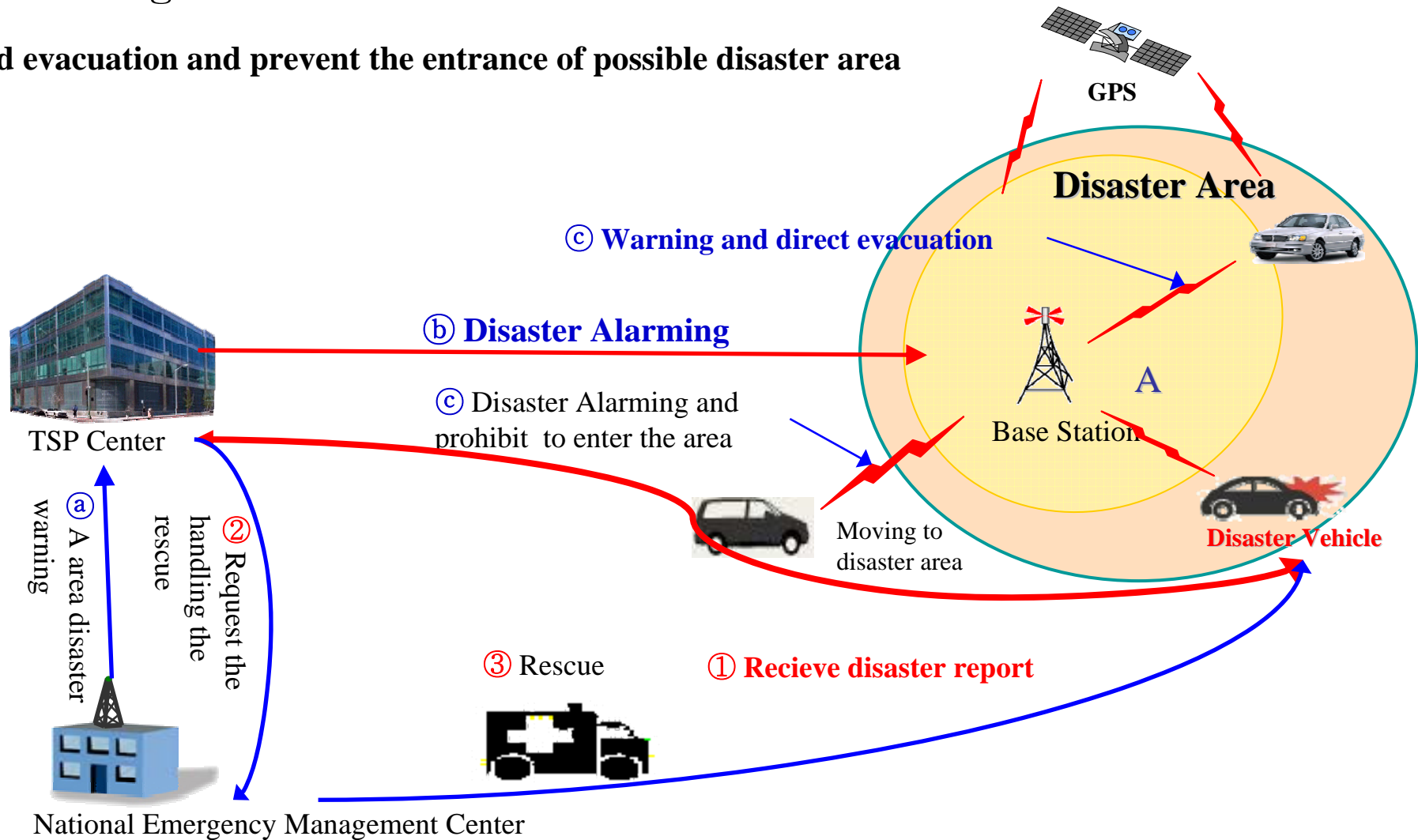
1. Definition of Disaster Warning System



1. Definition of Disaster Warning System

Warning of Disaster Event and Evacuation

Lead evacuation and prevent the entrance of possible disaster area



2. Limitations

Limits of existing Disaster Warning System

- **Unidirectional broadcasting**
 - *Collecting individual information is not possible*
- **Narrow transmission channel bandwidth**
 - *Detailed or multi-linguistic message is not possible*

- *Personalized and targeted message **using digital technology***
- *Bidirectional communications via **interconnection with cellular networks***
- *Detailed rescue information **using broadband channel***
- *Wide coverage **using high power broadcasting transmitters***

3. National Disaster Warning System in Korea

No	Equipment/System	Installation set	Target for info.	Alert method	Management host
1	CBS Mobile-Phone Disaster Notification Message Broadcasting System	37.5 Million Users	CBS User 22 Million	Message broadcasting (Mobile Phone)	Central
2	Automatic Verbal(Text) Notification System	234 set nation wide	Civil official, head of government offices and specific regional residents – about 550,000 people	Guidance-information broadcasting(wire and mobile phones, etc)	Regional
3	Automatic Rainfall Warning System	148 set nation wide	Valley, Mountain, Public places, holiday-makers, campers, etc	Warn-alarming, guidance-information broadcasting	Regional
4	Disaster Notification Board System	299 set nation wide	The specific regional residents, holiday-makers, etc	Propagation and notification of disaster by wording through electronic board	Regional
5	TV Disaster Warning Broadcasting System	3997 set nation wide	Disaster Prevention & Countermeasures Headquarters at each local provinces and each regional administrative offices and its related institutes.	Auto TV Power-On, Volume-Up, broadcasting the situation	Central
6	Radio Disaster Warning Broadcasting System	5 area	Residents, Holiday-makers, etc	Auto Audio Amp Power-On, Alarming and Guidance-information broadcasting	Regional

