



**SMART ENVIRONMENT PROTECTION  
PROMOTES DEVELOPMENT OF SMART CITY**



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2017.05.12

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<b>Part 4</b>	<b>Smart Environment Protection Promotes Smart City</b>



Part 1

## The Environment Challenges the City Faced Today

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## The Environment Challenges the City Faced Today

- **Population**
- **Resources**
- **Air quality**
- **Energy**
- **Transportation**

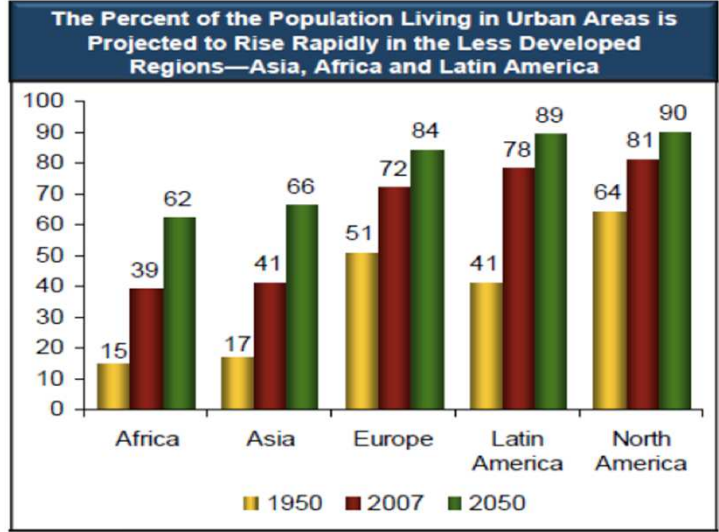


河南安阳市范家庄离炼钢炉只有一墙之隔，村里每天都下“铁雨”，村民就在这样环境中日出而作，日落而息。



- **Waste treatment**
- **Security issue**
- **Global warming**

People lives in cities



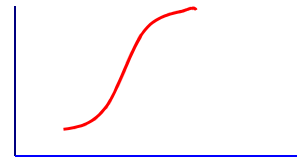
The increase speed of population growth in 21st century is as the growth of bacteria not primate. (Edward O. Wilson)



Population Growth as Bacteria not Primate (year/billion)


World	
1800	1
1900	1.6
2000	6
2050	7.3-10.44

China	
1950	0.45
1970	0.7
2000	1.2
2030	1.6



1 million of world population have been increased every week, more than half of them lived in city till 2010.



 中科宇图  
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### The different scale of the urban environmental problems

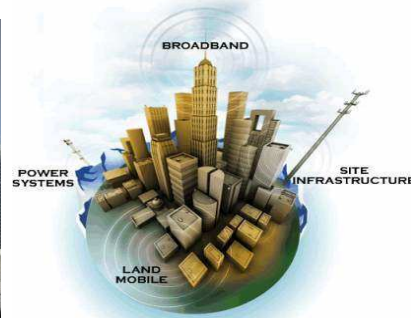
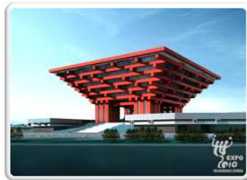
水污染 Water pollution	生境丧失 Loss of habitat, biodiversity and species endangered	地区/国家 Region/Nation	土壤流失及盐碱化 Soil erosion and increased salinity	废物流失及酸雨 Toxic run-off and acid rain
风景区破坏 Amenity loss	交通拥挤 Traffic congestion	城市 City	历史文物古迹丧失 Loss of heritage and historical buildings	建筑及财产值下降 Reduced property and building values
事故及灾害 Accidents and disasters	土地污染 Polluted land	社区 Community	技术使用不合理或不足 Inappropriate and inadequate technology use	税收及财政收入不足 Inadequate tax/financial revenues
洪水和径流 Flooding and surface drainage			对环境问题认识不足 Lack of understanding of environmental problems	法律制度不健全 Lack of, and inappropriate, laws and legislation
有毒废品回收 Toxic and hazardous wastes/dumps	垃圾收集 Trash dumping	家庭 Household 家庭健康, 垃圾产生, 空气/水/噪音污染, 疾病流行 household health, garbage generation, air/water/noise pollution, spread of diseases	自然灾害 Natural disasters	高密度居住 High living densities
	洪水 Flooding	噪音污染 Noise pollution	电力不足或传输不够 Inadequate supply and transmission loss of electricity	
农业土地丧失及沙漠化 Loss of agricultural land and desertification	空气污染 Air pollution	水污染 Water pollution	不科学的城市管理 Misguided urban governments and management practices	
自然和人为的灾害 Natural and man-made hazards and disasters	滥砍滥伐 Land clearance and loss of forest cover	大气和全球变暖效应 Effects of climate change and global warming		



