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Socio-Economic Benefits of Meteorological and  
Hydrological Services  
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# Partnership Practice in Public Weather Service

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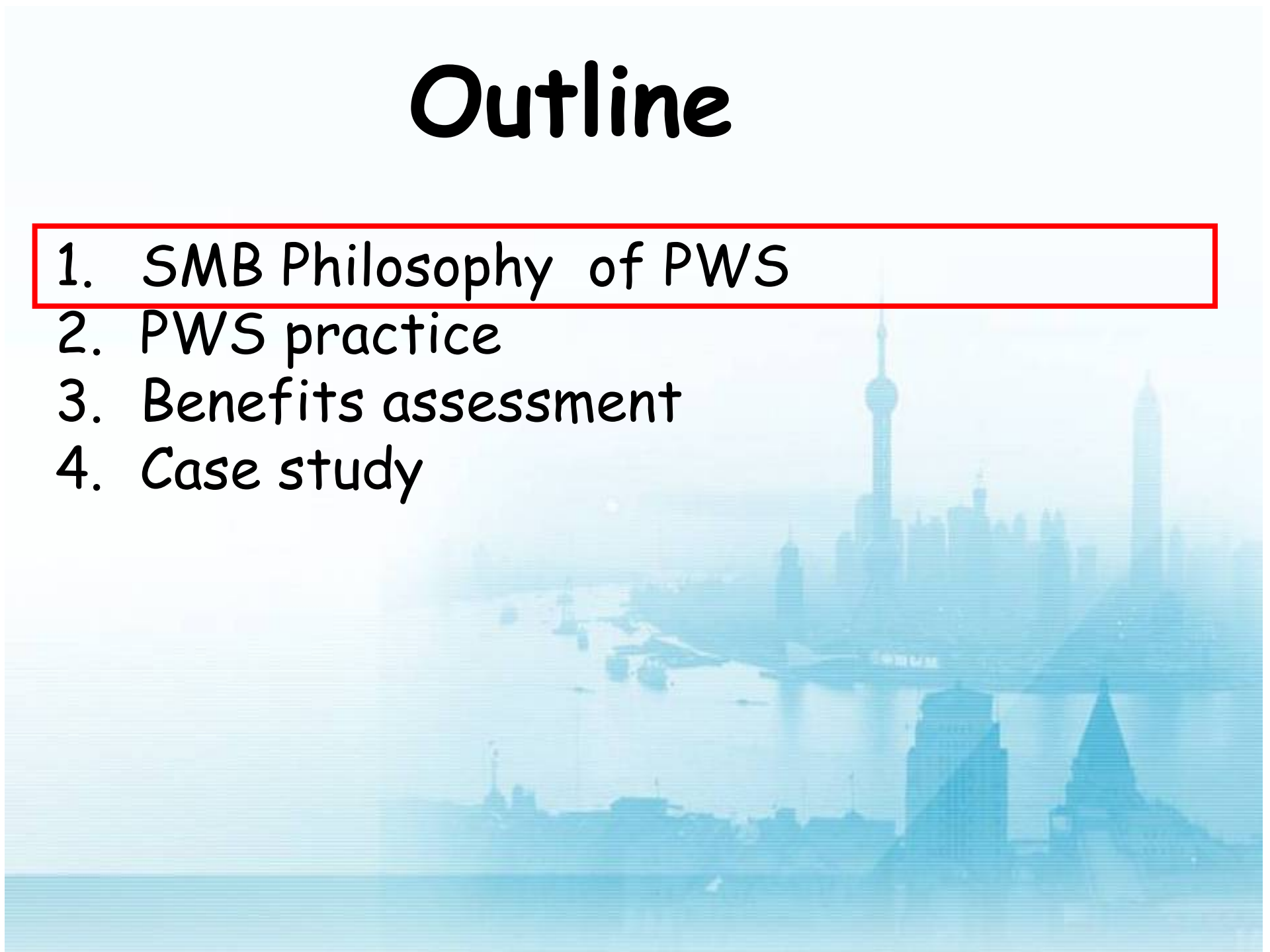


*Dr. Xu TANG*

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- *Deputy Mayor of Jingchang City, Gansu Province from Nov. 2002 -- Nov. 2004;*
- *Director-general, Department of R&D, CMA from Jan. 1999 to Nov. 2002.*

# Outline

1. SMB Philosophy of PWS
2. PWS practice
3. Benefits assessment
4. Case study



# SMB Philosophy of PWS

In this section, following issues will be discussed.

1. Task of PWS
2. Service and service delivery
3. Language
4. Summary for this section



# Philosophy of PWS

## 1. Task of PWS

- **Daily service delivery**

Short term (twice daily briefing with 4 times per day distribution routine)

- **High impact weather and high sensitivity departments service delivery**

In addition to **typical due diligence** for severe impact events such as typhoons, ongoing support is offered to sensitive departments such as the aviation bureau and railway network and for special events: Infrastructure projects and large scale events of economic and cultural importance such as APEC or The Olympic Games.

- **Support to emergency management**

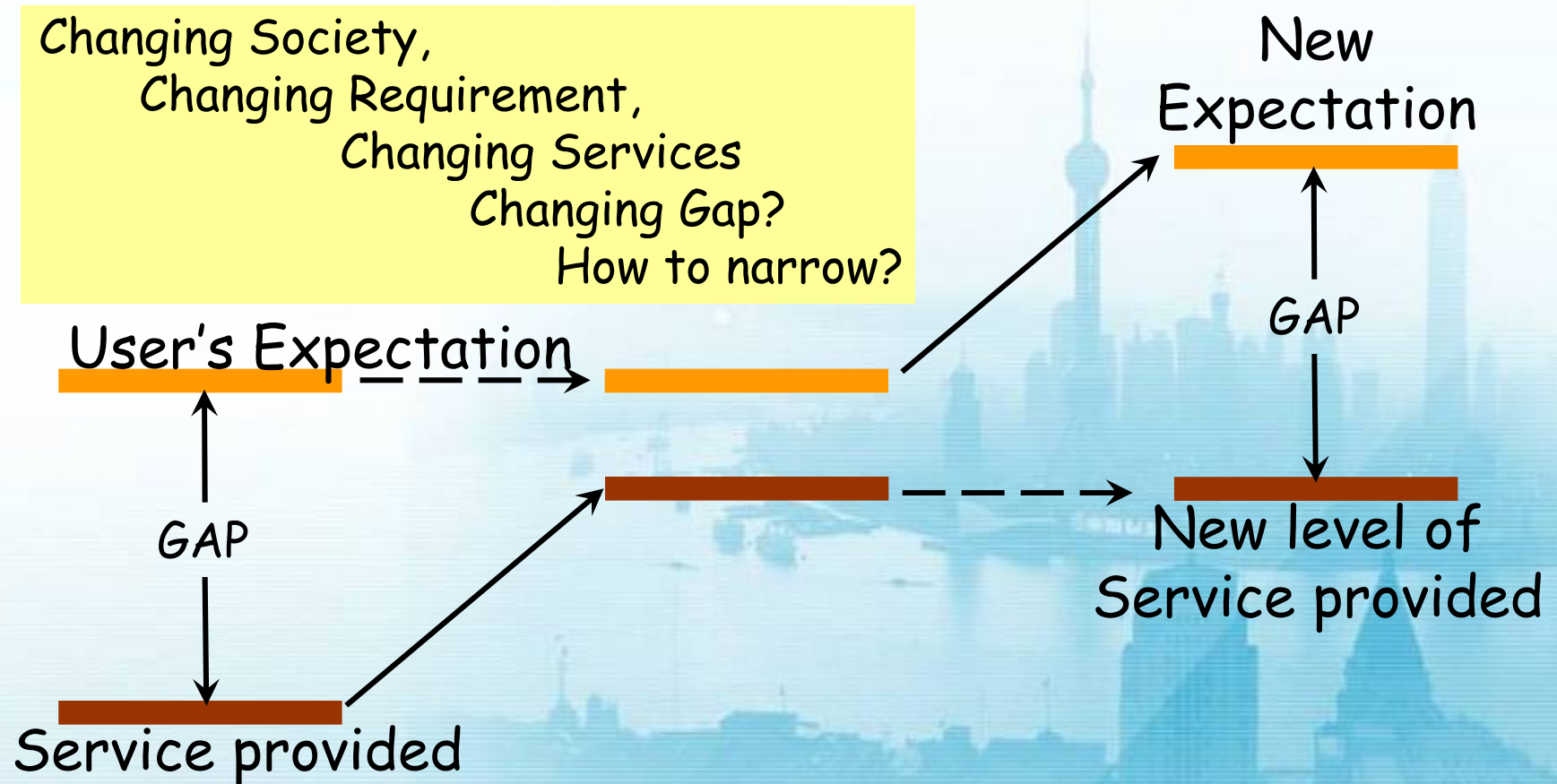
- High impact weather of small probability.
- Meteorological support to accident response.

Certain accidents, while not weather induced (fire, gas leak etc) may be influenced by weather related factors such as wind, temperature and precipitation.

# Philosophy of PWS

## 2. Service and service delivery

(1) There has always been Gaps in PWS delivery



*Diagram derived from C.Y. Lam (HK Observatory)*

# Philosophy of PWS

## 2. Service and service delivery

### Pizza Delivery Concept

- A customer orders a pizza to according to his requirements, such as size, toppings and choice of crust.
- He sits down on his sofa, opens a bottle of wine and waits for the pizza, expecting it to arrive in a timely fashion.
- The doorbell rings. The order must be checked for accuracy. Is the pizza still hot?
- The bill is paid and the customer sits down for a nice meal.
- The entire process from ordering to successful delivery is one chain with many steps.
- How does this analogy relate to Met Service Delivery?

# Philosophy of PWS

## 2. Service and service delivery

### Pizza Delivery Concept VS Met Service Delivery

- During the whole procedure from initial order and interaction on the phone, to the delivery at his doorstep, only one step is linked to the chef who actually produces the exact pizza you want.
- Only he is responsible for the flavor, ingredients and quality
- The other steps on the chain, are not linked to the quality or skill of the chef.

If the kitchen is the traditional forecasting platform then it is only the cooking stage that is linked to forecasting accuracy

So service delivery has many links on the chain that need to be handled.



# Philosophy of PWS

## 2. Service and service delivery

### Pizza Delivery Concept

**What else did the Management need to think about, after hiring the chef?**

1. A clear ordering system, which keeps the details of the client and their desired Pizza closely together.
2. A system to allow the person taking the order to quickly estimation as to when the pizza will be ready and when it will be delivered.
3. A system of transport that incorporates warm boxes.
4. Making sure that the delivery drivers know the area thoroughly.

**What has all this got to do with NMHSs?**

1. A good product does not necessarily mean a good service.
2. A good service starts with considering the needs of the client.
3. Service Delivery is not an "add-on". It should be fundamental to the way we design our systems - and even our organisations.

# Philosophy of PWS

## 2. Service and service delivery

(2) Provider and user are the key nodes in service delivery.

To achieve better service delivery:

- ✓ SOPs should be established to realize effective interaction between users and provider

To ensure the right pizza will be delivered to the right person at the right place and on time.

- ✓ Interaction platform should be established

Method (Telephone etc.) for communication between the shop and user should be smooth and easy to operate.

# Philosophy of PWS

## 2. Service and service delivery

(3) Multi-agency cooperation and coordination is a valuable and efficient method to achieve better service delivery.

### Natural Events

Weather factor is the first collapsed plat of domino.



# SMB Philosophy of PWS

## 3. Language

- Significant progress have been achieved in the field of weather forecasting.
- How to translate the meteorological language to user language?
- The right information to the right person, at the right place and time?

# Dialogue with GOD

Traditional weather forecast focused on the sky.  
We have the ability to produce a decent **Pizza**.

# Weather God

LEI GONG: God in charge of thunder

DIAN MU: Goddess in charge of Lightning



Zeus

In ancient times, people know little about nature. The first meteorologists were perhaps the priests. Weather phenomena such as wind, rain, thunder, and lightning were believed to be the behaviors of the Gods, which are unpredictable. Both China and the West have many tales about such weather deities, such as Father of Thunder and Mother of Lightning in China, the Egyptian sun-god Ra, Zeus on Mount Olympus or Thor, the god of lighting from Norse mythology

# Experience of ancient person for weather forecast

In daily lives, ancient people come to realize there are patterns of weather phenomena, for example, the change of animal behavior may be an indication of an impending weather disaster occurrence. The knowledge was passed down in form of proverbs.

During the Zhou Dynasty (1045 BC to 256 BC), people had learned to forecast weather through the behavior of animals.

## Animals:

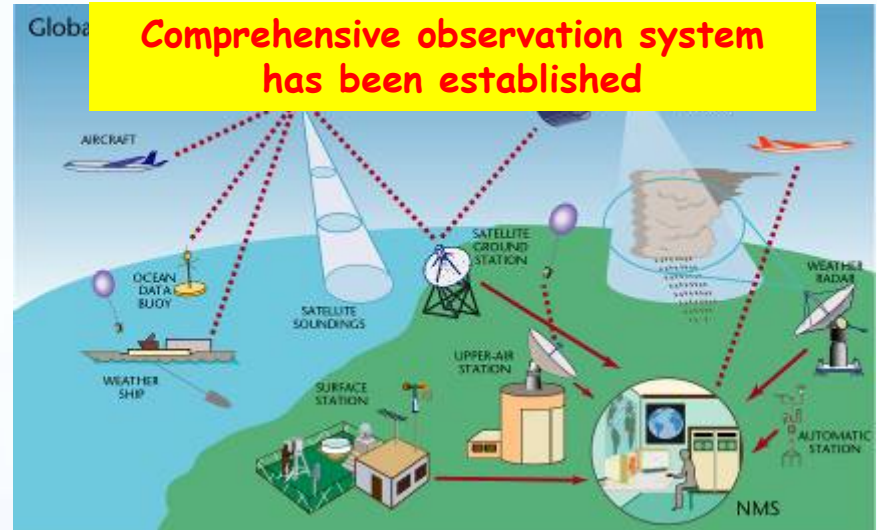
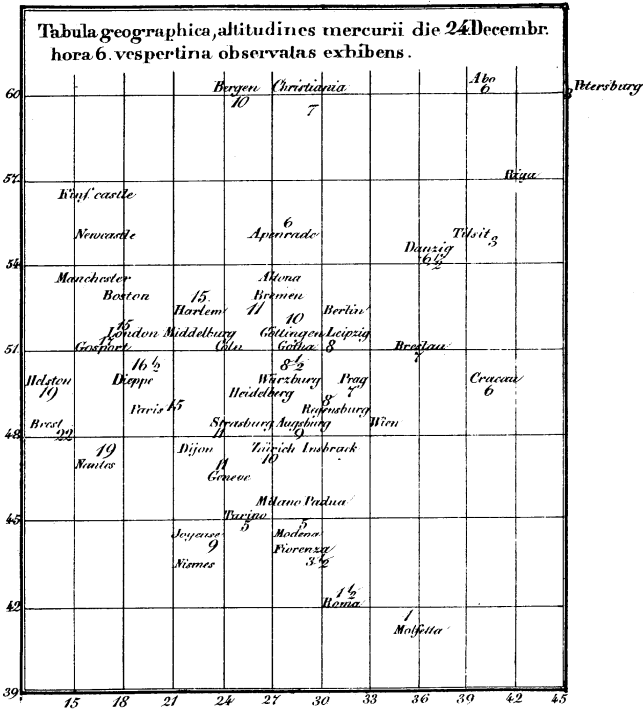
- If people can clearly hear the cricket chirp at night, it was believed that the weather next day will be fairly good.
- If the dragonfly flies up and down in the sky, there will be a heavy rain.
- If the anthill is closed, a thunder storm is on the way.