3. National Disaster Warning System in Korea

○ The Status of natural disaster warning system in Korea

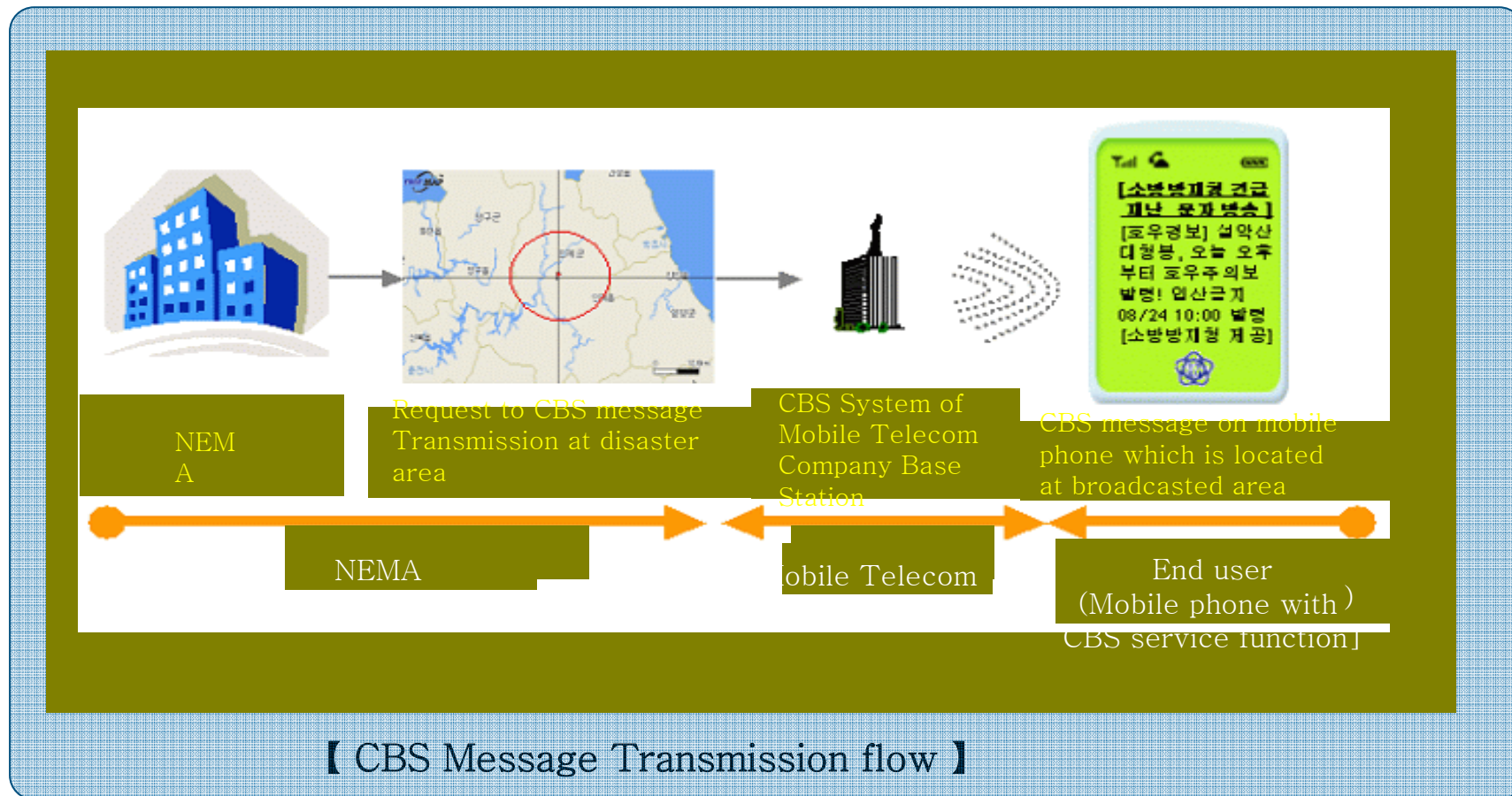
1) CBS (Cell Broadcasting Service) Phone Disaster Notification Broadcasting System

▣ System overview

- The mobile communication technology that broadcast disaster message to mobile-phone users at Base Station Transceiver Subsystem, who have special receivable ID.
- Disaster message transmission to nation-wide or specific area resident users simultaneously at once.
 - ※ CBS (Cell Broadcasting Service)

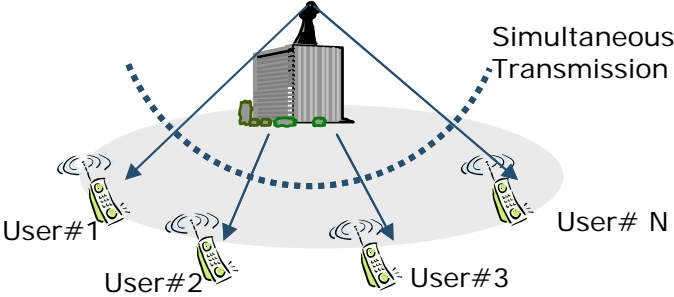
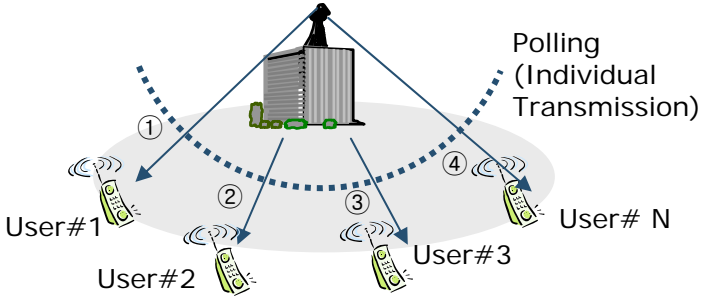
3. National Disaster Warning System in Korea