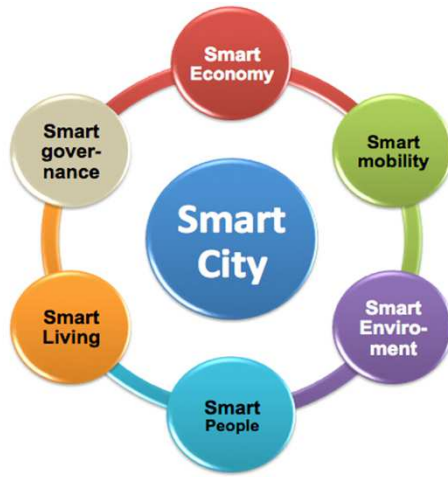
Part 2 **What is a Smart City**

**What is a smart city ?**

**A city can be defined as 'smart' when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory governance.**



### A smart city should be identified by six dimensions



### The smart cities of tomorrow




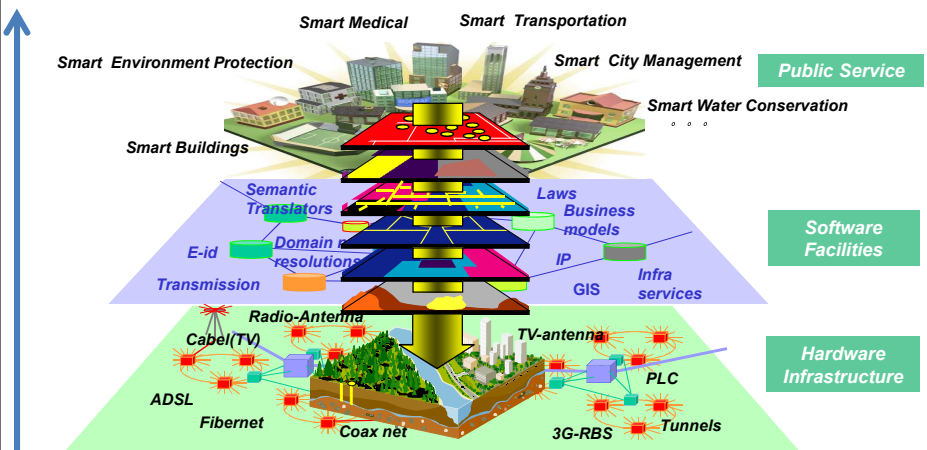
The smart city of tomorrow...

***“Safe, Humane & Sustainable”***




## The Infrastructure of Smart City

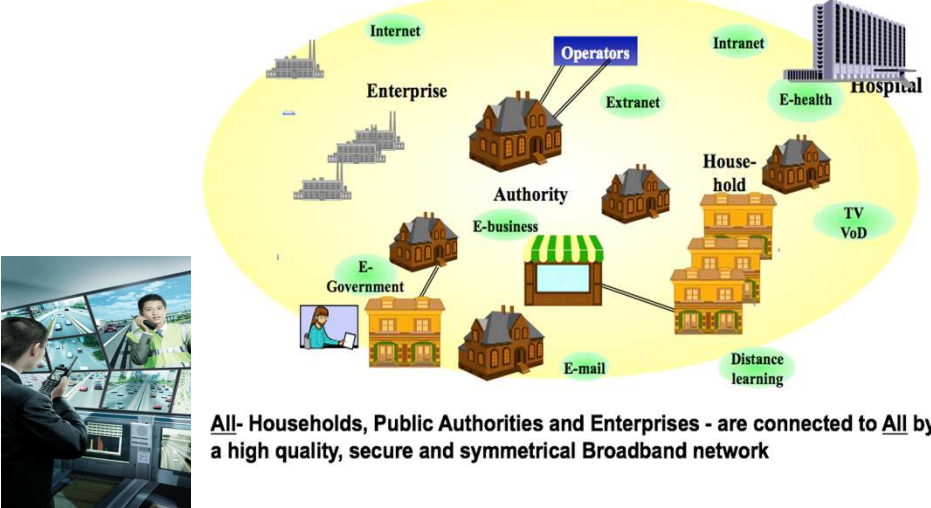




Smart City is an extension of the digital city. It is a comprehensive reflection of smart transportation, smart environment protection, smart water conservation, smart city management etc.,. The construction will be developed by hardware infrastructure, software facilities and public services. **Internet of things technology, cloud computing technology, big data, 3S technology** are the core technology of smart city construction!