## Proverbs Concerning Weather

- There will be rain if the foot of a pillar is wet.
- Morning glow presages rain while evening glow indicates a fine sunny day.

# Great achievement in meteorological science



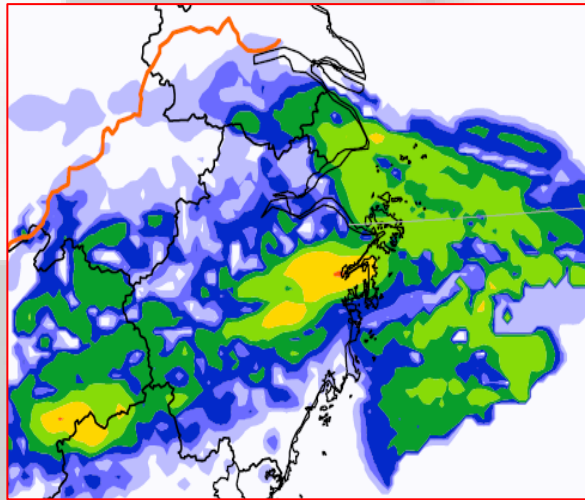
In 1820, Heinrich Wilhelm Brandes, published the first weather charts in Beiträgen zur Witterungskunde ("Contributions to Meteorology"). Thus he is considered to be a founder of synoptic meteorology.

Improvements in Met Science: Forecasting is becoming increasingly accurate.....

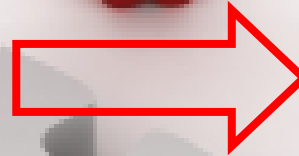
**HOWEVER.....**



# Meteorological (Scientific) Language vs. User Language



Rainfall forecast



Can users understand your forecasts and what to do with them?

# Dialogue with the People

A faded, blue-tinted background image of a city skyline, likely Shanghai, featuring the Oriental Pearl Tower and other skyscrapers. The image is semi-transparent and serves as a backdrop for the text.

But how to provide timely *Pizza delivery service* to the users?

# How to translate Meteorological language into user language

Put yourself in their shoes.

Do your products fit user needs?



What are your partner's needs?  
Do you understand their requirements?

# Philosophy of PWS

- Is the right **information**
- being delivered to the **right person?**
- at the right **place?**
- at the right **time?**





How to  
Bridge  
*Gap?*

- **Partnership** is critical to better PWS.
- Establishing **standard operating procedures** (SOPs) for Multi-agency response is an effective approach for better **partnership**.

# Philosophy of PWS

## Summary

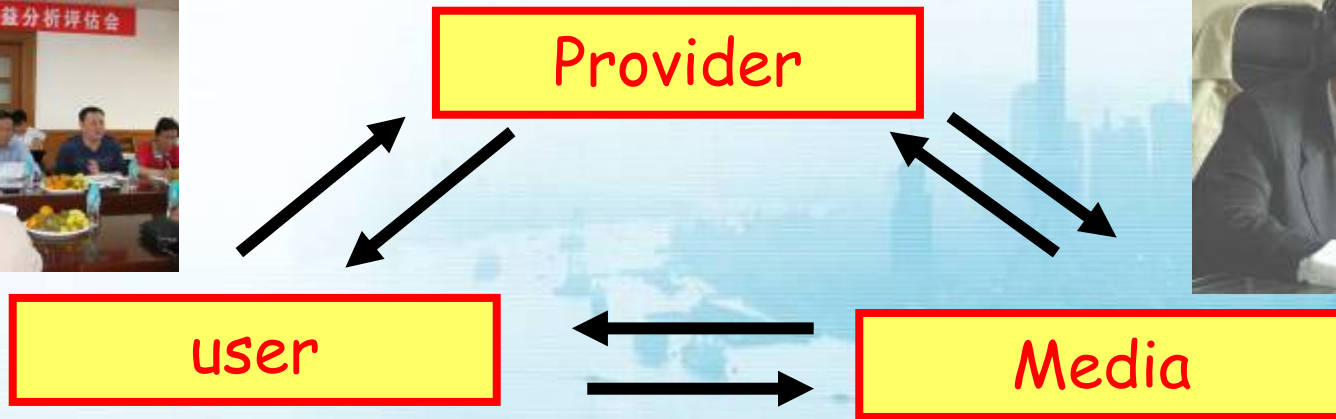
### 4. Summary for this section

- 21<sup>st</sup> century service delivery should include:
    - Mechanisms, platform and work teams for interaction among provider, media and the general public should be established.
    - Mechanisms, platform and work teams for multi-agency cooperation and coordination should be established and the coverage widened.
    - Mechanisms, platform and work teams for handling high impact weather of small probability and accident response should be established, just like the current routine work for basic forecast products.
    - The concept of PWS should be adopted to an every changing society, taking factors such as interaction with user and media, multi-agency cooperation and coordination and support to emergency response into account, which will make the sustainable development of PWS possible.
- Action means gains, Those transmissions in concept, mechanisms and workflow are essential to maximize the benefit of PWS.

# Philosophy of PWS

## Summary

(1) Routine interaction mechanisms involving provider, media and the general public should be established, as well as work teams and platform



# Philosophy of PWS

## Summary

(2) Multi-agency cooperation and coordination coverage should be widened and act according to Standard Operating Procedures (SOP) to perfect the service delivery in PWS.



Training for the special work plan



Special working plan for Emergency Preparedness and Response on Meteorological Hazards, such as Heavy Fog, Snowstorm, have been developed and issued by Shanghai Municipal Government at the end of last year. In those documents, the roles and arrangement of relevant government agencies in the whole process of disaster prevention and mitigation have been clearly defined.



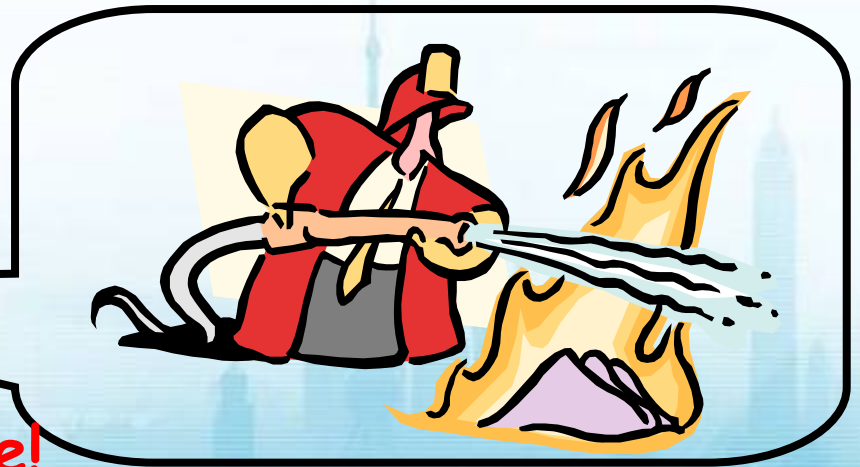
# Philosophy of PWS

## Summary

(3) Mechanisms, platform and work teams for dealing with high impact weather of small probability and efficient accident response should be established, just like the current routine work for basic forecast products.



**Not on the schedule!**



Traditional weather forecast operates according to a schedule, in Shanghai consulting once and disseminating forecasts twice a day. However, this mechanism is not suitable for timely responses to high impact weather such as severe convective weather, which is an extremely vital service in today's interdependent society and economy. It is critical to establish a mechanism capable of quick response, timely dissemination, and notifying the users as soon as possible.

# Philosophy of PWS

## Summary

(4) PWS is more than forecasting weather accurately.

It is a **chain of service**.

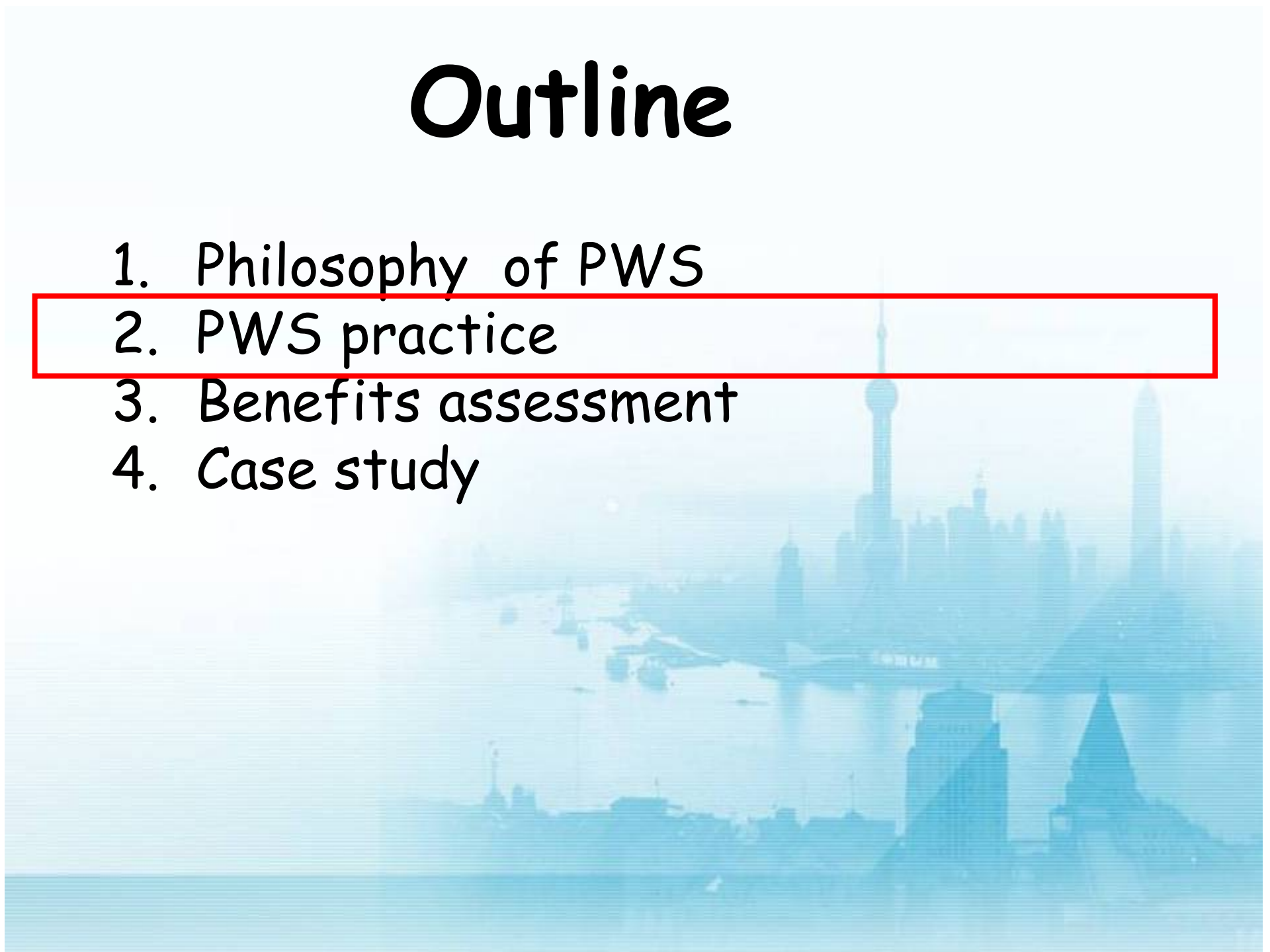
Interaction, coordination and timely response are key nodes in the PWS. For the purpose of maximizing benefit, the mechanisms, platform and work team concerning the above factors should be taken into consideration and be established.



And now it is time for action.

# Outline

1. Philosophy of PWS
2. PWS practice
3. Benefits assessment
4. Case study



# PWS practice

Following issues will be discussed in this session

1. Requirement from WMO
2. Requirement from and practice of CMA
3. Practice of Shanghai



# PWS practice

## WMO requirements

*"Extreme events like droughts, floods, tropical cyclones, severe storms, cold and hot spells, among others, are often associated with loss of life and property, famine, mass migration, disease, pollution and environmental degradation, and other far-reaching threats and disasters. However, appropriate weather, climate and water services can help societies to meet, or at least to reduce substantially, much of the death and destruction,"*



- Michel Jarraud, secretary-general of the World Meteorological Organization (WMO). speaking at the opening of a WMO international conference on the social and economic benefits of weather, climate and water services in Madrid, Spain, in March 2007.

# PWS practice

## Madrid 2007 Action plan

**Goal:** To evaluate, demonstrate, and ultimately enhance the social and economic benefits of weather, climate and water services.