System Structure and Message Flow



3. National Disaster Warning System in Korea

Comparison of CBS and SMS

CBS (Cell Broadcasting Service)	SMS (Short Messaging Service)
 <p>The diagram illustrates CBS where a central base station (tower) is connected to a network of mobile phones. A dashed blue circle represents the broadcast area. Arrows point from the base station to each phone, labeled 'Simultaneous Transmission'. The phones are labeled 'User#1', 'User#2', 'User#3', and 'User#N'.</p>	 <p>The diagram illustrates SMS where a central base station (tower) is connected to a network of mobile phones. A dashed blue circle represents the polling area. Arrows point from the base station to each phone, labeled 'Polling (Individual Transmission)'. The phones are labeled 'User#1', 'User#2', 'User#3', and 'User#N'. The arrows are numbered 1, 2, 3, and 4, indicating a sequential transmission process.</p>
<ul style="list-style-type: none"> • Point to Multi-Point (Simultaneous Multi Casting) 	<ul style="list-style-type: none"> • Point to Point (Individual Transmission by Polling)
<ul style="list-style-type: none"> • Real time service to all users located at specified base station • Very low transmission cost • No database of phone number and to select transmission area from one base station area to nation wide. • Max. 230 characters information per transmission. 	<ul style="list-style-type: none"> • Minuets or hours transmission time required depend on number or service user and real timer service impossible if service user more than 300,000. • Transmission cost high (25 or 30 won per person) • Database of phone number required • Max. 40 characters information per transmission.