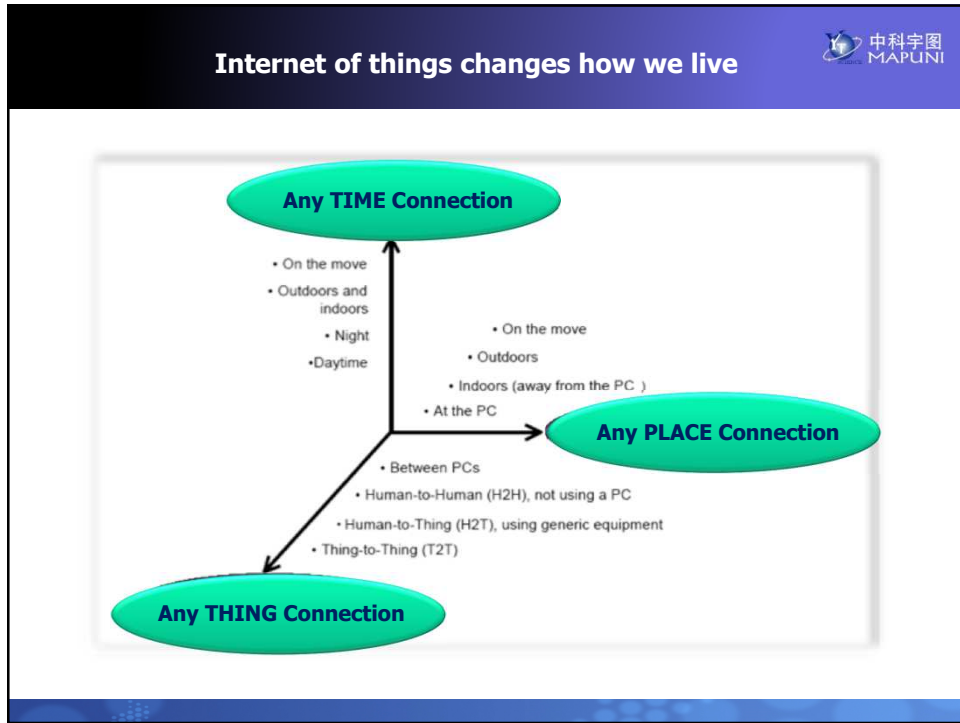
## The Broadband and Big Data Society






**All- Households, Public Authorities and Enterprises - are connected to All by a high quality, secure and symmetrical Broadband network**

宽带无处不在






## Health & Elderly Care



**Example on services**



**Hospital**

- Video conference
- Transmission of data at home visit
- Supervision of analysis equipment

**Care Center**

- Video conference with visiting nurse
- Patient journal over TV
- Sensor measurements


**Relatives**

- Voice controlled picture phone using TV
- Safety alarm

**Home Service**


- Information on TV about planned visits
- Medicine reminder
- Alarm monitoring


## Waste as a source of energy



**Gavle City has brought down the level of deposit garbage to 3%**

**97% is reused or turned in to energy!**





## The Benefits of Smart City




- **Sustainability**
  - Environment (carbon footprint)
  - Reduce waste
- **Economic development**
  - Attractive to people
  - Attractive to Investment
  - Attractive to Businesses
  - Increase per capita GDP
  - Drive economic diversity



Part 3

## Smart Cities in China



 中科宇图  
MAPUNI

## Shanghai, to be the ICON

During “12.5”,  
the framework of  
“smart city” will  
be formed in  
Shanghai, which  
explicit four  
main points of  
focus:


Energy level elevating on information infrastructure.

Shanghai will put forth effort on “MONET” to expand network bandwidth and access capability for expanding whole city coverage, developing 3G, WIFI and others, motivating RD and application on cloud computing, internet of things and accelerating the progress on tri-networks integration.