**Action 7:** *Facilitate and strengthen dialogue and collaboration between providers and users of weather, climate and water information and services through international, regional and national platforms and programs, and through the development of appropriate tools and methods.*

**Action 9:** *Strengthen existing, and establish new, operating partnerships between users and providers of weather, climate and water services to share responsibility for effective delivery of services, and evaluate their performance.*

# PWS practice

## 2. Requirement from and practice of CMA

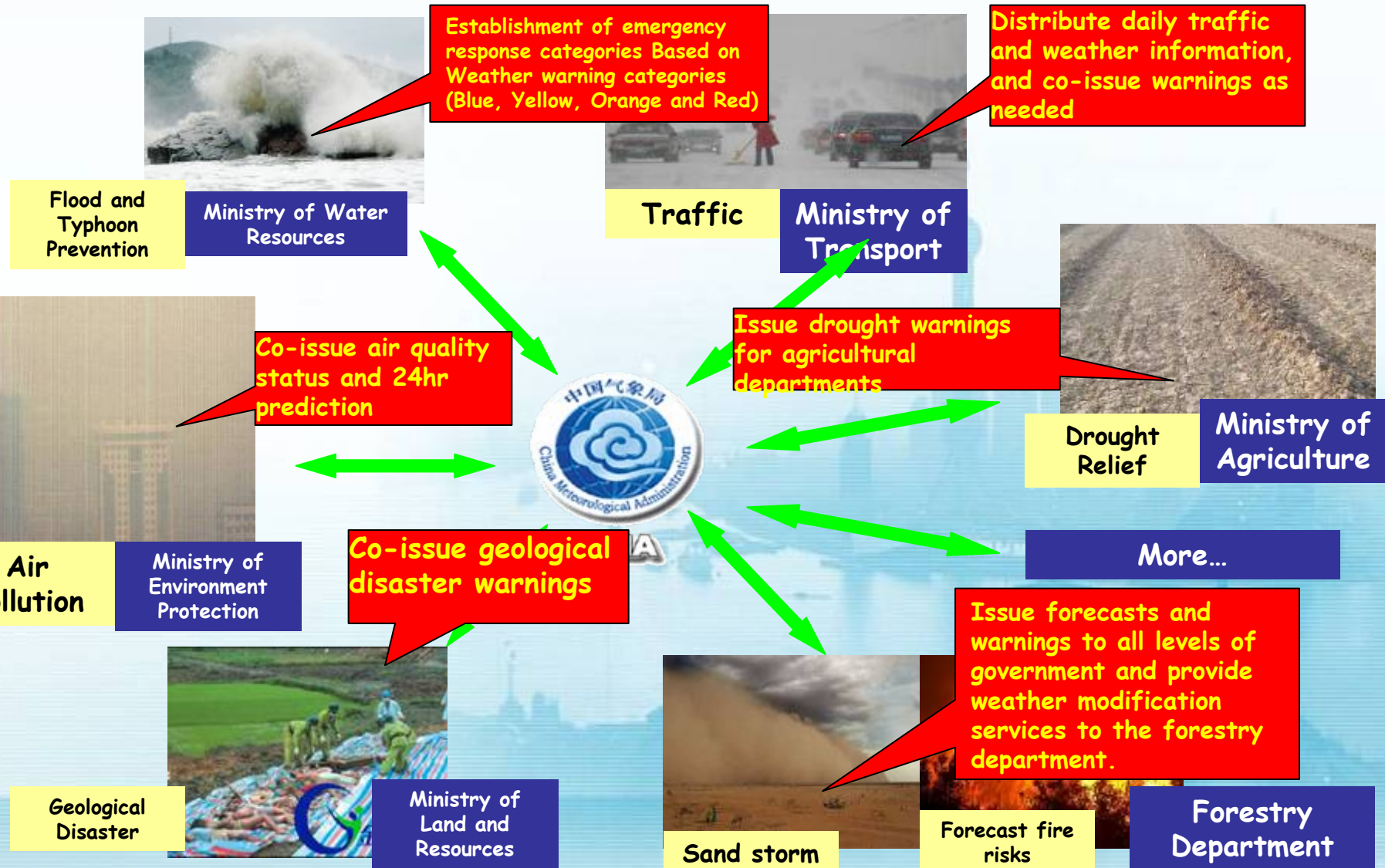
### (1) Requirements from CMA

- **1950's :**  
For civil defense and economy development
- **1960's:**  
Put emphasis on service especially for agriculture
- **1980's:**  
Expanding the service area and centered on improving service economic benefits
- **1990's:**  
Targeting economic development, improving service capacity and widening the service coverage
- **Recently:**  
Weather service for public, national security and climate resource utilization

# PWS practice

## 2. Requirement from and practice of CMA

### (2) Practice of CMA





# PWS practice

## 3. Practice of Shanghai

### (1) Goal of the PWS platform

- To make the weather service delivery become routine work completed by person at given position.
- To make the service delivery tailored to and targeted at various users' need.

Taking the Chief Service Officer (CSO) as the core post, based on partnership in the PWS platform, a fast, efficient, and unified meteorological service delivery operation system was established.



# PWS practice

## 3. Practice of Shanghai

### (2) Introduction of the platform: Support needed

- Real time monitoring data, forecast information, historical data, and weather disaster risk information are needed to make the platform an effective bridge to the user.
- The platform should be supported by necessary facilities and infrastructure. Resource should be shared with other departments, which make sustainable development possible and financial support from governments easier to get.
- The platform should operational 24/7, so corresponding work team shifts should be established
- A set of rules on coping with high impact weather and high sensitive weather are needed, as well as SOPs for standard multi-agency cooperation and coordination.

# PWS practice

## Functions of PWS platform

### (2) Introduction of the platform: Functions

#### Forecasting Operation Platform

Regional  
Chemical  
Weather  
Forecasting  
Center

Forecasting  
for Traffic

Typhoon  
Warning  
Center

Severe Convective  
Weather Warning  
Center

Multi-agency  
cooperation and  
coordination

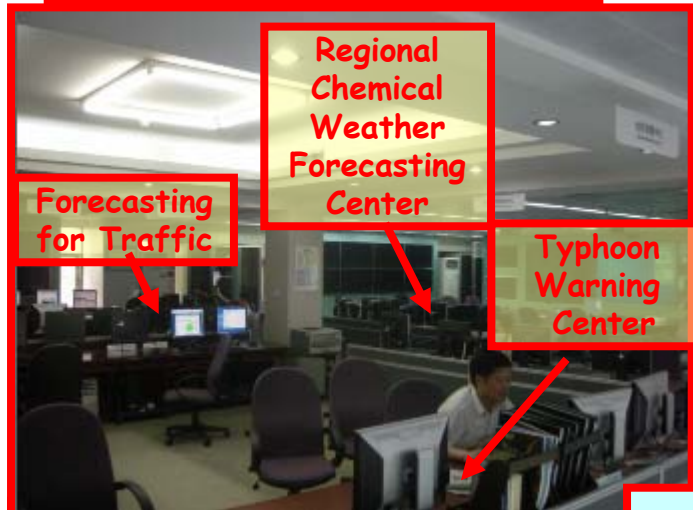
Disaster Information  
Collection and  
assessment

PWS Operation platform  
(CSO work platform)

Service Delivery  
monitoring and  
benefit assessment

Supporting to decision-  
making and emergency  
response

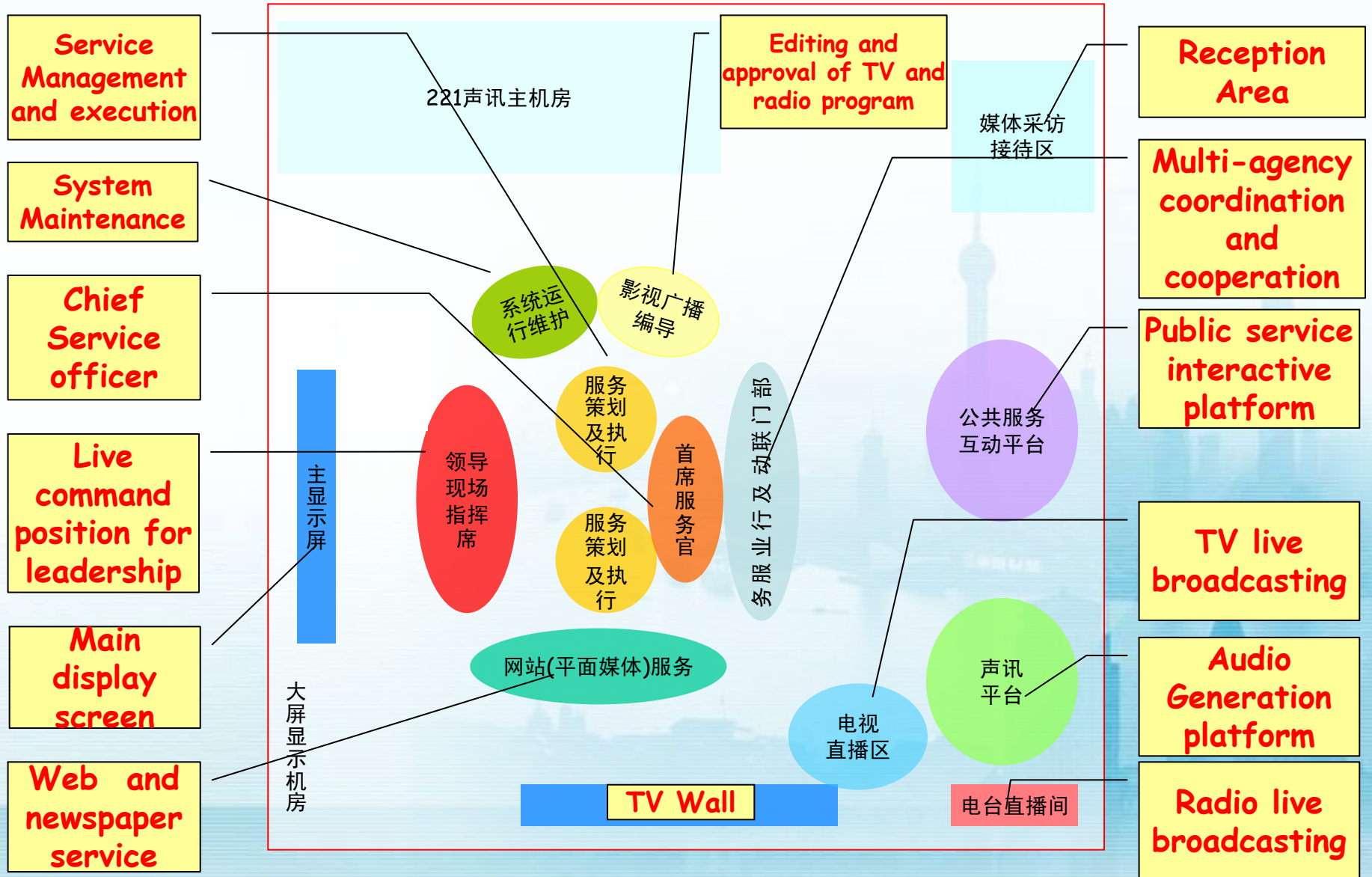
Service dissemination  
(TV, SMS, Radio,  
Newspaper, etc)



# PWS practice

## 3. Practice of Shanghai

### (3) Component of the platform: Layout of the PWS platform



# PWS practice

## 3. Practice of Shanghai

### (3) Component of the platform

- CSO
- Assistant CSO
- Service delivery to the relevant departments
- Service delivery to the public
- Method of service dissemination
- Role in the management system of Shanghai

# PWS practice

## 3. Practice of Shanghai

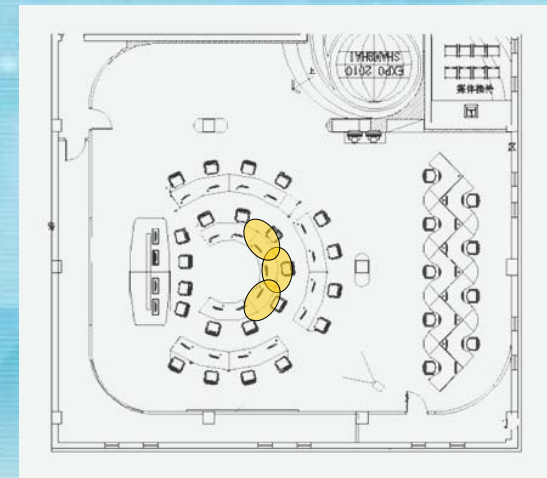
(3)Component of the platform: **Chief Service Officer (CSO)**

### Responsibilities

Coordinator in the PWS platform:

- Decision-making and instigation of emergency response;
- Decision for multi-hazard early warning issuance;
- Presiding at the morning meeting and weekly service consultation meeting;
- Routine news dissemination and interviews with media.

There are 5 CSOs in total. 2 per shift. Each shift 24 hrs with 1 on duty and 1 deputy available at all times



# PWS practice

## 3. Practice of Shanghai

### (3) Component of the platform: Assistant CSO

#### Responsibilities

- ① Assisting the CSO in service inspection;
- ② Assisting the CSO in special service management;
- ③ Collection and analysis of service information;
- ④ Collection and assessment of weather disaster information;
- ⑤ Preparing the information for media dissemination;
- ⑥ Liaison in service of emergency response and decision-making support.

There are 5 assistant CSOs in total, 2 per shift with 1 on duty, and 1 on deputy on duty at all times.

The person on duty is mainly responsible for special service planning, information analysis, preparing the dissemination.

The deputy is responsible for weather disaster information collection and assessment.



# PWS practice

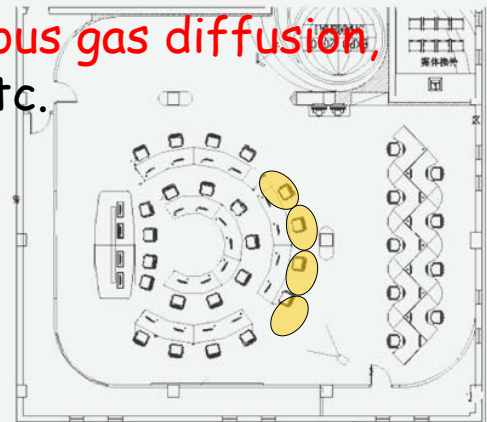
## 3. Practice of Shanghai

(3) Component of the platform: Service delivery to the relevant departments

### Counselor for multi-agency coordination

- ① Position 1 (concerning city safe operation supporting): Responsible for coordination and service related to city operation with relevant departments, generation of early notification and warning products of relevant agencies. (departments: **Construction, traffic, power company, etc**)
- ② Position 2 (concerning high sensitive users): Responsible for coordination with high sensitive users and providing targeted service. (departments: **Expo Park, Airport, business zones, railway station, Yangshan port, etc**)
- ③ Position 3 (concerning people's livelihood): Responsible for service for the **public health, air quality, fire accident risk, dangerous gas diffusion, heat stroke risk, bacterial food poisoning, agriculture, etc.**

These individuals also act in much the same way as sales managers since according to standard operating procedures they must keep a close relationship with the users.





# PWS practice

## 3. Practice of Shanghai

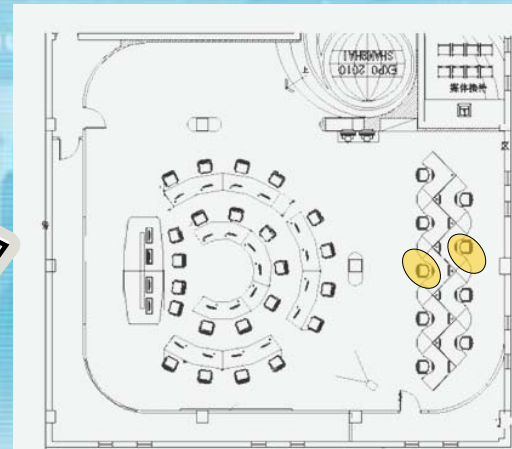
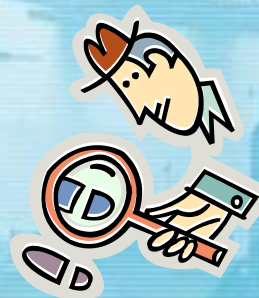
(3)Component of the platform: Service delivery to the public (1)

Expert for interaction with the public through telephone:

- Service benefit assessment.
- Survey and assessment qualities of service.
- Handling citizens complaint calls.
- Telephone surveys on PWS qualities.
- Collection of information from **weather forecast supervisors**.
- Expert for telephone inquiries.