3. National Disaster Warning System in Korea

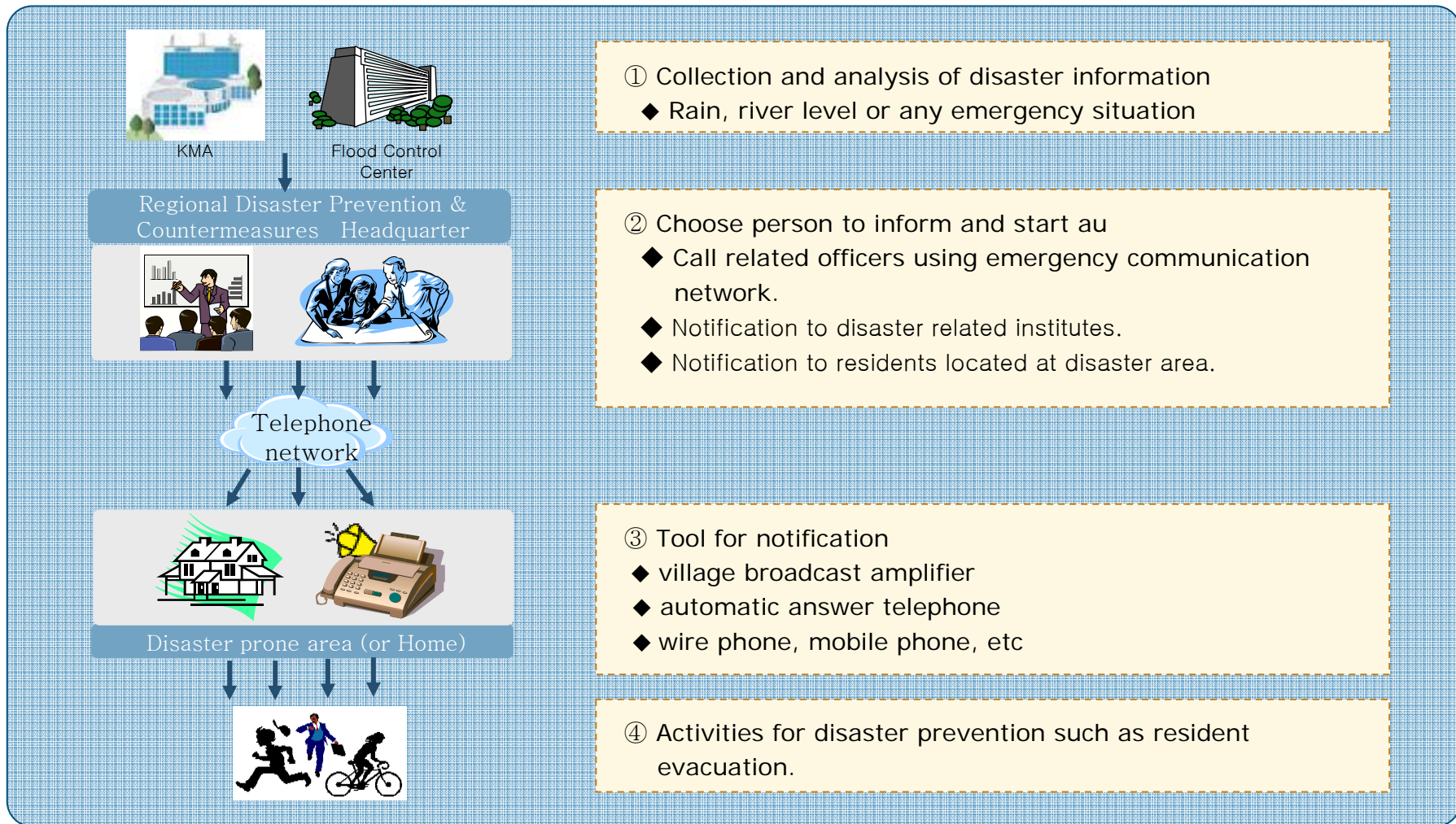
2) Automatic Verbal Notification System

■ System Overview

- Real time propagation of message of disaster situation with “Automatic Verbal Notification Equipment” located at Regional Disaster Prevention & Countermeasures Headquarters, When flood, typhoon or any disaster occurs or are expected.
 - By wire telephone, mobile phone, village broadcast amplifier and any available communication tool, person in charge of regional offices (eup, myun, dong), drainage pump chapter, each administrative offices related to disaster, etc.
 - Minimize of loss in lives and properties by construction of fast shelter system using immediate disaster notification to residents located at dangerous area and coast, etc.
- Management of database of 550,000 people such as civil officer, residents

3. National Disaster Warning System in Korea

System organization & Management streamlines



3. National Disaster Warning System in Korea

3) Automatic Rainfall Warning System

■ System Overview

- Establishing automatic rainfall (water leveling) observing station at the upper and middle area of mountain valley, as well as automatic warning system at the lower area of it, and the automatic remote control/ observing station at the local Disaster Prevention & Countermeasures Headquarters and local administrative offices.
- Automatically observing the rain falling status at the upper/middle areas, and automatically performing the warning alarming and disaster information broadcasting at the lower areas. Those series of action flows should be observed and controlled by the remote control station manually and/or automatically.
- At '96~'05 period, 148 sites have been already established and operated at the valleys, and downy side of rivers, national parks, and at '05~'09 period, planned to establish additional 113 sites.

3. National Disaster Warning System in Korea

■ Snap shots



< Rainfall Observation Station >



< Warn Alarming Station >



< Control Station >



< Monitoring Station >

3. National Disaster Warning System in Korea

4) Disaster Notification Board System

■ System Overview

- Preparing of immediate response system toward disaster by notifying and broadcasting rapidly the disaster situation through blowing siren and board messaging, at the normal times, performing national propagation of awareness toward disaster, etc.
- 299 sites of system establishment and management all throughout of the nation such as coastal beaches, public parks around lower river areas, etc.

3. National Disaster Warning System in Korea

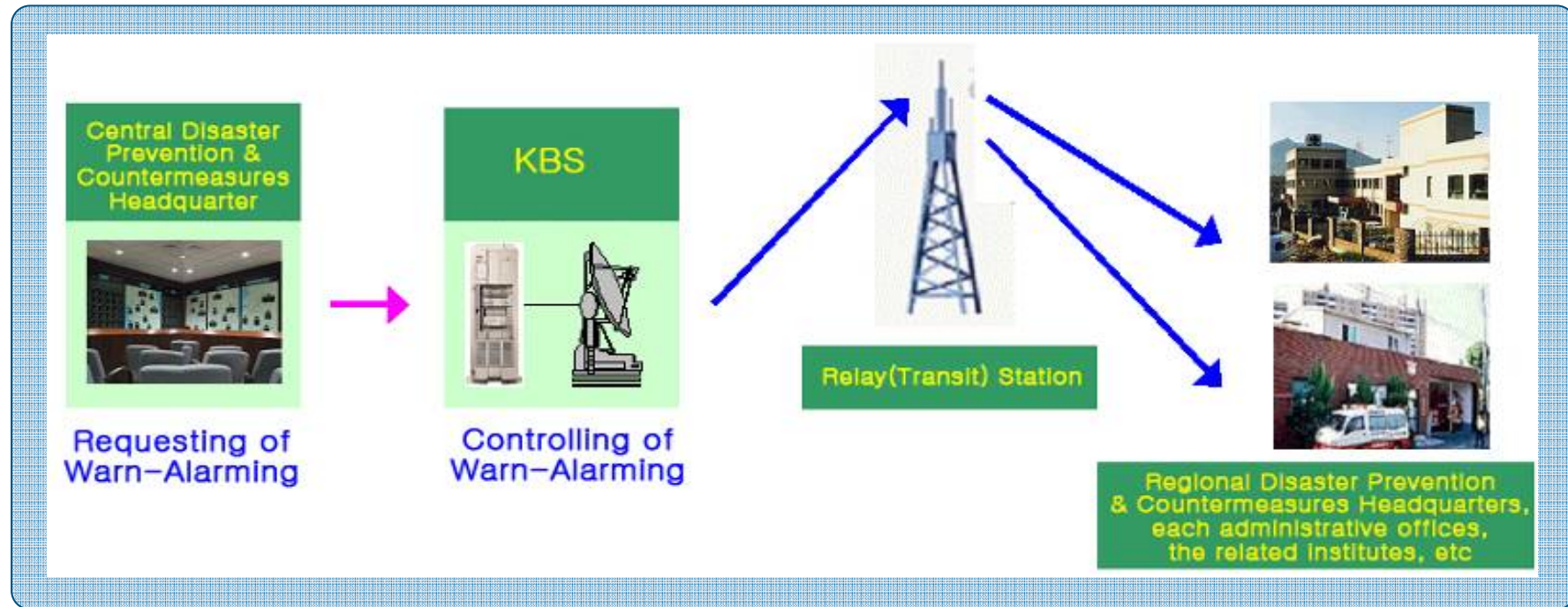
5) TV Disaster Warning Broadcasting System

■ System Overview

- Broadcasting the urgent disaster situation in the form of screen, sound, or screen messages by forcibly automatic turning on TV or changing to disaster warn channel with volume-up through the Broadcasting station's casting-equipment when out breaking of urgent disaster information that could not be easy to transmit this situation at such as deep night, etc.
- Upon establishing TV Disaster Warning Broadcasting Receiver at totally 3,997 places such as central, regional Disaster Prevention & Countermeasures Headquarters, each administrative offices, the related institutes, etc, Korea Broadcasting Systems (KBS-1TV) would broadcast the specific disaster information ones.