Widely application on information technology

The innovation and industrialization of information technology

The development environment on industrialization

 中科宇图  
MAPUNI

## Wuxi—Deeply build up internet of things

01

widely application on internet of things in Wuxi is a practice for intelligent city development, in the future 5-10 years, Wuxi will promote regional centralized international city, pave a path for new model city.

02

Specially pay attention to the trends and development of world intelligent city based on the evolutionary break on the technology of city development.

03

Fully utilized the opportunities on building new demonstration plot for Sensing china center, promoting the advantages on RD application of internet of things, entering the first batch of perception city in the nation and world wide.

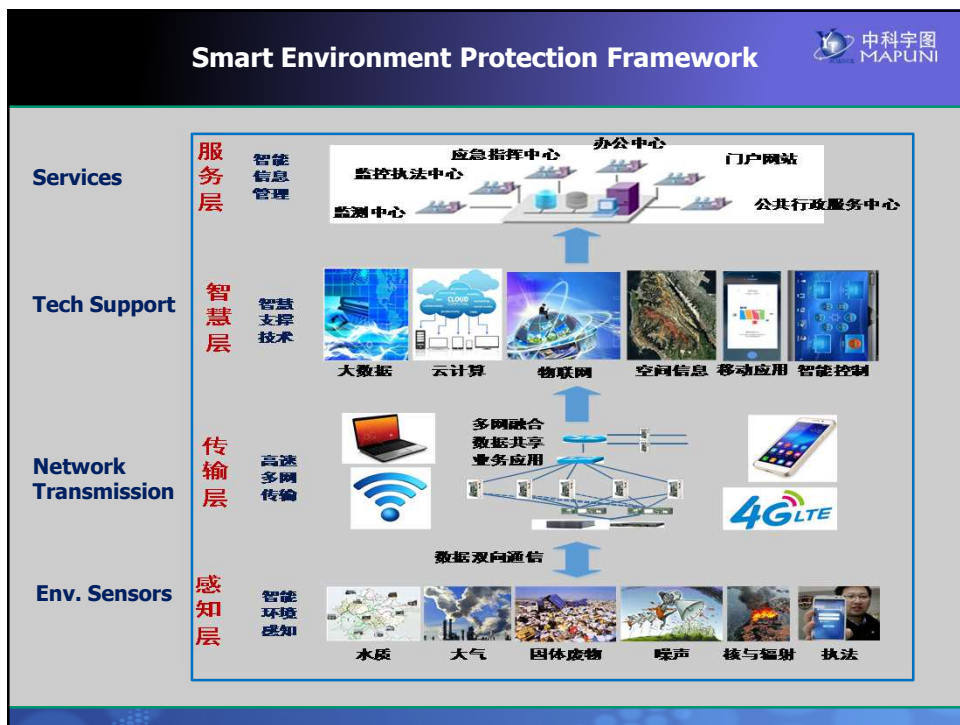
 中科宇图  
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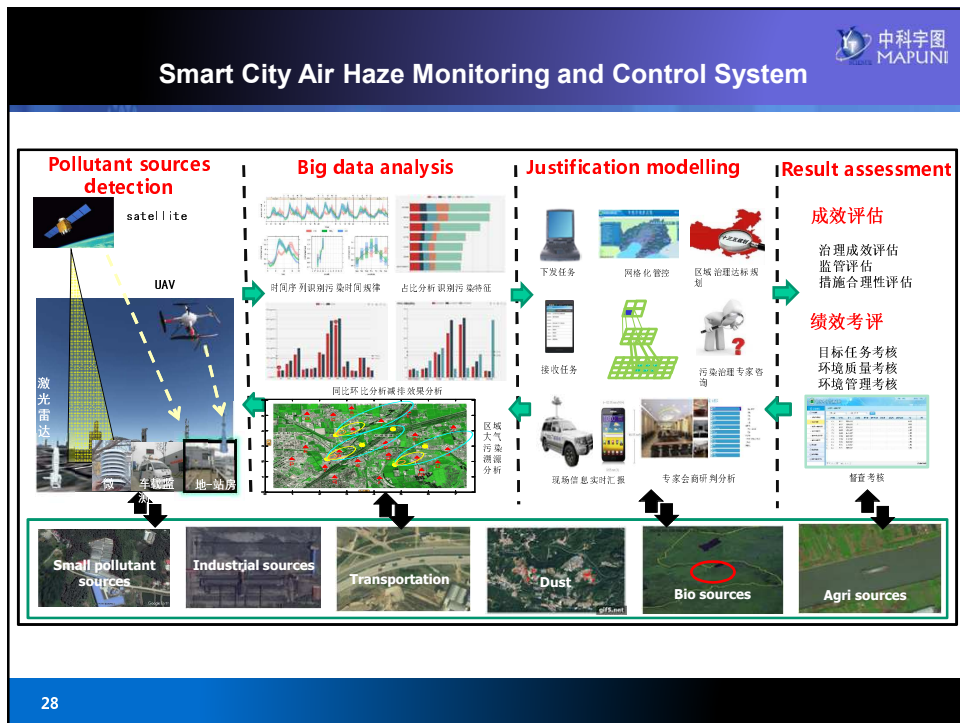
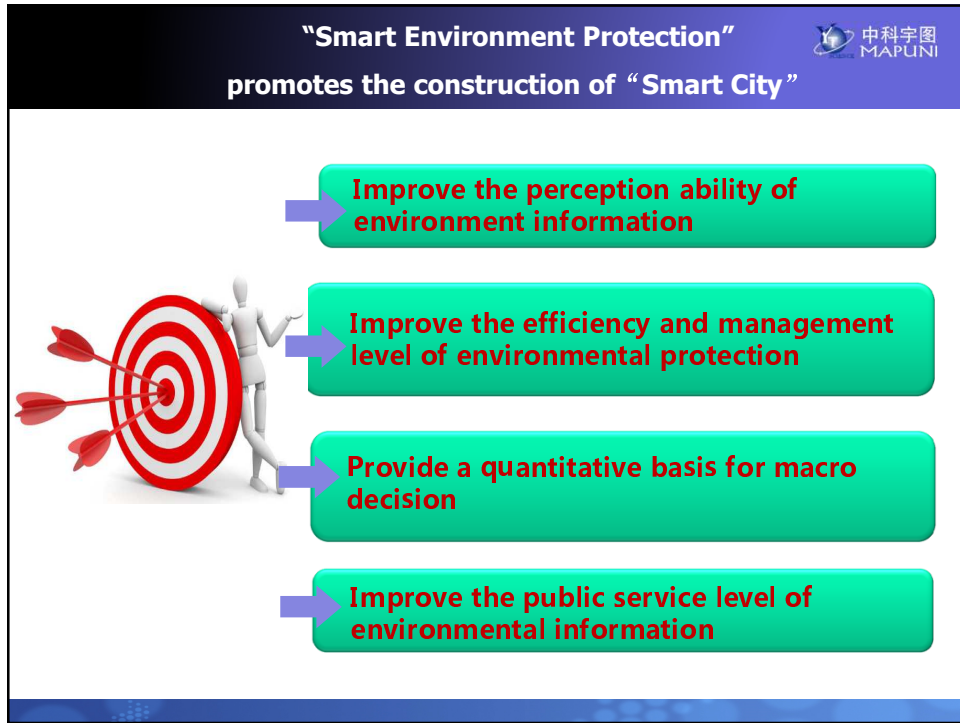