Weather forecast supervisors are the citizens employed by SMB, whose responsibilities are the evaluation of the public weather forecast accuracy basing at the view of general public. The personal evaluation results (Very accurate, accurate or wrong) will be reported to SMB every day, the data is one of important part of PWS social benefit database.



# PWS practice

## 3. Practice of Shanghai

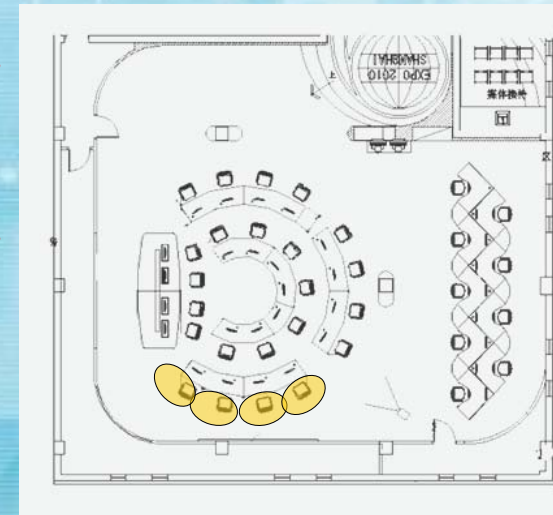
(3) Component of the platform: Service delivery to the public(2)

Expert for interaction with the public through website:

- ① Management of the web service development;
- ② Daily operation of the website;
- ③ Monitoring the accuracy of weather information on other websites
- ④ Service for media such as newspapers and magazines.

By monitoring the weather forecast information for Shanghai and nearby regions, related information will be recorded and summarized. The summarized result of weather information quality will be co-issued with relevant government agencies periodically, aiming to provide guidance for weather related information choices to "netizens".

User feedback information such as daily visitor counts, messages on the BBS and message boards, and hits on various sections, will be collected.



# PWS practice

## 3. Practice of Shanghai

(3) Component of the platform: Service delivery to the public (3)

**Expert for interaction with the public through media:**

- ① Collection of public requirements about weather related information dissemination.
- ② Planning TV programs focusing on big or high impact weather event reporting.
- ③ Planning TV talk shows about the future weather outlook and recent weather diagnostic.
- ④ Editing and examination of meteorological information in the TV program
- ⑤ Communication with TV studios
- ⑥ Editing draft for live broadcast on radio station.



# PWS practice

## 3. Practice of Shanghai

(3)Component of the platform: Method of service dissemination

The weather related information can be disseminated through the following methods:

- ① SMS (Short message service)
- ② TV, Radio (FM subsidiary radio).
- ③ Newspaper, Magazine.
- ④ Web (China: [www.weather.gov.cn](http://www.weather.gov.cn); Shanghai: [www.soweather.com](http://www.soweather.com)).
- ⑤ Basic Grid Unit management system.
- ⑥ Electronical screen.
- ⑦ Telephone (Warning call), Fax.

**SMS:** There are two major classes of user: special and general public.

Special users: education, agriculture, construction, etc.

General public: Information delivered to the public can be customized. Weather information can be disseminated to the whole net if necessary, for example, the emergency warning for typhoon.



# PWS practice

## 3. Practice of Shanghai

(3)Component of the platform: Method of service dissemination

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- ⑤ Basic Grid Unit management system
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- ⑦ Telephone (Warning call), Fax.

**TV, Radio:** Up to now, the TV program are broadcasted in Chinese and English, and are expected to include French and Japanese during Expo 2010.

The weather information can be added or inserted into the ongoing TV and Radio program. For example, the "nowcasting" forecast and real time weather information were inserted into the radio ongoing program on July 22, 2009 during the total eclipse of the sun.

FM Subsidiary Communication Authorization (SCA) is used to broadcast warning information



# PWS practice

## 3. Practice of Shanghai

(3)Component of the platform: Method of service dissemination

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Web: The official website for disseminating the weather forecast for China is <http://www.weather.gov.cn>, to Shanghai the official website is <http://www.soweather.com>. In addition, the weather forecast for the Shanghai and the east China will be distributed to the partner sites by SMB.



# PWS practice

## 3. Practice of Shanghai

(3)Component of the platform: Method of service dissemination

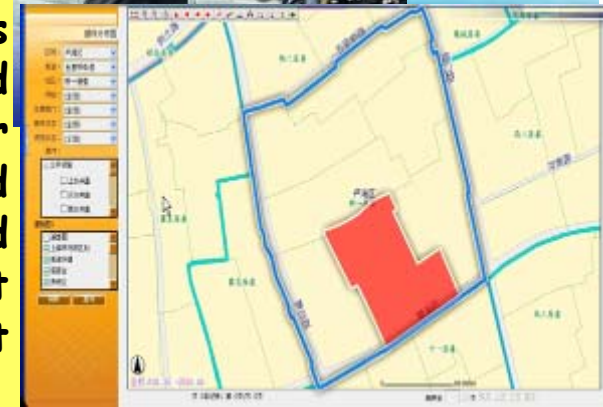
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- ⑦ Telephone (Warning call), Fax.



**Grid supervisors**

**Urban grid management system:** Urban grid management system: Shanghai utilizes a Basic Grid Unit (BGU) management method for event monitoring and management in residential communities. The area of an average BGU is approximately 10,000 square meters. All BGUs are monitored and managed by supervisors, who are responsible for collecting information and forwarding it to the city and district response centre through the BGU network. SMB and other government agencies have provided many management and service products based on the BGU management framework.



# PWS practice

## 3. Practice of Shanghai

(3) Component of the platform: Method of service dissemination

The weather related information can be disseminated through the following methods:

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- ⑦ Telephone (Warning call), Fax.

**Electronic screens:** weather information are issued via display screens in the streets and parks. At present there are 22,000 public electronic screens, 2,000 Digital TVs and 1,000 electronic screens in the streets.

**Telephone:** The numbers are 12121, 969221, and 969222. There is also an active outgoing call service, named Warning Call (150 calls every minute).

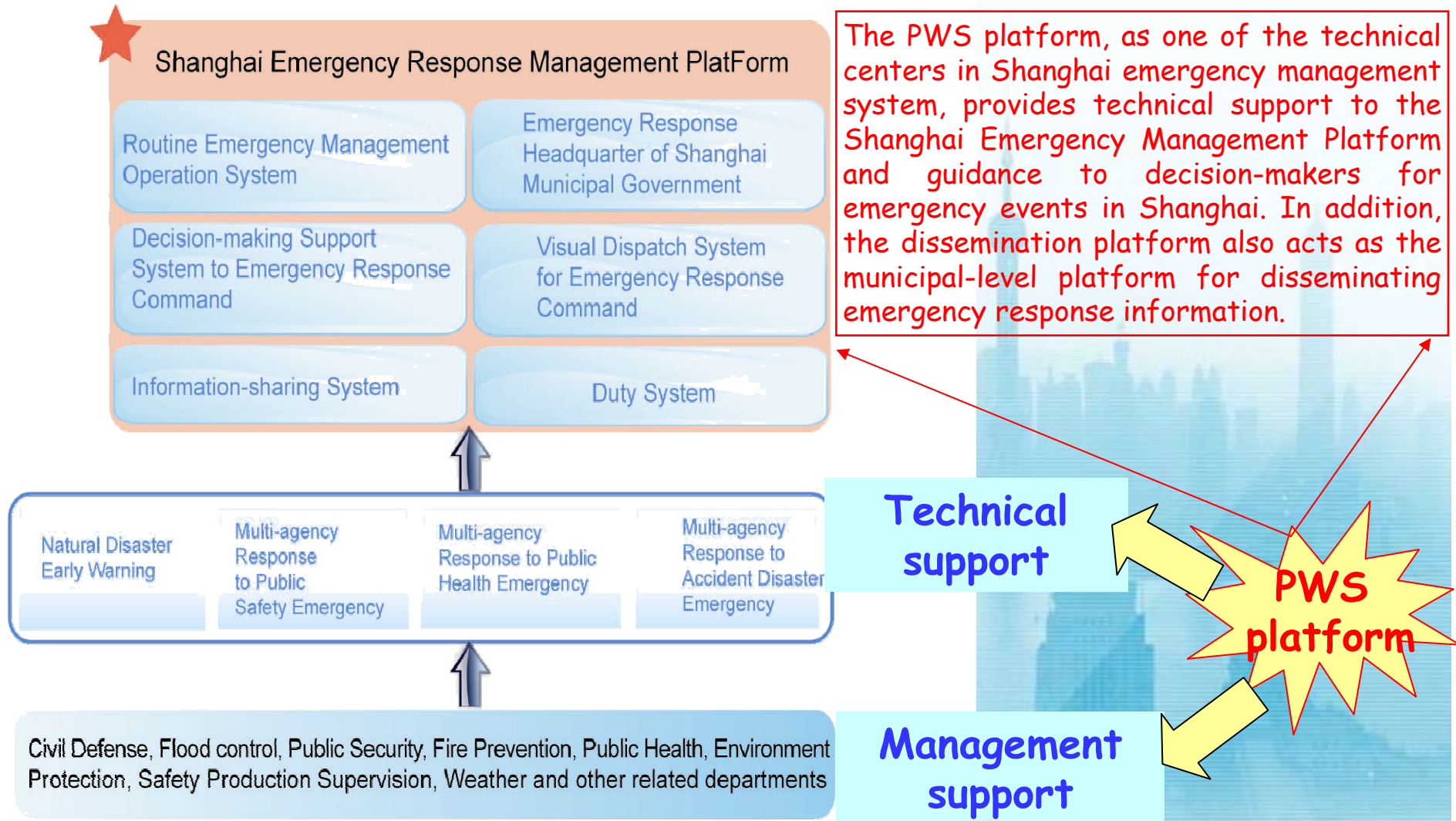




# PWS practice

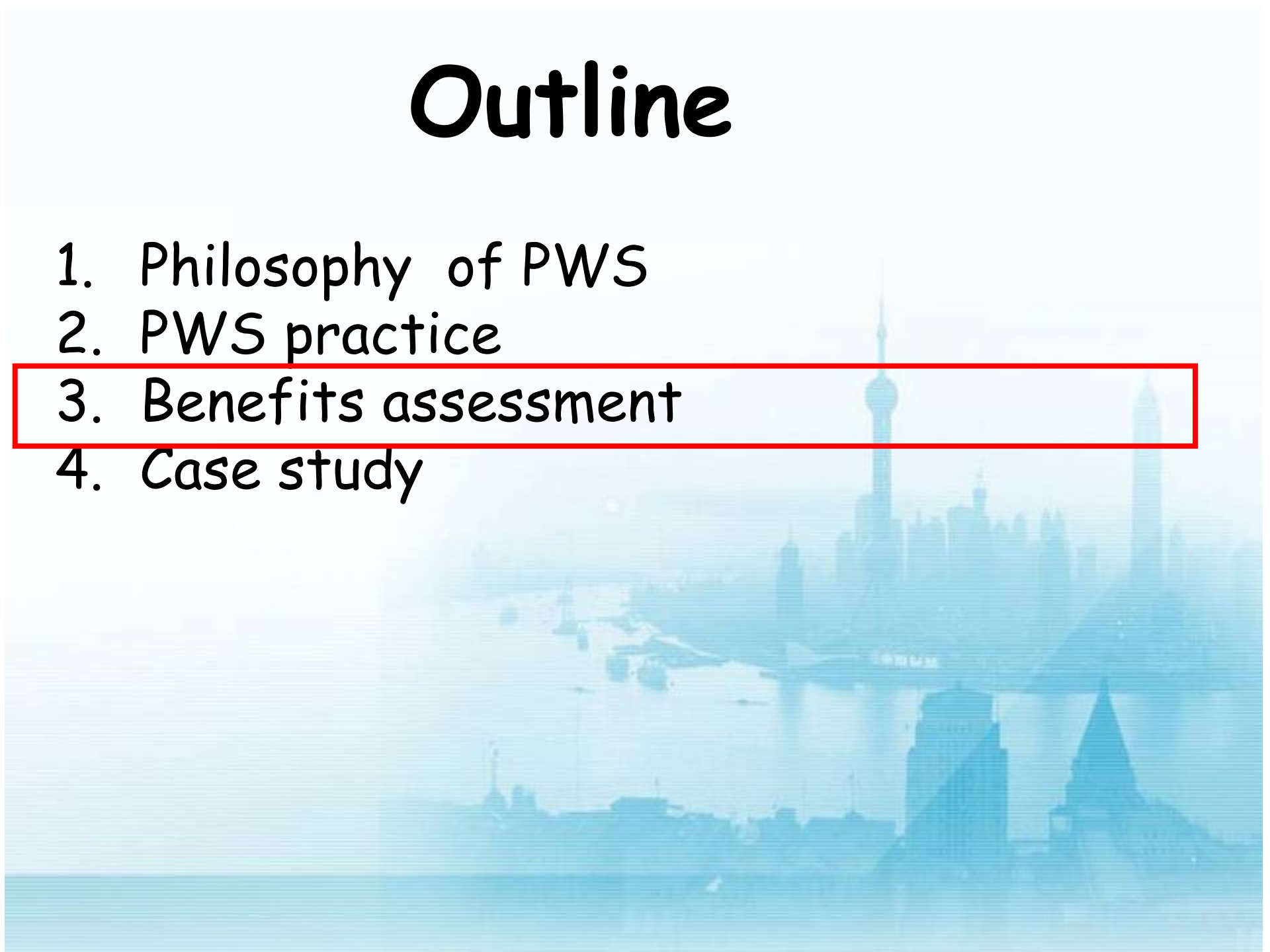
## 3. Practice of Shanghai

### (4) Role in the emergency management system of Shanghai



# Outline

1. Philosophy of PWS
2. PWS practice
3. Benefits assessment
4. Case study



# Benefits assessment

Considerations should be taken into count in benefit assessment:

1. Benefit assessment should be considered as routine work as well as research project.
2. Both objective and subject methodologies are important.
3. Routine benefit assessment follows a schedule.

# Benefits Assessment

## Challenge

- **Routine user investigation**
  - SMB's annual user symposium on weather service
- **Special User investigation**
  - SMB's symposium on marine meteorological service
- **Public survey on weather forecast**
  - SMB's survey on weather forecast
- **Something new**
  - Expo 2010?

Those methods are essential to benefit assessment, and play an important role in improving service delivery.

**However**, with the establishment of fresh new PWS platform, both the concept and mechanism of service benefit assessment should be enhanced to adapt to changes.