3. National Disaster Warning System in Korea

▣ System Management streamlines



3. National Disaster Warning System in Korea

6) RDS-Radio Disaster Warning Broadcasting System

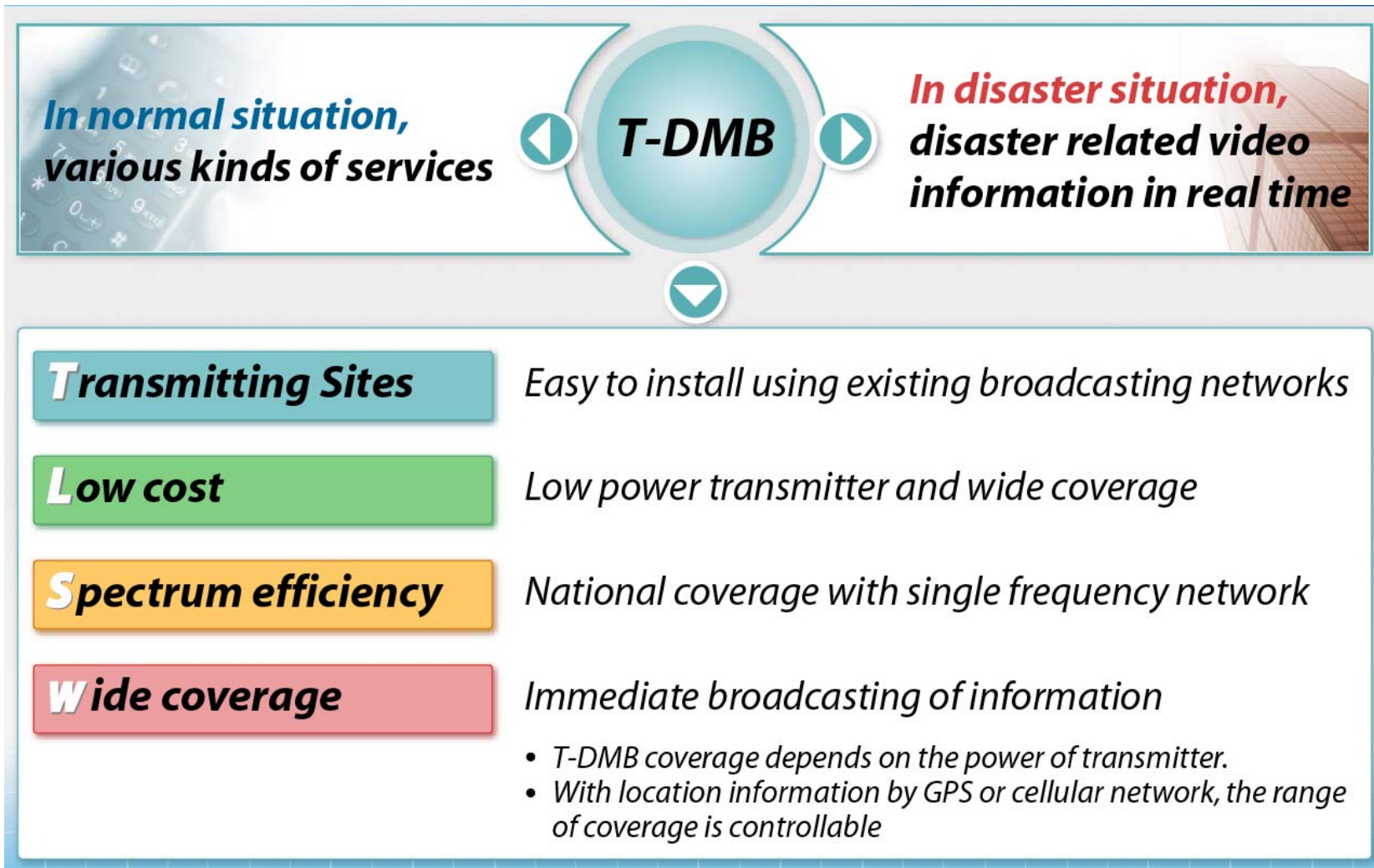
▣ System Overview

- When the situation would be faced, that needs a kind of urgent operation such as residents' sheltering upon the expectation of river-overflowing, typhoon-attack, etc, simultaneously broadcasting the disaster situation to huge crowd to make them immediately pre-escape from it by using the technology of automatic radio turning-on/off for activating the agora's amplifying speaker systems.