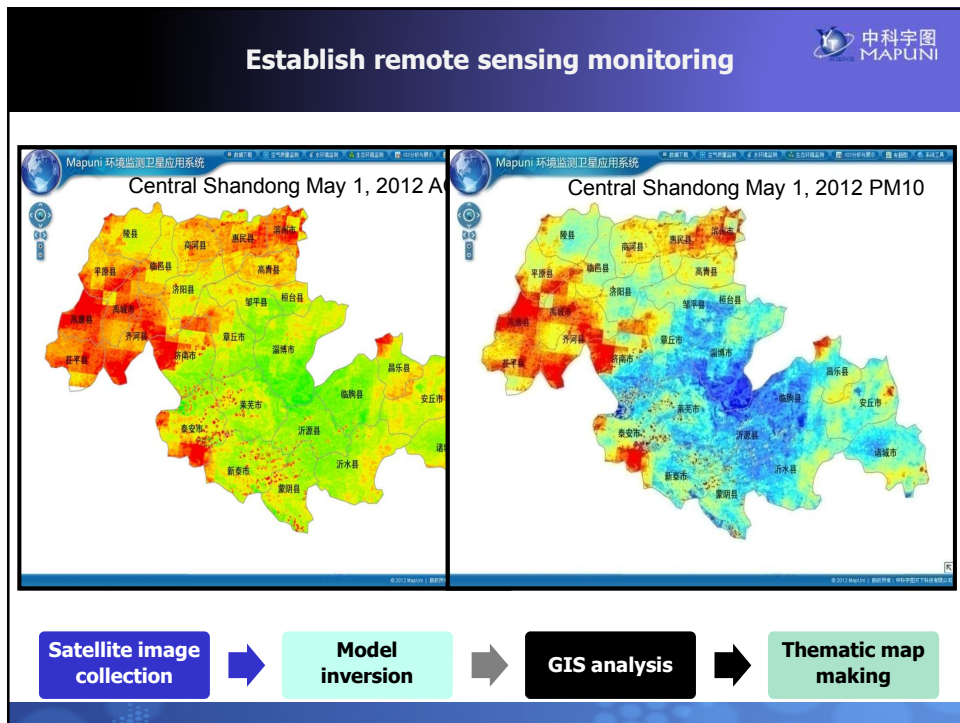
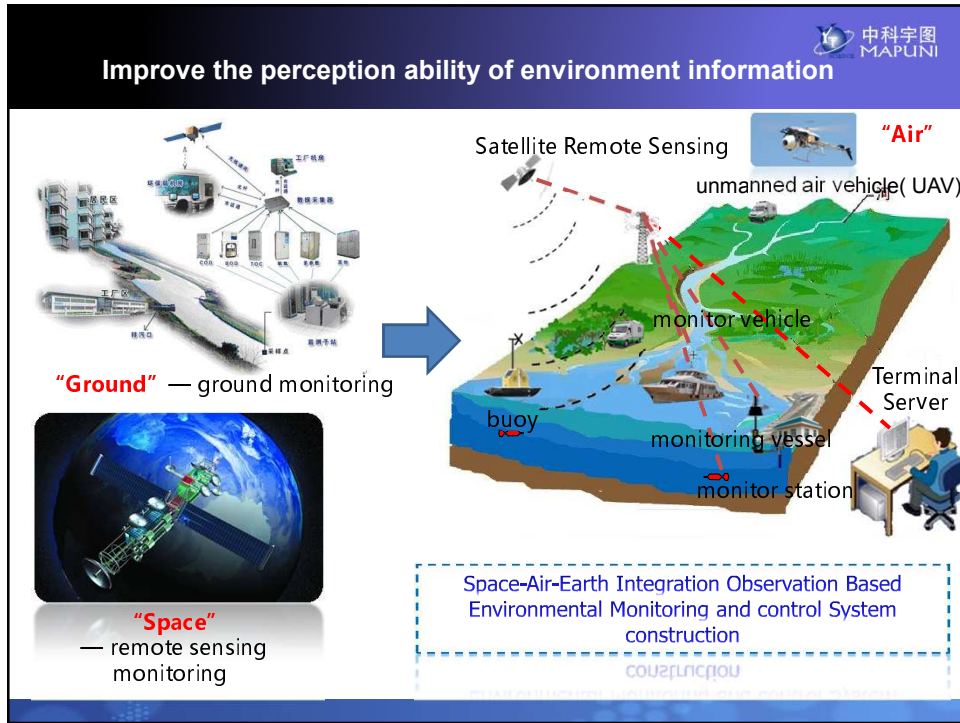
Part 4