Tracking the socio economic impacts of PWS service delivery is vital to enhancing standards and improving every aspect of the platform.

Collecting feedback from multiple channels regarding met service delivery **must be an ongoing DAILY activity**

Benefits assessment routine seeks to track public and user satisfaction as well as quantitative and qualitative assessments of *impacts*

- Excellent
- Very good
- Good
- Average
- Poor

# Daily tracking and Benefits Assessment



## SEEDS-DATA Routine

Socio Economic Effects of Delivery

Data Assessment Tracking and Analysis Routine

# Benefits assessment

## How to assess the benefits

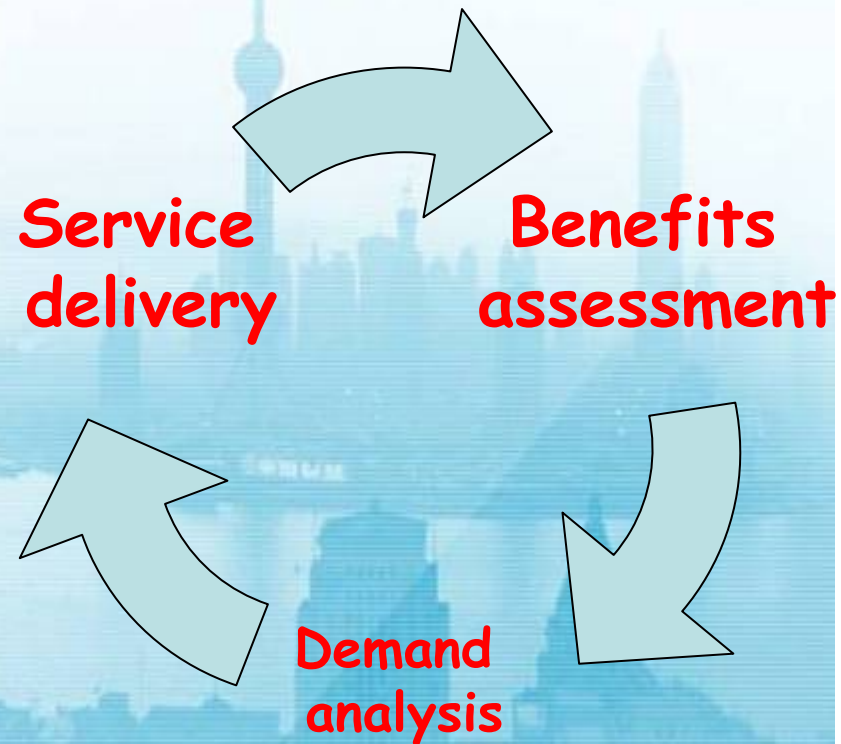
- Benefit assessment should be a routine work of the PWS platform.
- Benefit of each post in the platform should be assessed.
- Benefit assessment result should be the summary of daily assessment information.
- Both objective (numerical data) and subjective (opinions) methodologies are important.

# Benefits assessment

## Benefit assessment system

The comprehensive benefits assessment system should be consisted of demand analysis, service delivery and service benefit assessment.

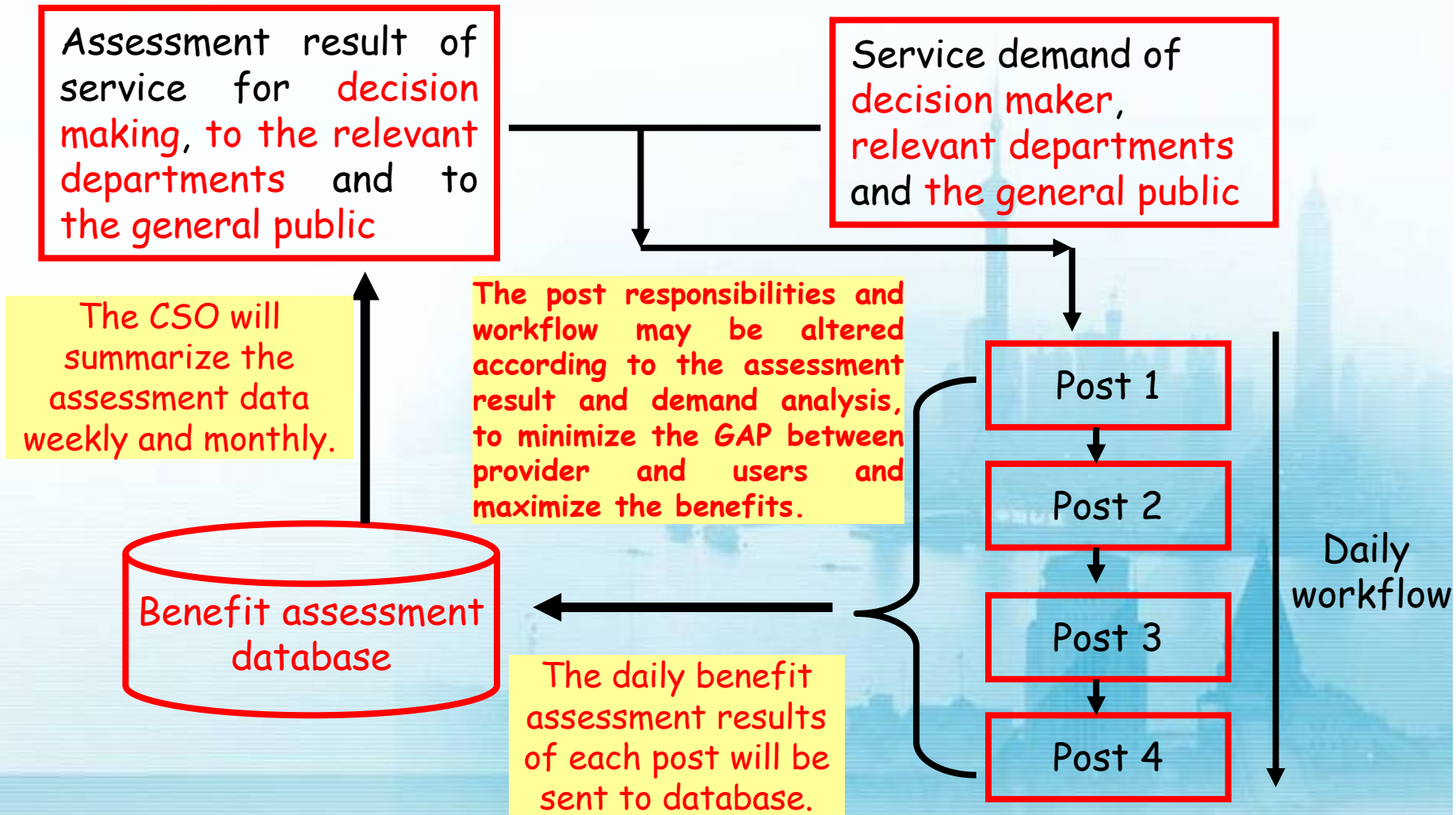
- **Demand analysis:** As the first step, the users' demand for service should be addressed clearly and analyzed in detail.
- **Service delivery:** Acting according to the demand analysis, corresponding products will be developed and delivered to the users, the efficiency of each post and cooperation among them have direct impact on the service quality.
- **Benefits assessment:** The social and economic benefits of the PWS will be assessed. The result will give reference to the demand analysis.





# Benefits assessment

Workflow for SEEDS-DATA routine (benefits assessment) in the PWS platform (1): Considering post



# Benefits assessment

## Workflow for routine benefits assessment in the PWS platform (1): Regarding Op Center Positions

Various posts in the PWS will use different factors for benefit assessment, and the method should be easier to operate. There are **two examples** for demonstration.

### For post of interaction with the public through telephone:

#### Method:

- In this post, besides the count of inquiry calls, post call inquiry will be conducted to collect the necessary data for benefit assessment.

#### Question :

- Whether the information is useful?

#### Answer choice:

- key 1: Very useful; key 2: Useful; Key 3: Not Useful; Key 4: Leave voice message.

### For post of interaction with the public through website:

#### Method:

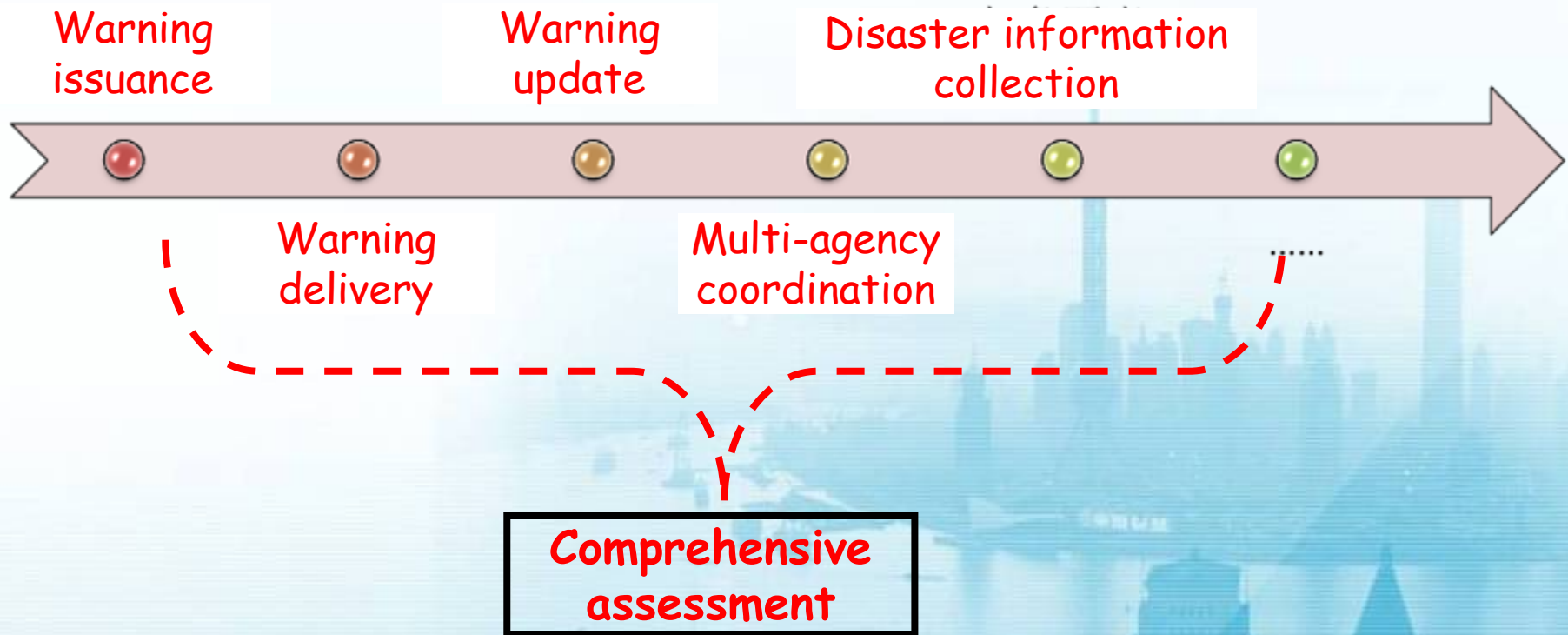
- In this post, besides the count of visitors and hits on each section, additional page will be developed to collect useful information, following questions will be listed on page, let the visitors to make the choice or fill the blank.

#### Question :

- Whether the information is helpful?
- Can you describe the avoided potential loss by using the weather service information?
- Suggestion for the weather service (Content and dissemination method)

# Benefits assessment

Workflow for routine benefits assessment in the PWS platform (2) : Considering weather events



The service benefits assessment during given weather events are based on the benefit work of each post in the PWS platform. The information related to each step in the whole process will be extract from the post assessment result. This method is suitable to high impact weather such as typhoon, severe convective weather and heat wave. (POST BY POST ANALYSIS)

# Benefits assessment

## Benefit assessment for big events

Besides the routine benefits assessment plan, the benefits assessment of PWS to support large scale events is also important. A socio-economic benefits assessment of PWS in Expo will be conducted.

Six of the most important users were selected from among EXPO participants, government agencies, and relevant departments:

### **Operation Management level departments in the Expo Park:**

- Disaster prevention and mitigation
- Events management department

### **Government and agencies for safe city operation:**

- Emergency response management office
- Flood control office

### **High Sensitive Departments:**

- Electric utilities
- Yatong Co.

# Benefits assessment

## Benefit assessment for big events

Social-Economic Benefits of PWS in EXPO will be conducted.

### Method for assessment:

Method of investigation includes issuance of questionnaires, face to face interviews, online questionnaires and SMS surveys.

### Emphasis of assessment:

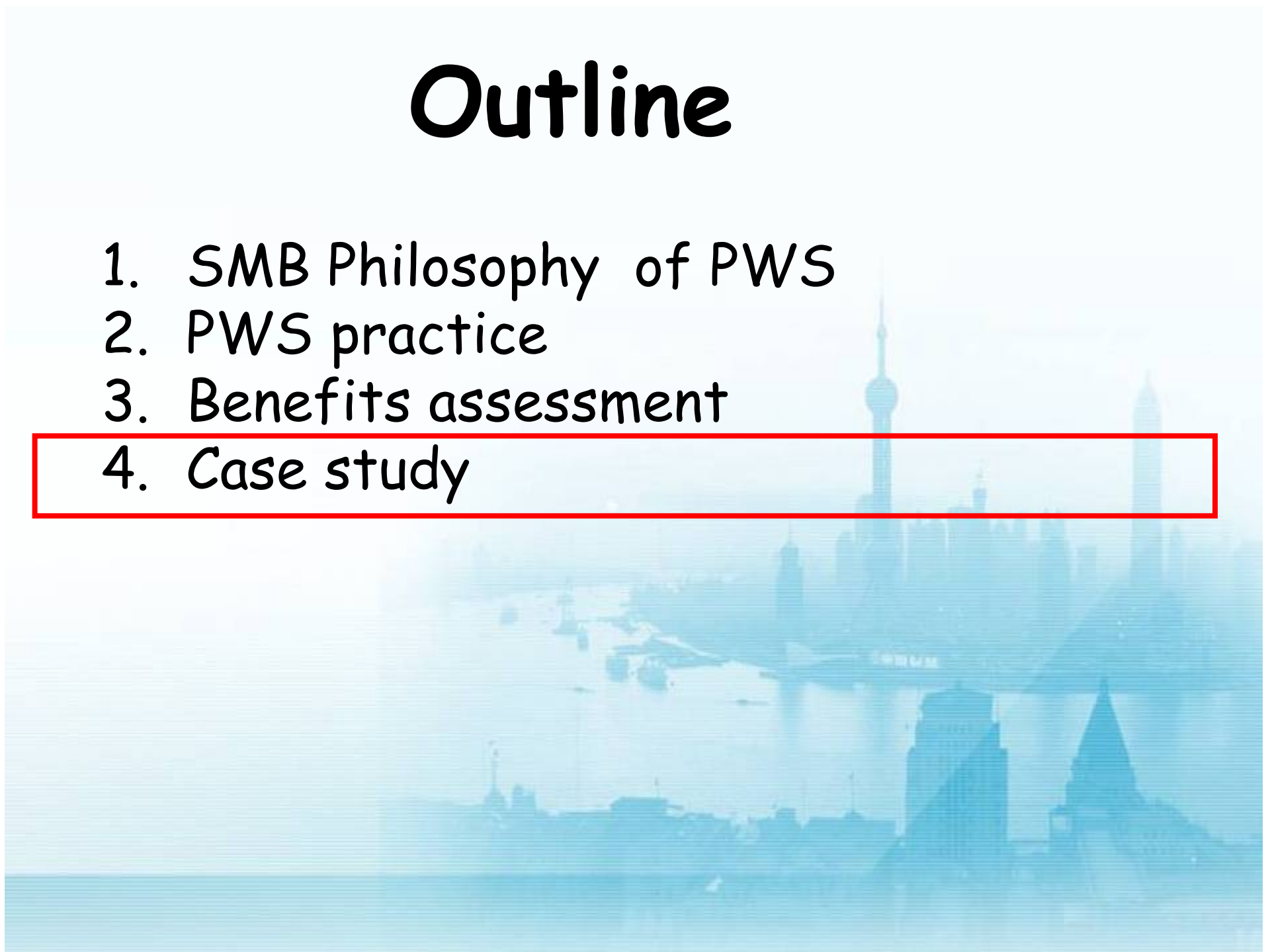
- Role of meteorological information in Expo;
- Attention paid on weather service by user in Expo;
- Satisfactory degree of weather service in Expo;
- User's concern on weather disaster risk.