※ Promotional operation at the damaged 5 areas by Typhoon, MAEMI

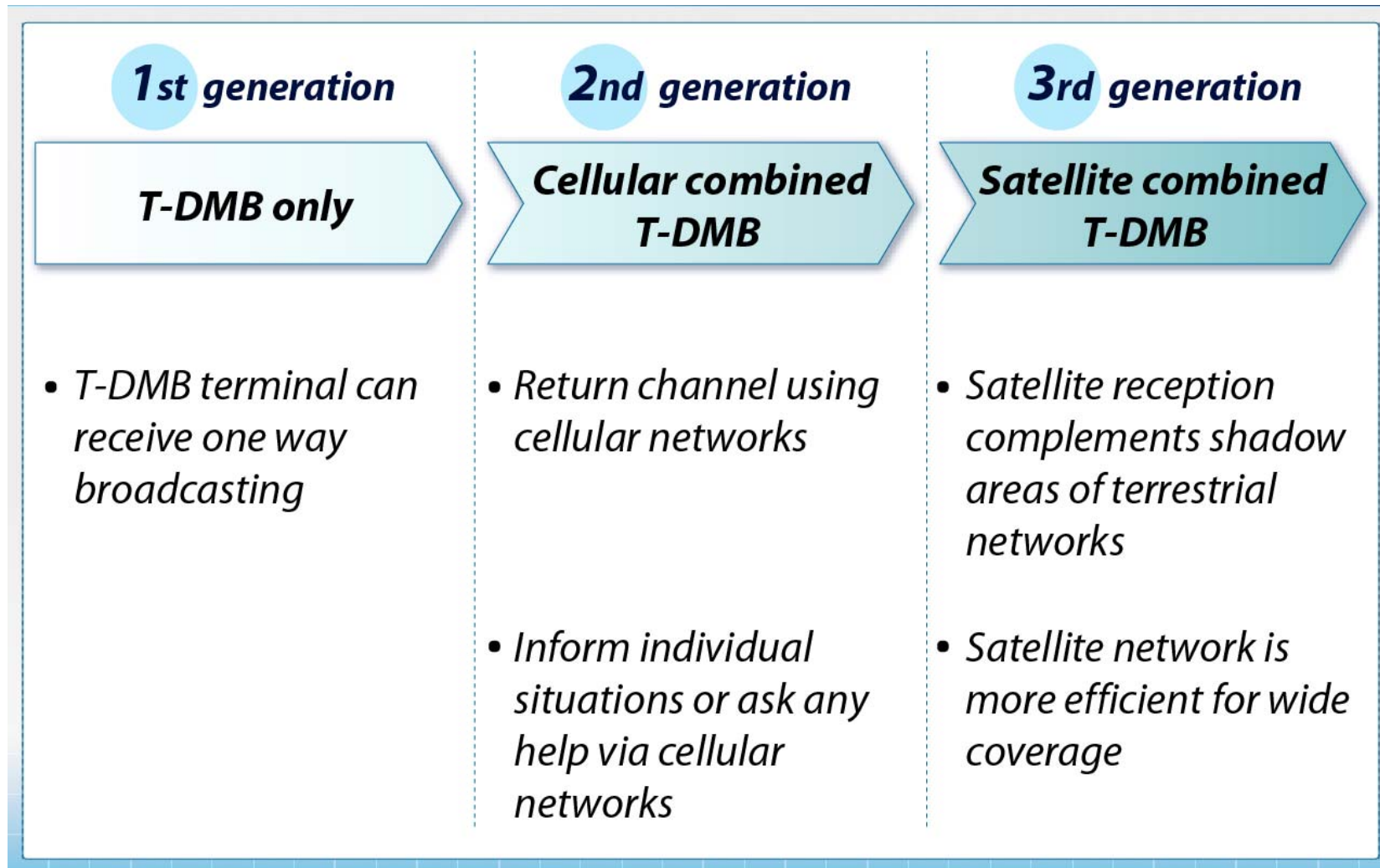
3. National Disaster Warning System in Korea

Strength of T-DMB



3. National Disaster Warning System in Korea

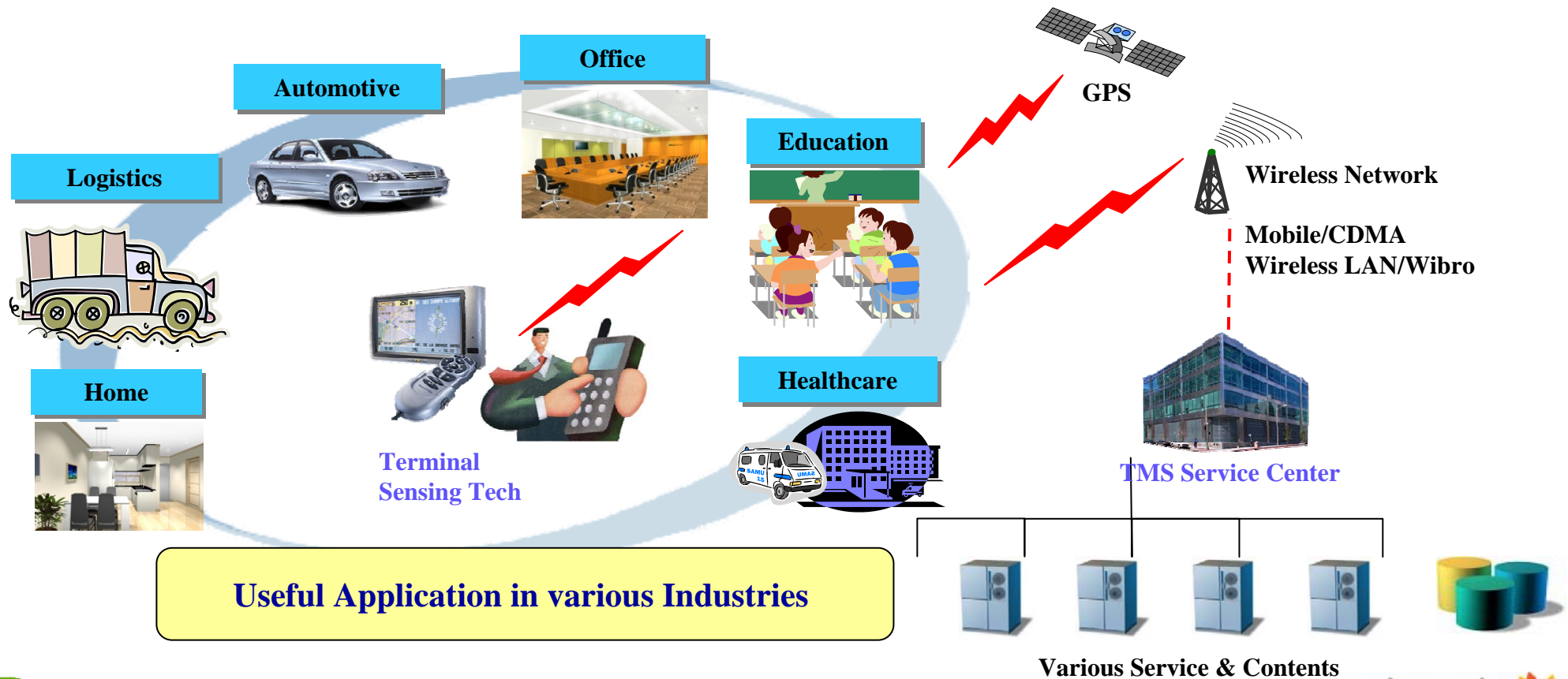
Function Improvements with Other Networks