## Smart Environment Protection Promotes the Smart Cities


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### Air quality monitoring system



• Aerosol, PM<sub>2.5</sub>/PM<sub>10</sub>、NO<sub>2</sub>/SO<sub>2</sub>/O<sub>3</sub>、CO/CH<sub>4</sub>/CO<sub>2</sub>、Biomass burning, dust

**Aqua**



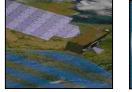
**MODIS**

**Terra**



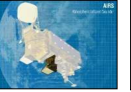
**MISR**

**Aura**




**OMI**

**Aqua**




**AIRS**

**CALIPSO**

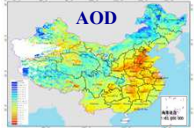
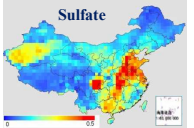
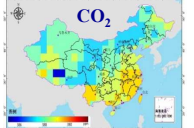
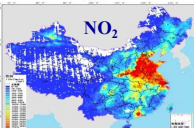
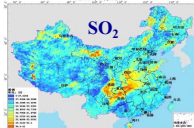
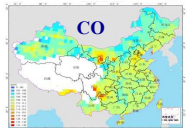



**CALIPSO**

**FY-3A/B**



**MERIS**

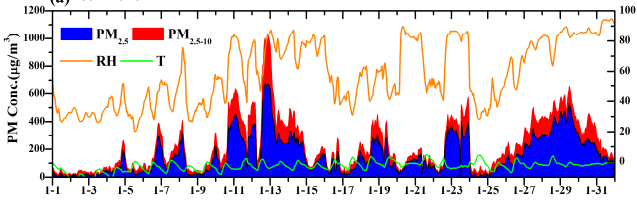









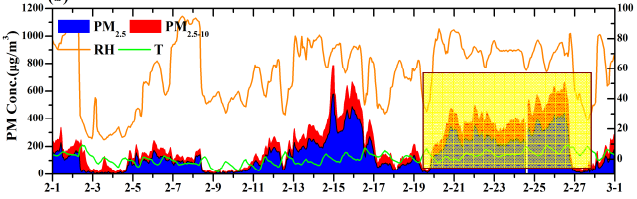
### The variation of hourly averaged PM<sub>2.5</sub> in Beijing

In Jan.2013 and Feb. 2014,the monthly averaged PM<sub>2.5</sub> are 173 ± 139 and 153 ± 124 μg·m<sup>-3</sup> respectively, it decreased 11% in Feb. 2014 compare with that in Jan.2013.

**(a) Jan.2013**



**(b) Feb.2014**



Date(mm-dd)

—From Wang Yuesi, IAP/CAS



### Improve the ground monitoring system

**Exhaust gas online monitoring**

**Radiation source monitoring**

**Environmental emergency monitoring system**

**Drinking water dynamic supervision system**

### Improve the efficiency and management level of environmental protection


**Environmental Data Center Analysis System**

**Environmental Monitoring Data Center System**

**Spatial Data Sharing Service Platform**

**2D and 3D Environmental GIS**

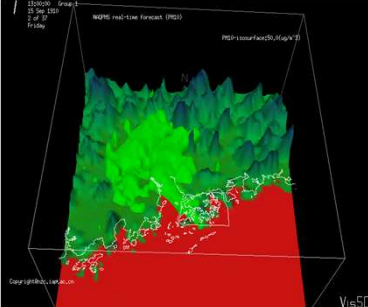


 中科宇图  
MAPUN

## Provide a quantitative basis for macro decision

Multi-model air quality forecasting system

---Realize the forecasting and warning of conditions of regional air pollution , achieving daily business running of regional air quality monitoring and forecasting at he same time.



数据采集与处理子系统

NCEP/AVN  
全球初始场

MMS模式

MCIP

SMOKE  
模型

排放清单数据库

Interp/tograd

MMS to STEM

NAQPMS模式

STEM模式

CMAQ模式


多空气污染  
模式集成

空气质量  
集合预报


分析显示  
平台

Guangzhou Asian Games project


We predict the air factor(eg PM10) by NAQPMS-MODE, CMAQ-MODE and CAMx-MODE and we get predictive value(egPM10) by integrating the three models.

 中科宇图  
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## Beijing Changping—Grid based Air Quality Monitoring System



环境大数据中心




**Data center**



**Sensors distribution**


**Real time monitoring**



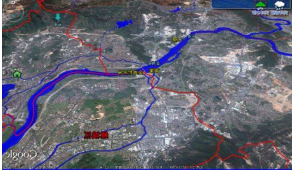
**Grid system**

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## Water Environment integrated decision support



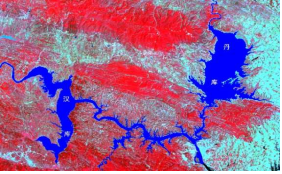
Use water model to provide comprehensive analysis for regional water quality monitoring, the eutrophication, water quality comprehensive toxicity warning, agricultural water source pollution, etc.