### Content of survey:

- Whether the information is helpful;
- Role of weather information in big events;
- Whether the information can be timely obtained;
- Accuracy of the weather information;
- Whether the information is understandable;
- Suggestions.

# Outline

1. SMB Philosophy of PWS
2. PWS practice
3. Benefits assessment
4. Case study



# Case Study (1): MHEWS

## 1. Overview of MHEWS

### (1)Background

#### Approved by:

World Meteorological Organization (WMO)  
China Meteorological Administration (CMA)  
Shanghai Municipal People's Government (SMG)


#### Implemented by:

Shanghai Meteorological Bureau (SMB)

#### Expected outcome:

- Establishment of an advanced multi-hazard early warning system
- Increase in the timeliness and effectiveness of response in monitoring, warning and information dissemination through the approaches of multi-hazard integration, multi-agency response and multi-phase process for the purpose of the fulfillment the End-to-End strategy.
- Summary and documentation of the experience in Shanghai multi-hazard early warning, mega-city risk management and emergency response system.
- Publications, manuals, study tours, training curricula and training workshops for the Members of WMO.

22/09/2007 15:14 WMO (RPP) 000004 + 00002164070022 (4) (14) (000)

 World Meteorological Organization  
Organisation météorologique mondiale

Tempa • Climat • Eau  
Weather • Climate • Water

Facsimile

From: Secretary-General To: Dr Guoping Zheng  
Permanent Representative of China with  
WMO

Date: 21 September 2007 City: BEIJING

Op. ref.: ACEP/MHEWS-Shanghai Country: China

No. pages: 1 Fax No.: +86 10 62174700

Copy for information to: Dr Tang Xu, DC, Shanghai Regional Meteorological Center Fax No.: +86 21 64475023

Dear Dr Zheng,

As you are aware, the Shanghai Meteorological Bureau (SMB) together with CMA, Shanghai Municipal People's Government and WMO has put together a proposal for the Shanghai Multi-Hazard Early Warning System (MHEWS) Demonstration Project. The goal of the project is to establish the Shanghai MHEWS as a critical component of the Shanghai disaster preparedness strategy with SMB as the key management and implementation agency. The project is to be operational by May 2010, illustrating the benefits of the multi-hazard approach and providing a demonstration case to WMO Members. The expected outcomes of this project are:


- establishment of an advanced MHEWS and application in 2010
- increase in the timeliness and effectiveness of response in monitoring, warning and dissemination
- summary and documentation of the experiences in Shanghai MHEWS, mega-city risk management, and emergency response system
- publications, manuals, study tours, training for WMO Members.

Several technical subprojects are planned, including a GURME project on urban meteorology and air quality, one on health-care warning systems, and one on storm surge. An important part will be the development of the early warning system itself and communication to the public.

WMO is very satisfied with the draft work plan and the inclusion of the project, which will be useful not only to the CMA, and to Shanghai but also to WMO Members. Therefore, I am pleased to approve the project as part of our activities to reduce risks caused by disasters.

I look forward to collaboration with you on the above project.

Yours sincerely,

  
Secretary-General

# Case Study (1): MHEWS

## 1. Overview of MHEWS

### (1) Background

Service delivery standard which is different with traditional standard.

- 1) **Early detection** for the target area (Urban core, EXPO park, Port etc) with warning levels alerts often corresponding to distance
- 2) Early **warning** not only according to the typical standard developed by NMHSs, but according to user requirements.
- 3) **Early dissemination** of seamless information which reflects the whole evolution process of high impact events.

**Multi-agency interaction mechanism (core of MHEWS):**

- 1) **Early briefing** to the agencies who need quick response as early as possible.
- 2) **Early consultation** with users when information obtained from uncertain forecast information or risk information utilization.
- 3) **Early handling** to take action as early as possible.



# Case Study (1): MHEWS

## 1. Overview of MHEWS

### (2)Contents



# Case Study (1): MHEWS

## 1. Subsystems of MHEWS

### (2)Contents

#### ➤ Extreme weather Early Warning

- Severe convective weather
- Tropical cyclones
- Heavy fog
- Snow and freezing rain

#### ➤ Weather-related Hazards Early Warning

- Heavy haze and static stability
- Marine meteorological hazards
- Wind hazards
- Lightning hazards
- Agricultural hazards
- Urban traffic
- Aeronautical Risks
- Potential fire hazards
- Bacterial food poisoning
- Heat waves and human health
- Dangerous gas diffusion
- Urban inundation
- Energy security
- Infectious diseases

# Case Study (1): MHEWS

## 2. Effort for narrowing the gap in service

### (1) At technical level: Disaster forecast (tailored product)

High impact weather often leads to secondary disasters because of intense density of population, construction, economy and the close relationship among these factors in mega cities. So for the purpose of city safe operation not only the accurate and timely weather forecast was need, but also the disaster impact assessment and prevention guidelines were needed.

Development of disaster impact assessment products( based on risk mapping outcomes)

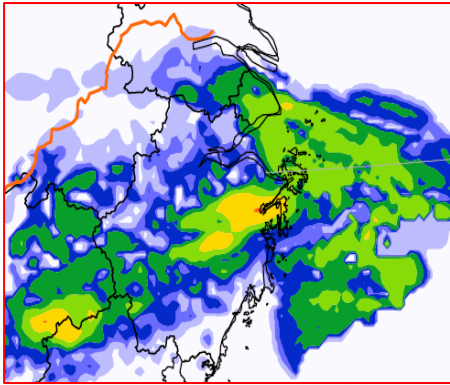
**Threats** such as aggregation forecast for typhoon track and urban inundation early warning system.

- **Threats** such as bacterial food poisoning warning system, heat wave and human health warning system, high temperature and power supply and so on.

# Case Study (1): MHEWS

## 2. Effort for narrowing the gap in service

### (1) Technical level: Disaster forecast (tailored product)



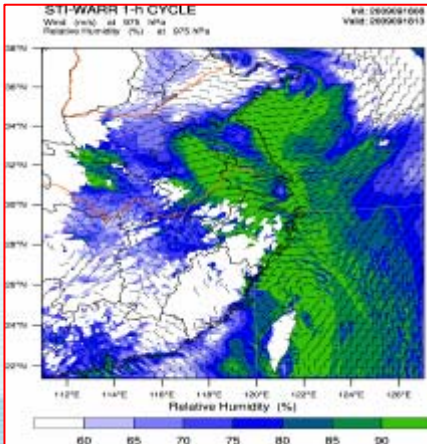
Rainfall forecast



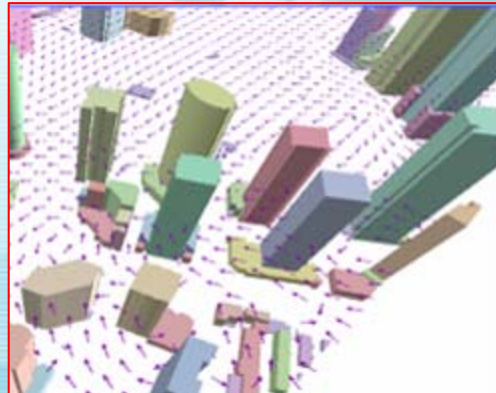
Water depth prediction



Impact assessment



Wind field forecast



Flow prediction



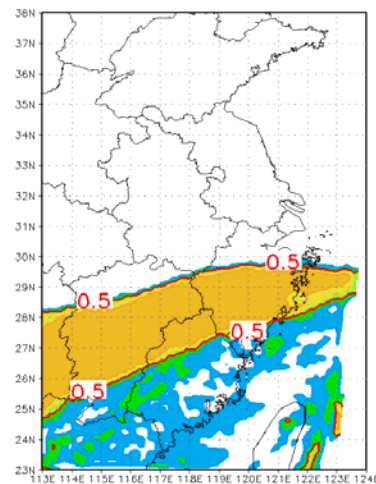
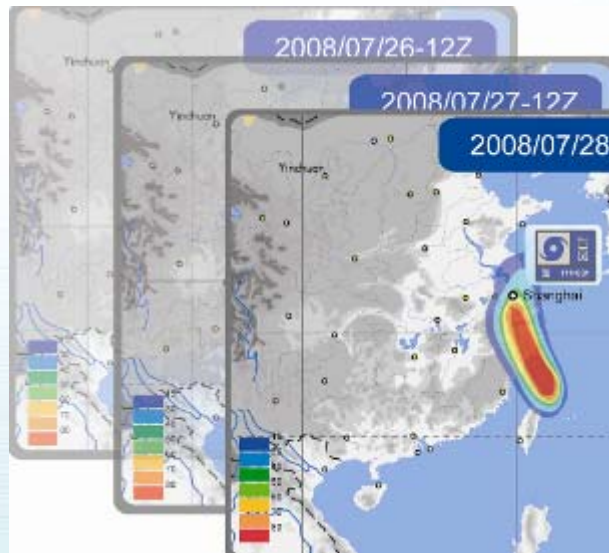
Impact assessment

# Case Study (1): MHEWS

## 2. Effort for narrowing the gap in service

### (1) Technical level: Product of probability (Right time)

In Shanghai MHEWS, probability products such as typhoon track and rainfall probability were wide used, which gave the stakeholders enough time to prepare and opportunity to manage the emergency response arrangement.



# Case Study (1): MHEWS

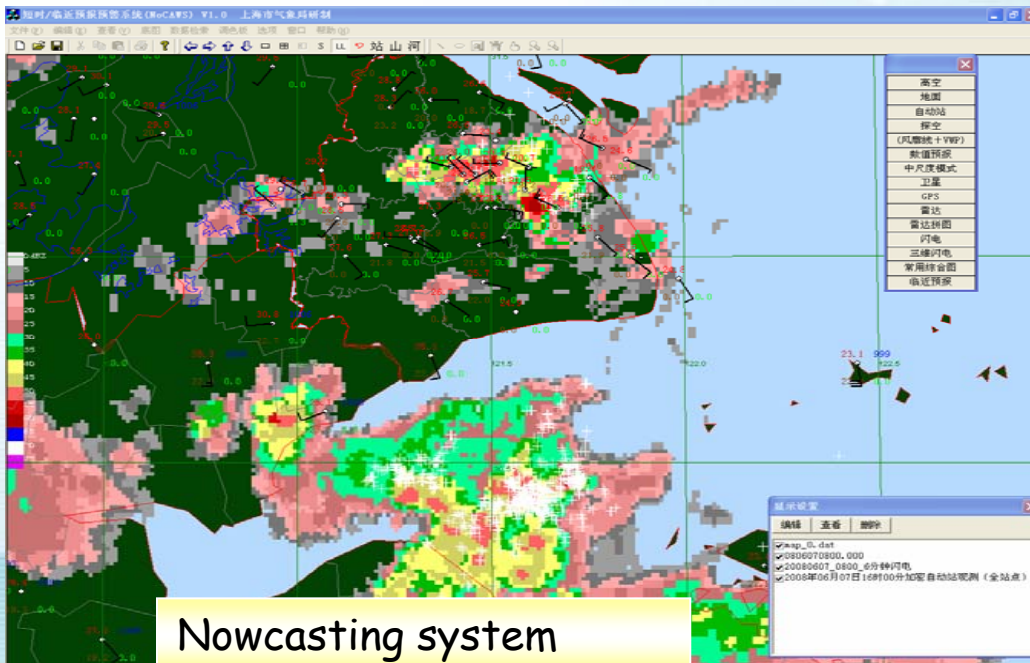
## 2. Effort for narrowing the gap in service

(2) Management level: Establishment of severe convective warning center

Severe convective weather has a high impact on city operation, so accurate, timely and refined forecasts are needed.

### Practice:

- Establishment of severe convective weather warning center.
- Establishment of mechanism for issuing warning to regions at district level.
- Establishment of mechanism for **regional cooperation** on severe convective weather forecast.



Nowcasting system



Warning at district level

Effective **routine** workflow for dealing with **sudden occurrence** of high impact weather was set up.

# Case Study (1): MHEWS

## 2. Effort for narrowing the gap in service

(2) Management level: SOPs in multi-agency cooperation and coordination

Different users have different needs. As a result There is no "one size fits all solution. Several methods are required to meet differing User needs through standard multi-agency cooperation and coordination mechanism.