3. National Disaster Warning System in Korea

What is Telematics?

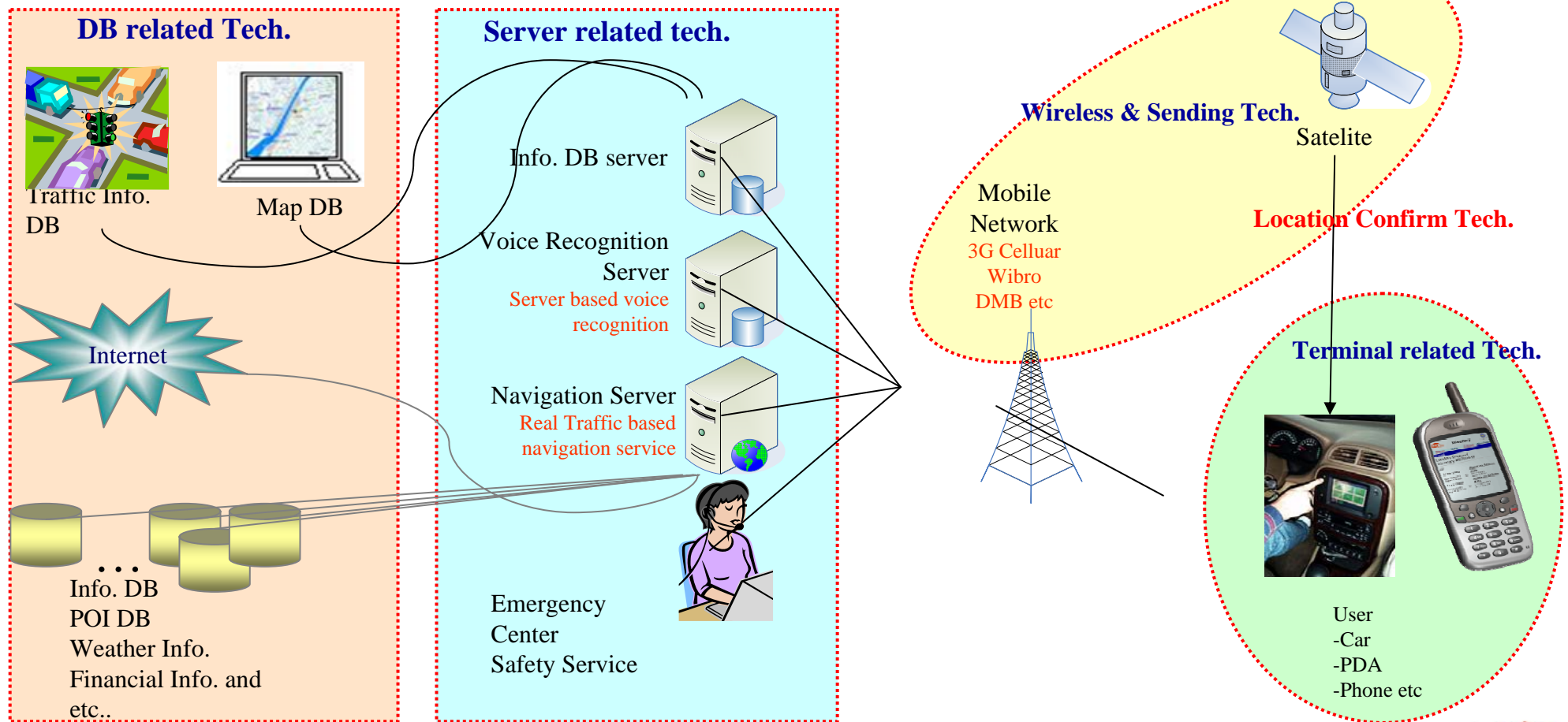
- Telematics = Telecommunication + Informatics
- Visible Ubiquitous



3. National Disaster Warning System in Korea

Basic Technologies of Telematics

- Center (Server and DB related tech.), Terminal (Platform, User Interface, voice Recognition and etc.) Contents (Service) and network (wire, wireless) which can be used by users anytime, anywhere.