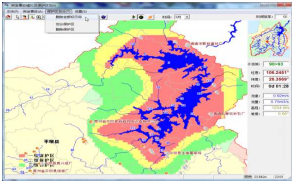
Jinjiang Quanzhou digital watershed  
(distributed hydrological model )



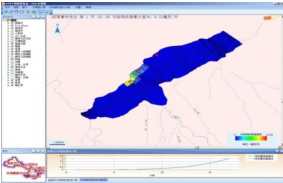
South-to-North water diversion middle route project



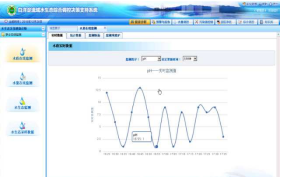
Water quality monitoring and warning key technology research and demonstration



Hongfeng Lake Basin, Guiyang -Water Program Classification and protection of drinking water sources




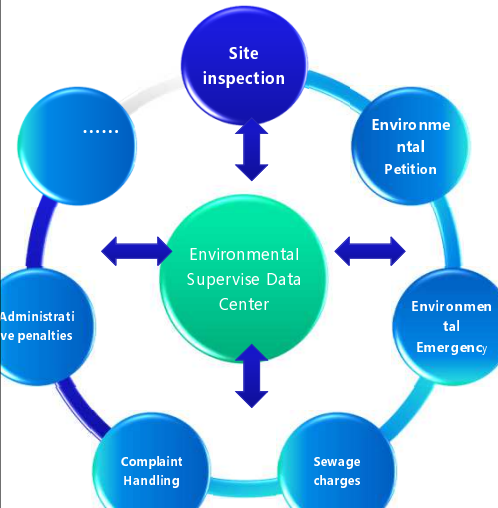
Water pollution of Danjiangkou Reservoir



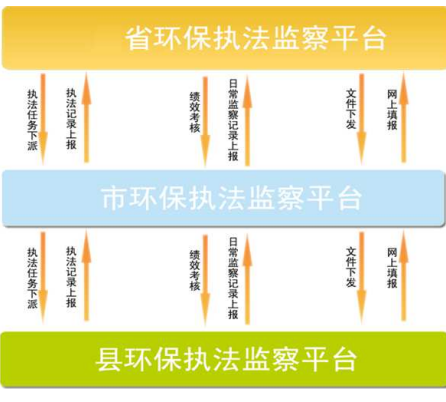
Baiyangdian Lake-water program

## Environmental Law Enforcement System




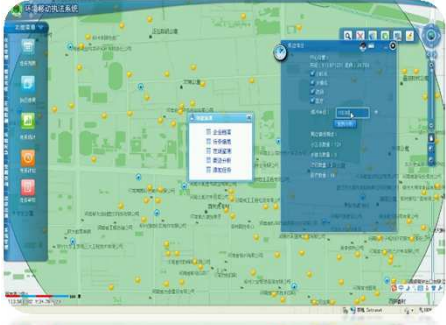


Design concept — "integration" design




Design concept — three level network

 中科宇图  
**Environmental Law Enforcement System**




**“ONE MAP” DESIGN CONCEPT**


**Environment Supervise Data Center**




Environmental supervise website



Backstage desktop application system



Mobile application system



Enforcement Box

**MOBILE ENFORCEMENT PRODUCTS CONSTITUTE OF ENVIRONMENTAL SUPERVISE**

 中科宇图  
**Improve the public service level of environmental information**

**WEIBAO-APP—A Public Mobil Product for Environmental Information Services**

**Functions:**

- Air quality and Green Commuting
- AOI、PM2.5、PM10
  - Interaction of Green Tips
  - Advice and Share of Commuting
  - City Rankings
- Historical trends
- Features :
  - Base on multi-model to forecast Air quality in the next 5 days :
  - Push Weather warning information
  - Refined air quality data Based on the location:
  - Air Quality Review (Interactive) :
  - Noise data.



## Conclusions



- ◆ To truly move towards a new era of smart city, the construction of the smart environmental protection system must be strengthened;
- ◆ The smart environmental protection system is built based on comprehensive use of a new generation of intelligent data perception, transmission and application services technology, such as Internet of things, cloud computing, big data, environmental modelling and GIS;
- ◆ The smart environmental protection will build up the new service model with rapid, accurate, real production, transmission of the corresponding environmental protection data or solutions.
- ◆ Building smart environmental protection system is an important part of the smart city construction with a great significance.



# Thank You

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