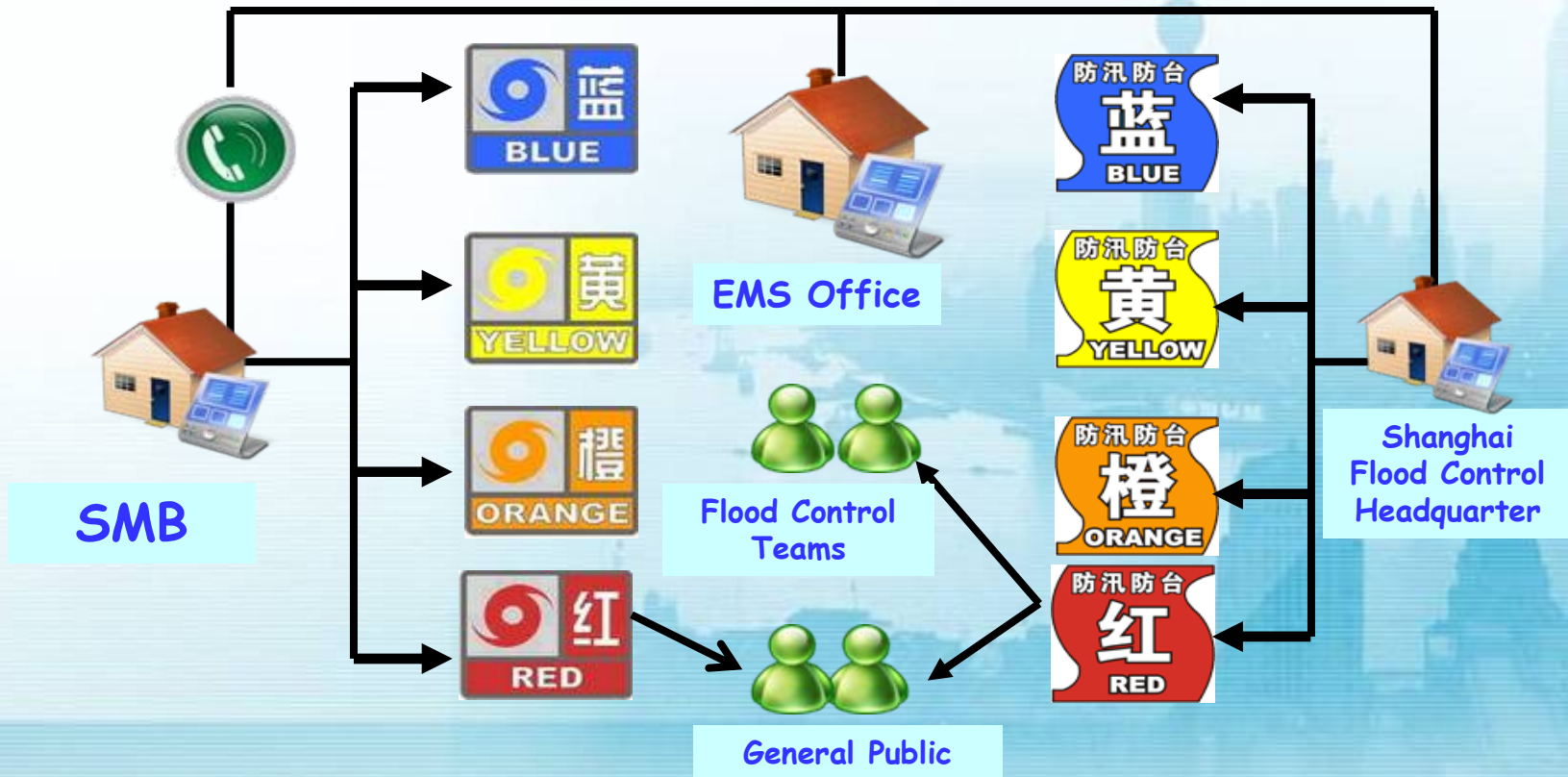
1. Joint response warnings and standard respond actions
2. Joint produce and joint dissemination
3. Joint dissemination
4. Special weather office
5. Regional joint disaster prevention
6. Community safety programme

# Case Study (1): MHEWS

(2) Management level: SOP in multi-agency cooperation and coordination

**Coordination Mechanism (1): Joint Response  
Warnings and Standard Respond Actions**

## SMB and Shanghai Flood Control Headquarter

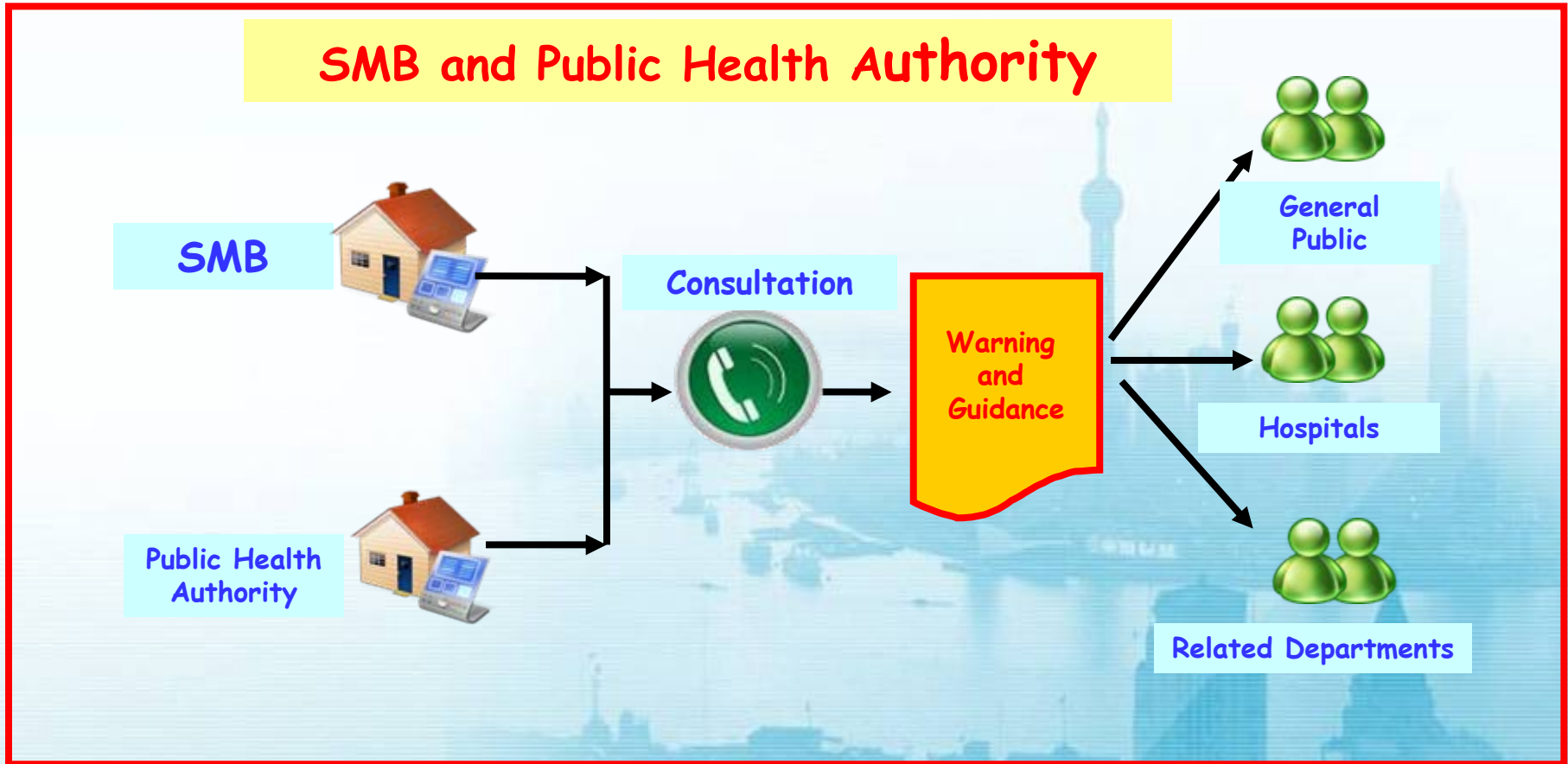




# Case Study (1): MHEWS

(2) Management level: SOP in multi-agency cooperation and coordination

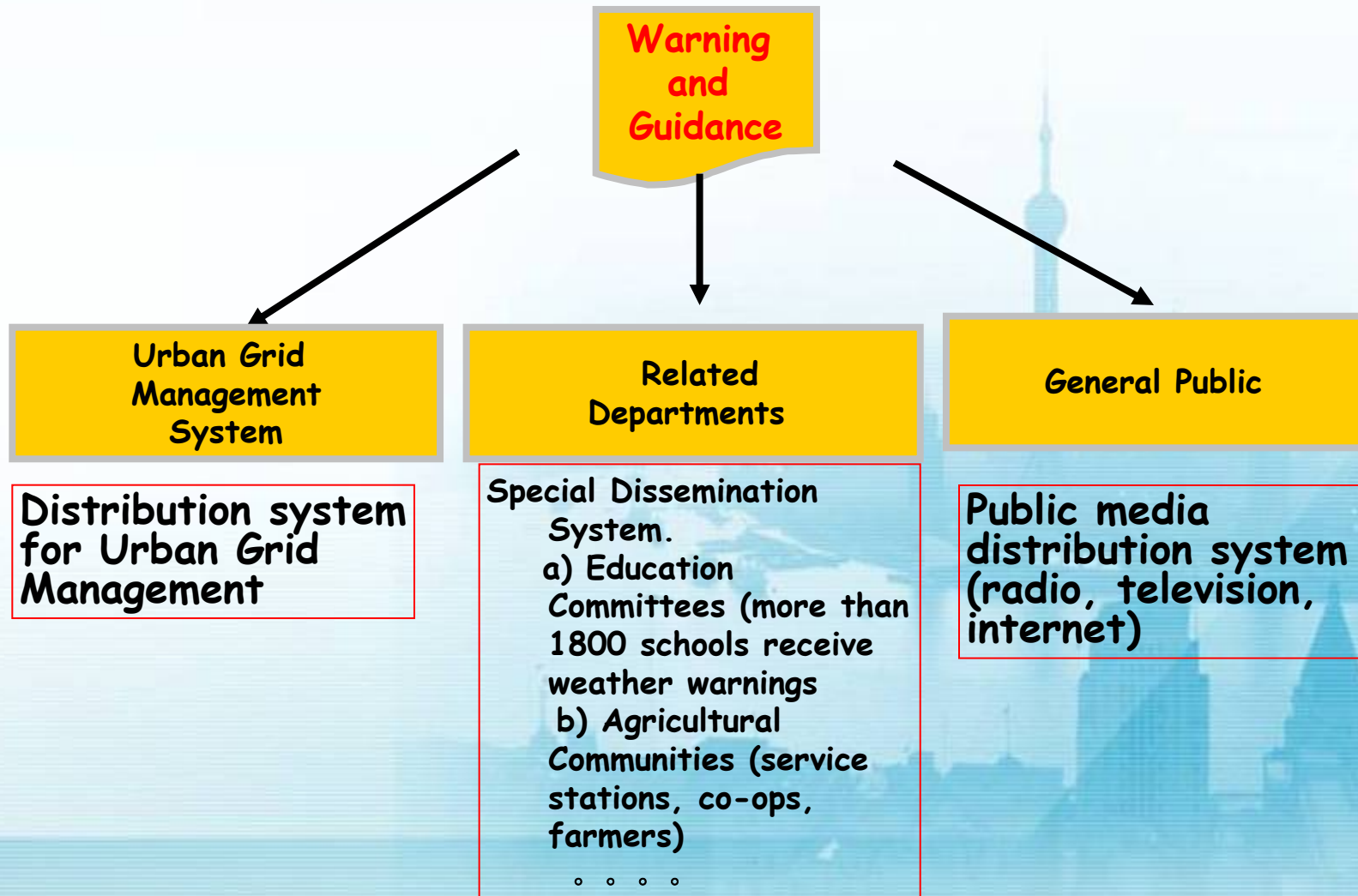
## Coordination Mechanism (2): Joint Production and Joint Dissemination



# Case Study (1): MHEWS

(2) Management level: SOP in multi-agency cooperation and coordination

## Coordination Mechanism (3): Joint Dissemination

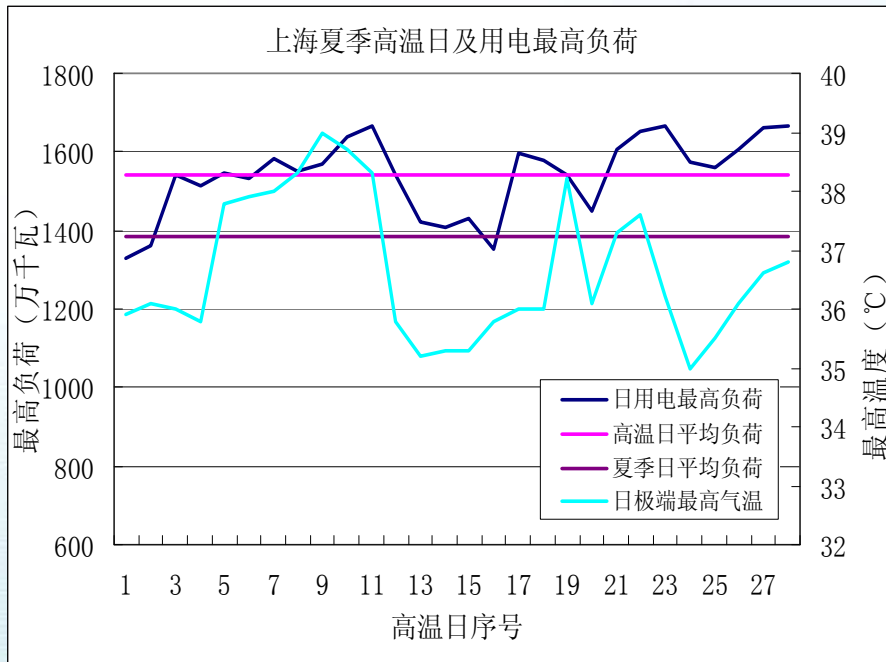


# Case Study (1): MHEWS

(2) Management level: SOPs in multi-agency cooperation and coordination

## Coordination Mechanism (4): Special weather office

A joint production between the weather Service and the Electric company. Both groups pooled data and resources to develop a predictive electricity load and consumption forecasting system.



Electricity weather  
service department

Electricity production and supply of Shanghai  
is weather sensitive

# Case Study (1): MHEWS

(2) Management level: SOP in multi-agency cooperation and coordination

## Coordination Mechanism (5): Regional Joint Disaster Prevention

- Establishment of Regional Weather Information Sharing Platform
- Regional Intensified Emergency Observation
- Joint Observing Instrument
- Forecast consultation and on-the spot support
- Regional warning information sharing
- Sharing of disaster warning through Short message
- Sharing of Video Information



The SMB and Fujian Meteorological Bureau signed an agreement of 'Regional Joint Typhoon outfield observation test site.'

# Case Study (1): MHEWS

(2) Management level: SOP in multi-agency cooperation and coordination

## Coordination Mechanism (6): Community Safety Programme



Based on the grid management strategy, Shanghai will learn from the advanced experience of the world, so as to launch a safe strategy of residential community-**Risk Response Readiness** ("3R"). The Community Safety Programme aims to provide "**End-to-End-to-End**" multi-hazards early warning services for policymakers, the public and special users.