3. National Disaster Warning System in Korea

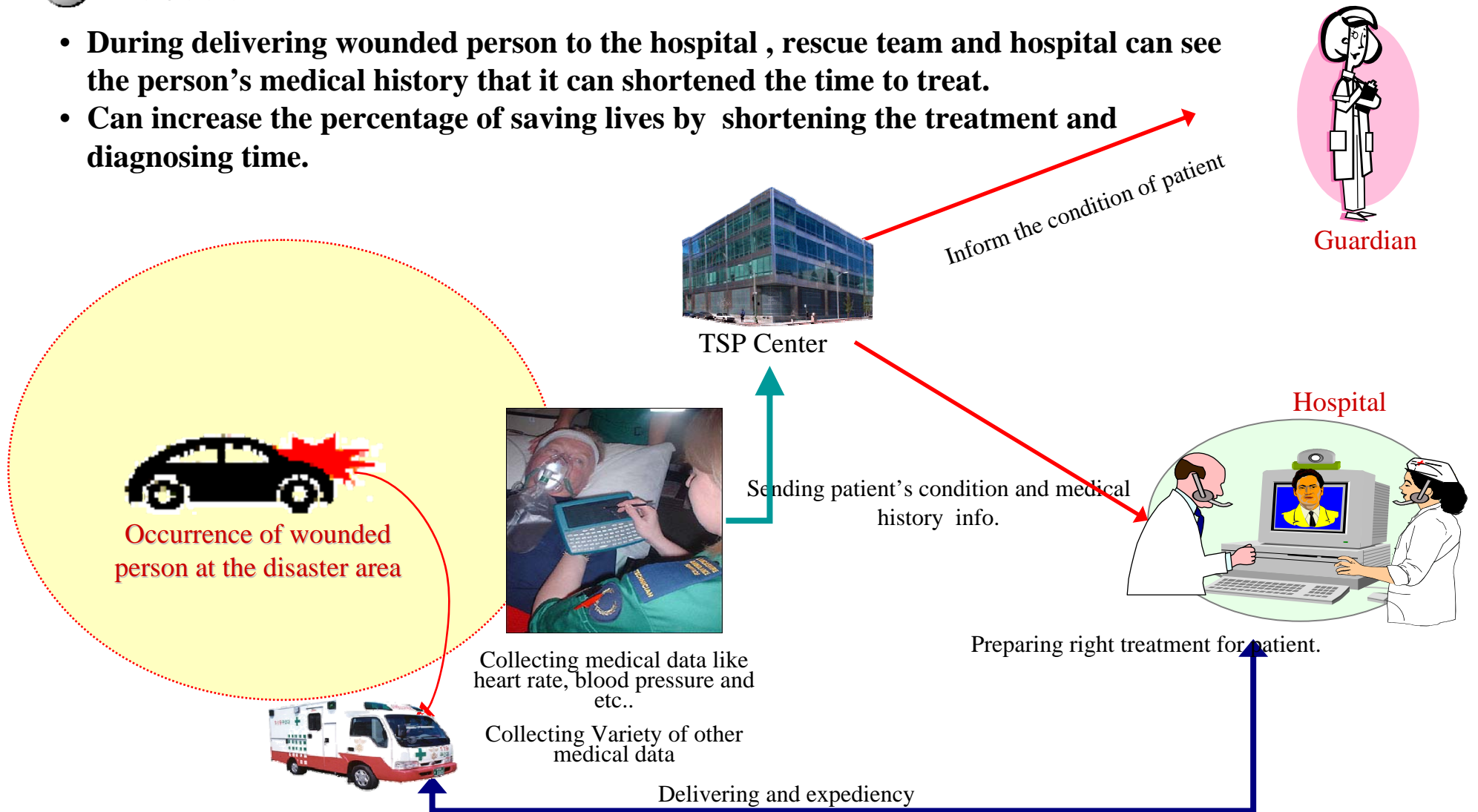
● Disaster Warning System by Telematics

- **Warning to possible disaster area and lead the evacuation**
Sending message or signal to users via mobile phone or telematics terminal of possible disaster area and direct them to evacuation area
- **Prevent the entrance to possible disaster area** Using location tracking system, send warning message or signal to users who are going around the possible disaster area
- **Rescue and expediency at the disaster area** Automatics location recognition of patient and rescue wounded people from their request via emergency button in their car
From Rescue to taking the wounded people to the hospital, the time of researching people's medical history will be shortened.
 - **Establishment of DSW via observation.**
Using Remote diagnosis of Telemetry and look out for disaster area.

3. National Disaster Warning System in Korea

Rescue

- During delivering wounded person to the hospital, rescue team and hospital can see the person's medical history that it can shortened the time to treat.
- Can increase the percentage of saving lives by shortening the treatment and diagnosing time.



4. Conclusion

Hazard

Vulnerability

Emerging risk

Disaster Impact

1

Develop Disaster Warning Systems Strategies

- a. Preparedness, and Emergency Response Strategies
- b. Roles and Responsibilities for Central Gov't vs Local Gov't
- c. Develop IT Strategies for DWS and Use References for "Best-Practices"

2

Global Strategies for the "Early Public Disaster Warning"

- a. "False Alarm"
- b. Roles and Responsibility of the ISO
- c. International Coordination Plan

3

International Consensus and Cooperation