# Case Study (1): MHEWS

## 3. Experience summary

- Expansion from weather forecast to disaster assessment impact prediction is critical to perfecting PWS.
- In order to handle high impact weather of sudden occurrence, a fresh work framework should be established, aiming at timely response to such events.
- Steps for improving NHMS contribution in service delivery should focus on institutional coordination and cooperation.
- To bridge to gap between the providers and users for better PWS, partnership should be enhanced, which can be achieved by establishing standard operating procedures (SOP's) for Multi-agency response.

# Case study (2): PWS in EXPO 2010

## Background

- **Time:** May 1 to Oct 31, 2010 World Expo (high impact period in a year)
- **Theme:** Better City, Better Life
- **Objective:** To attract more than **200** official participants and **70** million visitors

Mascot: Haibao

In order to illustrate the EXPO theme, "Better city, Better Life", more detailed, interactive and people-oriented weather service are required for EXPO organizers, participants and visitors.

EXPO weather service is not only a task, but also an opportunity to demonstrate meteorological science and technology through the platform of World Expo.



# Meteoworld Pavilion



The flowing contour designed pavilion is named "Cloud Droplets"



# Case study(2): PWS in EXPO 2010

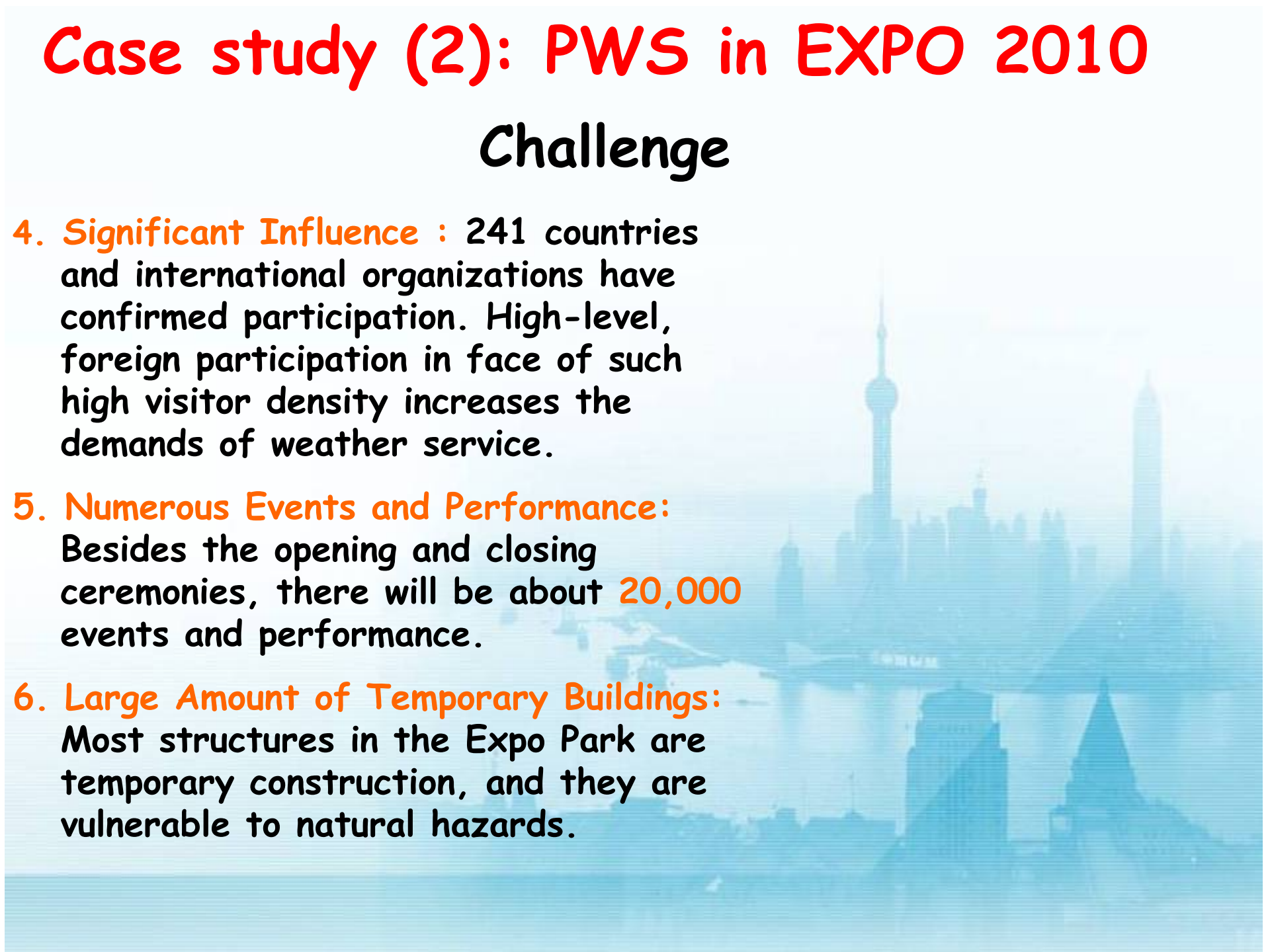
## Challenge

- 1. Long lasting:** May 1<sup>st</sup> to October 31<sup>st</sup> 2010, with 184 days, covering the rainy season and high temp period of Shanghai.
- 2. Special location:** EXPO Park is located at the waterfront area on both sides of the Huangpu River, a large open area which is vulnerable to meteorological hazards.
- 3. High density visitors:** It is expected that at least 70 million visitors, 384,000 visitors a day on average would visit the EXPO Park, as well as other tourist destinations in the Yangtze River Delta. With such high densities it will be a challenge to ensure visitor safety



# Case study (2): PWS in EXPO 2010

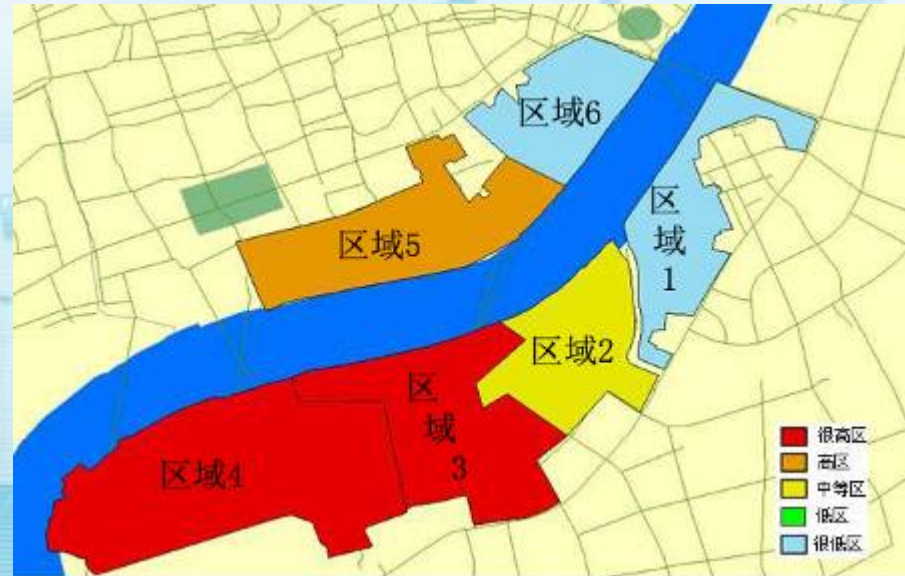
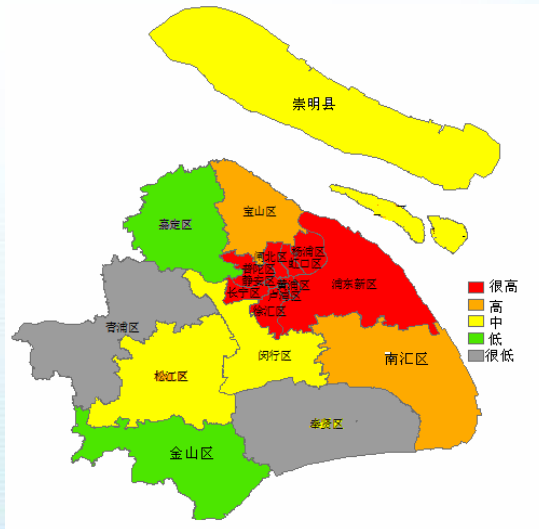
## Challenge

- 4. Significant Influence :** 241 countries and international organizations have confirmed participation. High-level, foreign participation in face of such high visitor density increases the demands of weather service.
  - 5. Numerous Events and Performance:** Besides the opening and closing ceremonies, there will be about **20,000** events and performance.
  - 6. Large Amount of Temporary Buildings:** Most structures in the Expo Park are temporary construction, and they are vulnerable to natural hazards.
- 

# Case study (3): PWS in EXPO 2010

## Partnership Practice in weather risk mapping

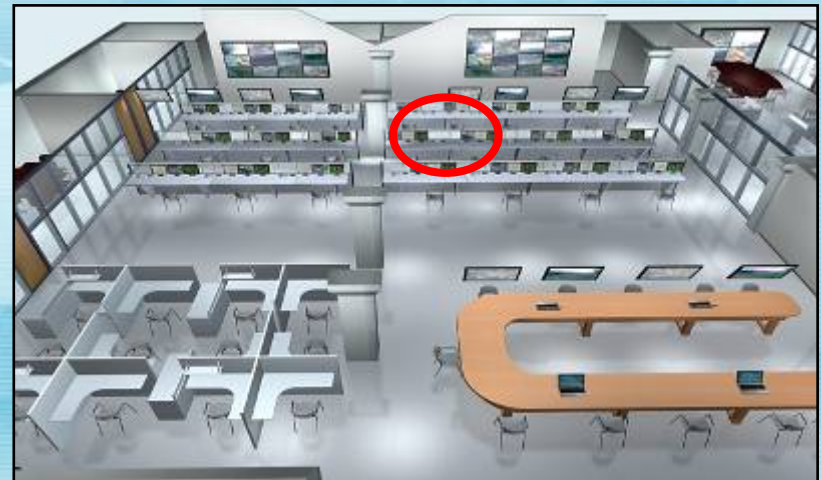
Weather related disasters may have great impact on the successful holding of Expo 2010. So support emergency management of Expo 2010, the weather disaster risks of typhoon, heavy rain, strong wind, high temperature, lightning for Shanghai and the Expo Park were obtained through cooperation with relevant departments such as the Emergency Response Center, Water affairs Bureau, the Public Health Bureau, etc. The outcome will provide reference to the development of special work plan during the Expo 2010.



# Case study (2): PWS in EXPO 2010

## Partnership Practice in Expo Weather Office

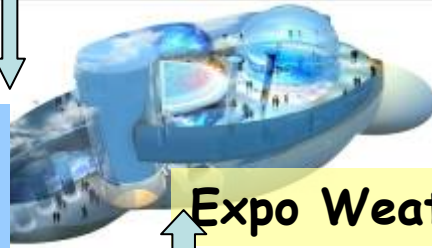
- Expo Weather Office will be established to ensure better services to participants and visitors by enhancing partnerships with Organizers, Participant Service Center and Visitors Service Centers.
- A post will be setup in the Expo 2010 Operation Command Center to give face to face service to the Commander in chief.
- The Weather related information will be disseminated to the participants and visitors through the Public Information Dissemination Platform in Expo park.



Shanghai MHEWS

Shanghai Emergency Response Management Platform

Coordination Mechanism  
(Big Events)



Expo Weather Office



Expo2010 Operation Command Center



Participants Service Center

More than 240 Participants



Organization Department

Through electronic screen and broadcast system in Expo site, cell-phone short message and other measures.

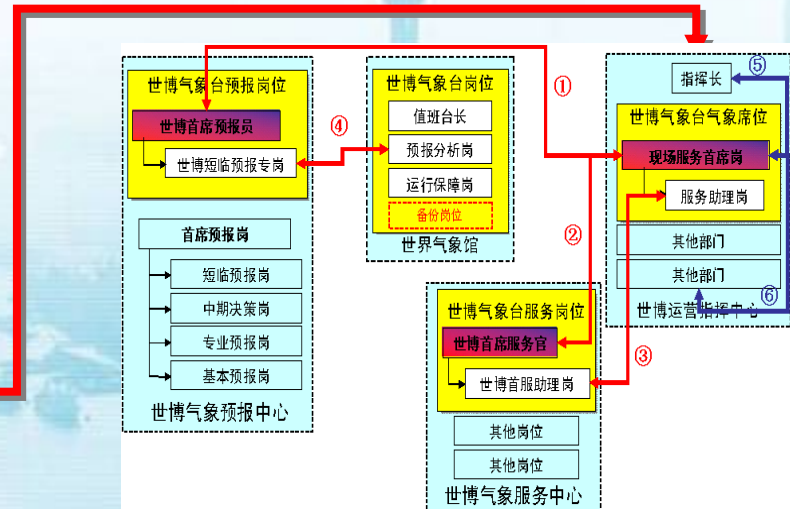
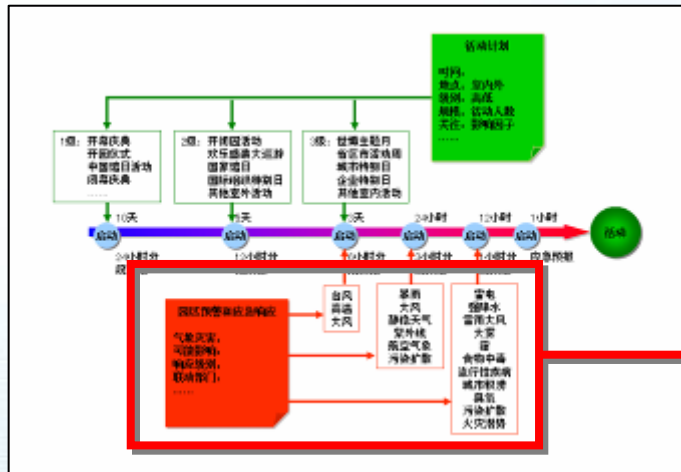


Visitors

# Case study (2): PWS in EXPO 2010

**Partnership Practice** in Weather disaster Warning dissemination, emergency response and multi-agency cooperation and coordination in Expo Park

In case of severe weather disaster potential or high impact weather, the related information will be delivered to the Commander in Chief at the Expo Operation Command Center, providing decision support for warning issuance, implementation of emergency response and **multi-agency cooperation and coordination** in the Expo park.



The development of special work plans focusing on weather disasters prevention and mitigation in the Expo Park are under way, which are categorized by classification of weather disasters, key regions and departments. Those plan will be developed through the cooperation with **Operation Command Center, Security Departments, Event Management Department, and Concierge Department.**

# Conclusion

- There will always be a gap in PWS service delivery.
- The best way to narrow the gap is through the establishment of SOP's to guide multi-agency coordination, which is a valuable approach to maximize the benefit socio-economic benefit of the weather service
- Relentless assessment and data tracking should play important role in benefits assessment, which is key to improving service and narrowing the gap.

**Perfection is constant improvement**

**Thanks for Your Attention**

**Comments and Questions?**

